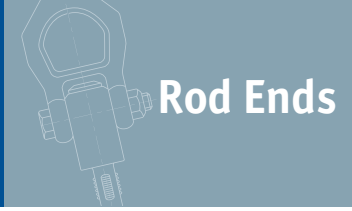


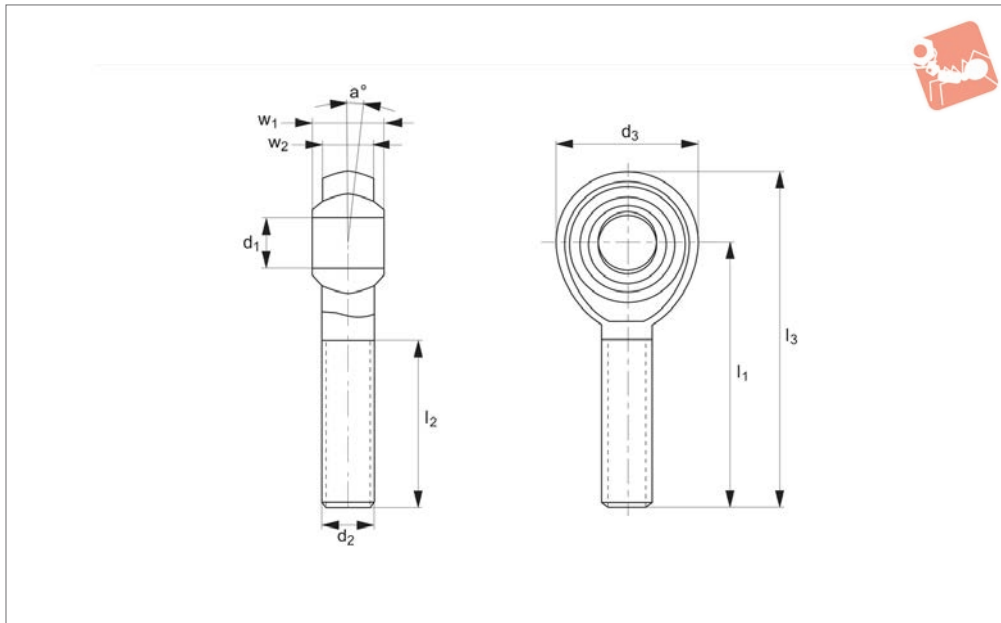


Low Cost Rod End - Male

with teflon bearing race



Rod Ends



65704

ROD ENDS

Material

Ball: low carbon steel, surface hardened.
 Silver zinc plated.
 Housing: low carbon steel, zinc plated for

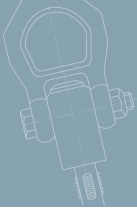
corrosion resistance.

Bearing race: teflon.
 Brass bearing with PTFE composite lining.

Technical Notes

Standard thread is right hand thread.

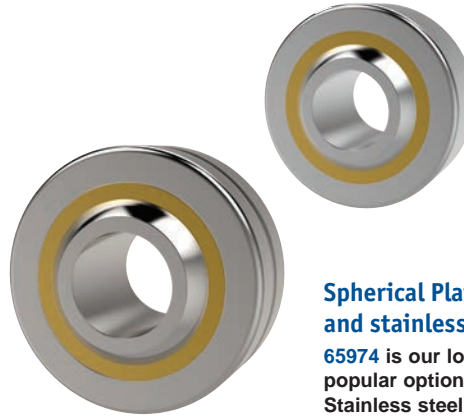
Order No.	Thread hand	d ₁ tol. H7	l ₁	d ₂	d ₃	l ₂	a°	l ₃	w ₁	w ₂	Static load C ₀ kN max.
65704.W0005	Right	5	33	M5	18	19	13	42	8	6.00	4.8
65704.W0006	Right	6	36	M6	20	21	13	46	9	6.75	6.2
65704.W0008	Right	8	42	M8	24	25	14	54	12	9.00	10.3
65704.W0010	Right	10	48	M10	28	28	13	62	14	10.50	14.4
65704.W0012	Right	12	54	M12	32	32	13	70	16	12.00	19.2
65704.W0016	Right	16	66	M16	42	37	15	87	21	15.00	31.2
65704.W0505	Left	5	33	M5	18	19	13	42	8	6.00	3.9
65704.W0506	Left	6	36	M6	20	21	13	46	9	6.75	6.0
65704.W0508	Left	8	42	M8	24	25	14	54	12	9.00	10.0
65704.W0510	Left	10	48	M10	28	28	13	62	14	10.50	16.0
65704.W0512	Left	12	54	M12	32	32	13	70	16	12.00	23.0
65704.W0516	Left	16	66	M16	42	37	15	87	21	15.00	44.0



Parts overview



Heavy Duty Rod Ends: integral spherical plain bearings - series K and series E
Male and female rod ends, maintenance free. These are our most popular range of heavy duty rod ends. Bore diameters 5mm up to 30mm.



Spherical Plain Bearings: steel and stainless steel
65974 is our lowest cost, most popular option spherical bearing. Stainless steel version 65976 requires maintenance. 65974 is maintenance free. Bore diameters 5mm up to 30mm.



Heavy Duty Rod Ends: integral ball bearings - series K and series E
Male and female rod ends. Different bore sizes in relation to the thread size. All require maintenance. Bore diameters 6mm up to 30mm.

Stainless Steel Heavy Duty Rod Ends: integral spherical plain bearings
Male and female rod ends maintenance free.



Low Cost Rod Ends: with spherical plain bearing
These are our most popular male and female rod ends. Maintenance free. Female-bore diameters 5mm up to 12mm. Male-bore diameters 5mm up to 16mm.



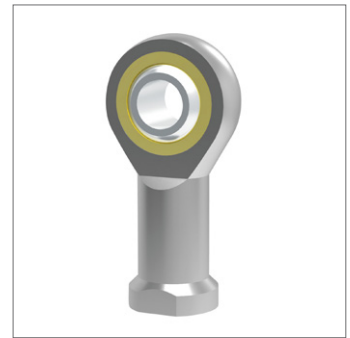
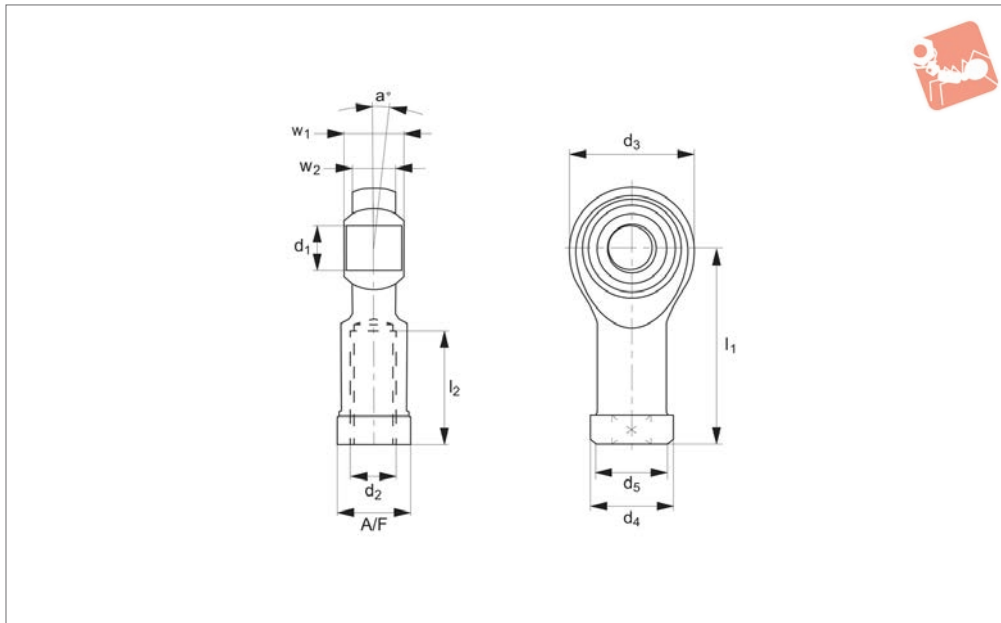
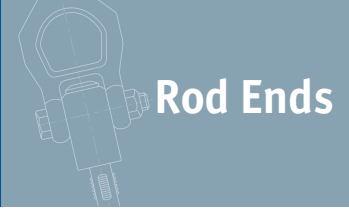
Rod Ends with Studs
Steel and Stainless steel, male and female, maintenance free. Sizes M6 up to M16.

see our website for our full range:
wixroyd.com



Low Cost Rod End - Female

with teflon bearing race



65724

ROD ENDS

Material

Ball: low carbon steel, surface hardened.
Silver zinc plated.
Housing: low carbon steel, zinc plated for corrosion resistance.

Bearing race: teflon.

Brass bearing with PTFE composite lining.

Technical Notes

Standard thread is right hand thread.

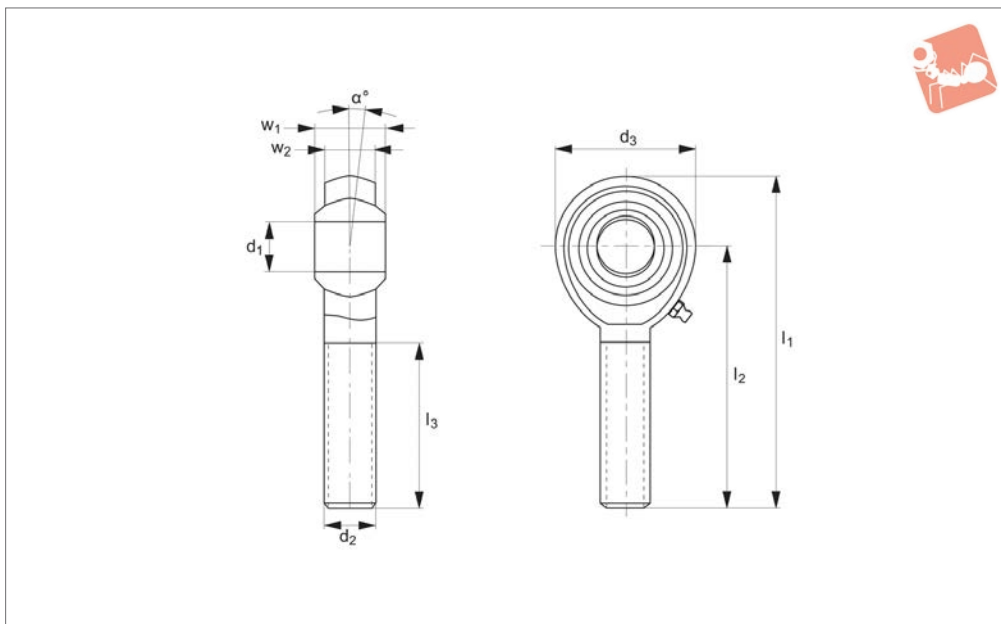
Important Notes

Housing styles are subject to change.

Order No.	Thread hand	d ₁ tol. H7	l ₁	d ₂	d ₃	d ₄	d ₅	l ₂	w ₁	w ₂	A/F	a	Static load C ₀ kN max.
65724.W0005	Right	5	27	M5	18	11	9	10	8	6	9	13	4.8
65724.W0006	Right	6	30	M6	20	13	10	12	9	6.75	11	13	6.2
65724.W0008	Right	8	36	M8	24	16	12.5	16	12	9	13	14	10.3
65724.W0010	Right	10	43	M10	28	19	15	20	14	10.5	17	13	14.4
65724.W0012	Right	12	50	M12	34	22	17.5	22	16	12	19	13	19.2
65724.W0016	Right	16	64	M16	42	27	22	28	21	15	22	15	31.2
65724.W0505	Left	5	27	M5	18	11	9	10	8	6	9	13	4.8
65724.W0506	Left	6	30	M6	20	13	10	12	9	6.75	11	13	6.2
65724.W0508	Left	8	36	M8	24	16	12.5	16	12	9	13	14	10.3
65724.W0510	Left	10	43	M10	28	19	15	20	14	10.5	17	13	14.4
65724.W0512	Left	12	50	M12	34	22	17.5	22	16	12	19	13	19.2
65724.W0516	Left	16	64	M16	42	27	22	28	21	15	22	15	31.2



65706



Material

Housing: stainless steel (AISI 303)

Ball: stainless steel, hardened, ground and polished.

Race: teflon or PTFE liner.

Stainless steel bearing ring lined with bronze and PTFE Composite

Technical Notes

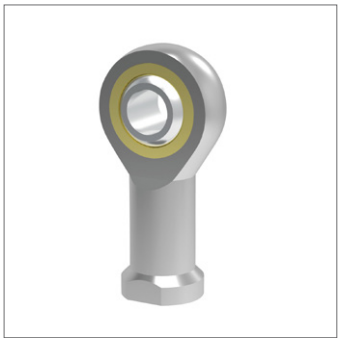
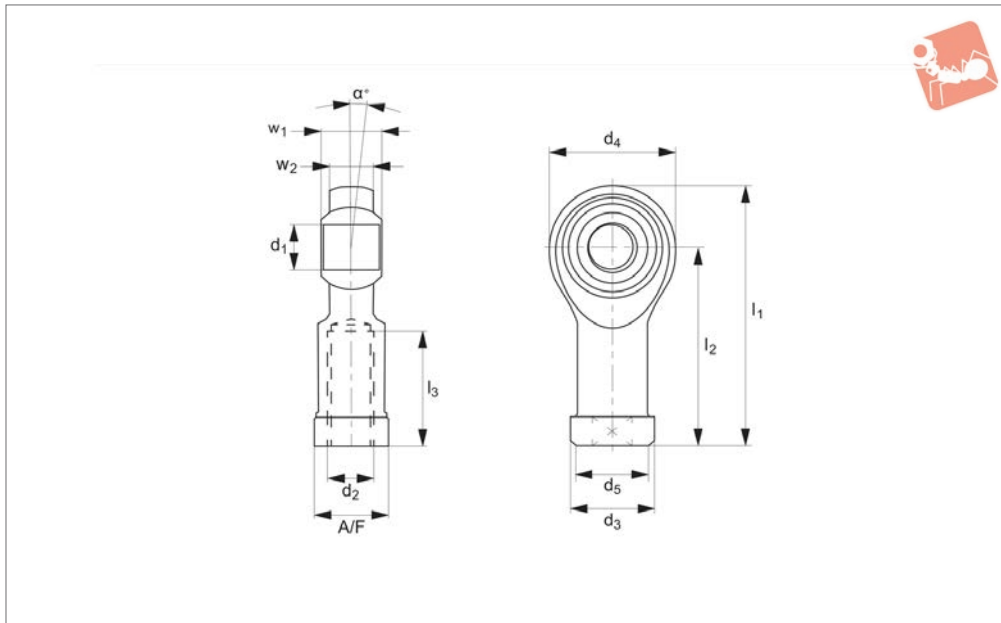
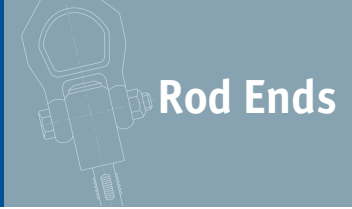
Standard thread is right hand thread.

Order No.	Thread hand	d ₁ tol. H7	l ₁	d ₂	d ₃	l ₂	α	l ₃	w ₁	w ₂	Static load kN max.	Weight g
65706.W0005	Right	5	42	M5	18	33	13	19	8	6	4.8	13
65706.W0006	Right	6	46	M6	20	36	13	21	9	6.75	6.2	20
65706.W0008	Right	8	54	M8	24	42	14	25	12	9	10.3	38
65706.W0010	Right	10	62	M10	28	48	13	28	14	10.50	14.4	55
65706.W0012	Right	12	70	M12	32	54	13	32	16	12	19.2	85
65706.W0505	Left	5	42	M5	18	33	13	19	8	6	4.8	13
65706.W0506	Left	6	46	M6	20	36	13	21	9	6.75	5.2	20
65706.W0508	Left	8	54	M8	24	42	14	25	12	9	7.0	38
65706.W0510	Left	10	62	M10	28	48	13	28	14	10.50	10.4	55
65706.W0512	Left	12	70	M12	32	54	13	32	16	12	13.0	85



Stainless Low Cost Rod Ends

Female



65726

ROD ENDS

Material

Housing: stainless steel (AISI 303)

Ball: Stainless steel, hardened ground and

polished stainless steel bearing rings

series K, maintenance free.

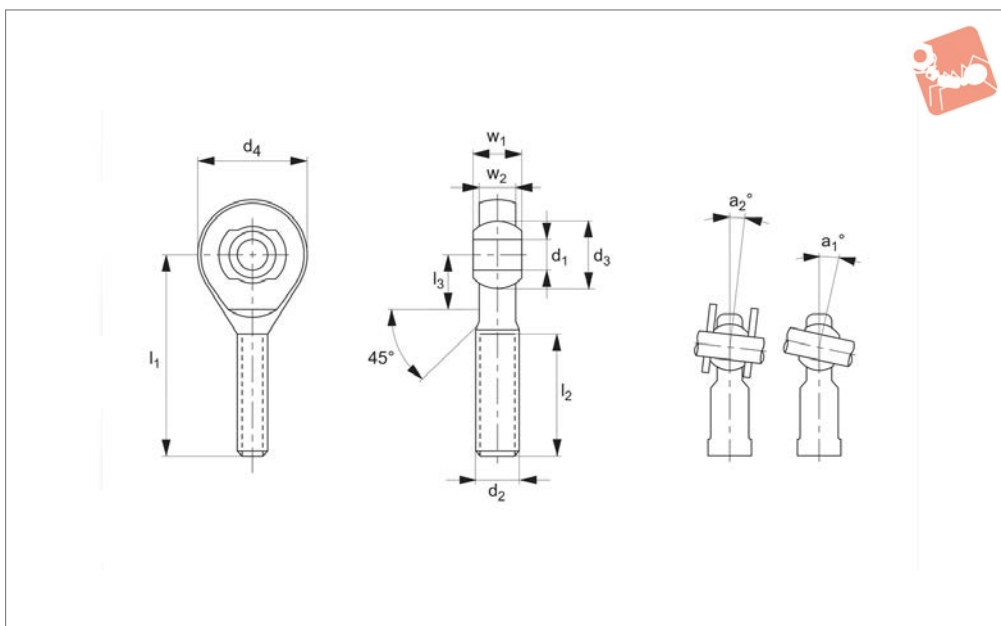
Technical Notes

Standard thread is right hand thread,

Order No.	Thread hand	d ₁ tol. H7	l ₁	d ₂	d ₃	d ₄	d ₅	l ₂	l ₃	w ₁	w ₂	A/F	α°	Static load C ₀ kN max.	Weight g
65726.W0005	Right	5	36	M 5	18	11	8.5	27	10	8	6.00	9	13	4.8	16
65726.W0006	Right	6	40	M 6	20	13	10	30	12	9	6.75	11	13	6.2	22
65726.W0008	Right	8	48	M 8	16	24	12.5	36	16	12	9.00	14	14	10.3	47
65726.W0010	Right	10	57	M10	28	19	15	43	20	14	10.50	17	13	14.4	77
65726.W0012	Right	12	66	M12	32	22	17.5	50	22	16	12.00	19	13	19.2	100
65726.W0016	Right	16	85	M16	42	27	22	64	28	21	15.00	22	15	31.2	220
65726.W0505	Left	5	36	M 5	18	11	8.5	27	10	8	6.00	9	13	4.8	16
65726.W0506	Left	6	40	M 6	20	13	10	30	12	9	6.75	11	13	6.2	22
65726.W0508	Left	8	48	M 8	16	24	12.5	36	16	12	9.00	14	14	10.3	47
65726.W0510	Left	10	57	M10	28	19	15	43	20	14	10.50	17	13	14.4	77
65726.W0512	Left	12	66	M12	32	22	17.5	50	22	16	12.00	19	13	19.2	100
65726.W0516	Left	16	85	M16	42	27	22	64	28	21	15.00	22	15	31.2	220



65700



Material

Housing - forged steel, tempered, rolled thread, surface galvanized.

Joint ball - ball bearing steel, hardened and ground.

Race - nylon/teflon/glass compound.

Technical Notes

Maintenance free, sizes according to DIN ISO 12240-4, series K, for tolerances see technical pages.

Tips

Standard thread is right hand thread.

Important Notes

* Denotes fine pitch thread.

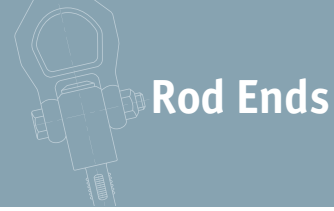
Order No.	Thread hand	d ₁	l ₁	d ₂	d ₃	l ₂	d ₄	a ₁	Weight g
65700.W0005	Right	5	33	M5	11.11	20	18	13.0	14
65700.W0006	Right	6	36	M6	12.70	22	20	13.0	20
65700.W0008	Right	8	42	M8	15.87	25	24	14.5	38
65700.W0010	Right	10	48	M10	19.05	29	28	13.5	60
65700.W0012	Right	12	54	M12	22.22	33	32	13.0	92
65700.W0014	Right	14	60	M14	25.40	36	36	16.0	127
65700.W0016	Right	16	66	M16	28.57	40	42	15.5	202
65700.W0018	Right	18	72	M18x1,5*	31.75	44	46	15.0	250
65700.W0020	Right	20	78	M20x1,5*	34.92	47	50	14.5	327
65700.W0022	Right	22	84	M22x1,5*	38.10	51	54	15.5	440
65700.W0025	Right	25	94	M24x2*	42.85	57	60	15.0	630
65700.W0030	Right	30	110	M30x2*	50.75	66	70	17.0	1015
65700.W0505	Left	5	33	M5	11.11	20	18	13.0	14
65700.W0506	Left	6	36	M6	12.70	22	20	13.0	20
65700.W0508	Left	8	42	M8	15.87	25	24	14.5	38
65700.W0510	Left	10	48	M10	19.05	29	28	13.5	60
65700.W0512	Left	12	54	M12	22.22	33	32	13.0	92
65700.W0514	Left	14	60	M14	25.40	36	36	16.0	127
65700.W0516	Left	16	66	M16	28.57	40	42	15.5	202
65700.W0518	Left	18	72	M18x1,5*	31.75	44	46	15.0	250
65700.W0520	Left	20	78	M20x1,5*	34.92	47	50	14.5	327
65700.W0522	Left	22	84	M22x1,5*	38.10	51	54	15.5	440
65700.W0525	Left	25	94	M24x2*	42.85	57	60	15.0	630
65700.W0530	Left	30	110	M30x2*	50.80	66	70	17.0	1015

Order No.	a ₂	l ₃	w ₁	w ₂	Dyn. load C kN max.	Static load C ₀ kN max.
65700.W0005	7.5	9	8	6.00	3.9	5.6
65700.W0006	6.5	12	9	6.75	4.6	7.8
65700.W0008	7.5	15	12	9.00	7.0	14.3
65700.W0010	8.0	15	14	10.50	10.4	22.6



Heavy-Duty Rod Ends - Male

with integral spherical plain bearing



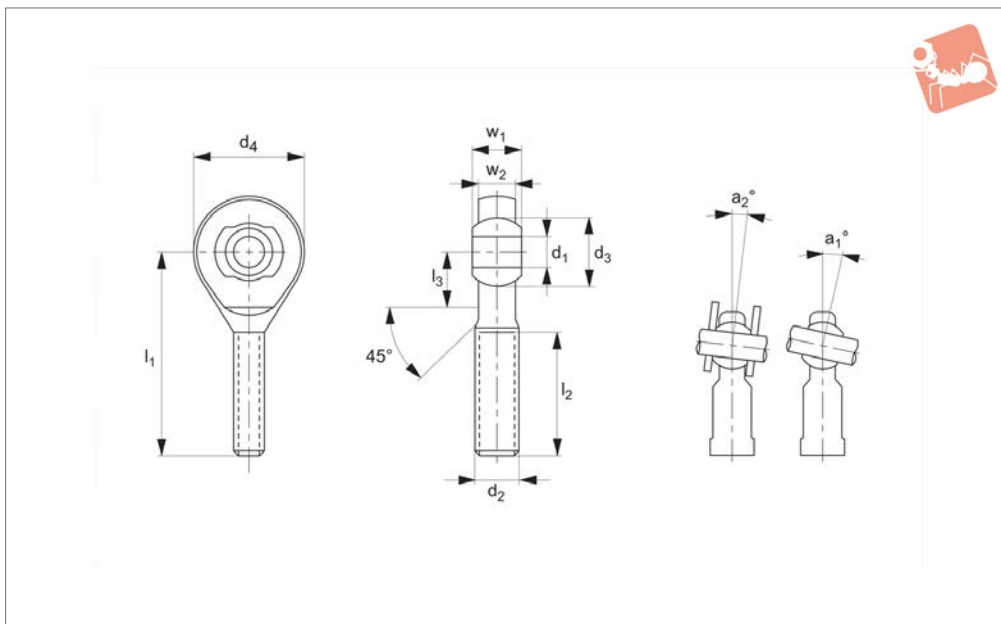
Rod Ends

Order No.	a_2	l_3	w_1	w_2	Dyn. load C kN max.	Static load C_0 kN max.
65700.W0012	8.0	19	16	12.00	12.4	32.8
65700.W0014	9.5	20	19	13.50	15.4	41.3
65700.W0016	8.5	22	21	15.00	22.4	56.6
65700.W0018	9.5	25	23	16.50	26.3	69.7
65700.W0020	9.0	28	25	18.00	30.8	82.2
65700.W0022	10.0	26	28	20.00	38.2	95.6
65700.W0025	10.0	30	31	22.00	45.3	118.6
65700.W0030	10.5	35	37	25.00	55.0	145.6
65700.W0505	7.5	9	8	6.00	3.9	5.6
65700.W0506	6.5	12	9	6.75	4.6	7.8
65700.W0508	7.5	15	12	9.00	7.0	14.3
65700.W0510	8.0	15	14	10.50	10.4	22.6
65700.W0512	8.0	19	16	12.00	12.4	32.8
65700.W0514	9.5	20	19	13.50	15.4	41.3
65700.W0516	8.5	22	21	15.00	22.4	56.6
65700.W0518	9.5	25	23	16.50	26.325	69.700
65700.W0520	9.0	28	25	18.00	30.805	82.200
65700.W0522	10.0	26	28	20.00	38.2	95.6
65700.W0525	10.0	30	31	22.00	45.3	118.6
65700.W0530	10.5	35	37	25.00	55.0	145.6

ROD ENDS



65702



Material

Rod end housing: Stainless steel DIN 1.4301 (AISI 304), forged, rolled thread
 Joint ball: Stainless steel 1.4412, hardened and ground, surface polished.
 Race: Nylon/Teflon/glass compound.

Technical Notes

Maintenance free, for tolerances see technical

page 123, standard thread is right hand thread.

Tips

A2 stainless steel provides good corrosion resistance to a wide range of atmospheric conditions and corrosive media.

It is considered resistant to potable water.

Important Notes

*Denotes fine pitch thread.

Order No.	Thread hand	d ₁	l ₁	d ₂	d ₃	l ₂	d ₄	a ₀	Weight g
65702.W0005	Right	5	33	M5	11.11	20	18	13.0	14
65702.W0006	Right	6	36	M6	12.70	22	20	13.0	20
65702.W0008	Right	8	42	M8	15.87	25	24	14.5	38
65702.W0010	Right	10	48	M10	19.05	29	28	13.5	60
65702.W0012	Right	12	54	M12	22.22	33	32	13.0	92
65702.W0014	Right	14	60	M14	25.40	36	36	16.0	127
65702.W0016	Right	16	66	M16	28.57	40	42	15.5	202
65702.W0018	Right	18	72	M18x1,5*	31.75	44	46	15.0	250
65702.W0020	Right	20	78	M20x1,5*	34.92	47	50	14.5	327
65702.W0022	Right	22	84	M22x1,5*	38.10	51	54	15.5	440
65702.W0025	Right	25	94	M24x2*	42.85	57	60	15.0	630
65702.W0030	Right	30	110	M30x2*	50.80	66	70	17.0	1015
65702.W0505	Left	5	33	M5	11.11	20	18	13.0	14
65702.W0506	Left	6	36	M6	12.70	22	20	13.0	20
65702.W0508	Left	8	42	M8	15.87	25	24	14.5	38
65702.W0510	Left	10	48	M10	19.05	29	28	13.5	60
65702.W0512	Left	12	54	M12	22.22	33	32	13.0	92
65702.W0514	Left	14	60	M14	25.40	36	36	16.0	127
65702.W0516	Left	16	66	M16	28.57	40	42	15.5	202
65702.W0518	Left	18	72	M18x1,5*	31.75	44	46	15.0	250
65702.W0522	Left	22	84	M22x1,5*	38.10	51	54	15.5	440
65702.W0525	Left	25	94	M24x2*	42.85	57	60	15.0	630
65702.W0530	Left	30	110	M30x2*	50.80	66	70	17.0	1015

Order No.	a ₂	l ₃	w ₁	w ₂	Dyn. load C kN max.	Static load C ₀ kN max.
65702.W0005	7.5	9	8	6.00	3.9	3.9
65702.W0006	6.5	12	9	6.75	4.6	5.4



Stainless Heavy-Duty Rod Ends - Male

with integral spherical plain bearing



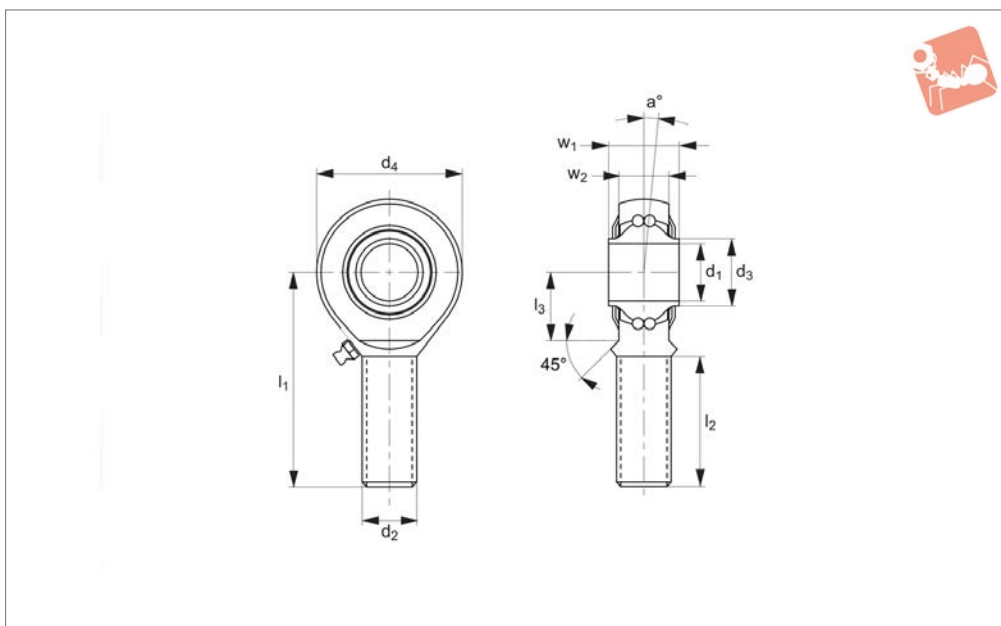
Rod Ends

Order No.	a_2	l_3	w_1	w_2	Dyn. load C kN max.	Static load C_0 kN max.
65702.W0008	7.5	15	12	9.00	7.0	9.7
65702.W0010	8.0	15	14	10.50	10.4	15.4
65702.W0012	8.0	19	16	12.00	12.4	22.3
65702.W0014	9.5	20	19	13.50	15.4	30.4
65702.W0016	8.5	22	21	15.00	22.4	41.5
65702.W0018	9.5	25	23	16.50	26.3	51.2
65702.W0020	9.0	28	25	18.00	30.8	60.3
65702.W0022	10.0	26	28	20.00	38.2	70.0
65702.W0025	10.0	30	31	22.00	45.4	87.0
65702.W0030	10.5	35	37	25.00	55.0	106.8
65702.W0505	7.5	9	8	6.00	3.9	3.9
65702.W0506	6.5	12	9	6.75	4.6	5.4
65702.W0508	7.5	15	12	9.00	7.0	9.7
65702.W0510	8.0	15	14	10.50	10.4	15.4
65702.W0512	8.0	19	16	12.00	12.4	22.3
65702.W0514	9.5	20	19	13.50	15.4	30.4
65702.W0516	8.5	22	21	15.00	22.4	41.5
65702.W0518	9.5	25	23	16.50	26.3	51.2
65702.W0522	10.0	26	28	20.00	38.2	70.0
65702.W0525	10.0	30	31	22.00	45.4	87.0
65702.W0530	10.5	35	37	25.00	55.0	106.8

ROD ENDS



65740



Material

Housing - forged steel, tempered, case hardened bearing race, ground and lapped, rolled thread, surface galvanized.
Inner ring - ball bearing steel, hardened, superfine ground, lubrication - calcium-complex-soap-grease, temp range -20°C to +120°C.

Lubrication nipple - DIN 3405 D1/A (sizes 6 to 10) DIN 71412 H1 (sizes 12 to 30).

technical pages.

Tips

Standard thread is right hand thread.

Technical Notes

Low maintenance. Sizes according to DIN ISO 12240-4 series K, for tolerances see

Important Notes

*Denotes fine pitch thread.

Order No.	Thread hand	d ₁	l ₁	d ₂	d ₃	l ₂	d ₄	a°	l ₃	w ₁	Weight g
65740.W0106	Right	6	36	M6	9.0	22	20	8.0	12	9	19
65740.W0108	Right	8	42	M8	10.5	25	24	8.5	15	12	36
65740.W0110	Right	10	48	M10	12.0	29	28	8.0	15	14	60
65740.W0112	Right	12	54	M12	14.5	33	32	7.5	19	16	87
65740.W0114	Right	14	60	M14	17.0	36	36	6.0	20	19	135
65740.W0116	Right	16	66	M16	19.0	40	42	8.0	22	21	190
65740.W0118	Right	18	72	M18x1,5*	21.5	44	46	8.5	25	23	270
65740.W0120	Right	20	78	M20x1,5*	24.5	47	50	7.0	28	25	338
65740.W0122	Right	22	84	M22x1,5*	26.0	51	54	8.0	26	28	450
65740.W0125	Right	25	94	M24x2*	29.5	57	64	5.0	30	31	602
65740.W0130	Right	30	110	M30x2*	34.5	66	70	7.5	35	37	922
65740.W0206	Left	6	36	M6	9.0	22	20	8.0	12	9	19
65740.W0208	Left	8	42	M8	10.5	25	24	8.5	15	12	36
65740.W0210	Left	10	48	M10	12.0	29	28	8.0	15	14	60
65740.W0212	Left	12	54	M12	14.5	33	32	7.5	19	16	87
65740.W0214	Left	14	60	M14	17.0	36	36	6.0	20	19	135
65740.W0216	Left	16	66	M16	19.0	40	42	8.0	22	21	190
65740.W0218	Left	18	72	M18x1,5*	21.5	44	46	8.5	25	23	270
65740.W0220	Left	20	78	M20x1,5*	24.5	47	50	7.0	28	25	338
65740.W0222	Left	22	84	M22x1,5*	26.0	51	54	8.0	26	28	450
65740.W0225	Left	25	94	M24x2*	29.5	57	64	5.0	30	31	602
65740.W0230	Left	30	110	M30x2*	34.5	66	70	7.5	35	37	922

Order No.	w ₂	Calc. factor Y	Calc. factor Y ₀	Dyn. load C kN max.	Speed rpm max.	Static load C ₀ kN max.
65740.W0106	6.75	2.19	2.09	2.75	1350	0.65
65740.W0108	9.00	1.89	1.80	4.00	1300	1.00
65740.W0110	10.50	1.81	1.90	4.45	1225	1.45



Heavy-Duty Rod Ends - Male

with integral ball bearing



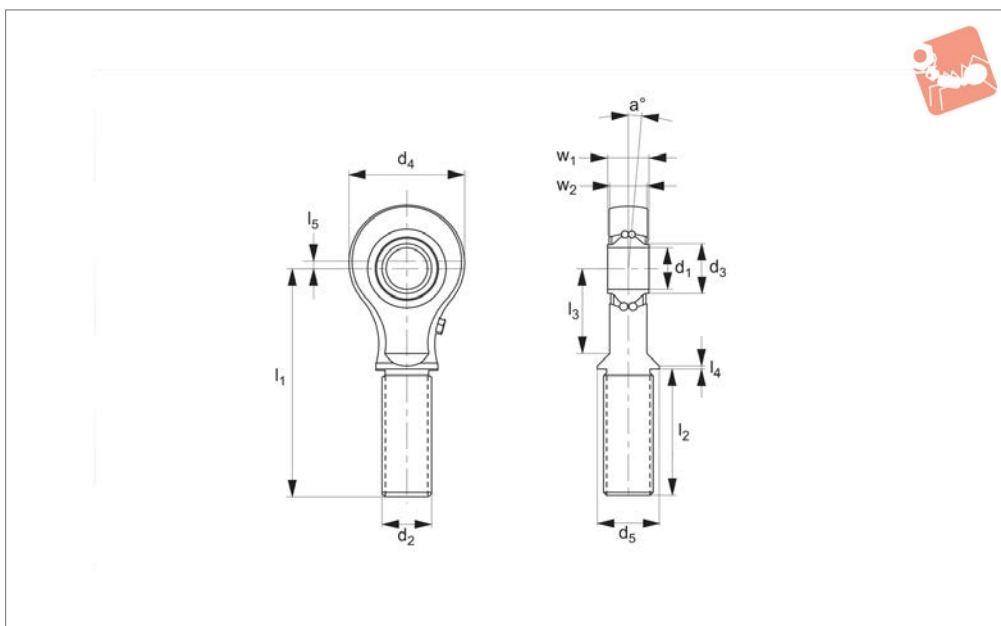
Rod Ends

Order No.	w ₂	Calc. factor Y	Calc. factor Y ₀	Dyn. load C kN max.	Speed rpm max.	Static load C ₀ kN max.
65740.W0112	12.00	1.82	1.74	4.95	1125	1.80
65740.W0114	13.50	2.48	2.36	5.60	1025	2.00
65740.W0116	15.00	2.35	2.24	6.25	975	2.35
65740.W0118	16.50	2.31	2.21	7.10	900	2.90
65740.W0120	18.00	2.58	2.46	7.90	825	3.45
65740.W0122	20.00	2.24	2.35	9.30	725	3.98
65740.W0125	22.00	2.12	2.02	11.03	600	5.68
65740.W0130	25.00	2.35	2.24	14.15	450	7.45
65740.W0206	6.75	2.19	2.09	2.75	1350	0.65
65740.W0208	9.00	1.89	1.80	4.00	1300	1.00
65740.W0210	10.50	1.81	1.90	4.45	1225	1.45
65740.W0212	12.00	1.82	1.74	4.95	1125	1.80
65740.W0214	13.50	2.48	2.36	5.60	1025	2.00
65740.W0216	15.00	2.35	2.24	6.25	975	2.35
65740.W0218	16.50	2.31	2.21	7.10	900	2.90
65740.W0220	18.00	2.58	2.46	7.90	825	3.45
65740.W0222	20.00	2.24	2.35	9.30	725	3.98
65740.W0225	22.00	2.12	2.02	11.03	600	5.68
65740.W0230	25.00	2.35	2.24	14.15	450	7.45

ROD ENDS



65820



Material

Housing - forged steel, tempered, case hardened bearing race, ground and lapped, surface galvanized.
 Inner ring - ball bearing steel, hardened, superfine ground.
 Lubrication - calcium-complex-soap-

grease, temp range -20°C to +120°C, lubrication nipple - DIN 3405 D1/A.

Technical Notes

Low maintenance, for tolerances see technical pages.

Tips

Standard thread is right hand thread.

Important Notes

* Denotes fine pitch thread.

Order No.	Thread hand	d ₁	l ₁	d ₂	d ₃	l ₂	d ₄	d ₅	a°	l ₃	Weight g
65820.W0006	Right	6	64.0	M10x1	8.5	42.5	24	14	10.5	17	62
65820.W0007	Right	6	40.5	M10x1	8.5	19	24	14	10.5	17	57
65820.W0008	Right	8	72.0	M12x1,5	11.0	46.5	30	17	8.5	20	97
65820.W0009	Right	8	48.5	M12x1,5	11.0	23	30	17	8.5	20	88
65820.W0010	Right	10	82.0	M14x1,5	13.5	49.5	36	19	9.5	28	168
65820.W0011	Right	10	58.5	M14x1,5	13.5	26	36	19	9.5	28	154
65820.W0012	Right	12	90.0	M16x1,5	15.0	53.5	40	21	7.5	31	226
65820.W0013	Right	12	65.5	M16x1,5	15.0	29	40	21	7.5	31	204
65820.W0015	Right	15	100.0	M20x1,5	18.5	62.5	42	26	6.5	30	310
65820.W0016	Right	15	73.5	M20x1,5	18.5	36	42	26	6.5	30	273
65820.W0017	Right	17	105.0	M20x1,5	21.0	62.5	48	26	7.0	36	401
65820.W0018	Right	17	78.5	M20x1,5	21.0	36	48	26	7.0	36	354
65820.W0020	Right	20	117.0	M24x1,5	24.0	68.5	56	30	5.5	41	587
65820.W0021	Right	20	89.5	M24x1,5	24.0	41	56	30	5.5	41	519
65820.W0506	Left	6	64.0	M10x1	8.5	42.5	24	14	10.5	17	62
65820.W0507	Left	6	40.5	M10x1	8.5	19	24	14	10.5	17	57
65820.W0508	Left	8	72.0	M12x1,5	11.0	46.5	30	17	8.5	20	97
65820.W0509	Left	8	48.5	M12x1,5	11.0	23	30	17	8.5	20	88
65820.W0510	Left	10	82.0	M14x1,5	13.5	49.5	36	19	9.5	28	168
65820.W0511	Left	10	58.5	M14x1,5	13.5	26	36	19	9.5	28	154
65820.W0512	Left	12	90.0	M16x1,5	15.0	53.5	40	21	7.5	31	226
65820.W0513	Left	12	65.5	M16x1,5	15.0	29	40	21	7.5	31	204
65820.W0515	Left	15	100.0	M20x1,5	18.5	62.5	42	26	6.5	30	310
65820.W0516	Left	15	73.5	M20x1,5	18.5	36	42	26	6.5	30	273
65820.W0517	Left	17	105.0	M20x1,5	21.0	62.5	48	26	7.0	36	401
65820.W0518	Left	17	78.5	M20x1,5	21.0	36	48	26	7.0	36	354
65820.W0520	Left	20	117.0	M24x1,5	24.0	68.5	56	30	5.5	41	587
65820.W0521	Left	20	89.5	M24x1,5	24.0	41	56	30	5.5	41	519



Heavy-Duty Rod Ends - Male

with integral ball bearing



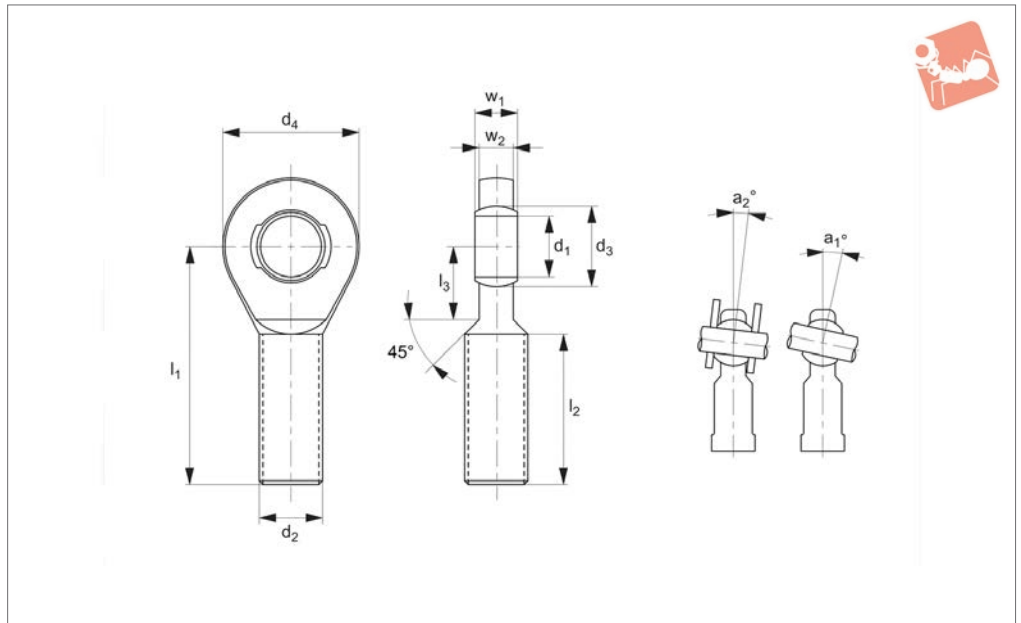
Rod Ends

Order No.	l_4	l_5	w_1	w_2	Calc. factor Y	Calc. factor Y_0	Dyn. load C kN max.	Speed rpm max.	Static load C_0 kN max.
65820.W0006	2.5	1.5	14	10	1.28	1.34	2.44	1300	0.76
65820.W0007	2.5	1.5	14	10	1.28	1.34	2.44	1300	0.76
65820.W0008	2.5	2.0	15	10	1.9	1.81	2.60	1225	0.98
65820.W0009	2.5	2.0	15	10	1.9	1.81	2.60	1225	0.98
65820.W0010	2.5	2.5	20	14	1.69	1.77	5.12	1100	1.90
65820.W0011	2.5	2.5	20	14	1.69	1.77	5.12	1100	1.90
65820.W0012	2.5	3.0	20	14	1.81	1.90	5.34	1050	2.06
65820.W0013	2.5	3.0	20	14	1.81	1.90	5.34	1050	2.06
65820.W0015	2.5	3.0	20	14	2.07	2.17	5.48	975	3.27
65820.W0016	2.5	3.0	20	14	2.07	2.17	5.48	975	3.27
65820.W0017	2.5	3.5	22	16	2.35	2.46	5.57	875	2.68
65820.W0018	2.5	3.5	22	16	2.35	2.46	5.57	875	2.68
65820.W0020	3.0	3.5	24	18	2.76	2.90	6.16	775	3.14
65820.W0021	3.0	3.5	24	18	2.76	2.90	6.16	775	3.14
65820.W0506	2.5	1.5	14	10	1.28	1.34	2.44	1300	0.76
65820.W0507	2.5	1.5	14	10	1.28	1.34	2.44	1300	0.76
65820.W0508	2.5	2.0	15	10	1.9	1.81	2.60	1225	0.98
65820.W0509	2.5	2.0	15	10	1.9	1.81	2.60	1225	0.98
65820.W0510	2.5	2.5	20	14	1.69	1.77	5.12	1100	1.90
65820.W0511	2.5	2.5	20	14	1.69	1.77	5.12	1100	1.90
65820.W0512	2.5	3.0	20	14	1.81	1.90	5.34	1050	2.06
65820.W0513	2.5	3.0	20	14	1.81	1.90	5.34	1050	2.06
65820.W0515	2.5	3.0	20	14	2.07	2.17	5.48	975	3.27
65820.W0516	2.5	3.0	20	14	2.07	2.17	5.48	975	2.68
65820.W0517	2.5	3.5	22	16	2.35	2.46	5.57	875	2.68
65820.W0518	2.5	3.5	22	16	2.35	2.46	5.57	875	2.68
65820.W0520	3.0	3.5	24	18	2.76	2.90	6.16	775	3.14
65820.W0521	3.0	3.5	24	18	2.76	2.90	6.16	775	3.14

ROD ENDS



65860



Material

Housing - forged steel, tempered, rolled thread, surface galvanized.

Joint ball - ball bearing steel, hardened and ground, surface superfinished and chromium plated.

Race - nylon/teflon/glass compound.

Technical Notes

Maintenance free, sizes according to DIN ISO 12240-4, series E, for tolerances tech-

nical pages.

Tips

Standard thread is right hand thread.

Important Notes

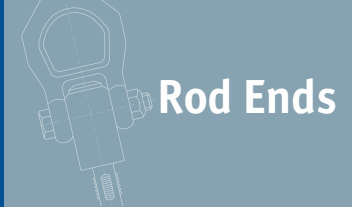
*Denotes fine pitch thread.

Order No.	Thread hand	d ₁	l ₁	d ₂	d ₃	l ₂	d ₄	a ₁	Weight g
65860.W0006	Right	6	36	M6	10.0	22	20	13.0	14
65860.W0008	Right	8	42	M8	13.0	25	23	15.0	24
65860.W0010	Right	10	48	M10	16.0	29	28	12.0	41
65860.W0012	Right	12	54	M12	18.0	33	32	10.5	67
65860.W0015	Right	15	63	M14	22.0	33	38	8.5	110
65860.W0017	Right	17	69	M16	25.0	40	44	10.0	163
65860.W0020	Right	20	78	M20x1,5*	29.0	47	51	9.0	270
65860.W0025	Right	25	94	M24x2*	35.5	57	62	7.5	508
65860.W0030	Right	30	110	M30x2*	40.7	66	70	6.0	785
65860.W0035	Right	35	140	M36x3*	47.0	92	82	6.5	1330
65860.W0040	Right	40	145	M42x3*	53.0	94	92	7.0	1890
65860.W0041	Right	40	150	M39x3*	53.0	99	92	7.0	1785
65860.W0045	Right	45	165	M45x3*	60.0	100	102	7.5	2620
65860.W0046	Right	45	163	M42x3*	60.0	98	102	7.5	2430
65860.W0050	Right	50	195	M52x3*	66.0	120	112	6.5	3865
65860.W0051	Right	50	185	M45x3*	66.0	110	112	6.5	3225
65860.W0060	Right	60	225	M60x4*	80.0	140	135	6.5	6400
65860.W0061	Right	60	210	M60x4*	80.0	125	-	6.5	5430
65860.W0506	Left	6	36	M6	10.0	22	20	13.0	14
65860.W0508	Left	8	42	M8	13.0	25	23	15.0	24
65860.W0510	Left	10	48	M10	16.0	29	28	12.0	41
65860.W0512	Left	12	54	M12	18.0	33	32	10.5	67
65860.W0515	Left	15	63	M14	22.0	33	38	8.5	110
65860.W0517	Left	17	69	M16	25.0	40	44	10.0	163
65860.W0520	Left	20	78	M20x1,5*	29.0	47	51	9.0	270
65860.W0525	Left	25	94	M24x2*	35.5	57	62	7.5	508
65860.W0530	Left	30	110	M30x2*	40.7	66	70	6.0	785
65860.W0535	Left	35	140	M36x3*	47.0	92	82	6.5	1330
65860.W0540	Left	40	145	M42x3*	53.0	94	92	7.0	1890
65860.W0541	Left	40	150	M39x3*	53.0	99	92	7.0	1785
65860.W0545	Left	45	165	M45x3*	60.0	100	102	7.5	2620
65860.W0546	Left	45	163	M42x3*	60.0	98	102	7.5	2430



Heavy-Duty Rod Ends - Male

with integral spherical plain bearing

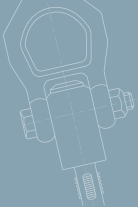


Rod Ends

Order No.	Thread hand	d ₁	l ₁	d ₂	d ₃	l ₂	d ₄	a ₁	Weight g
65860.W0550	Left	50	195	M52x3,0*	66.0	120	112	6.5	3865
65860.W0551	Left	50	185	M45x3,0*	66.0	110	112	6.5	3225
65860.W0560	Left	60	225	M60x4,0*	80.0	140	135	6.5	6400
65860.W0561	Left	60	210	M52x3,0*	80.0	125	135	6.5	5430

Order No.	a ₂	l ₃	w ₁	w ₂	Dyn. load C kN max.	Static load C ₀ kN max.
65860.W0006	6.5	11	6	4	2.5	6.4
65860.W0008	8.0	12	8	5	4.2	11.0
65860.W0010	6.0	15	9	6	6.4	16.8
65860.W0012	5.0	15	10	7	9.2	23.0
65860.W0015	4.5	18	12	9	13.4	39.6
65860.W0017	5.5	23	14	10	19.2	54.1
65860.W0020	4.5	25	16	12	25.2	76.7
65860.W0025	3.5	32	20	16	42.4	119.1
65860.W0030	3.0	35	22	18	54.0	141.8
65860.W0035	3.5	38	25	20	70.4	180.8
65860.W0040	3.5	42	28	22	86.0	222.6
65860.W0041	3.5	42	28	22	86.0	222.6
65860.W0045	4.0	50	32	25	107.0	276.2
65860.W0046	4.0	50	32	25	107.0	276.2
65860.W0050	3.0	60	35	28	132.0	339.2
65860.W0051	3.0	60	35	28	132.0	339.2
65860.W0060	3.5	70	44	36	208.0	532.1
65860.W0061	3.5	70	44	36	208.0	532.1
65860.W0506	6.5	11	6	4	2.5	6.4
65860.W0508	8.0	12	8	5	4.2	11.0
65860.W0510	6.0	15	9	6	6.4	16.8
65860.W0512	5.0	15	10	7	9.2	23.0
65860.W0515	4.5	18	12	9	13.4	39.6
65860.W0517	5.5	23	14	10	19.2	54.1
65860.W0520	4.5	25	16	12	25.2	76.7
65860.W0525	3.5	32	20	16	42.4	119.1
65860.W0530	3.0	35	22	18	54.0	141.8
65860.W0535	3.5	38	25	20	70.4	180.8
65860.W0540	3.5	42	28	22	86.0	222.6
65860.W0541	3.5	42	28	22	86.0	222.6
65860.W0545	4.0	50	32	25	107.0	276.2
65860.W0546	4.0	50	32	25	107.0	276.2
65860.W0550	3.0	60	35	28	132.0	339.2
65860.W0551	3.0	60	35	28	132.0	339.2
65860.W0560	3.5	70	44	36	208.0	532.1
65860.W0561	3.5	70	44	36	208.0	532.1

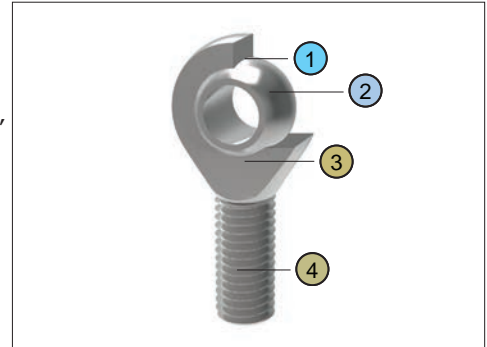
ROD ENDS



All of our rod ends incorporate either a plain spherical bearing, ball bearing, or roller bearing. Below is an overview of each type.

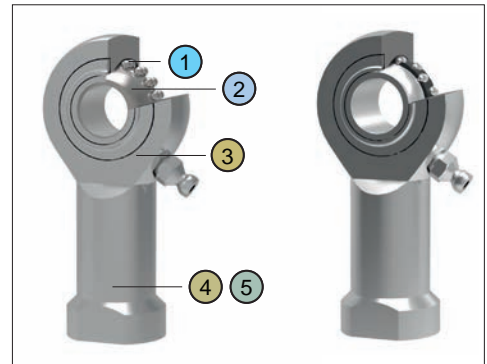
Plain spherical bearings

- ① Thin coating made from Polyamid-PTFE-fibreglass - compound, maintenance free, absorbs any foreign particles.
- ② Ball made of bearing steel, hardened, ground, polished and hard chromium plated, ensures reliable corrosion protection.
- ③ No clearance - radial clearance 0-10µm.
- ④ All rod end housings made of forged steel, tempered, extremely high load resistances.



Ball and roller bearings

- ① Radial clearance: 10-30µm, low friction.
- ② Inner ring made of bearing steel, hardened ball grooves polished.
- ③ Shields on both sides protect against rough dirt penetration.
- ④ All rod ends housings are made of forged steel, case hardened bearing race.
- ⑤ Low maintenance due to long-term greasing, especially suitable for high speed large swiveling angles or rotating movements.



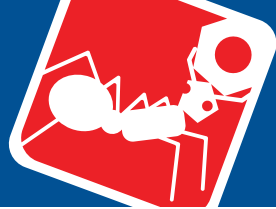
Rod ends and water

Stainless steel versions

Most of our rod ends are available in stainless steel as standard.

High grade AISI 316 stainless steel available on request.





In many cases heavy-duty rod ends with integral spherical plain bearings are most often used. They are above all used for small swivelling or tilting movements at low speeds. They stand out for their high load capacity and can also be used for shock-like loads. The rod end ball slides on a plastic bearing shell consisting of a glass fibre-filled nylon/teflon compound. This design assures a maintenance-free rod end. Heavy-duty plain bearing rod ends have slight initial movement friction and virtually no clearance. The plastic material used has another advantage in that it can absorb many foreign particles so that no damage can occur. The balls of heavy-duty rod ends with integral spherical plain bearings are hard chrome plated. This reliable corrosion protection ensures that the function of the rod end will not be affected by a corroded ball surface under humid operating conditions.

This design is especially suitable for high speeds, large swivelling angles or rotating movements with relatively low or medium loads. Prominent technical features are the low bearing friction, long-time greasing as well as the sealing against some dirt penetration (by means of shields on both sides). Under normal operating conditions the rod ends are maintenance-free. Greasing nipples are provided for lubrication in case of rough operations and maximum loads. To avoid incompatibility with the production lubrication, we recommend lubrication with a calcium-complex-soap-grease. A special heat treatment procedure gives the rod end housing a raceway hardness adapted to the antifriction bearing, ensuring at the same time high stability with changing loads.

This design, based on the structure of a self-aligning roller bearing is preferably used for high speed, large tilting angles or rotating movements under high loads. Compared to rod ends with ball bearings, rod ends with self-aligning roller bearings essentially have higher basic load ratings. This design is equipped with a cage to minimise the rolling friction and heat build-up. These rod ends, with long-time lubrication are under normal operating conditions maintenance-free. Greasing nipples are provided for lubrication in case of rough operations and maximum loads. To avoid incompatibility with the production lubrication, we recommend lubricating with a calcium-complex-soap-grease. Shields on both sides limit dirt particles from penetrating into the bearing. The rod ends with roller bearings are subjected to a special heat treatment to obtain a raceway hardness adapted to the antifriction bearings, ensuring at the same time a high stability with changing loads.

Rod end bearings load capacity explained

The static load capacity C_0 is the radially acting static load which does not cause any permanent deformation of the components when the spherical bearing or rod end is stationary, (i.e. the load condition without pivoting, swivelling or tilting movements). It is also a precondition here that the operating temperature must be at normal room temperature and the surrounding components must possess sufficient stability.

The values specified in the tables are determined by static tension tests on a representative number of series components at 20°C normal room temperature. The static load capacity may vary with lower or higher temperature depending on the material. In the case of all rod ends with plain bearings, the static load rating refers to the maximum permissible static load of the rod end housing in a tensile direction up to which no permanent deformation occurs at the weakest housing cross-section. The value in the product tables has a safety factor of 1.2 times the tensile strength of the rod ends housing material.

For our rod ends with roller and ball bearings, the static load rating is the load at which the bearing can operate at room temperature without its performance being impaired as a result of deformations, fracture, or damage to the sliding contact surfaces (max 1/10,000th of the ball diameter).

Dynamic load ratings serve as values for calculation of the service life of dynamically-loaded spherical bearings and rod ends. The values themselves do not provide any information about the effective dynamic load capacity of the spherical bearing or rod end. To obtain this information, it is necessary to take into account the additional influencing factors such as load type, swivel or tilt angle, speed characteristic, max. permitted bearing clearance, max. permitted bearing friction, lubrication conditions and temperature, etc.

Dynamic load capacities depend on the definition used to calculate them. Comparison of values is not always possible owing to the different definitions used by various manufacturers, and because the load capacities are often determined under completely different test conditions.

For our rod ends with roller and ball bearings, the dynamic load capacity is the load at which 90% of a large quantity of identical rod ends reach 1 million revolutions before they fail (due to fatigue of the rolling surfaces.)

Rod ends with integral maintenance-free spherical plain bearings

Rod ends with integral ball bearings

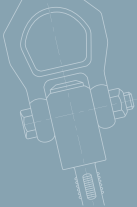
Rod ends with integral roller bearings

Static load capacity C_0 (plain bearings)

Static load capacity C_0 (roller and ball bearings)

Dynamic load capacity C (plain bearings)

Dynamic load capacity C (roller and ball bearings)



Operating temperatures

Heavy-duty ball and roller bearing rod ends can be used for operating temperatures between -20°C and $+120^{\circ}\text{C}$. The temperature range of heavy-duty rod ends with integral spherical plain bearing is between -30°C and $+60^{\circ}\text{C}$, without affecting the load capacity. Higher temperatures will reduce the load capacity taken into account for the calculation of the 'working life' under the temperature factor C_2 on page 451.

Loads

The decisive parameters for the selection and calculation of heavy-duty rod ends are size, direction and type of load.

Radial or combined loads

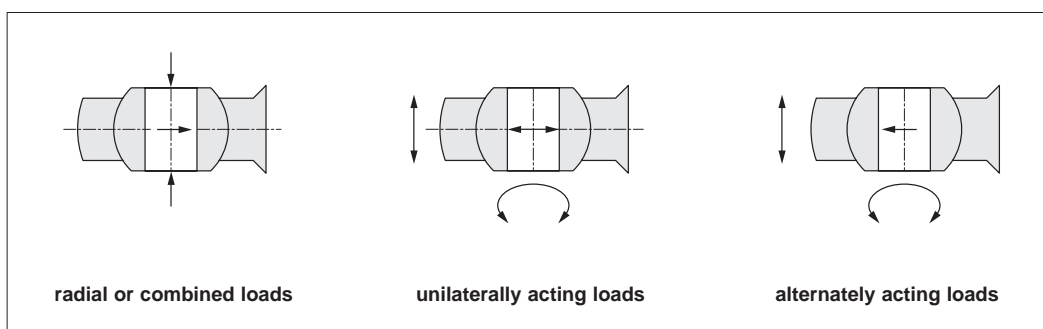
The heavy-duty rod ends have been especially designed to cope with high radial loads. They can be used for combined loads, the axial load share of which does not exceed 20% of the corresponding radial load.

Unilaterally acting load

In this case the load acts only in the same direction, which means that the load area is always in the same bearing section.

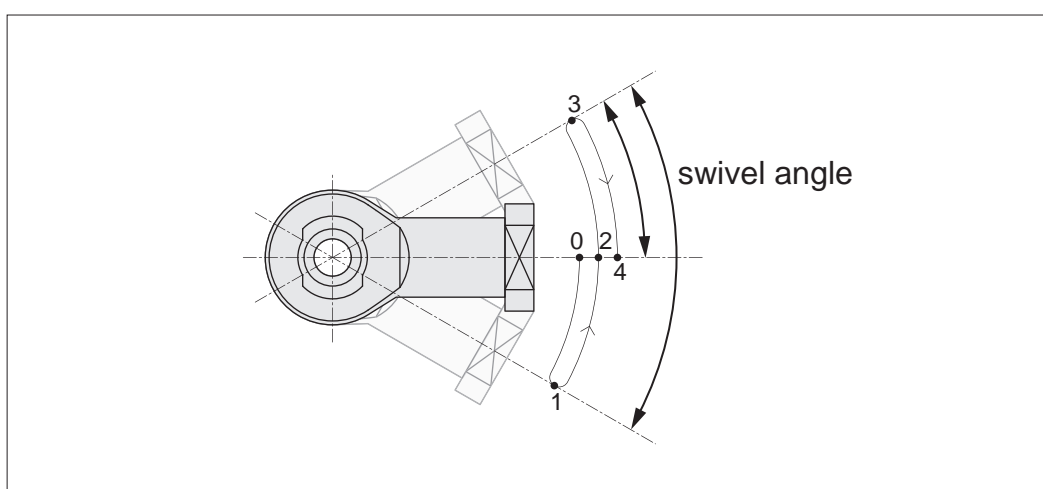
Alternately acting load

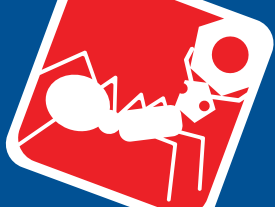
In case of alternating loads, the load areas facing each other are alternately loaded and/or relieved, which means that the load changes its direction constantly by approximately 180° .



Swivelling angle

The swivelling angle is the movement of the rod end from one final position to the other. Half the swivelling angle α° is used to calculate the service or 'working life'.



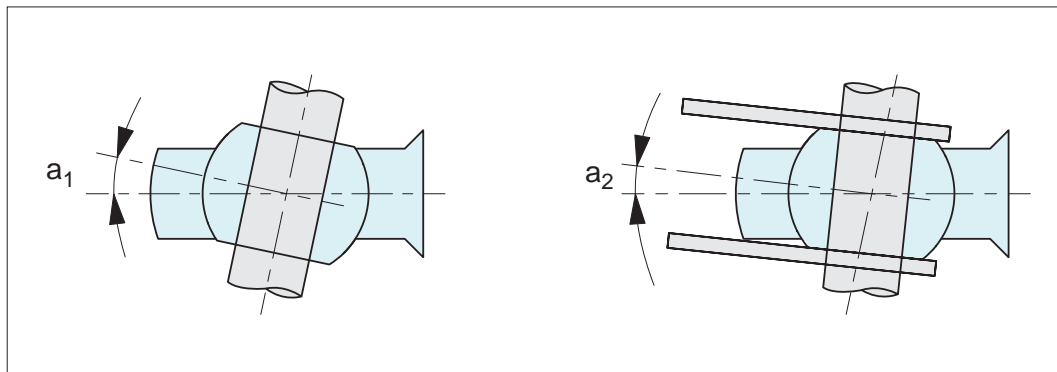


The angle of tilt, also called setting angle, refers to the movement of the joint ball and/ or the inner ring to the rod end axis (in degrees). The tilting angle (a) indicated in the table for the heavy-duty ball and roller bearing rod ends corresponds to the maximum possible movement being limited by the shields on both sides.

It is important that this tilting angle is not exceeded either during installation or operation, as otherwise the shields may be damaged. For heavy-duty plain bearing rod ends a distinction is made between the tilting angles (a_1 and a_2).

If the movement is not limited by adjacent components, then angle a_1 can fully be used without affecting the rod end capacity. Tilting angle a_2 is the movement limit when connecting a forked component.

Angle of tilt



The term 'nominal service life' is used for heavy-duty ball and roller bearing rod ends and represents the number of swivelling motions or rotations and/or the number of service hours the rod end performs before showing the first signs of material fatigue on the raceway or roller bodies. In view of many factors that are difficult or impossible to assess, the service life of several apparently identical bearings differ under the same operating conditions.

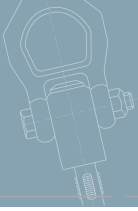
For this reason, the following method for the service life determination of heavy-duty ball and roller rod ends results in a nominal service life being achieved or exceeded by at least 90% of a large quantity of identical rod ends.

Nominal service life

The term 'working life' is used with heavy-duty plain bearing rod ends. It represents the number of swivelling motions or rotations and/ or the number of service hours the heavy duty plain bearing rod end performs before becoming unserviceable due to material fatigue, wear, increased bearing clearance or increase of the bearing friction moment.

The 'working life' is not only influenced by the size and the type of load, it is also affected by a number of factors, which are difficult to assess. A calculation of the exact service life is therefore impossible. Field-experienced standard values for the approximate 'working life' can nevertheless be determined by using the following calculation procedure which is based on numerous results from endurance test runs and values from decades of experience. The values determined by this formula are achieved, if not exceeded, by the majority of the heavy-duty rod ends.

Working life



Heavy-duty rod ends

65700, 65720, 65740, 65742,
65760, 65780, 65800

d_1		d_{1mp} Tolerance limit		V_{d1p}	V_{d1mp}	b_{1s} Tolerance limit		h_s, h_{1s}, h_{2s} Tolerance limit	
Over	Incl.	Upper	Lower	Max.	Max.	Upper	Lower	Upper	Lower
	6	+0,012	0	0,012	0,009	0	-0,12	+0,8	-1,2
6	10	+0,015	0	0,015	0,011	0	-0,12	+0,8	-1,2
10	18	+0,018	0	0,018	0,014	0	-0,12	+1,0	-1,7
18	30	+0,021	0	0,021	0,016	0	-0,12	+1,4	-2,1
30	50	+0,025	0	0,025	0,019	0	-0,12	+1,8	-2,7

Dimensions and tolerance symbols

- d_1 = nominal bore diameter of the inner ring or joint ball.
- d_{1mp} = mean bore diameter deviation in one plane, arithmetical mean of the largest and smallest bore diameter.
- V_{d1p} = bore diameter variation in one plane, difference between the largest and smallest bore diameter.
- V_{d1mp} = mean bore diameter variation, difference between the largest and smallest bore diameter of one inner ring or joint ball.
- b_{1s} = single inner ring or joint ball width deviation.
- h, h_1, h_2 = single length from inner ring or ball bore centre to shank end.
- h_s, h_{1s}, h_{2s} = single length variation of a single rod end.



The maximum load is defined by the static basic load rating C_0 . If static loads are a combination of radial and axial loads, the equivalent static load will have to be calculated.

Permissible load

$$P_0 \leq C_0 \text{ (N)}$$

P_0 = Static equivalent load

$$\text{Self-aligning ball bearing} = P_0 = F_r + Y_0 \cdot F_a$$

$$\text{Self-aligning roller bearing} = P_0 = F_r + 5 \cdot F_a$$

F_a = Axial load

F_r = Radial load

Y_0 = Axial factor, static, see individual product pages

Y_0 = Basic static load rating (kN), see individual product pages

For Rod Ends with integral self-aligning ball bearing **65740, 65742, 65760, 65820, 65840.**

Nominal service life

Rotating

$$G_{h_{rot.}} = 10^6 \frac{\left(\frac{C}{P}\right)^3}{60 \cdot n} \text{ (h)}$$

Oscillating

$$G_{h_{osc.}} = 10^6 \frac{\left(\frac{C}{P \sqrt[3]{\frac{\beta}{90}}}\right)^3}{60 \cdot f} \text{ (h)}$$

P = Dynamic equivalent load (kN)

$$\text{Self-aligning ball bearing} = P = F_r + Y \cdot F_a$$

$$\text{Self-aligning roller bearing} = P = F_r + 9.5 \cdot F_a$$

C = Basic dynamic load (kN), see individual product pages

Y = axial factor, dynamic, see individual product pages

$G_{h_{rot.}}$ = nominal service life for rotation (hours of operation)

$G_{h_{osc.}}$ = nominal service life for rotation (hours of operation)

β = half of swivelling angle (degree), $\beta = 90$ should be used for rotation.

Condition: Swivelling angle $\beta \geq 3^\circ$. For swivelling angles $\beta < 3^\circ$ we recommend the use of heavy-duty spherical plain bearing rod ends

n = rotation speed (rpm)

f = frequency of oscillation (rpm)

h = hours

For Rod ends with integral self-aligning roller bearing **65780, 65800.**

Rotating

$$G_{h_{rot.}} = 10^6 \frac{\left(\frac{C}{P}\right)^{3,333}}{60 \cdot n} \text{ (h)}$$

Oscillating

$$G_{h_{osc.}} = 10^6 \frac{\left(\frac{C}{P \sqrt[3]{\frac{\beta}{90}}}\right)^{3,333}}{60 \cdot f} \text{ (h)}$$

At the rotating side of a crank mechanism a ball or roller bearing rod end should be installed. The expected service life amounts to at least 5000 hours.

Calculation example

Selected: **65760.W0108** = 4,0 kN

$$G_{h_{rot.}} = 10^6 \frac{\left(\frac{C}{P}\right)^3}{60 \cdot n} \text{ (h)}$$

$$= 10^6 \frac{\left(\frac{4,0}{0,75}\right)^3}{60 \cdot 300} = 8428 \text{ h} > 5000 \text{ h} \quad \checkmark$$



The permissible sliding velocity of heavy-duty rod ends mainly depends on the load and temperature conditions. Heat generated by friction in the rod end housing is the main limitation on sliding velocity. When selecting the rod end size, it is necessary to determine the sliding velocity and the pv-value, which is a product of the specific bearing load p (N/mm²) and the sliding velocity v (m/s).

Permissible sliding velocity

Specific bearing load

$$p = k \cdot \frac{P}{C}$$

Known: Permissible pv-value = 0,5 N/mm² • m/s

- P = Specific bearing load (N/mm²)
- C = Basic dynamic load rating (N), see individual product pages
- k = Specific load factor (N/mm²) for tribological pairing
- k = 50 N/mm²**

Mean sliding velocity

$$V_m = 5,82 \cdot 10^{-7} \cdot d_3 \cdot \beta \cdot f$$

Known: Permissible sliding velocity $v_{max} = 0,15$ m/s

- V_m = Mean sliding velocity (m/s)
- d_3 = Pivot ball diameter (mm), see individual product pages
- β = Half swivelling angle (degree), for swivelling angle > 180°
- $\beta = 90^\circ$ to be used**
- f = Frequency of oscillation (rpm)

Nominal service life

$$G = C_1 \cdot C_2 \cdot C_3 \cdot \frac{3}{d_3 \cdot \beta} \cdot \frac{C}{P} \cdot 10^8$$

$$G_h = C_1 \cdot C_2 \cdot C_3 \cdot \frac{5}{d_3 \cdot \beta \cdot f} \cdot \frac{C}{P} \cdot 10^6$$

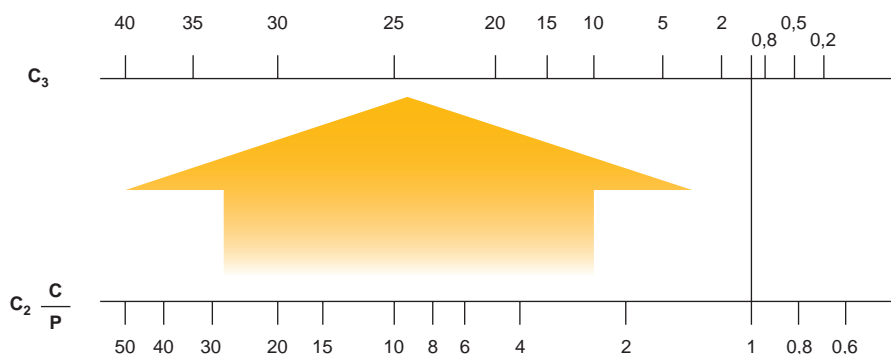
- G = Nominal service life (number of oscillations or revolutions)
- G_h = Nominal service life (hours)
- C_2 = Temperature factor, see previous pages
- C_3 = Material factor, see alignment chart on next page
- C_1 = Load direction factor
- $C_1 = 1,0$ = Single load direction

Alternating load direction at $f < 30$ rpm: $C_1 = 0,250$

Alternating load direction at $f > 30$ rpm: $C_1 = 0,125$

To find C_3 calculate $C_2 \cdot \frac{C}{P}$ and on the chart below, read across to C_3

- C_2 = Temperature factor
- C = Basic dynamic load rating (N) see individual product pages
- P = Specific bearing load (N/mm²)



Alignment



Calculation example

The rod end assembly of conveyor equipment calls for heavy-duty rod end with a service life of 7000 hours in conjunction with an alternating acting load of 5 kN. 25 swivelling moments with a swivelling angle of 20° take place per minute. The operating temperature amounts to approx. 60° C. The choice is a heavy-duty rod end **65880.W0115** with: C = 13,4 kN, d₃ = 22mm.

Checking the permissible load of the rod end

$$P_{\max} = C_0 \cdot C_2 \cdot C_4$$

$$P_{\max} = 41 \cdot 0,2 \cdot 1,0 = 8,2 \text{ kN} > 5,0 \text{ kN}$$

$$C_0 = 41 \text{ kN}$$

$$C_2 = 1,0 \text{ (temperature } 60^\circ\text{C)}$$

$$C_4 = 0,2 \text{ (alternating load)}$$

Checking the permissible sliding velocity

$$V_m = 5,82 \cdot 10^{-7} \cdot d_3 \cdot \beta \cdot f = 5,82 \cdot 10^{-7} \cdot 22 \cdot 10 \cdot 25$$

$$= 0,0032 \text{ m/s} < 0,15 \text{ m/s} \quad \checkmark$$

Checking the p · V -value

$$pV = p \cdot V_m$$

$$pV = 18,66 \cdot 0,0032$$

$$= 0,06 \text{ N/mm}^2 \cdot \text{m/s} < 0,5 \text{ N/mm}^2 \cdot \text{m/s} \quad \checkmark$$

$$p = k \cdot \frac{P}{C} = 50 \cdot \frac{5000}{13400} \times 18,66 \text{ N/mm}^2$$

Nominal service life

$$G_h = C_1 \cdot C_2 \cdot C_3 \cdot \frac{5}{d_3 \cdot \beta \cdot f} \cdot \frac{C}{P} \cdot 10^6$$

$$G_h = 0,25 \cdot 1,0 \cdot 12 \cdot \frac{5}{22 \cdot 10 \cdot 25} \cdot \frac{13,4}{5,0} \cdot 10^6$$

$$= 7308 \text{ h} > 7000 \text{ h} \quad \checkmark$$

Known: C₁ = 0,25 (alternating load direction, f = 25 rpm < 30 rpm)

$$C_3 = C_2 \cdot \frac{C}{P} = 1,0 \cdot \frac{13,4}{5,0} = 2,68$$

See alignment chart C₃ = 12

$$d_3 = 22$$

$$f = 25 \text{ rpm}$$



The ultimate radial static load rating is measured as the failure point when a load is increasingly applied to a pin through the rod end's bore and pulled straight up while the rod end is held in place. Note that the actual rating is determined by calculating the lowest of the following three values:

1. Raceway material comprehensive strength (R value)

$$R = E \times T \times X$$

2. Rod end head strength (H value, cartridge type construction)

$$H = \left[\left(\frac{T}{2} \sqrt{D^2 - T^2} \right) + \left(\frac{D}{2} \times \sin^{-1} \frac{T}{D} \right) - (\text{O.D. of Bearing} \times T) \right] \times X$$

Angle of $\frac{T}{D}$ expressed in radians

3. Shank strength (S value)

Male Threaded Rod End

$$S = [(\text{root diameter of thread}^2 \times .78) - (N^2 \times .78)] \times X$$

Female Threaded Rod End

$$S_2 = [(J^2 \times .78) + (\text{major diameter of thread} \times .78)] \times X$$

- E = Ball diameter
- T = Housing width
- X = Allowable stress
- D = Head diameter
- N = Diameter of drilled hole in shank of male rod end
- J = Shank diameter of female rod end

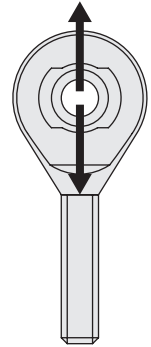
The axial static load capacity is measured as the force required to cause failure via a load parallel to the axis of the bore. Depending on the material types and construction methods, the ultimate axial load is generally 10-20% of the ultimate radial static load. The formula does not account for the bending of the shank due to a moment of force, nor the strength of the stake in cartridge-type construction.

Axial strength (A value)

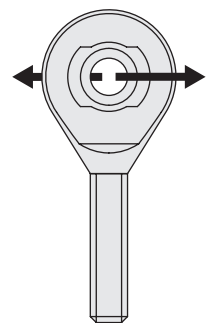
$$A = .78 [(E + .176T)^2 - E^2] \times X$$

- X = Allowable Stress (see table)
- E = Ball diameter
- T = Housing width

Radial static load



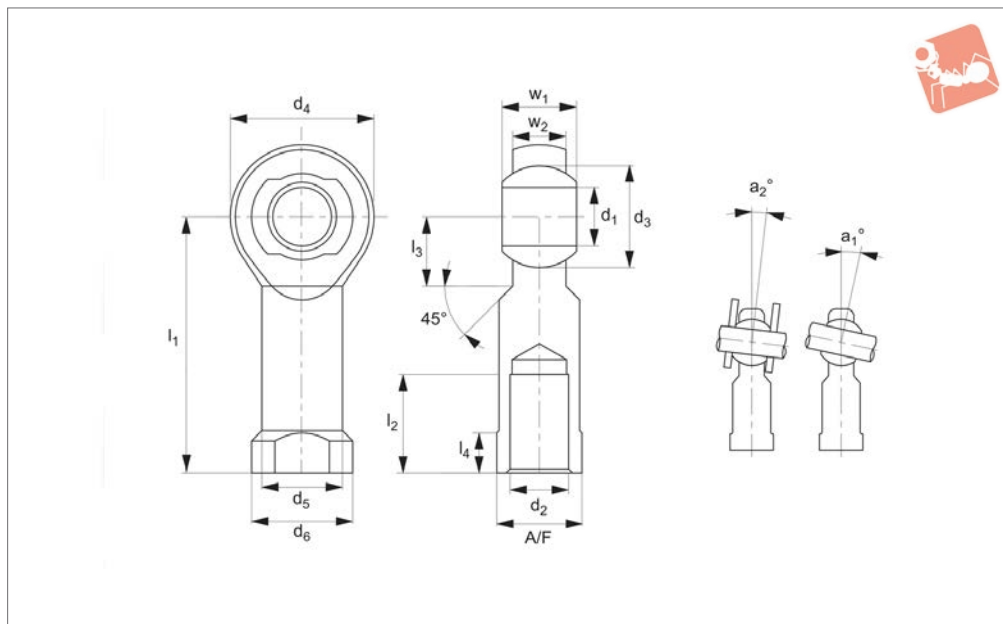
Axial static load



Material	Allowable stress (PSI)
300 Series stainless steel	35,000
Low carbon steel	52,000



65720



Material

Rod end housing - forged steel, tempered, surface galvanized.

Joint ball - ball bearing steel, hardened and ground, polished and chromium plated.

Race - nylon/teflon/glass compound.

Technical Notes

Maintenance free, sizes according to DIN ISO 12240-4, series K, thread according to Cetop RP 103 P.

For tolerances see technical pages.

Tips

Standard thread is right hand thread.

Important Notes

* Denotes fine pitch thread.

Order No.	Thread hand	d ₁	l ₁	d ₂	d ₃	d ₄	d ₅	d ₆	l ₂	Weight g
65720.W0004	Right	5	27	M4	11.11	18	9.0	11	10	18
65720.W0005	Right	5	27	M5	11.11	18	9.0	11	10	18
65720.W0006	Right	6	30	M6	12.70	20	10.0	13	12	24
65720.W0008	Right	8	36	M8	15.87	24	12.5	16	16	45
65720.W0010	Right	10	43	M10	19.05	28	15.0	19	20	74
65720.W0011	Right	10	43	M10x1,25*	19.05	28	15.0	19	20	74
65720.W0012	Right	12	50	M12	22.22	32	17.5	22	22	109
65720.W0013	Right	12	50	M12x1,25*	22.22	32	17.5	22	22	109
65720.W0014	Right	14	57	M14	25.40	36	20.0	25	25	155
65720.W0016	Right	16	64	M16	28.57	42	22.0	27	28	233
65720.W0017	Right	16	64	M16x1,5*	28.57	42	22.0	27	28	233
65720.W0018	Right	18	71	M18x1,5*	31.75	46	25.0	31	32	310
65720.W0020	Right	20	77	M20x1,5*	34.92	50	27.5	34	33	386
65720.W0022	Right	22	84	M22x1,5*	38.10	54	30.0	38	37	520
65720.W0025	Right	25	94	M24x2*	42.85	60	33.5	42	42	705
65720.W0030	Right	30	110	M30x2*	50.80	70	40.0	50	51	1084
65720.W0031	Right	30	110	M27x2*	50.80	70	40.0	50	51	1084
65720.W0504	Left	5	27	M4	11.11	18	9.0	11	10	18
65720.W0505	Left	5	27	M5	11.11	18	9.0	11	10	18
65720.W0506	Left	6	30	M6	12.70	20	10.0	13	12	24
65720.W0508	Left	8	36	M8	15.87	24	12.5	16	16	45
65720.W0510	Left	10	43	M10	19.05	28	15.0	19	20	74
65720.W0511	Left	10	43	M10x1,25*	19.05	28	15.0	19	20	74
65720.W0512	Left	12	50	M12	22.22	32	17.5	22	22	109
65720.W0513	Left	12	50	M12x1,25*	22.22	32	17.5	22	22	109
65720.W0514	Left	14	57	M14	25.40	36	20.0	25	25	155
65720.W0516	Left	16	64	M16	28.57	42	22.0	27	28	233
65720.W0517	Left	16	64	M16x1,5*	28.57	42	22.0	27	28	233
65720.W0518	Left	18	71	M18x1,5*	31.75	46	25.0	31	32	310
65720.W0520	Left	20	77	M20x1,5*	34.92	50	27.5	34	33	386
65720.W0522	Left	22	84	M22x1,5*	38.10	54	30.0	38	37	520
65720.W0525	Left	25	94	M24x2*	42.85	60	33.5	42	42	705



Heavy-Duty Rod Ends - Female

with integral spherical plain bearing



Rod Ends

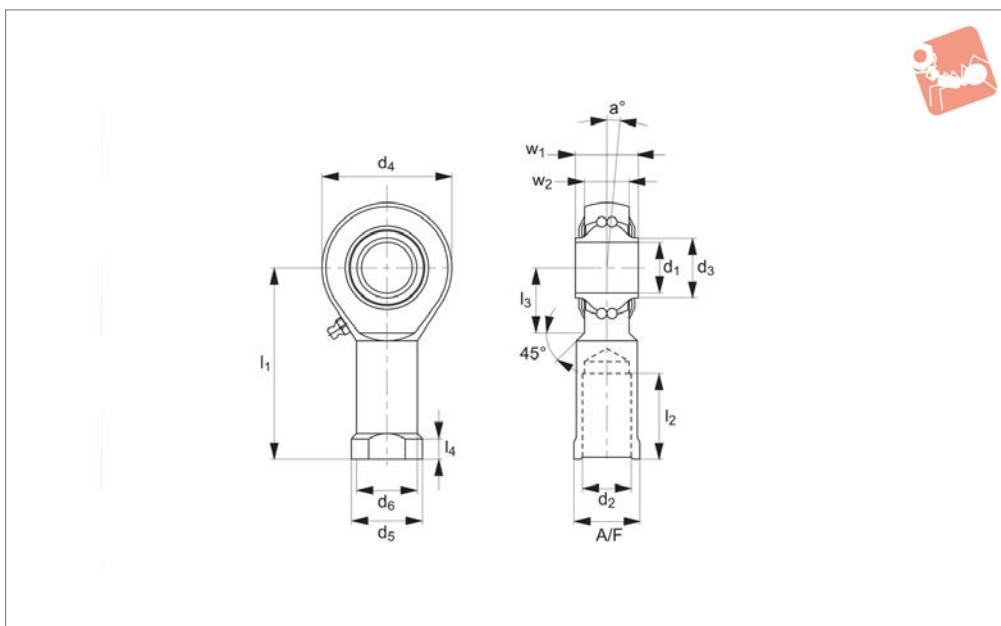
Order No.	Thread hand	d ₁	l ₁	d ₂	d ₃	d ₄	d ₅	d ₆	l ₂	Weight g
65720.W0530	Left	30	110	M30x2*	50.80	70	40.0	50	51	1084
65720.W0531	Left	30	110	M27x2*	50.80	70	40.0	50	51	1084

Order No.	l ₃	l ₄	w ₁	w ₂	A/F	a ₁	a ₂	Dyn. load C kN max.	Static load C ₀ kN max.
65720.W0004	10	4.0	8	6.00	9	13.0	7.5	3.91	10.8
65720.W0005	10	4.0	8	6.00	9	13.0	7.5	3.91	10.8
65720.W0006	12	5.0	9	6.75	11	13.0	6.5	4.59	12.8
65720.W0008	12	5.0	12	9.00	14	14.5	7.5	6.965	19.2
65720.W0010	15	6.5	14	10.50	17	13.5	8.0	10.42	27.4
65720.W0011	15	6.5	14	10.50	17	13.5	8.0	10.42	27.4
65720.W0012	16	6.5	16	12.00	19	13.0	8.0	12.42	33.4
65720.W0013	16	6.5	16	12.00	19	13.0	8.0	12.42	33.4
65720.W0014	20	8.0	19	13.50	22	16.0	9.5	15.44	41.3
65720.W0016	22	8.0	21	15.00	22	15.5	8.5	22.41	59.6
65720.W0017	22	8.0	21	15.00	22	15.5	8.5	22.41	59.6
65720.W0018	24	10.0	23	16.50	27	15.0	9.5	26.32	69.7
65720.W0020	26	10.0	25	18.00	30	14.5	9.0	30.80	82.2
65720.W0022	26	12.0	28	20.00	32	15.5	10.0	38.23	95.60
65720.W0025	30	12.0	31	22.00	36	15.0	10.0	45.35	118.6
65720.W0030	35	15.0	37	25.00	41	17.0	10.5	55.01	145.6
65720.W0031	35	15.0	37	25.00	41	17.0	10.5	55.01	145.6
65720.W0504	10	4.0	8	6.00	9	13.0	7.5	3.91	10.8
65720.W0505	10	4.0	8	6.00	9	13.0	7.5	3.91	10.8
65720.W0506	12	5.0	9	6.75	11	13.0	6.5	4.59	12.8
65720.W0508	12	5.0	12	9.00	14	14.5	7.5	6.965	19.2
65720.W0510	15	6.5	14	10.50	17	13.5	8.0	10.42	27.4
65720.W0511	15	6.5	14	10.50	17	13.5	8.0	10.42	27.4
65720.W0512	16	6.5	16	12.00	19	13.0	8.0	12.42	33.4
65720.W0513	16	6.5	16	12.00	19	13.0	8.0	12.42	33.4
65720.W0514	20	8.0	19	13.50	22	16.0	9.5	15.44	41.3
65720.W0516	22	8.0	21	15.00	22	15.5	8.5	22.41	59.6
65720.W0517	22	8.0	21	15.00	22	15.5	8.5	22.41	59.6
65720.W0518	24	10.0	23	16.50	27	15.0	9.5	26.32	69.7
65720.W0520	26	10.0	25	18.00	30	14.5	9.0	30.80	82.2
65720.W0522	26	12.0	28	20.00	32	15.5	10.0	38.23	95.6
65720.W0525	30	12.0	31	22.00	36	15.0	10.0	45.35	118.6
65720.W0530	35	15.0	37	25.00	41	17.0	10.5	55.01	145.6
65720.W0531	35	15.0	37	25.00	41	17.0	10.5	55.01	145.6

ROD ENDS



65760



Material

Rod end housing - forged steel, tempered, case hardened bearing race, ground and lapped, surface galvanized.

Inner ring - ball bearing steel, hardened, superfine ground.

Lubrication - calcium-complex-soap-

grease, temp range -20°C to +120°C.

Lubrication nipple - DIN 3405 D1/A (sizes 6 to 10) DIN 71412 H1 (sizes 12 to 30).

Technical Notes

Low maintenance. Sizes according to DIN ISO 12240-4 series K, for tolerances see

technical pages.

Tips

Standard thread is right hand thread.

Important Notes

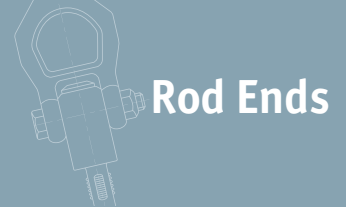
*Denotes fine pitch thread.

Order No.	Thread hand	d ₁	l ₁	d ₂	d ₃	d ₄	d ₅	d ₆	l ₂	l ₃	l ₄	Weight g
65760.W0106	Right	6	30	M6	9.0	20	10.0	13	12	10	5.0	24
65760.W0108	Right	8	36	M8	10.5	24	12.5	16	16	12	5.0	44
65760.W0110	Right	10	43	M10	12.0	28	15.0	19	20	15	6.5	72
65760.W0112	Right	12	50	M12	14.5	32	17.5	22	22	16	6.5	107
65760.W0114	Right	14	57	M14	17.0	36	20.0	25	25	20	8.0	160
65760.W0116	Right	16	64	M16	19.0	42	22.0	27	28	22	8.0	224
65760.W0118	Right	18	71	M18X1,5*	21.5	46	25.0	31	32	24	10.0	293
65760.W0120	Right	20	77	M20X1,5*	24.5	50	27.5	34	33	26	10.0	367
65760.W0122	Right	22	84	M22X1,5*	26.0	54	30.0	38	37	26	12.0	480
65760.W0125	Right	25	94	M24X2*	29.5	64	30.0	35	42	32	10.0	572
65760.W0130	Right	30	110	M30X2*	34.5	70	40.0	50	51	35	15.0	978
65760.W0206	Left	6	30	M6	9.0	20	10.0	13	12	10	5.0	24
65760.W0208	Left	8	36	M8	10.5	24	12.5	16	16	12	5.0	44
65760.W0210	Left	10	43	M10	12.0	28	15.0	19	20	15	6.5	72
65760.W0212	Left	12	50	M12	14.5	32	17.5	22	22	16	6.5	107
65760.W0216	Left	16	64	M16	19.0	42	22.0	27	28	22	8.0	224
65760.W0214	Left	14	57	M14	17.0	36	20.0	25	25	20	8.0	160
65760.W0218	Left	18	71	M18X1,5*	21.5	46	25.0	31	32	24	10.0	293
65760.W0220	Left	20	77	M20X1,5*	24.5	50	27.5	34	33	26	10.0	367
65760.W0222	Left	22	84	M22X1,5*	26.0	54	30.0	38	37	26	12.0	480
65760.W0225	Left	25	94	M24X2*	29.5	64	30.0	35	42	32	10.0	572
65760.W0230	Left	30	110	M30X2*	34.5	70	40.0	50	51	35	15.0	978

Order No.	w ₁	w ₂	A/F	a°	Calc. factor Y	Dyn. load C kN max.	Calc. factor Y ₀	Speed rpm max.	Static load C ₀ kN max.
65760.W0106	9	6.75	11	8.0	2.09	2.8	2.19	1350	0.7
65760.W0108	12	9.00	14	8.5	1.80	4.0	1.89	1300	1.0
65760.W0110	14	10.50	17	8.0	1.90	4.5	1.81	1225	1.5
65760.W0112	16	12.00	19	7.5	1.74	5.6	1.82	1125	2.0



Heavy-Duty Rod Ends - Female with integral ball bearing



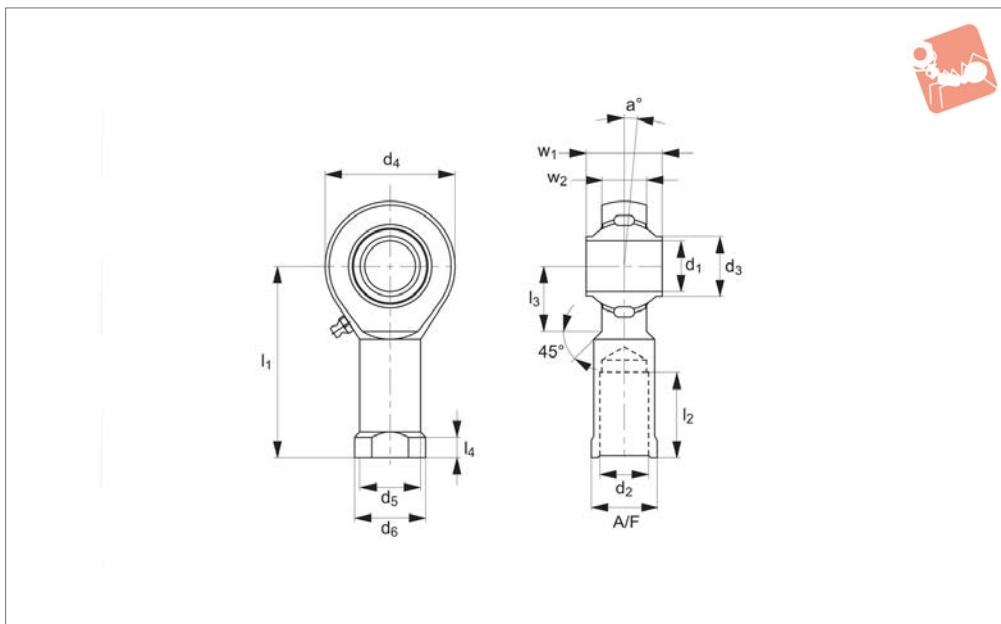
Rod Ends

Order No.	w ₁	w ₂	A/F	a °	Calc. factor Y	Dyn. load C kN max.	Calc. factor Y ₀	Speed rpm max.	Static load C ₀ kN max.
65760.W0114	19	13.50	22	6.0	2.36	7.1	2.48	1025	2.9
65760.W0116	21	15.00	22	8.0	2.24	7.9	2.35	975	3.5
65760.W0118	23	16.50	27	8.5	2.21	11.0	2.31	900	5.7
65760.W0120	25	18.00	30	7.0	2.46	14.2	2.58	825	7.5
65760.W0122	28	20.00	32	8.0	2.35	14.2	2.24	725	7.5
65760.W0125	31	22.00	30	5.0	2.02	14.2	2.12	600	7.5
65760.W0130	37	25.00	41	7.5	2.24	14.2	2.35	450	7.5
65760.W0206	9	6.75	11	8.0	2.09	2.8	2.19	1350	0.7
65760.W0208	12	9.00	14	8.5	1.80	4.0	1.89	1300	1.0
65760.W0210	14	10.50	17	8.0	1.90	4.5	1.81	1225	1.5
65760.W0212	16	12.00	19	7.5	1.74	5.6	1.82	1125	2.0
65760.W0216	21	15.00	22	8.0	2.24	7.9	2.35	1025	3.5
65760.W0214	19	13.50	22	6.0	2.36	7.1	2.48	975	2.9
65760.W0218	23	16.50	27	8.5	2.21	11.0	2.31	900	5.7
65760.W0220	25	18.00	30	7.0	2.46	14.2	2.58	825	7.5
65760.W0222	28	20.00	32	8.0	2.35	14.2	2.24	725	7.5
65760.W0225	31	22.00	30	5.0	2.02	14.2	2.12	600	7.5
65760.W0230	37	25.00	41	7.5	2.24	14.2	2.35	425	7.5

ROD ENDS



65800



Material

Rod end housing - forged steel, tempered, case hardened bearing race, ground and lapped, surface galvanized.

Inner ring - ball bearing steel, hardened, superfine ground.

Lubrication - calcium-complex-soap-

grease, temp. range -20°C to +120°C, lubrication nipple - DIN 71412 HZ.

Technical Notes

Low maintenance. Sizes according to DIN ISO 12240-4, series K, for tolerances see technical pages.

Tips

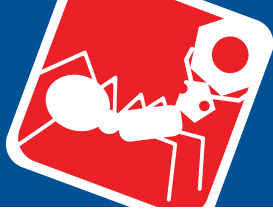
Standard thread is right hand thread.

Important Notes

* Denotes fine pitch thread.

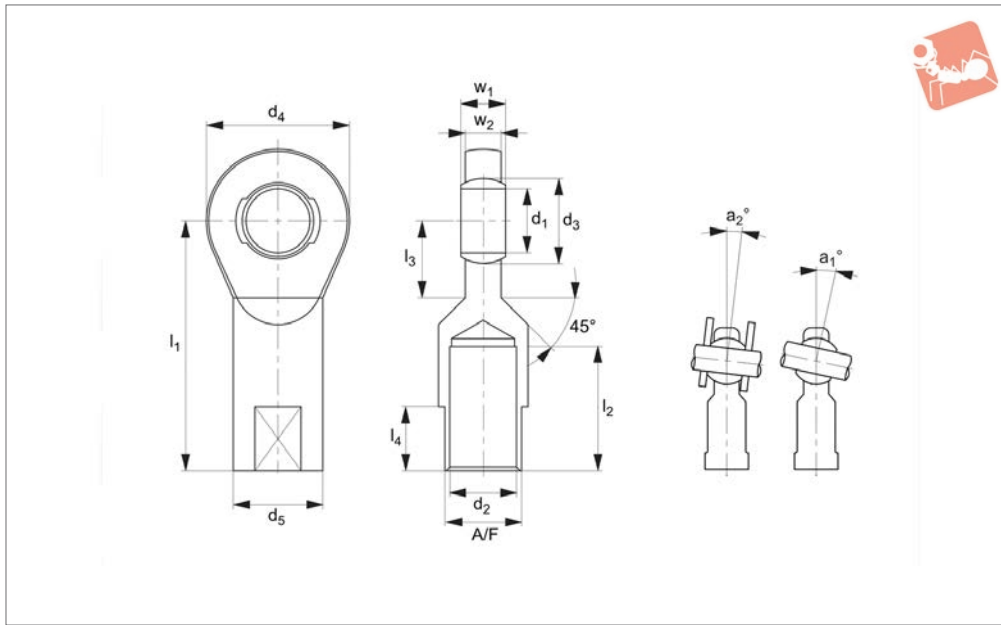
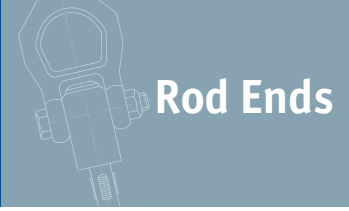
Order No.	Thread hand	d ₁	l ₁	d ₂	d ₃	d ₄	d ₅	d ₆	l ₂	Weight g
65800.W0112	Right	12	50.0	M12	14.5	32	17.5	22	22.0	109
65800.W0116	Right	16	64.0	M16	19.0	42	22.0	27	28.0	220
65800.W0120	Right	20	77.0	M20x1,5*	24.5	50	27.5	34	33.0	361
65800.W0125	Right	25	94.0	M24x2*	29.5	64	30.0	35	42.0	565
65800.W0130	Right	30	110.0	M30x2*	34.5	70	40.0	50	51.0	1000
65800.W0212	Left	12	50.0	M12	14.5	32	17.5	22	22.0	109
65800.W0216	Left	16	64.0	M16	19.0	42	22.0	27	28.0	220
65800.W0220	Left	20	77.0	M20x1,5*	24.5	50	27.5	34	33.0	361
65800.W0225	Left	25	94.0	M24x2*	29.5	64	30.0	35	42.0	565
65800.W0230	Left	30	110.0	M30x2*	34.5	70	40.0	50	51.0	1000

Order No.	l ₃	l ₄	w ₁	w ₂	A/F	a°	Dyn. load C kN max.	Speed rpm max.	Static load C ₀ kN max.
65800.W0112	16	6.5	16	12	19	7.5	10.3	1125	6.6
65800.W0116	22	8.0	21	15	22	7.0	13.3	975	8.9
65800.W0120	26	10.0	25	18	30	7.0	17.0	825	11.7
65800.W0125	32	10.0	31	22	30	5.0	24.9	600	18.5
65800.W0130	35	15.0	37	25	41	7.5	32.5	450	24.9
65800.W0212	16	6.5	16	12	19	7.5	10.3	1125	6.6
65800.W0216	22	8.0	21	15	22	7.0	13.3	975	8.9
65800.W0220	26	10.0	25	18	30	7.0	17.0	825	11.7
65800.W0225	32	10.0	31	22	30	5.0	24.9	600	18.5
65800.W0230	35	15.0	37	25	41	7.5	32.5	450	24.9



Heavy-Duty Rod Ends - Female

with integral spherical plain bearing



65880

ROD ENDS

Material

Rod end housing - forged steel, tempered, surface galvanized.
 Joint ball - ball bearing steel, hardened and ground, polished and chromium plated.

Race - nylon/teflon/glass compound.

Technical Notes

Female thread maintenance free adapter sizes according to DIN ISO 12240-4, series E.

For tolerances see technical pages.

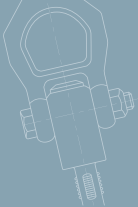
Tips

Standard thread is right hand thread.

Important Notes

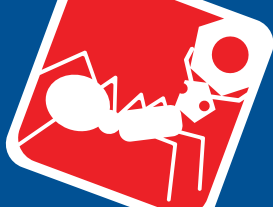
*Denotes fine pitch thread.

Order No.	Thread hand	d ₁	l ₁	d ₂	d ₃	d ₄	d ₅	l ₂	l ₃	Weight g
65880.W0106	Right	6	30	M6	10.0	20	10	12	11	17
65880.W0108	Right	8	36	M8	13.0	23	13	16	12	31
65880.W0110	Right	10	43	M10	16.0	28	16	20	13	54
65880.W0111	Right	10	43	M10x1,25*	16.0	28	16	20	13	54
65880.W0112	Right	12	50	M12	18.0	32	19	22	15	86
65880.W0113	Right	12	50	M12x1,25*	18.0	32	19	22	15	86
65880.W0115	Right	15	61	M14	22.0	38	22	25	18	142
65880.W0117	Right	17	67	M16	25.0	44	25	28	20	208
65880.W0120	Right	20	77	M20x1,5*	29.0	51	28	33	23	290
65880.W0125	Right	25	94	M24x2*	35.5	62	35	42	30	573
65880.W0130	Right	30	110	M30x2*	40.7	70	42	51	32	908
65880.W0135	Right	35	125	M36x3*	47.0	82	50	61	38	1230
65880.W0136	Right	35	130	M36x2*	47.0	82	50	66	38	1230
65880.W0140	Right	40	145	M42x3*	53.0	92	58	71	42	2075
65880.W0141	Right	40	142	M39x3*	53.0	92	52	66	42	1880
65880.W0145	Right	45	165	M45x3*	60.0	102	67	76	50	3085
65880.W0146	Right	45	145	M42x3*	60.0	102	58	66	50	2500
65880.W0150	Right	50	195	M52x3*	66.0	112	70	89	60	3975
65880.W0151	Right	50	160	M45x3*	66.0	112	62	69	60	3200
65880.W0160	Right	60	225	M60x4*	80.0	135	82	103	70	7300
65880.W0161	Right	60	175	M52x3*	80.0	135	71	71	70	5900
65880.W0206	Left	6	30	M6	10.0	20	10	12	11	17
65880.W0208	Left	8	36	M8	13.0	23	13	16	12	31
65880.W0210	Left	10	43	M10	16.0	28	16	20	13	54
65880.W0211	Left	10	43	M10x1,25*	16.0	28	16	20	13	54
65880.W0212	Left	12	50	M12	18.0	32	19	22	15	86
65880.W0213	Left	12	50	M12x1,25*	18.0	32	19	22	15	86
65880.W0215	Left	15	61	M14	22.0	38	22	25	18	142
65880.W0217	Left	17	67	M16	25.0	44	25	28	20	208
65880.W0220	Left	20	77	M20x1,5*	29.0	51	28	33	23	290
65880.W0225	Left	25	94	M24x2*	35.5	62	35	42	30	573
65880.W0230	Left	30	110	M30x2*	40.7	70	42	51	32	908

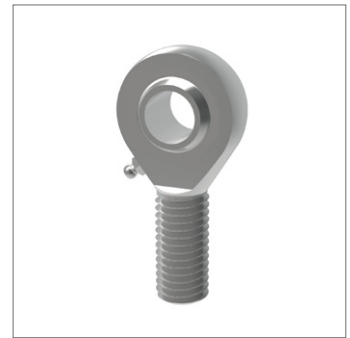
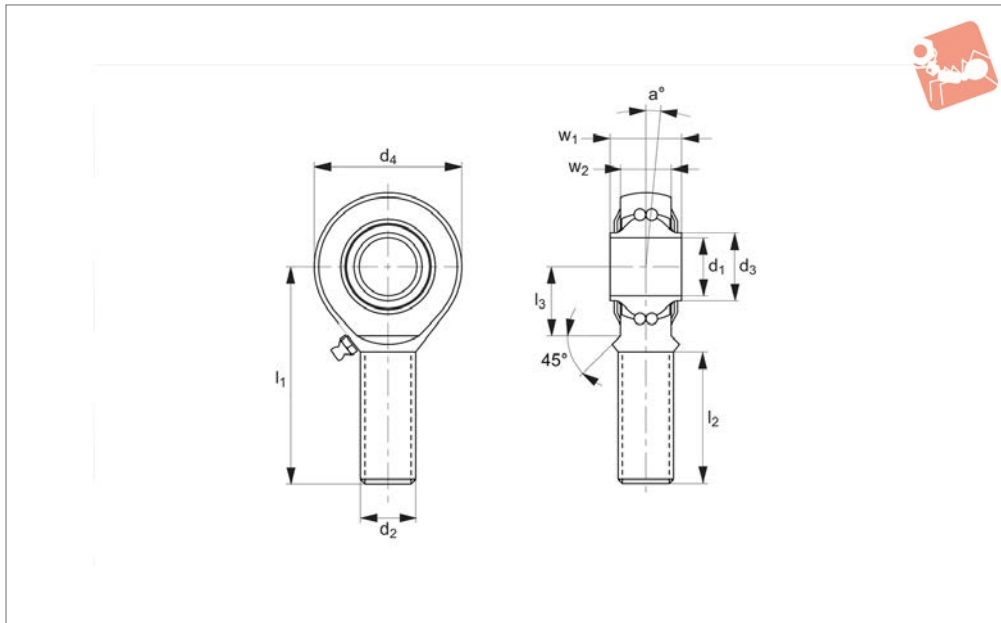
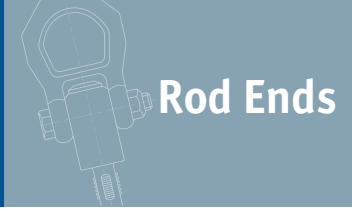


Order No.	Thread hand	d ₁	l ₁	d ₂	d ₃	d ₄	d ₅	l ₂	l ₃	Weight g
65880.W0235	Left	35	125	M36x3*	47.0	82	50	61	38	1230
65880.W0236	Left	35	130	M36x2*	47.0	82	50	66	38	1230
65880.W0240	Left	40	145	M42x3*	53.0	92	58	71	42	2075
65880.W0241	Left	40	142	M39x3*	53.0	92	52	66	42	1880
65880.W0245	Left	45	165	M45x3*	60.0	102	67	76	50	3085
65880.W0246	Left	45	145	M42x3*	60.0	102	58	66	50	2500
65880.W0250	Left	50	195	M52x3*	66.0	112	70	89	60	3975
65880.W0251	Left	50	160	M45x3*	66.0	112	62	69	60	3200
65880.W0260	Left	60	225	M60x4*	80.0	135	82	103	70	7300
65880.W0261	Left	60	175	M52x3*	80.0	135	71	71	70	5900

Order No.	l ₄	w ₁	w ₂	A/F	a ₁	a ₂	Dyn. load C kN max.	Static load C ₀ kN max.
65880.W0106	-	6	4	9	13.0	6.5	2.5	10.6
65880.W0108	-	8	5	11	15.0	8.0	4.2	13.1
65880.W0110	-	9	6	14	12.0	6.0	6.4	18.8
65880.W0111	-	9	6	14	12.0	6.0	6.4	18.8
65880.W0112	-	10	7	17	10.5	5.0	9.2	28.0
65880.W0113	-	10	7	17	10.5	5.0	9.2	28.0
65880.W0115	-	12	9	19	8.5	4.5	13.4	41.0
65880.W0117	-	14	10	22	10.0	5.5	19.2	57.9
65880.W0120	-	16	12	24	9.0	4.5	25.2	76.7
65880.W0125	-	20	16	30	7.5	3.5	42.4	119.1
65880.W0130	-	22	18	36	6.0	3.0	54.0	141.8
65880.W0135	36	25	20	41	6.5	3.5	70.4	180.8
65880.W0136	41	25	20	41	6.5	3.5	70.4	180.8
65880.W0140	42	28	22	50	7.0	3.5	86.0	222.6
65880.W0141	39	28	22	46	7.0	3.5	86.0	222.6
65880.W0145	45	32	25	55	7.5	4.0	107.0	276.2
65880.W0146	42	32	25	50	7.5	4.0	107.0	276.2
65880.W0150	52	35	28	60	6.5	3.0	132.0	339.2
65880.W0151	45	35	28	55	6.5	3.0	132.0	339.2
65880.W0160	60	44	36	70	6.5	3.5	208.0	532.1
65880.W0161	52	44	36	60	6.5	3.5	208.0	532.1
65880.W0206	-	6	4	9	13.0	6.5	2.5	10.6
65880.W0208	-	8	5	11	15.0	8.0	4.2	13.1
65880.W0210	-	9	6	14	12.0	6.0	6.4	18.8
65880.W0211	-	9	6	14	12.0	6.0	6.4	18.8
65880.W0212	-	10	7	17	10.5	5.0	9.2	28.0
65880.W0213	-	10	7	17	10.5	5.0	9.2	28.0
65880.W0215	-	12	9	19	8.5	4.5	13.4	41.0
65880.W0217	-	14	10	22	10.0	5.5	19.2	57.9
65880.W0220	-	16	12	24	9.0	4.5	25.2	76.7
65880.W0225	-	20	16	30	7.5	3.5	42.4	119.1
65880.W0230	-	22	18	36	6.0	3.0	54.0	141.8
65880.W0235	36	25	20	41	6.5	3.5	70.4	180.8
65880.W0236	41	25	20	41	6.5	3.5	70.4	180.8
65880.W0240	42	28	22	50	7.0	3.5	86.0	222.6
65880.W0241	39	28	22	46	7.0	3.5	86.0	222.6
65880.W0245	45	32	25	55	7.5	4.0	107.0	276.2
65880.W0246	42	32	25	50	7.5	4.0	107.0	276.2
65880.W0250	52	35	28	60	6.5	3.0	132.0	339.2
65880.W0251	45	35	28	55	6.5	3.0	132.0	339.2
65880.W0260	60	44	36	70	6.5	3.5	208.0	532.1
65880.W0261	52	44	36	60	6.5	3.5	208.0	532.1



Stainless Heavy-Duty Rod Ends - Male with integral ball bearing



65742

ROD ENDS

Material

Housing - stainless steel (AISI 304), forged, hardened bearing race, superfinished, rolled thread.

Inner ring - stainless steel (AISI 304), hardened, superfine finish.

Lubrication - aluminium-complex-soap-grease, temp range -45°C to +120°C.

Lubrication nipple - DIN 3405 D1/A (until size 10) DIN 71412 H1 (from size 12).

Technical Notes

Low maintenance, sizes according to DIN ISO 12240-4 series K, for tolerances see

technical pages.

Tips

Standard thread is right hand thread.

Important Notes

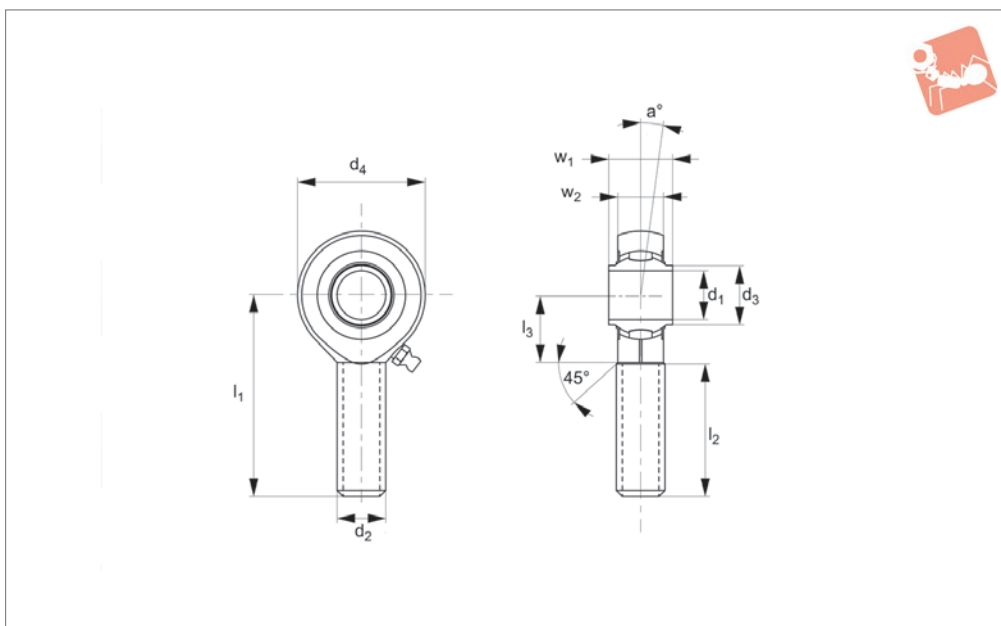
*Denotes fine pitch thread.

Order No.	Thread hand	d ₁	l ₁	d ₂	d ₃	l ₂	d ₄	a°	l ₃	w ₁	Weight g
65742.W0008	Right	8	42	M8	10.5	25	24	8.5	15	12	36
65742.W0010	Right	10	48	M10	12.0	29	28	8.0	15	14	60
65742.W0012	Right	12	54	M12	14.5	33	32	7.5	19	16	87
65742.W0016	Right	16	66	M16	19.0	40	42	8.0	22	21	190
65742.W0020	Right	20	78	M20x1,5*	24.5	47	50	7.0	28	25	338
65742.W0508	Left	8	42	M8	10.5	25	24	8.5	15	12	36
65742.W0510	Left	10	48	M10	12.0	29	28	8.0	15	14	60
65742.W0512	Left	12	54	M12	14.5	33	32	7.5	19	16	87
65742.W0516	Left	16	66	M16	19.0	40	42	8.0	22	21	190
65742.W0520	Left	20	78	M20x1,5*	24.5	47	50	7.0	28	25	338

Order No.	w ₂	Calc. factor Y	Calc. factor Y ₀	Dyn. load C kN max.	Speed rpm max.	Static load C ₀ kN max.
65742.W0008	9.00	1.89	1.80	0.7	1300	2.8
65742.W0010	10.50	1.81	1.90	1.0	1225	3.1
65742.W0012	12.00	1.82	1.74	1.3	1125	3.5
65742.W0016	15.00	2.35	2.24	1.6	975	4.3
65742.W0020	18.00	2.58	2.46	2.3	825	5.4
65742.W0508	9.00	1.89	1.80	0.7	1300	2.8
65742.W0510	10.50	1.81	1.90	1.0	1225	3.1
65742.W0512	12.00	1.82	1.74	1.3	1125	3.5
65742.W0516	15.00	2.35	2.24	1.6	975	4.3
65742.W0520	18.00	2.58	2.46	2.3	825	5.4



65780



Material

Rod end housing - forged steel, tempered, case hardened bearing race, ground and lapped, surface galvanized.

Inner ring - ball bearing steel, hardened, superfine ground.

Lubrication - calcium-complex-soap-

grease, temp. range -20°C to +120°C, lubrication nipple - DIN 71412 HZ.

Technical Notes

Low maintenance. Sizes according to DIN ISO 12240-4, series K, for tolerances see technical pages.

Tips

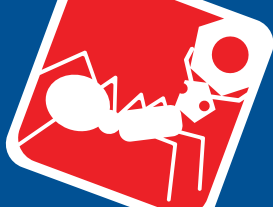
Standard thread is right hand thread.

Important Notes

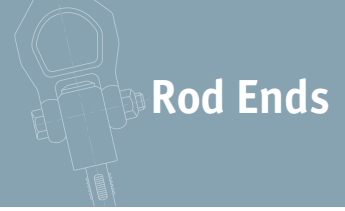
* Denotes fine pitch thread.

Order No.	Thread hand	d ₁	l ₁	d ₂	d ₃	l ₂	d ₄	a _o	Weight g
65780.W0112	Right	12	54	M12	14.5	33	32	7.5	88
65780.W0116	Right	16	66	M16	19.0	40	42	7.0	185
65780.W0120	Right	20	78	M20x1,5*	24.5	47	50	7.0	340
65780.W0125	Right	25	94	M24x2*	29.5	57	64	5.0	596
65780.W0130	Right	30	110	M30x2*	34.5	66	70	7.5	912
65780.W0512	Left	12	54	M12	14.5	33	32	7.5	88
65780.W0516	Left	16	66	M16	19.0	40	42	7.0	185
65780.W0520	Left	20	78	M20x1,5*	24.5	47	50	7.0	340
65780.W0525	Left	25	94	M24x2*	29.5	57	64	5.0	596
65780.W0530	Left	30	110	M30x2*	34.5	66	70	7.5	912

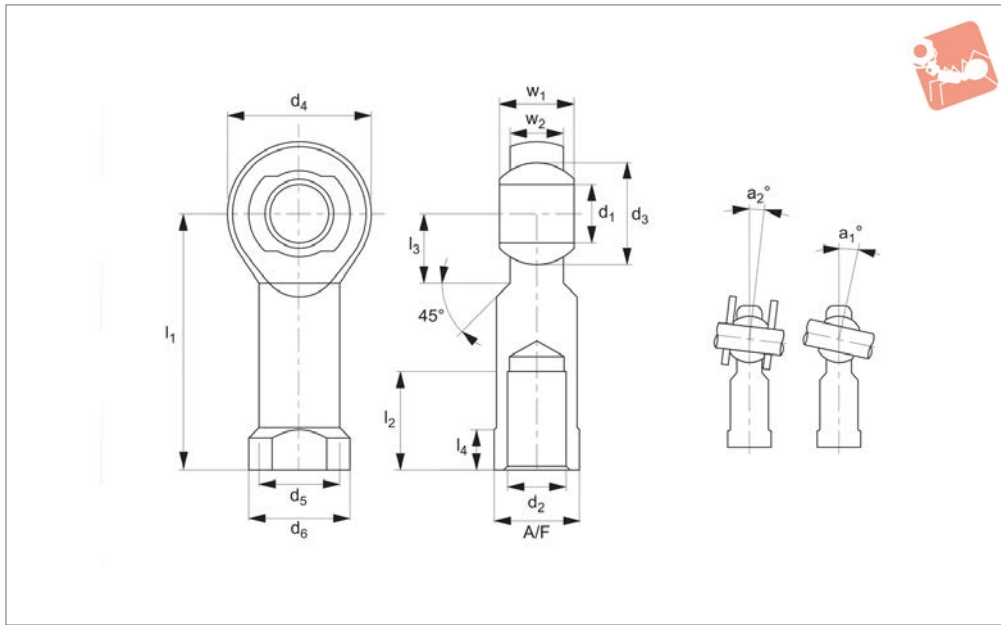
Order No.	l ₃	w ₁	w ₂	Dyn. load C kN max.	Speed rpm max.	Static load C ₀ kN max.
65780.W0112	19	16	12	10.25	1125	6.6
65780.W0116	22	21	15	13.3	975	8.9
65780.W0120	28	25	18	17.0	825	11.7
65780.W0125	30	31	22	24.90	600	18.5
65780.W0130	35	37	25	32.5	450	24.8
65780.W0512	19	16	12	10.25	1125	6.6
65780.W0516	22	21	15	13.3	975	8.9
65780.W0520	28	25	18	17.0	825	11.7
65780.W0525	30	31	22	24.9	600	18.5
65780.W0530	35	37	25	32.5	450	24.8



Stainless Heavy-Duty Rod Ends - with integral spherical plain bearing



Rod Ends



65722

ROD ENDS

Material

Rod end housing: Stainless steel DIN 12240-4 (AISI 304).

Joint Ball: Stainless steel 1.4412, hardened and ground, surface polished.

Race: nylon/teflon/glass compound.

Technical Notes

Maintenance free, for tolerances see technical page 123, standard thread is right hand thread.

Technical page 123, standard thread is right hand thread.

Tips

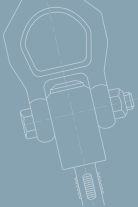
A2 stainless steel provides good corrosion resistance to a wide range of atmospheric conditions and corrosive media.

It is considered resistant to potable water.

Important Notes

*Denotes fine pitch thread.

Order No.	Thread hand	d ₁	l ₁	d ₂	d ₃	d ₄	d ₅	d ₆	l ₂	Weight g
65722.W0104	Right	5	36	M4	11.11	18	9.0	11	10	18
65722.W0105	Right	5	36	M5	11.11	18	9.0	11	10	18
65722.W0106	Right	6	40	M6	12.70	20	10.0	13	12	24
65722.W0108	Right	8	48	M8	15.87	24	12.5	16	16	45
65722.W0110	Right	10	57	M10	19.05	28	15.0	19	20	74
65722.W0111	Right	10	57	M10x1,25*	19.05	28	15.0	19	20	74
65722.W0112	Right	12	66	M12	22.22	32	17.5	22	22	109
65722.W0113	Right	12	66	M12x1,25*	22.22	32	17.5	22	22	109
65722.W0114	Right	14	75	M14	25.40	36	20.0	25	25	155
65722.W0116	Right	16	85	M16	28.57	42	22.0	27	28	233
65722.W0117	Right	16	85	M16x1,5*	28.57	42	22.0	27	28	233
65722.W0118	Right	18	94	M18x1,5*	31.75	46	25.0	31	32	310
65722.W0120	Right	20	102	M20x1,5*	34.92	50	27.5	34	33	386
65722.W0122	Right	22	111	M22x1,5*	38.10	54	30.0	38	37	520
65722.W0125	Right	25	124	M24x2*	42.85	60	33.5	42	42	705
65722.W0130	Right	30	145	M30x2*	50.80	70	40.0	50	51	1084
65722.W0131	Right	30	145	M27x2*	50.80	70	40.0	50	51	1084
65722.W0504	Left	5	36	M4	11.11	18	9.0	11	10	18
65722.W0505	Left	5	36	M5	11.11	18	9.0	11	10	18
65722.W0506	Left	6	40	M6	12.70	20	10.0	13	12	24
65722.W0508	Left	8	48	M8	15.87	24	12.5	16	16	45
65722.W0510	Left	10	57	M10	19.05	28	15.0	19	20	74
65722.W0511	Left	10	57	M10x1,25*	19.05	28	15.0	19	20	74
65722.W0512	Left	12	66	M12	22.22	32	17.5	22	22	109
65722.W0513	Left	12	66	M12x1,25*	22.22	32	17.5	22	22	109
65722.W0514	Left	14	75	M14	25.40	36	20.0	25	25	155
65722.W0516	Left	16	85	M16	28.57	42	22.0	27	28	233
65722.W0517	Left	16	85	M16x1,5*	28.57	42	22.0	27	28	233
65722.W0518	Left	18	94	M18x1,5*	31.75	46	25.0	31	32	310

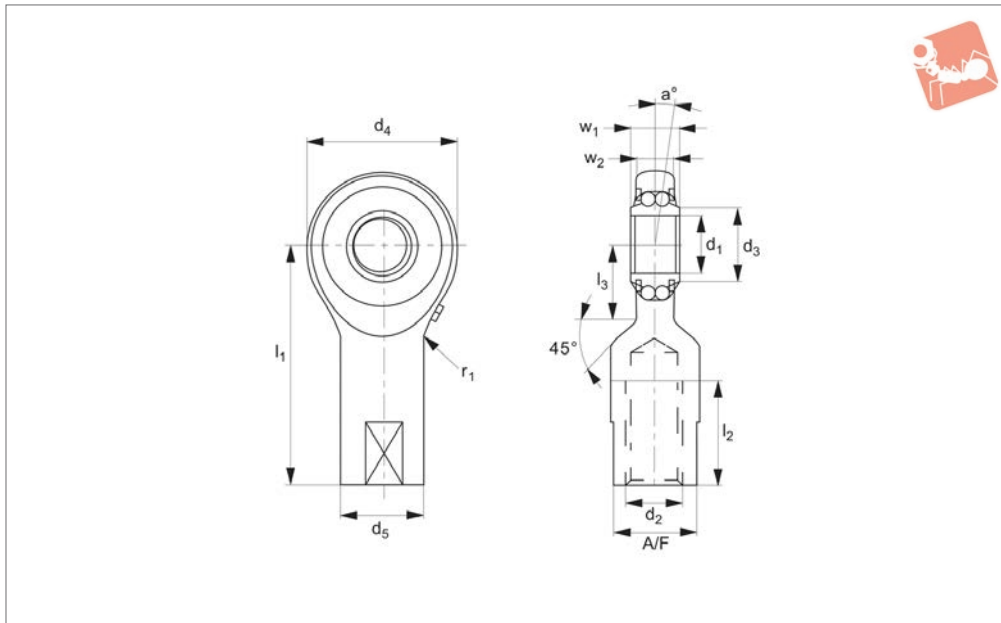
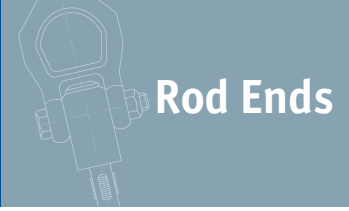


Order No.	Thread hand	d ₁	l ₁	d ₂	d ₃	d ₄	d ₅	d ₆	l ₂	Weight g
65722.W0520	Left	20	102	M20x1,5*	34.92	50	27.5	34	33	386
65722.W0522	Left	22	111	M22x1,5*	38.10	54	30.0	38	37	520
65722.W0525	Left	25	124	M24x2*	42.85	60	33.5	42	42	705
65722.W0530	Left	30	145	M30x2*	50.80	70	40.0	50	51	1084
65722.W0531	Left	30	145	M27x2*	50.80	70	40.0	50	51	1084

Order No.	l ₃	l ₄	w ₁	w ₂	A/F	a ₁	a ₂	Dyn. load C kN max.	Static load C ₀ kN max.
65722.W0104	10	4.0	8	6.00	9	13.0	7.5	3.9	7.9
65722.W0105	10	4.0	8	6.00	9	13.0	7.5	3.9	7.9
65722.W0106	12	5.0	9	6.75	11	13.0	6.5	4.6	9.4
65722.W0108	12	5.0	12	9.00	14	14.5	7.5	7.0	14.1
65722.W0110	15	6.5	14	10.50	17	13.5	8.0	10.4	20.1
65722.W0111	15	6.5	14	10.50	17	13.5	8.0	10.4	20.1
65722.W0112	16	6.5	16	12.00	19	13.0	8.0	12.4	24.5
65722.W0113	16	6.5	16	12.00	19	13.0	8.0	12.4	24.5
65722.W0114	20	8.0	19	13.50	22	16.0	9.5	15.4	30.4
65722.W0116	22	8.0	21	15.00	22	15.5	8.5	22.4	43.7
65722.W0117	22	8.0	21	15.00	22	15.5	8.5	22.4	43.7
65722.W0118	24	10.0	23	16.50	27	15.0	9.5	26.3	51.2
65722.W0120	26	10.0	25	18.00	30	14.5	9.0	30.8	60.3
65722.W0122	26	12.0	28	20.00	32	15.5	10.0	38.2	70.0
65722.W0125	30	12.0	31	22.00	36	15.0	10.0	45.4	87.0
65722.W0130	35	15.0	37	25.00	41	17.0	10.5	55.0	106.8
65722.W0131	35	15.0	37	25.00	41	17.0	10.5	55.0	106.8
65722.W0504	10	4.0	8	6.00	9	13.0	7.5	3.9	7.9
65722.W0505	10	4.0	8	6.00	9	13.0	7.5	3.9	7.9
65722.W0506	12	5.0	9	6.75	11	13.0	6.5	4.6	9.4
65722.W0508	12	5.0	12	9.00	14	14.5	7.5	7.0	14.1
65722.W0510	15	6.5	14	10.50	17	13.5	8.0	10.4	20.1
65722.W0511	15	6.5	14	10.50	17	13.5	8.0	10.4	20.1
65722.W0512	16	6.5	16	12.00	19	13.0	8.0	12.4	24.5
65722.W0513	16	6.5	16	12.00	19	13.0	8.0	12.4	24.5
65722.W0514	20	8.0	19	13.50	22	16.0	9.5	15.4	30.4
65722.W0516	22	8.0	21	15.00	22	15.5	8.5	22.4	43.7
65722.W0517	22	8.0	21	15.00	22	15.5	8.5	22.4	43.7
65722.W0518	24	10.0	23	16.50	27	15.0	9.5	26.3	51.2
65722.W0520	26	10.0	25	18.00	30	14.5	9.0	30.8	60.3
65722.W0522	26	12.0	28	20.00	32	15.5	10.0	38.2	70.0
65722.W0525	30	12.0	31	22.00	36	15.0	10.0	45.4	87.0
65722.W0530	35	15.0	37	25.00	41	17.0	10.5	55.0	106.8
65722.W0531	35	15.0	37	25.00	41	17.0	10.5	55.0	106.8



Heavy-Duty Rod Ends - Female with integral ball bearing



65840

ROD ENDS

Material

Rod end housing - forged steel, tempered, case hardened bearing race, ground and lapped, surface galvanized.
Inner ring - ball bearing steel, hardened, superfine ground.

Lubrication - calcium-complex-soap-grease, temp range -20°C to +120°C, lubrication nipple - DIN 3405 D1/A.

Technical Notes

Low maintenance, for tolerances see technical pages.

Standard thread is right hand thread.

Tips

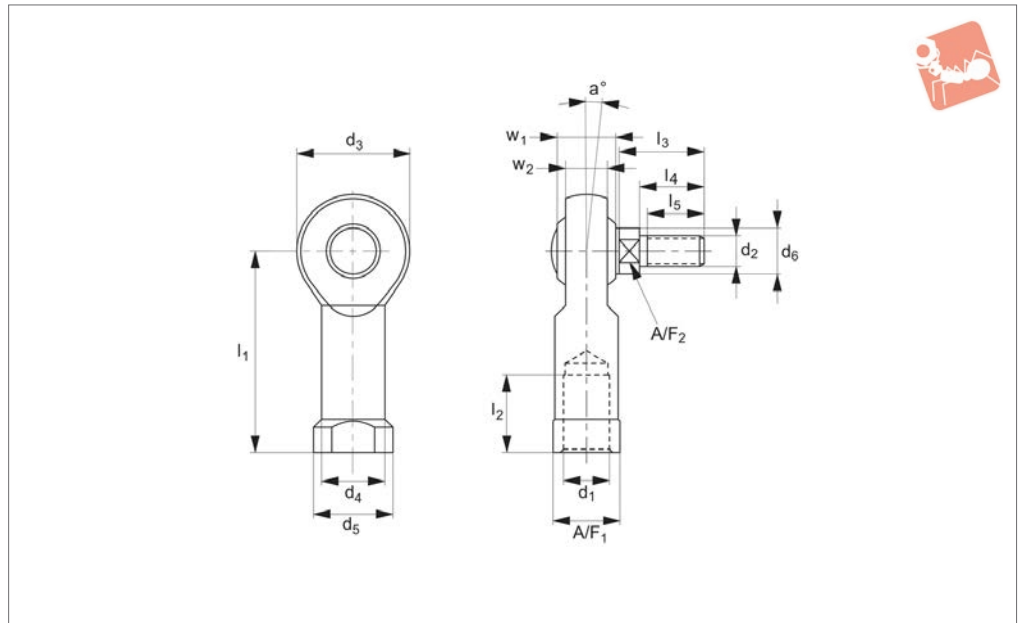
Standard thread is right hand thread.

Order No.	Thread hand	d ₁	l ₁	d ₂	d ₃	d ₄	d ₅	l ₂	l ₃	w ₁	w ₂	R	Weight g
65840.W0010	Right	10	38	M8	13.0	30	15	17	14.5	13.0	9	10	63
65840.W0015	Right	15	51	M12	17.5	40	19	24	20.0	16.5	12	15	140
65840.W0020	Right	20	65	M16	24.0	48	22	32	22.0	20.5	15	20	223
65840.W0510	Left	10	38	M8	13.0	30	15	17	14.5	13.0	9	10	63
65840.W0515	Left	15	51	M12	17.5	40	19	24	20.0	16.5	12	15	140
65840.W0520	Left	20	65	M16	24.0	48	22	32	22.0	20.5	15	20	223

Order No.	A/F	a°	Calc. factor Y	Dyn. load C kN max.	Calc. factor Y ₀	Speed rpm max.	Static load C ₀ kN max.
65840.W0010	13	7.0	1.90	2.6	1.81	1225	1.0
65840.W0015	17	7.0	2.30	5.0	2.41	1025	1.9
65840.W0020	19	6.5	2.34	6.1	2.45	850	3.0
65840.W0510	13	7.0	1.90	2.6	1.81	1225	1.0
65840.W0515	17	7.0	2.30	5.0	2.41	1025	1.9
65840.W0520	19	6.5	2.34	6.1	2.45	850	3.0



65990



ROD ENDS

Material

Body: surface zinc plated
 Race: steel/ bronze - PTFE composite.
 Inner ring: bearing steel, hardened ground and spherical surface chromium plates.
 Outer ring: brass body pressed around,

outer race lined with bronze - PTFE composite.

Technical Notes

Maintenance free. Sizes according to DIN ISO 12240-4 series K.

Tips

Standard thread is right hand thread.
 Rod end studs are all right hand threads.

Important Notes

*Denotes fine pitch threads.

Order No.	Thread hand	d ₁	d ₂	l ₁	w ₁	d ₃	d ₄	d ₅	d ₆	l ₂	Weight g
65990.W0106	Right	M6	M6	30	9	20	10.0	13	9.0	12	22
65990.W0108	Right	M8	M8	36	12	24	12.5	16	10.5	16	47
65990.W0110	Right	M10	M10	43	14	28	15.0	19	13.0	20	77
65990.W0111	Right	M10 x 1,25*	M10	43	14	28	15.0	19	13.0	20	77
65990.W0112	Right	M12	M12	50	16	32	17.5	22	15.0	22	100
65990.W0113	Right	M12 x 1,25*	M12	50	16	32	17.5	22	15.0	22	100
65990.W0114	Right	M14	M14	57	19	36	20.0	25	17.0	25	160
65990.W0115	Right	M14 x 1,5*	M14	57	19	36	20.0	25	17.0	25	160
65990.W0116	Right	M16	M16	64	21	42	22.0	27	19.0	28	220
65990.W0117	Right	M16 x 1,5*	M16	64	21	42	22.0	27	19.0	28	220
65990.W0506	Left	M6	M6	30	9	20	10.0	13	9.0	12	22
65990.W0508	Left	M8	M8	36	12	24	12.5	16	10.5	16	47
65990.W0510	Left	M10	M10	43	14	28	15.0	19	13.0	20	77
65990.W0511	Left	M10 x 1,25*	M10	43	14	28	15.0	19	13.0	20	77
65990.W0512	Left	M12	M12	50	16	32	17.5	22	15.0	22	100
65990.W0513	Left	M12 x 1,25*	M12	50	16	32	17.5	22	15.0	22	100
65990.W0514	Left	M14	M14	57	19	36	20.0	25	17.0	25	160
65990.W0515	Left	M14 x 1,50*	M14	57	19	36	20.0	25	17.0	25	160
65990.W0516	Left	M16	M16	64	21	42	22.0	27	19.0	28	220
65990.W0517	Left	M16 x 1,50*	M16	64	21	42	22.0	27	19.0	28	220

Order No.	l ₃	l ₄	l ₅	w ₂	A/F ₁	A/F ₂	a °	Static load C ₀ kN max.
65990.W0106	18.5	13	10	6.75	11	8	13	7.7
65990.W0108	23.5	17	13	9.00	14	8	14	12.9
65990.W0110	28.0	21	17	10.50	17	12	13	18.0
65990.W0111	28.0	21	17	10.50	17	12	13	18.0
65990.W0112	32.5	25	20	12.00	19	14	13	24.0
65990.W0113	32.5	25	20	12.00	19	14	13	24.0
65990.W0114	37.5	29	22	13.50	22	14	16	31.0
65990.W0115	37.5	29	22	13.50	22	14	16	31.0



Rod End with Stud - Female



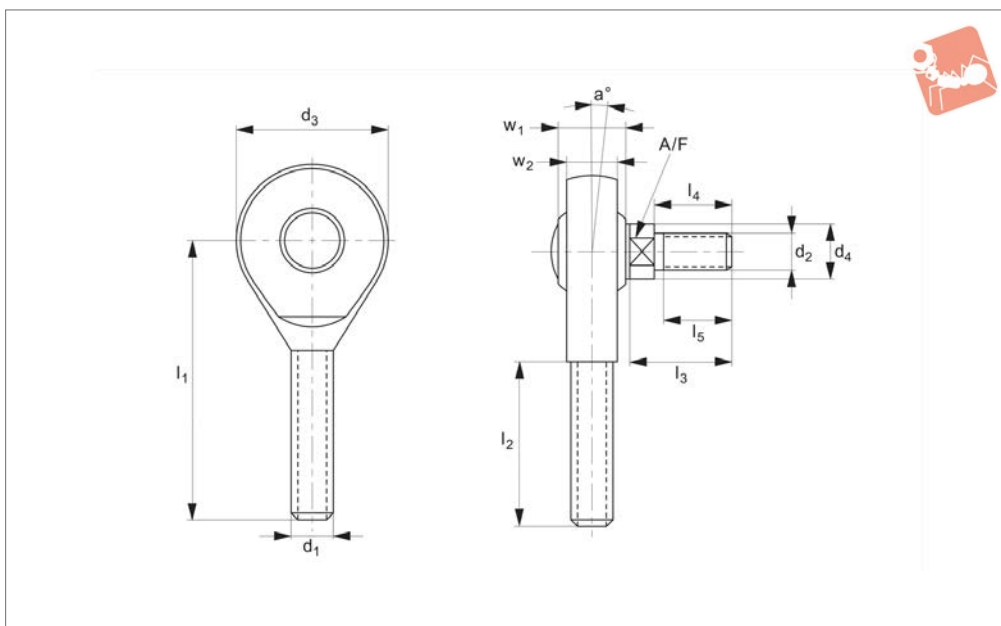
Rod Ends

Order No.	l_3	l_4	l_5	w_2	A/F_1	A/F_2	α	Static load C_0 kN max.
65990.W0116	42.5	33	24	15.00	22	17	15	39.0
65990.W0117	42.5	33	24	15.00	22	17	15	39.0
65990.W0506	18.5	13	10	6.75	11	8	13	7.7
65990.W0508	23.5	17	13	9.00	14	8	14	12.9
65990.W0510	28.0	21	17	10.50	17	12	13	18.0
65990.W0511	28.0	21	17	10.50	17	12	13	18.0
65990.W0512	32.5	25	20	12.00	19	14	13	24.0
65990.W0513	32.5	25	20	12.00	19	14	13	24.0
65990.W0514	37.5	29	22	13.50	22	14	16	31.0
65990.W0515	37.5	29	22	13.50	22	14	16	31.0
65990.W0516	42.5	33	24	15.00	22	17	15	39.0
65990.W0517	42.5	33	24	15.00	22	17	15	39.0

ROD ENDS



65992



Material

Body: surface zinc plated.
 Race: steel/ bronze - PTFE composite.
 Inner ring: bearing steel, hardened ground and spherical surface chromium plates.
 Outer ring: brass body pressed around,

outer race lined with bronze - PTFE composite.

Technical Notes

Maintenance free, sizes according to DIN ISO 12230-4 series K.

Tips

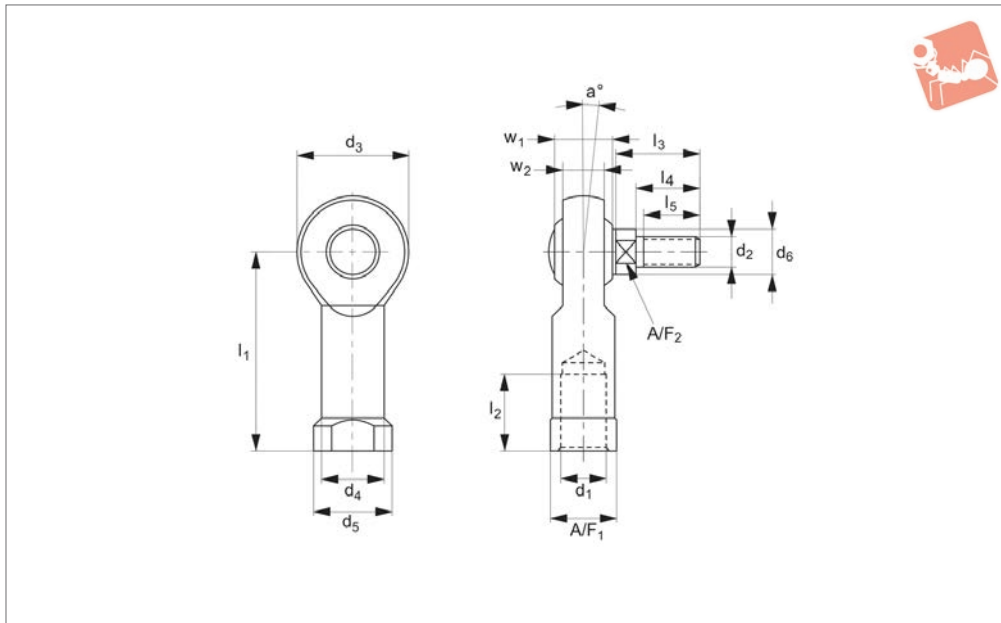
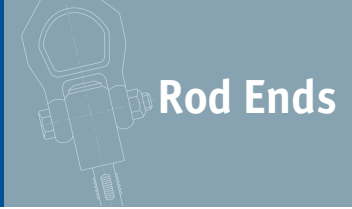
Standard thread is right hand thread.
 Rod end studs are all right hand threads.

Order No.	Thread hand	d ₁	d ₂	l ₁	w ₁	d ₃	d ₄	l ₂	l ₃	Weight g
65992.W0106	Right	M6	M6	36	9	20	9.0	21	18.5	20
65992.W0108	Right	M8	M8	42	12	24	10.5	25	23.5	38
65992.W0110	Right	M10	M10	48	14	28	13.0	28	28.5	55
65992.W0112	Right	M12	M12	54	16	32	15.0	32	32.5	85
65992.W0114	Right	M14	M14	60	19	36	17.0	36	37.5	140
65992.W0116	Right	M16	M16	66	21	42	19.0	37	42.5	210
65992.W0506	Left	M6	M6	36	9	20	9.0	21	18.5	20
65992.W0508	Left	M8	M8	42	12	24	10.5	25	23.5	38
65992.W0510	Left	M10	M10	48	14	28	13.0	28	28.5	55
65992.W0512	Left	M12	M12	54	16	32	15.0	32	32.5	85
65992.W0514	Left	M14	M14	60	19	36	17.0	36	37.5	140
65992.W0516	Left	M16	M16	66	21	42	19.0	37	42.5	210

Order No.	l ₄	l ₅	w ₂	A/F	a °	Static load C ₀ kN max.
65992.W0106	13	10	6.75	8	13	7.7
65992.W0108	17	13	9.00	8	14	12.9
65992.W0110	21	17	10.50	12	13	18.0
65992.W0112	25	20	12.00	14	13	24.0
65992.W0114	29	22	13.50	14	16	31.0
65992.W0116	33	24	15.00	17	15	39.0
65992.W0506	13	10	6.75	8	13	7.7
65992.W0508	17	13	9.00	8	14	12.9
65992.W0510	21	17	10.50	12	13	18.0
65992.W0512	25	20	12.00	14	13	24.0
65992.W0514	29	22	13.50	14	16	31.0
65992.W0516	33	24	15.00	17	15	39.0



Stainless Rod End with Stud Female



65994

ROD ENDS

Material

Body: stainless steel (AISI 304)
Race: steel/ bronze - PTFE composite.
Inner ring: stainless steel, hardened and ground (AISI 304).
Outer ring: brass body pressed around, outer race lined with bronze - PTFE compo-

site.
Joint ball: stainless steel (AISI 440C)

Technical Notes

Maintenance free. Sizes according to DIN ISO 12740-4, series K

Tips

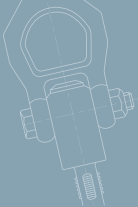
Standard thread is right hand thread.
Rod end studs are all right hand threads.

Important Notes

*denotes fine pitch threads.

Order No.	Thread hand	d ₁	d ₂	l ₁	w ₁	d ₃	d ₄	d ₅	d ₆	l ₂	Weight g
65994.W0106	Right	M6	M6	30	9	20	10.0	13	9.0	12	22
65994.W0108	Right	M8	M8	36	12	24	12.5	16	10.5	16	47
65994.W0110	Right	M10	M10	43	14	28	15.0	19	13.0	20	77
65994.W0111	Right	M10 x 1,25*	M10	43	14	28	15.0	19	13.0	20	100
65994.W0112	Right	M12	M12	50	16	32	17.5	22	15.0	22	100
65994.W0113	Right	M12 x 1,25*	M12	50	16	32	17.5	22	15.0	22	100
65994.W0114	Right	M14	M14	57	19	36	20.0	25	17.0	25	160
65994.W0115	Right	M14 x 1,5*	M14	57	19	36	20.0	25	17.0	25	160
65994.W0116	Right	M16	M16	64	21	42	22.0	27	19.0	28	220
65994.W0117	Right	M16 x 1,5*	M16	64	21	42	22.0	27	19.0	28	220
65994.W0506	Left	M6	M6	30	9	20	10.0	13	9.0	12	22
65994.W0508	Left	M8	M8	36	12	24	12.5	16	10.5	16	47
65994.W0510	Left	M10	M10	43	14	28	15.0	19	13.0	20	77
65994.W0511	Left	M10 x 1,25*	M10	43	14	28	15.0	19	13.0	20	100
65994.W0512	Left	M12	M12	50	16	32	17.5	22	15.0	22	100
65994.W0513	Left	M12 x 1,25*	M12	50	16	32	17.5	22	15.0	22	100
65994.W0514	Left	M14	M14	57	19	36	20.0	25	17.0	25	160
65994.W0515	Left	M14 x 1,50*	M14	57	19	36	20.0	25	17.0	25	160
65994.W0516	Left	M16	M16	64	21	42	22.0	27	19.0	28	220
65994.W0517	Left	M16 x 1,50*	M16	64	21	42	22.0	27	19.0	28	220

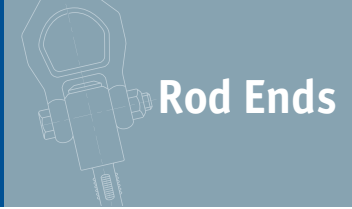
Order No.	l ₃	l ₄	l ₅	w ₂	A/F ₁	A/F ₂	a°	Static load C ₀ kN max.
65994.W0106	18.5	13	10	6.75	11	8	13	7.7
65994.W0108	23.5	17	13	9.00	14	8	14	12.9
65994.W0110	28.0	21	17	10.50	17	12	13	18.0
65994.W0111	28.0	21	17	10.50	17	12	13	18.0
65994.W0112	32.5	25	20	12.00	19	14	13	24.0
65994.W0113	32.5	25	20	12.00	19	14	13	24.0



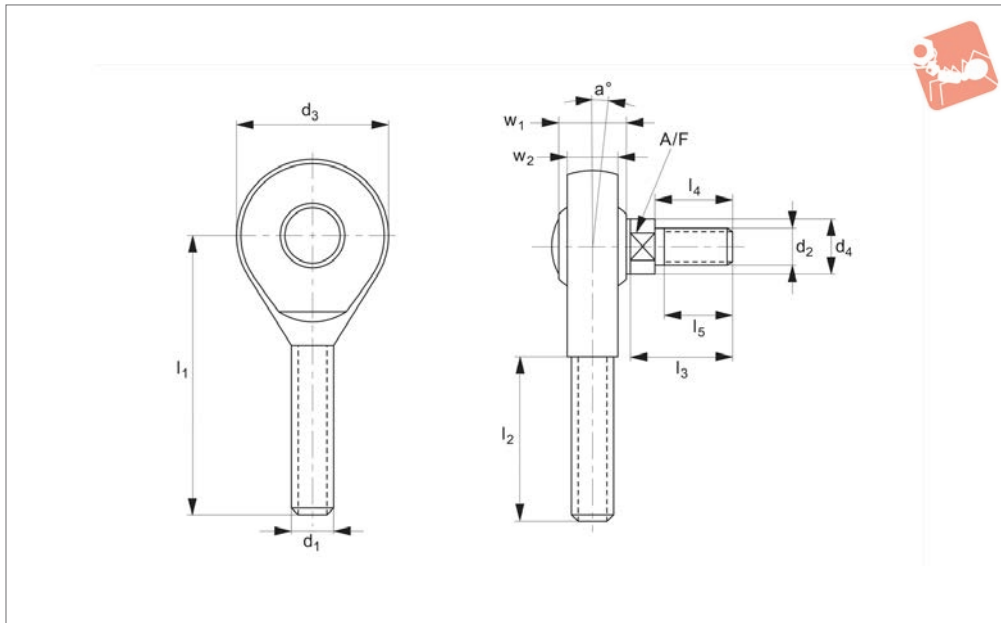
Order No.	l_3	l_4	l_5	w_2	A/F_1	A/F_2	a °	Static load C_0 kN max.
65994.W0114	37.5	29	22	13.50	22	14	16	31.0
65994.W0115	37.5	29	22	13.50	22	14	16	31.0
65994.W0116	42.5	33	24	15.00	22	17	15	39.0
65994.W0117	42.5	33	24	15.00	22	17	15	39.0
65994.W0506	18.5	13	10	6.75	11	8	13	7.7
65994.W0508	23.5	17	13	9.00	14	8	14	12.9
65994.W0510	28.0	21	17	10.50	17	12	13	18.0
65994.W0511	28.0	21	17	10.50	17	12	13	18.0
65994.W0512	32.5	25	20	12.00	19	14	13	24.0
65994.W0513	32.5	25	20	12.00	19	14	13	24.0
65994.W0514	37.5	29	22	13.50	22	14	16	31.0
65994.W0515	37.5	29	22	13.50	22	14	16	31.0
65994.W0516	42.5	33	24	15.00	22	17	15	39.0
65994.W0517	42.5	33	24	15.00	22	17	15	39.0



Stainless Rod End with stud Male



Rod Ends



65996

ROD ENDS

Material

Body: stainless steel (AISI 304)
Race: steel/ bronze - PTFE composite.
Inner ring: stainless steel, hardened and ground (AISI 304)
Outer ring: brass body pressed around,

outer race lined with bronze - PTFE composite.

Joint ball: stainless steel (AISI 440C)

Technical Notes

Maintenance free, sizes according to DIN

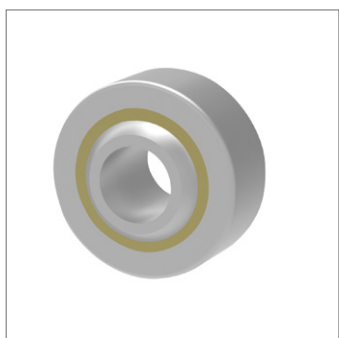
ISO 12240-4 series K.

Tips

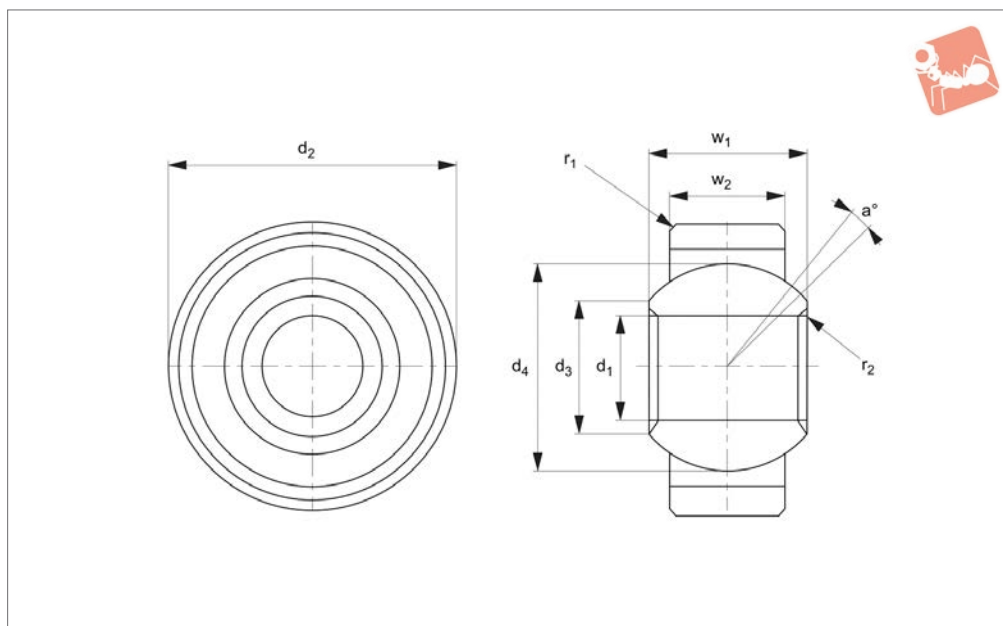
Standard thread is right hand thread.
Rod end studs are all right hand threads.

Order No.	Thread hand	d ₁	d ₂	l ₁	w ₁	d ₃	d ₄	Weight g
65996.W0106	Right	M6	M6	36	9	20	9.0	20
65996.W0108	Right	M8	M8	42	12	24	10.5	38
65996.W0110	Right	M10	M10	48	14	28	13.0	55
65996.W0112	Right	M12	M12	54	16	32	15.0	85
65996.W0116	Right	M16	M16	66	21	42	19.0	210
65996.W0506	Left	M6	M6	36	9	20	9.0	20
65996.W0508	Left	M8	M8	42	12	24	10.5	38
65996.W0510	Left	M10	M10	48	14	28	13.0	55
65996.W0512	Left	M12	M12	54	16	32	15.0	85
65996.W0516	Left	M16	M16	66	21	42	19.0	210

Order No.	l ₂	l ₃	l ₄	l ₅	w ₂	A/F	a°	Static load C ₀ kN max.
65996.W0106	21	18.5	13	10	6.75	8	13	7.7
65996.W0108	25	23.5	17	13	9.00	8	14	12.9
65996.W0110	28	28.5	21	17	10.50	12	13	18.0
65996.W0112	32	32.5	25	20	12.00	14	13	24.0
65996.W0116	37	42.5	33	24	15.00	17	15	39.0
65996.W0506	21	18.5	13	10	6.75	8	13	7.7
65996.W0508	25	23.5	17	13	9.00	8	14	12.9
65996.W0510	28	28.5	21	17	10.50	12	13	18.0
65996.W0512	32	32.5	25	20	12.00	14	13	24.0
65996.W0516	37	42.5	33	24	15.00	17	15	39.0



65974



Material

Housing: undercut steel 11SMnPb30K (1.0718) turned silver zinc plated.
Ball: ball bearing steel 100Cr6 hardened, surface condition polished.

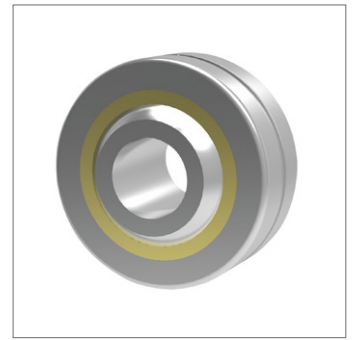
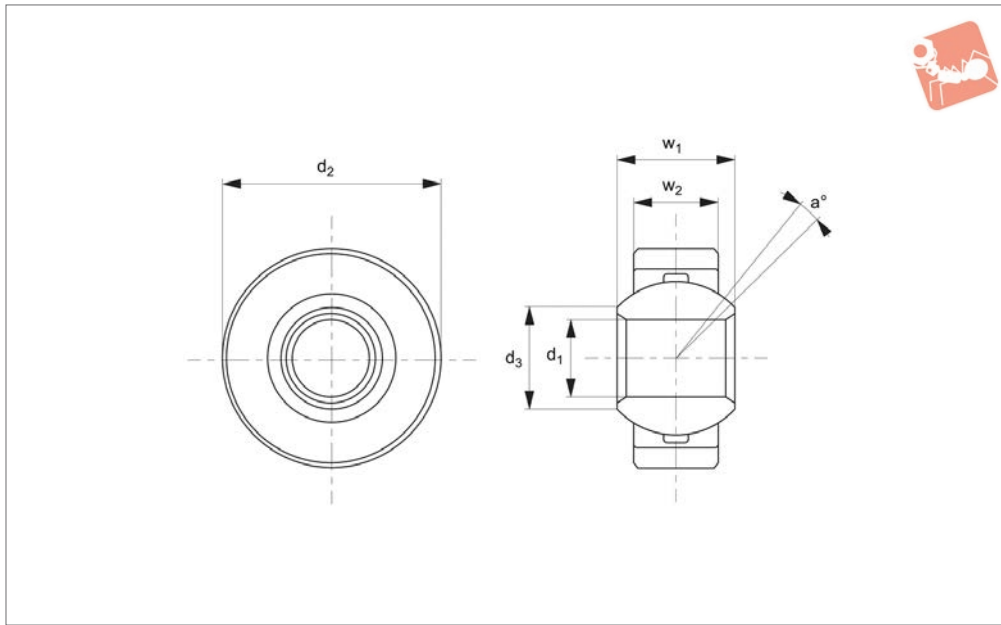
Race: teflon.

Technical Notes
To DIN 12240-1

Tips

For stainless steel version see R3641

Order No.	a°	d ₁ tol. H7	d ₂	d ₃	d ₄	r ₁	r ₂	w ₁	w ₂	Static load C ₀ kN max.	Weight g
65974.W0005	13	5	16	7.7	11.10	0.3	1.2	8	6	17	9
65974.W0006	13	6	18	8.9	12.70	0.3	1.2	9	6.75	22	13
65974.W0008	13	8	22	10.3	15.88	0.3	1.2	12	9	36	24
65974.W0010	13	10	26	12.9	19.05	0.3	1.2	14	10.5	50	40
65974.W0012	13	12	30	15.4	22.23	0.4	1.2	16	12	67	80
65974.W0016	15	16	38	19.3	28.58	0.4	1.5	21	15	107	130



65976

ROD ENDS

Material

Housing: stainless steel (1.4305) turned.
 Bearing shell: special brass CuSn8 surface coated with a PTFE foil.
 Ball: ball bearing steel 100Cr6 hardened, surface condition polished, hard chrome plated.
 Upon request: stainless steel (1.4034) hardened, surface condition polished.

Stainless steel (1.4401) not hardened, surface condition polished.

Technical Notes

Suitable for low speeds and high dynamic loads.

Maintenance free, series K similar to DIN 12240-1 (DIN 648)

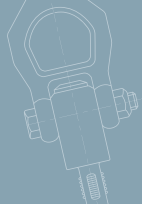
Important Notes

Working range -50°C to +200°C
 Recommended shaft tolerance: g6

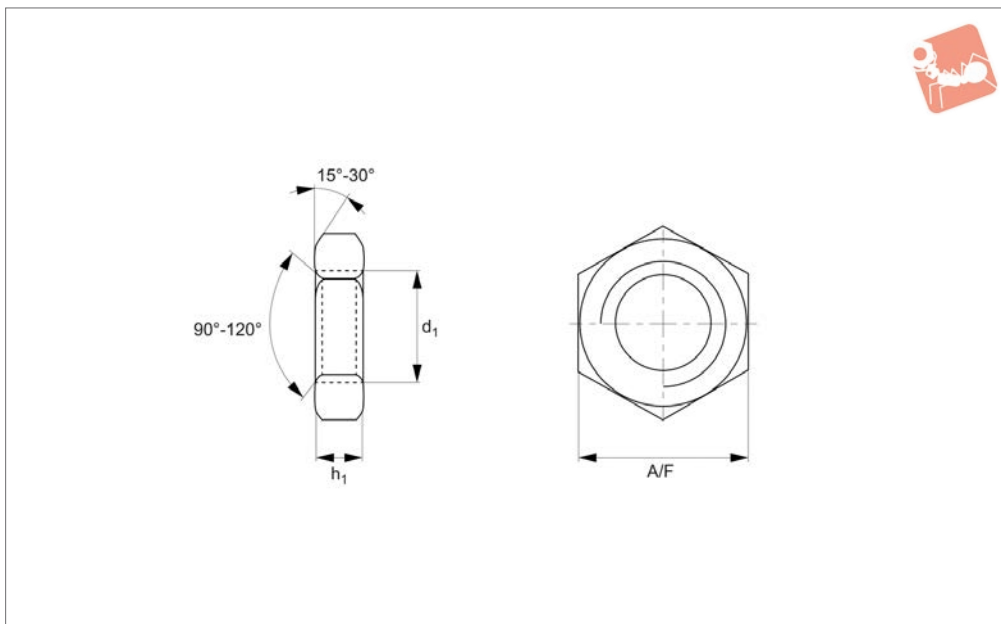
External diameter of pivoting bearing: h6

Recommended housing tolerance: J7

Order No.	a °	d ₁ tol. H7	d ₂	d ₃	w ₁	w ₂	Admissible rpm min.	Static load C ₀ kN max.	Weight g
65976.W0005	13	5	16	7.7	8	6	600	12.5	8
65976.W0006	13	6	18	8.9	9	6.75	530	15.5	12
65976.W0008	14	8	22	10.4	12	9	420	27.8	23
65976.W0010	13	10	26	12.9	14	10.5	350	39	38
65976.W0012	13	12	30	15.4	16	12	300	53.5	58
65976.W0016	15	16	38	19.3	21	15	230	88	115



65690.A2



Material

Stainless steel (A2).

Technical Notes

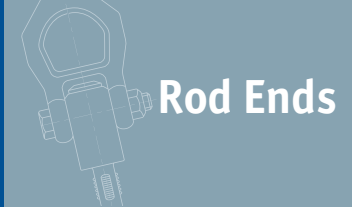
To DIN 439. Standard metric coarse pitch threads.

Order No.	d ₁	h ₁	A/F	Material
65690.016-A2	M1,6	0.75	3.2	A2 s/s
65690.017-A2	M1,7	0.75	3.5	A2 s/s
65690.020-A2	M 2	0.95	4	A2 s/s
65690.023-A2	M2,3	0.95	4.5	A2 s/s
65690.025-A2	M2,5	1.35	5	A2 s/s
65690.026-A2	M2,6	1.35	5	A2 s/s
65690.030-A2	M 3	1.55	5.5	A2 s/s
65690.040-A2	M 4	1.95	7	A2 s/s
65690.050-A2	M 5	2.45	8	A2 s/s
65690.060-A2	M 6	2.9	10	A2 s/s
65690.080-A2	M 8	3.7	13	A2 s/s
65690.100-A2	M10	4.7	17	A2 s/s
65690.120-A2	M12	5.7	19	A2 s/s
65690.140-A2	M14	6.42	22	A2 s/s
65690.160-A2	M16	7.42	24	A2 s/s
65690.180-A2	M18	8.42	27	A2 s/s
65690.200-A2	M20	9.1	30	A2 s/s
65690.220-A2	M22	9.9	34	A2 s/s
65690.240-A2	M24	10.9	36	A2 s/s
65690.270-A2	M27	12.4	41	A2 s/s
65690.300-A2	M30	13.9	46	A2 s/s
65690.330-A2	M33	15.4	50	A2 s/s
65690.360-A2	M36	16.9	55	A2 s/s
65690.420-A2	M42	19.7	65	A2 s/s
65690.480-A2	M48	22.7	75	A2 s/s

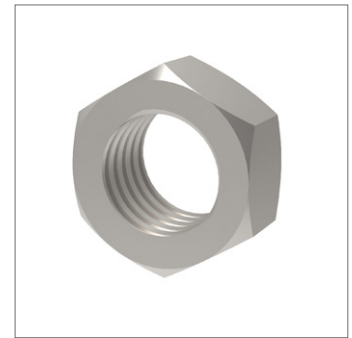
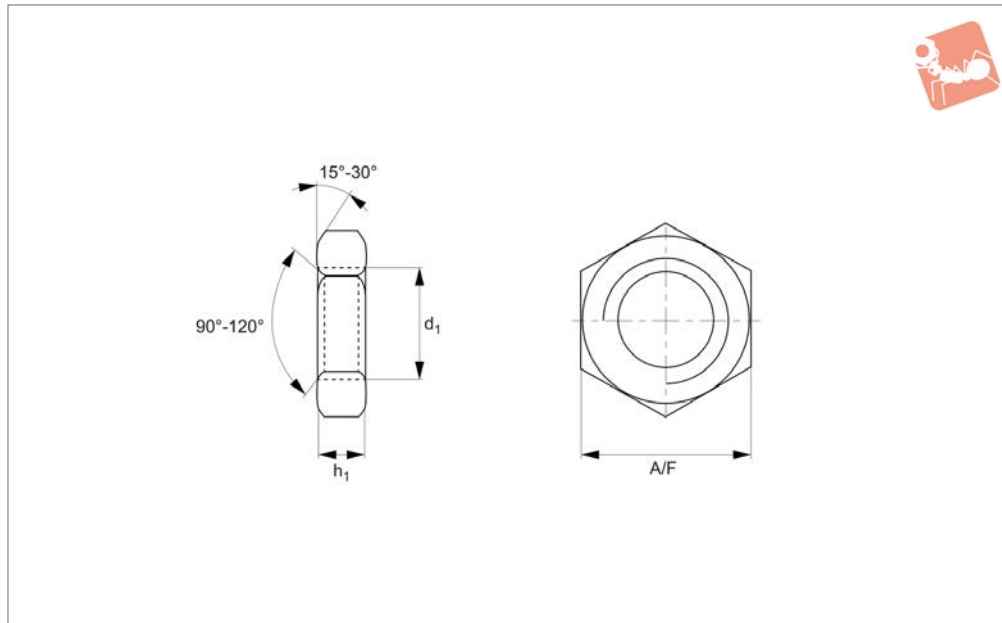


Lock Nuts Coarse Thread

A4 stainless



Rod Ends



65690.A4

ROD ENDS

Material

Stainless steel (A4).

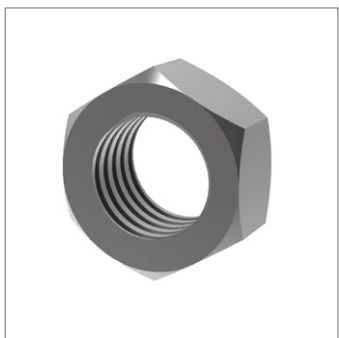
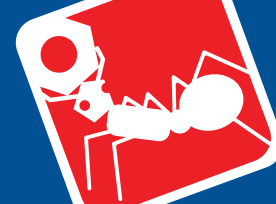
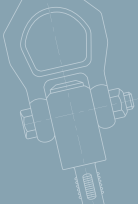
threads.

For fine thread lock nuts see P0306.

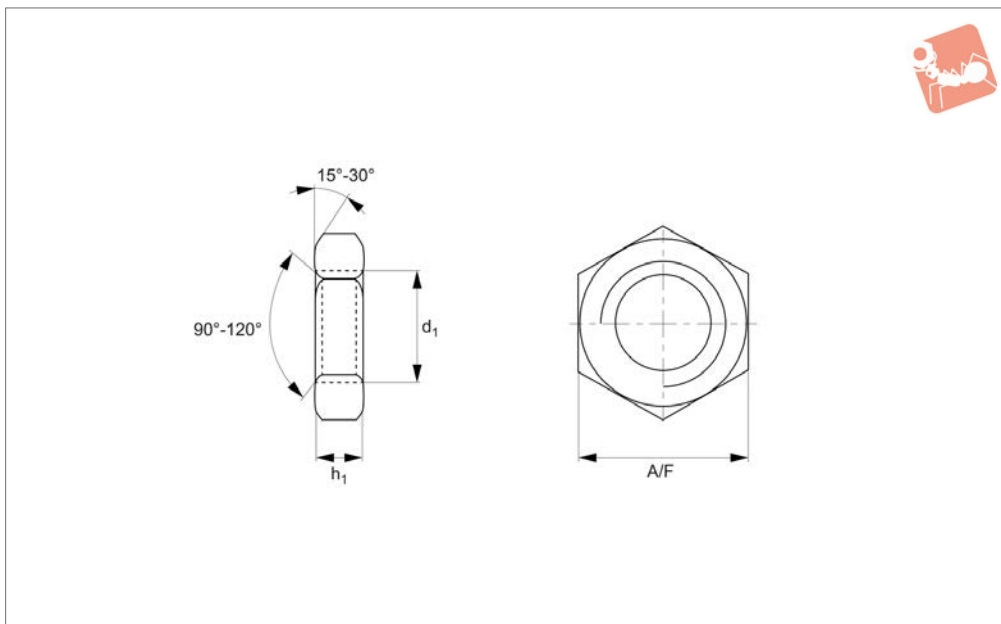
Technical Notes

To DIN 439. Standard metric coarse pitch

Order No.	d ₁	h ₁	A/F	Material
65690.016-A4	M1,6	0.75	3.2	A4 s/s
65690.017-A4	M1,7	0.75	3.5	A4 s/s
65690.020-A4	M 2	0.95	4	A4 s/s
65690.023-A4	M2,3	0.95	4.5	A4 s/s
65690.025-A4	M2,5	1.35	5	A4 s/s
65690.026-A4	M2,6	1.35	5	A4 s/s
65690.030-A4	M 3	1.55	5.5	A4 s/s
65690.040-A4	M 4	1.95	7	A4 s/s
65690.050-A4	M 5	2.45	8	A4 s/s
65690.060-A4	M 6	2.9	10	A4 s/s
65690.080-A4	M 8	3.7	13	A4 s/s
65690.100-A4	M10	4.7	17	A4 s/s
65690.120-A4	M12	5.7	19	A4 s/s
65690.140-A4	M14	6.42	22	A4 s/s
65690.160-A4	M16	7.42	24	A4 s/s
65690.180-A4	M18	8.42	27	A4 s/s
65690.200-A4	M20	9.1	30	A4 s/s
65690.220-A4	M22	9.9	34	A4 s/s
65690.240-A4	M24	10.9	36	A4 s/s
65690.270-A4	M27	12.4	41	A4 s/s
65690.300-A4	M30	13.9	46	A4 s/s
65690.330-A4	M33	15.4	50	A4 s/s
65690.360-A4	M36	16.9	55	A4 s/s
65690.420-A4	M42	19.7	65	A4 s/s
65690.480-A4	M48	22.7	75	A4 s/s



65690.SC



Material

Steel (class 4), self-colour.

threads.

For fine thread lock nuts see P0306.

Technical Notes

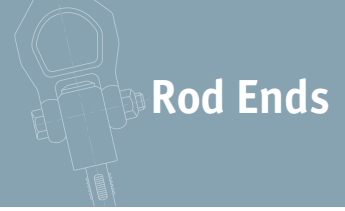
To DIN 439. Standard metric coarse pitch

Order No.	d ₁	h ₁	A/F	Material
65690.020-SC	M 2	0.95	4	Steel SC
65690.025-SC	M2,6	1.35	5	Steel SC
65690.030-SC	M 3	1.55	5.5	Steel SC
65690.040-SC	M 4	1.95	7	Steel SC
65690.050-SC	M 5	2.45	8	Steel SC
65690.060-SC	M 6	2.9	10	Steel SC
65690.080-SC	M 8	3.7	13	Steel SC
65690.100-SC	M10	4.7	17	Steel SC
65690.120-SC	M12	5.7	19	Steel SC
65690.140-SC	M14	6.42	22	Steel SC
65690.160-SC	M16	7.42	24	Steel SC
65690.180-SC	M18	8.42	27	Steel SC
65690.200-SC	M20	9.1	30	Steel SC
65690.220-SC	M22	9.9	34	Steel SC
65690.240-SC	M24	10.9	36	Steel SC
65690.270-SC	M27	12.4	41	Steel SC
65690.300-SC	M30	13.9	46	Steel SC
65690.330-SC	M33	15.4	50	Steel SC
65690.360-SC	M36	16.9	55	Steel SC

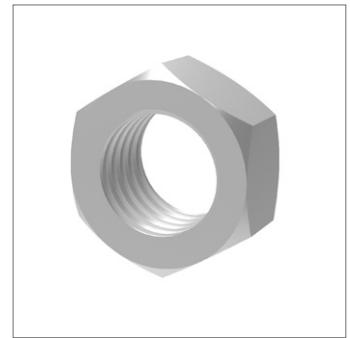
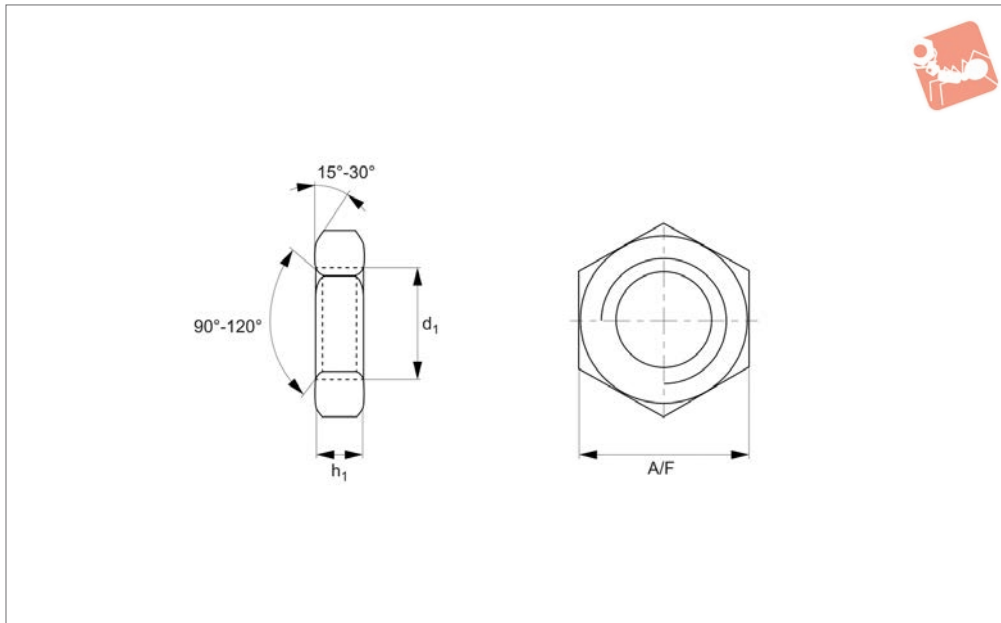


Lock Nuts Coarse Thread

Steel, zinc-plated



Rod Ends



65690.ZP

ROD ENDS

Material

Steel (class 4), zinc-plated.

threads.

For fine thread lock nuts see P0306.

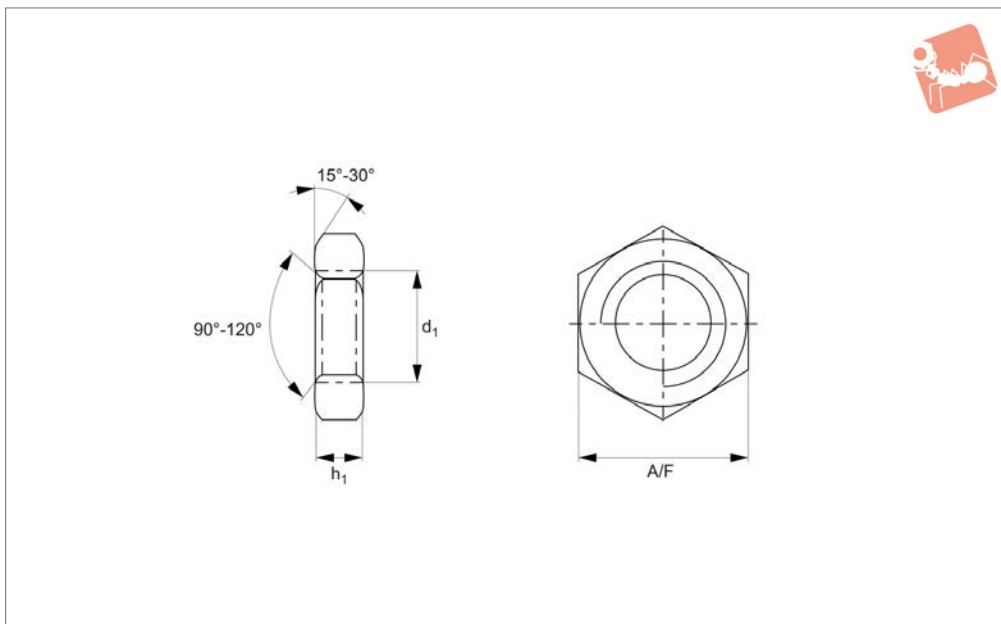
Technical Notes

To DIN 439. Standard metric coarse pitch

Order No.	d ₁	h ₁ min.	A/F	Material
65690.020-ZP	M 2	0.95	4	Steel ZP
65690.025-ZP	M2,5	1.35	5	Steel ZP
65690.030-ZP	M 3	1.55	5.5	Steel ZP
65690.040-ZP	M 4	1.95	7	Steel ZP
65690.050-ZP	M 5	2.45	8	Steel ZP
65690.060-ZP	M 6	2.9	10	Steel ZP
65690.080-ZP	M 8	3.7	13	Steel ZP
65690.100-ZP	M10	4.7	17	Steel ZP
65690.120-ZP	M12	5.7	19	Steel ZP
65690.140-ZP	M14	6.42	22	Steel ZP
65690.160-ZP	M16	7.42	24	Steel ZP
65690.180-ZP	M18	8.42	27	Steel ZP
65690.200-ZP	M20	9.1	30	Steel ZP
65690.220-ZP	M22	9.9	34	Steel ZP
65690.240-ZP	M24	10.9	36	Steel ZP
65690.270-ZP	M27	12.4	41	Steel ZP
65690.300-ZP	M30	13.9	46	Steel ZP
65690.330-ZP	M33	15.4	50	Steel ZP
65690.360-ZP	M36	16.9	55	Steel ZP



65691.A2



Material

Stainless steel (AISI 303, 1.4305).

Standard threads are coarse pitch.

Fine threads are indicated by an A & B suffix.

Technical Notes

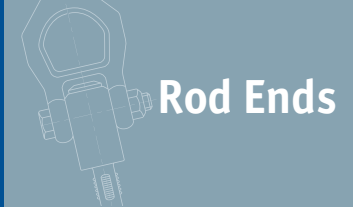
To DIN 439. Left hand threads.

Order No.	d ₁	h ₁ min.	A/F	Material
65691.060-A2	M 6	2.9	10	A2 s/s
65691.080-A2	M 8	3.7	13	A2 s/s
65691.100-A2	M10	4.7	17	A2 s/s
65691.100-100-A2	M10x1,0	4.7	17	A2 s/s
65691.100-125-A2	M10x1,25	4.7	17	A2 s/s
65691.120-A2	M12	5.7	19	A2 s/s
65691.120-100-A2	M12x1,0	5.7	19	A2 s/s
65691.120-125-A2	M12x1,25	5.7	19	A2 s/s
65691.120-150-A2	M12x1,5	5.7	19	A2 s/s
65691.140-A2	M14	7	22	A2 s/s
65691.160-A2	M16	7.42	24	A2 s/s
65691.160-150-A2	M16x1,5	7.42	24	A2 s/s
65691.180-A2	M18	9	27	A2 s/s
65691.200-A2	M20	9.1	30	A2 s/s
65691.200-150-A2	M20x1,5	9.1	30	A2 s/s
65691.220-150-A2	M22x1,5	9.1	32	A2 s/s
65691.240-A2	M24	10.9	36	A2 s/s
65691.240-150-A2	M24x1,5	10.9	36	A2 s/s
65691.240-200-A2	M24x2,0	10.9	36	A2 s/s
65691.270-A2	M27	13.5	41	A2 s/s
65691.270-150-A2	M27x1,5	13.5	41	A2 s/s
65691.300-A2	M30	13.9	46	A2 s/s
65691.300-150-A2	M30x1,5	13.9	46	A2 s/s
65691.360-A2	M36	16.9	55	A2 s/s

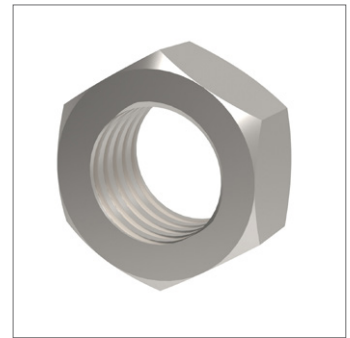
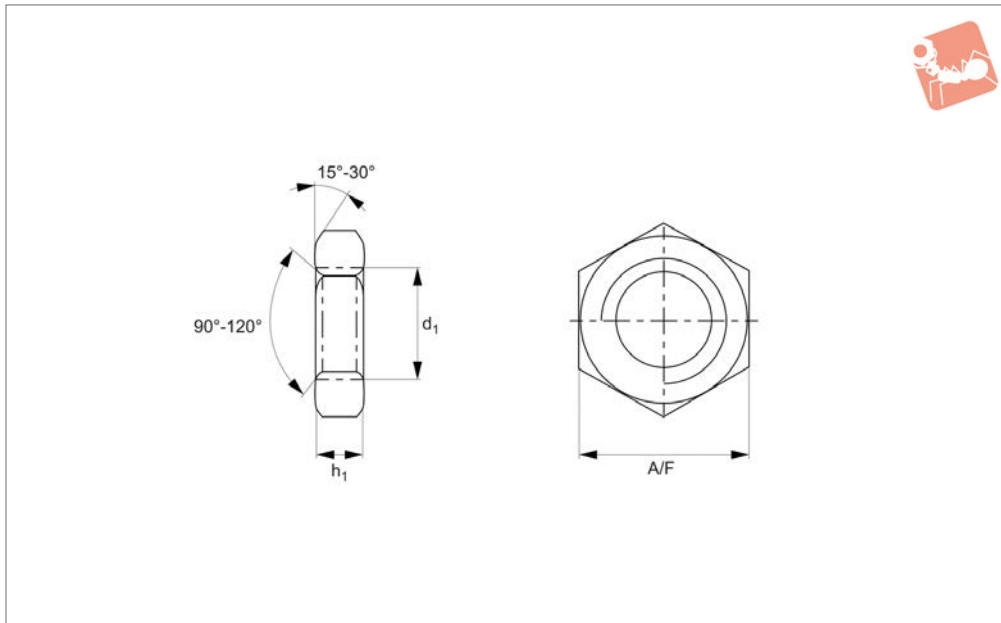


Lock Nuts Left Hand Thread

A4 stainless



ROD ENDS



65691.A4

ROD ENDS

Material

Stainless steel (A4).

Standard threads are coarse pitch.

Fine threads are indicated by an A & B suffix.

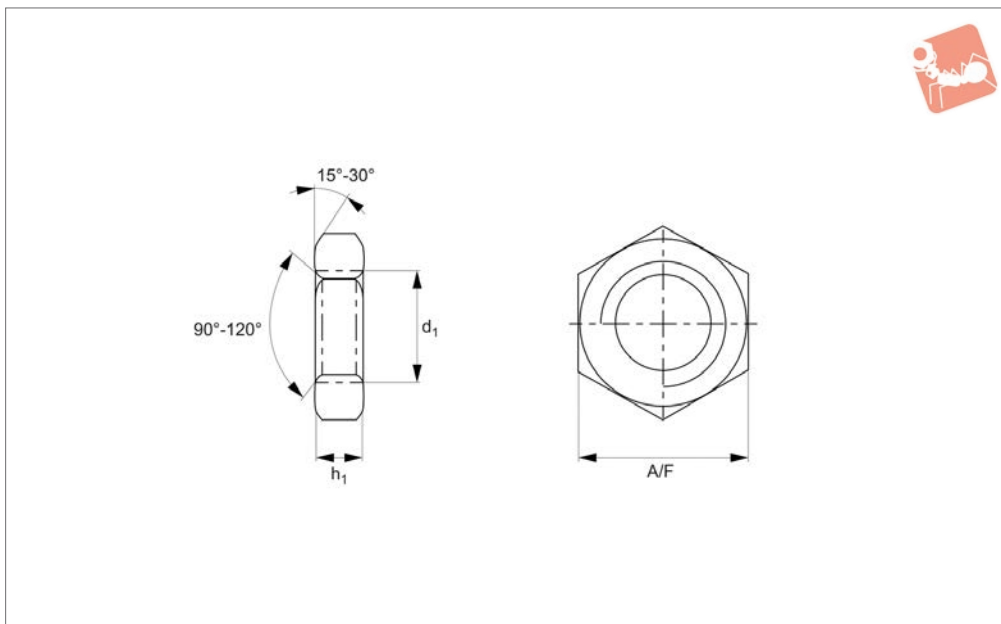
Technical Notes

To DIN 439. Left hand threads.

Order No.	d ₁	h ₁	A/F	Material
65691.060-A4	M 6	2.9	10	A4 s/s
65691.080-A4	M 8	3.7	13	A4 s/s
65691.100-A4	M10	4.7	17	A4 s/s
65691.120-A4	M12	5.7	19	A4 s/s
65691.160-A4	M16	7.42	24	A4 s/s
65691.200-A4	M20	9.1	30	A4 s/s
65691.240-A4	M24	10.9	36	A4 s/s
65691.300-A4	M30	13.9	46	A4 s/s
65691.360-A4	M36	16.9	55	A4 s/s



65691.ZP



Material

Steel (class 4), zinc-plated.

Standard threads are coarse pitch.

Fine threads are indicated by an A & B suffix.

Technical Notes

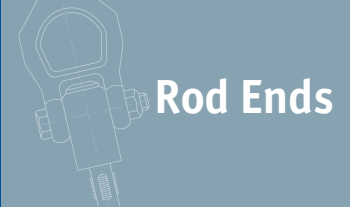
To DIN 439. Left hand threads.

Order No.	d ₁	h ₁	A/F	Material
65691.050-ZP	M 5	2.7	8	Steel ZP
65691.060-ZP	M 6	2.9	10	Steel ZP
65691.080-ZP	M 8	3.7	13	Steel ZP
65691.100-ZP	M10	4.7	17	Steel ZP
65691.100-100-ZP	M10x1,0	4.7	17	Steel ZP
65691.100-125-ZP	M10x1,25	4.7	17	Steel ZP
65691.120-ZP	M12	5.7	19	Steel ZP
65691.120-125-ZP	M12x1,25	5.7	19	Steel ZP
65691.120-150-ZP	M12x1,5	5.7	19	Steel ZP
65691.160-ZP	M16	7.42	24	Steel ZP
65691.160-150-ZP	M16x1,5	7.42	24	Steel ZP
65691.200-ZP	M20	9.1	30	Steel ZP
65691.200-150-ZP	M20x1,5	9.1	30	Steel ZP
65691.220-150-ZP	M22x1,5	9.1	32	Steel ZP
65691.240-ZP	M24	10.9	36	Steel ZP
65691.240-200-ZP	M24x2,0	10.9	36	Steel ZP
65691.300-ZP	M30	13.9	46	Steel ZP
65691.300-200-ZP	M30x2,0	13.9	46	Steel ZP

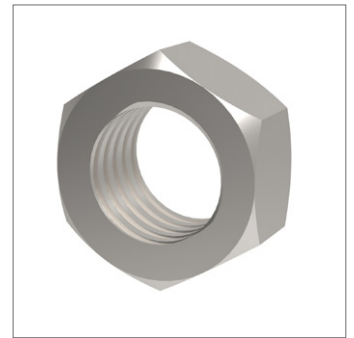
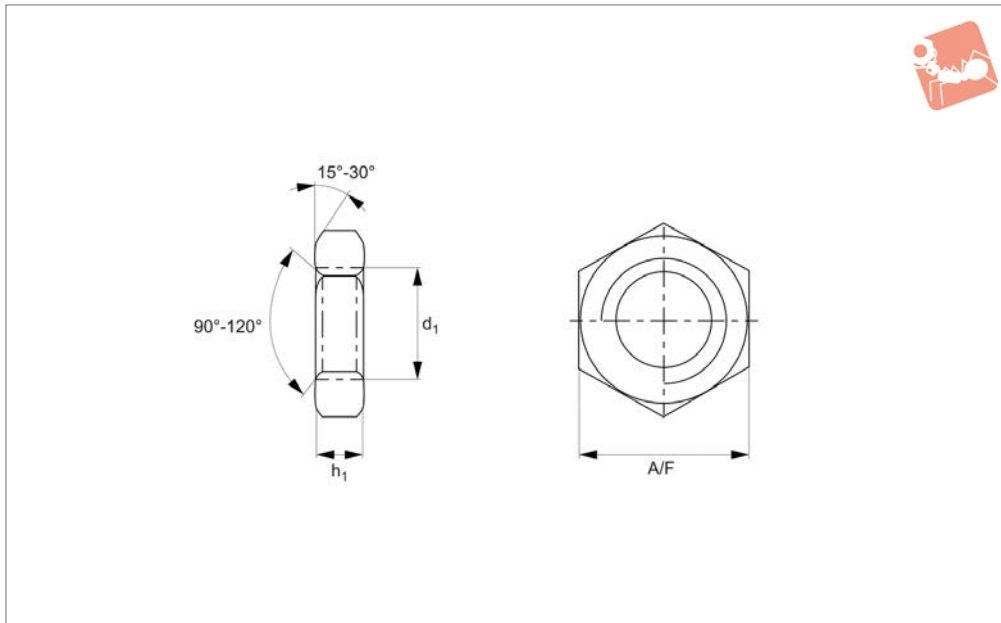


Lock Nuts Fine Thread

303 series stainless



Rod Ends



65692.A2

ROD ENDS

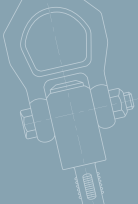
Material

Stainless steel (AISI 303, 1.4305).

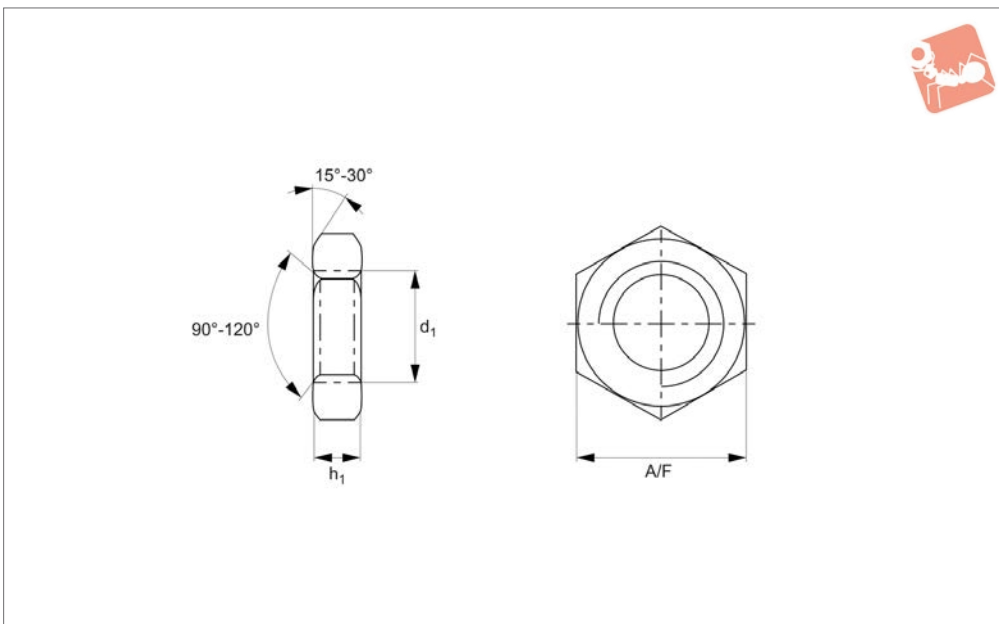
Technical Notes

To DIN 439. Fine pitch threads.
For coarse thread lock nuts see P0305.

Order No.	d ₁	h ₁ min.	A/F	Material
65692.080-100-A2	M 8x1,0	3.7	13	A2 s/s
32700.W0515	M10x1,0	4.7	17	A2 s/s
65692.100-125-A2	M10x1,25	4.7	17	A2 s/s
65692.120-125-A2	M12x1,25	5.7	19	A2 s/s
65692.120-150-A2	M12x1,5	5.7	19	A2 s/s
65692.140-150-A2	M14x1,5	6.42	22	A2 s/s
65692.160-150-A2	M16x1,5	7.42	24	A2 s/s
65692.180-150-A2	M18x1,5	8.42	27	A2 s/s
65692.200-150-A2	M20x1,5	9.1	30	A2 s/s
65692.220-150-A2	M22x1,5	9.9	34	A2 s/s
65692.240-150-A2	M24x1,5	10.9	36	A2 s/s
65692.240-200-A2	M24x2,0	10.9	36	A2 s/s
65692.270-150-A2	M27x1,5	12.4	41	A2 s/s
65692.270-200-A2	M27x2,0	12.4	41	A2 s/s
65692.300-150-A2	M30x1,5	13.9	46	A2 s/s
65692.300-200-A2	M30x2,0	13.9	46	A2 s/s
65692.330-200-A2	M33x2,0	15.4	49	A2 s/s
65692.360-150-A2	M36x1,5	16.9	55	A2 s/s



65692.A4



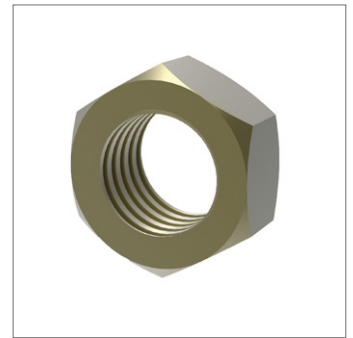
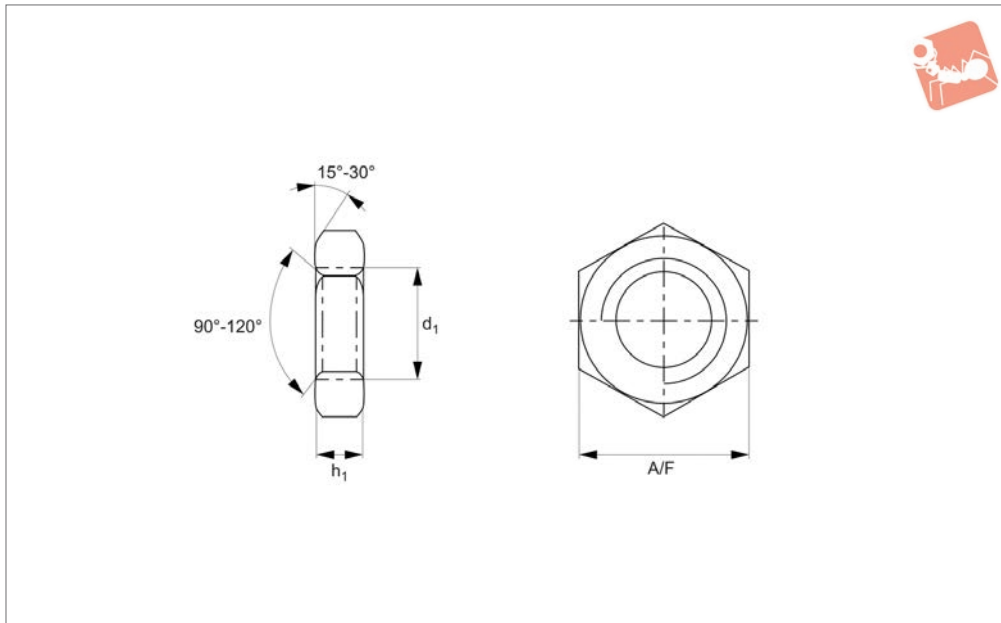
Material

Stainless steel (A4).

Technical Notes

To DIN 439. Fine pitch threads.
For coarse thread lock nuts see P0305.

Order No.	d ₁	h ₁	A/F	Material
65692.080-100-A4	M 8x1,0	3.7	13	A4 s/s
65692.100-100-A4	M10x1,0	4.7	17	A4 s/s
65692.100-125-A4	M10x1,25	4.7	17	A4 s/s
65692.120-125-A4	M12x1,25	5.7	19	A4 s/s
65692.120-150-A4	M12x1,5	5.7	19	A4 s/s
65692.140-150-A4	M14x1,5	6.42	22	A4 s/s
65692.160-150-A4	M16x1,5	7.42	24	A4 s/s
65692.180-150-A4	M18x1,5	8.42	27	A4 s/s
65692.200-150-A4	M20x1,5	9.1	30	A4 s/s
65692.220-150-A4	M22x1,5	9.9	34	A4 s/s
65692.240-150-A4	M24x1,5	10.9	36	A4 s/s
65692.240-200-A4	M24x2,0	10.9	36	A4 s/s
65692.270-150-A4	M27x1,5	12.4	41	A4 s/s
65692.270-200-A4	M27x2,0	12.4	41	A4 s/s
65692.300-150-A4	M30x1,5	13.9	46	A4 s/s
65692.300-200-A4	M30x2,0	13.9	46	A4 s/s
65692.330-200-A4	M33x2,0	15.4	49	A4 s/s
65692.360-150-A4	M36x1,5	16.9	55	A4 s/s



65692.BR

ROD ENDS

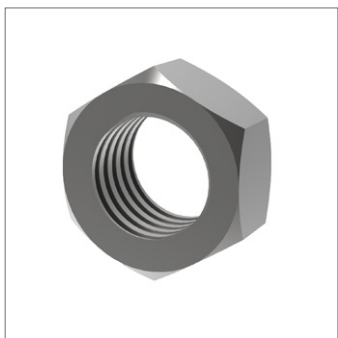
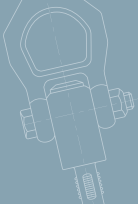
Material

Brass.

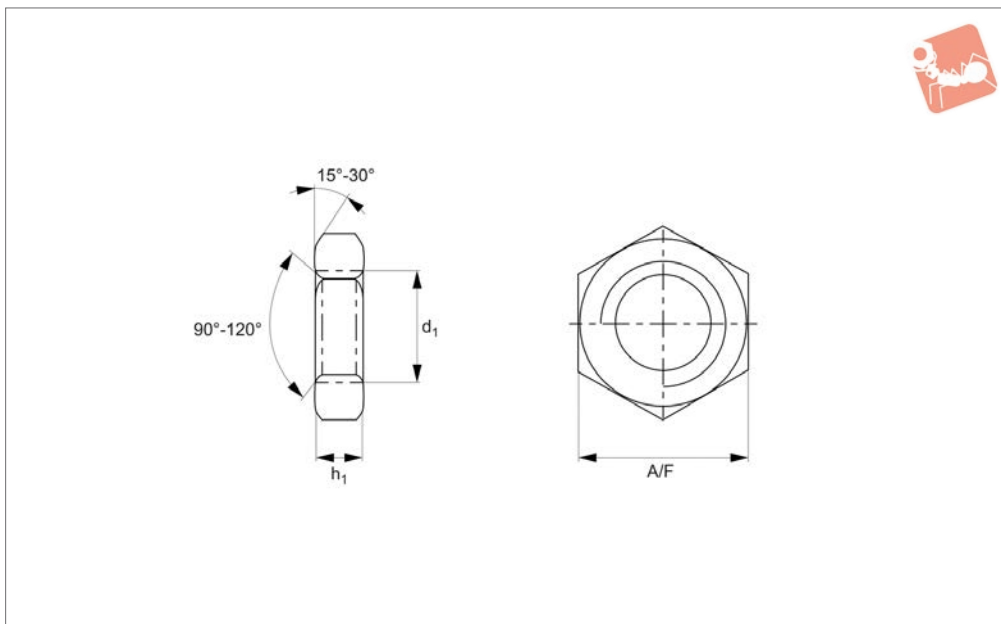
Technical Notes

To DIN 439. Fine pitch threads.
For coarse thread lock nuts see P0305.

Order No.	d	h	A/F	Material
65692.300-150-BR	M30x1,5	13.9	46	Brass



65692.SC



Material

Steel (class 4), self-colour.

Technical Notes

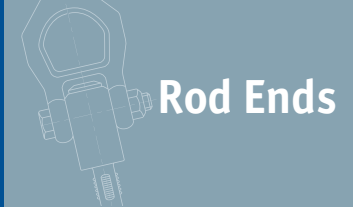
To DIN 439. Fine pitch threads.
For coarse thread lock nuts see P0305.

Order No.	d ₁	h ₁	A/F	Material
65692.100-100-SC	M10x1,0	4.7	17	Steel SC
65692.100-125-SC	M10x1,25	4.7	17	Steel SC
65692.120-125-SC	M12x1,25	5.7	19	Steel SC
65692.140-150-SC	M14x1,5	6.42	22	Steel SC
65692.160-150-SC	M16x1,5	7.42	24	Steel SC
65692.180-150-SC	M18x1,5	8.42	27	Steel SC
65692.200-150-SC	M20x1,5	9.1	30	Steel SC
65692.220-150-SC	M22x1,5	9.9	34	Steel SC
65692.240-150-SC	M24x1,5	10.9	36	Steel SC
65692.240-200-SC	M24x2,0	10.9	36	Steel SC
65692.270-150-SC	M27x1,5	12.4	41	Steel SC
65692.270-200-SC	M27x2,0	12.4	41	Steel SC
65692.300-150-SC	M30x1,5	13.9	46	Steel SC
65692.300-200-SC	M30x2,0	13.9	46	Steel SC
65692.330-200-SC	M33x2,0	15.4	49	Steel SC
65692.360-300-SC	M36x1,5	16.9	55	Steel SC
65692.420-150-SC	M42x1,5	21	65	Steel SC
65692.450-300-SC	M45x3,0	22.5	70	Steel SC
65692.560-200-SC	M56x2,0	28	85	Steel SC

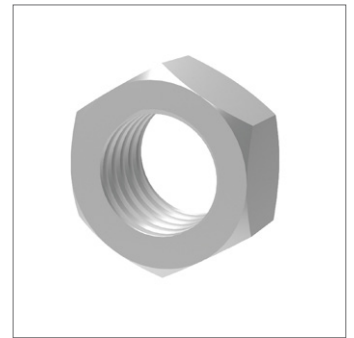
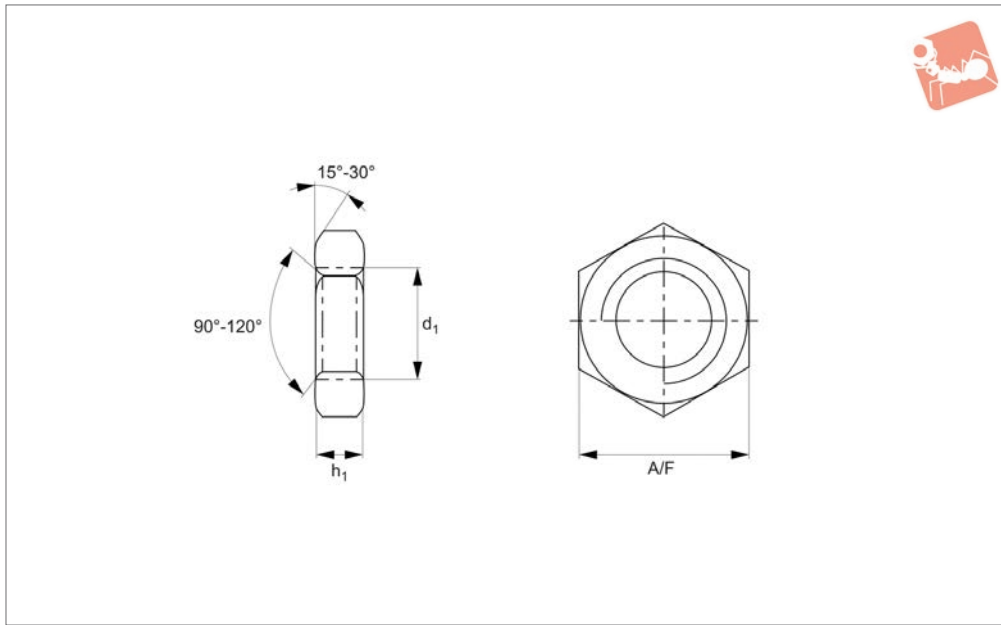


Lock Nuts Fine Thread

Steel, zinc-plated



Rod Ends



65692.ZP

ROD ENDS

Material

Steel (class 4), zinc-plated.

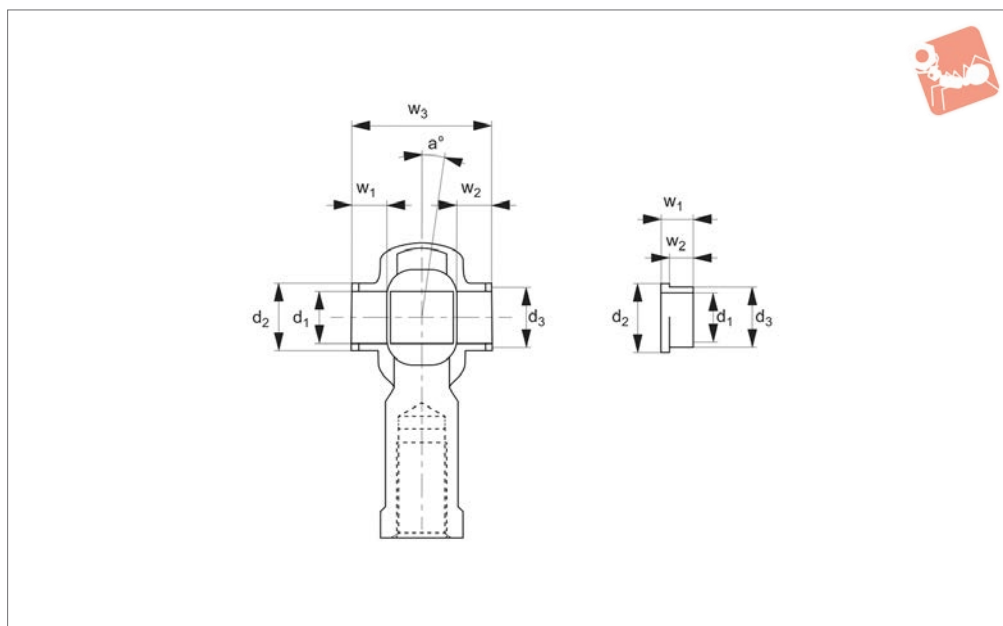
Technical Notes

To DIN 439. Fine pitch threads.
For coarse thread lock nuts see P0305.

Order No.	d_1	h_1	A/F	Material
65692.080-100-ZP	M 8x1,0	3.7	13	Steel ZP
65692.100-100-ZP	M10x1,0	4.7	17	Steel ZP
65692.100-125-ZP	M10x1,25	4.7	17	Steel ZP
65692.120-125-ZP	M12x1,25	5.7	19	Steel ZP
65692.120-150-ZP	M12x1,5	5.7	19	Steel ZP
65692.140-150-ZP	M14x1,5	6.42	22	Steel ZP
65692.160-150-ZP	M16x1,5	7.42	24	Steel ZP
65692.180-150-ZP	M18x1,5	8.42	27	Steel ZP
65692.200-150-ZP	M20x1,5	9.1	30	Steel ZP
65692.220-150-ZP	M22x1,5	9.9	34	Steel ZP
65692.240-150-ZP	M24x1,5	10.9	36	Steel ZP
65692.240-200-ZP	M24x2,0	10.9	36	Steel ZP
65692.270-150-ZP	M27x1,5	12.4	41	Steel ZP
65692.270-200-ZP	M27x2,0	12.4	41	Steel ZP
65692.300-150-ZP	M30x1,5	13.9	46	Steel ZP
65692.300-200-ZP	M30x2,0	13.9	46	Steel ZP
65692.330-200-ZP	M33x2,0	15.4	49	Steel ZP
65692.360-200-ZP	M36x2,0	16.9	55	Steel ZP
65692.360-300-ZP	M36x3,0	16.9	55	Steel ZP



65970



Material
Rubber

Technical Notes

Rubber protector caps for additional

protection of rod ends. For use with main-
tenance free series K rod ends.

Brass spacer bush available on request.

Temperature range: -20°C to + 110°C.

Tips

Mounted easily with retaining pliers.

Order No.	Suitable for steel rod ends	Suitable for stainless steel rod ends	d ₁	d ₂	d ₃	w ₁	w ₂	w ₃	a	Weight g
65970.W0006	R3550/R3551.006	R3565/R3566.006	6	11	8.7	6	4	21	13	3
65970.W0008	R3550/R3551.008	R3565/R3566.008	8	12	10.3	6	4	24	14	3
65970.W0010	R3550/R3551.010	R3565/R3566.010	10	14	12.5	6	4	26	14	5
65970.W0012	R3550/R3551.012	R3565/R3566.012	12	17	15.0	8	6	32	13	5
65970.W0014	R3550/R3551.014	R3565/R3566.014	14	19	16.8	8	6	35	16	7
65970.W0016	R3550/R3551.016	R3565/R3566.016	16	21	19.0	8	6	37	15	7
65970.W0018	R3550/R3551.018	R3565/R3566.018	18	25	21.8	8	6	39	15	7
65970.W0020	R3550/R3551.020	R3565/R3566.020	20	28	24.3	10	8	45	15	40
65970.W0022	R3550/R3551.022	R3565/R3566.022	22	29	25.7	10	8	48	15	40
65970.W0025	R3550/R3551.025	R3565/R3566.025	25	33	29.7	10	8	51	15	40