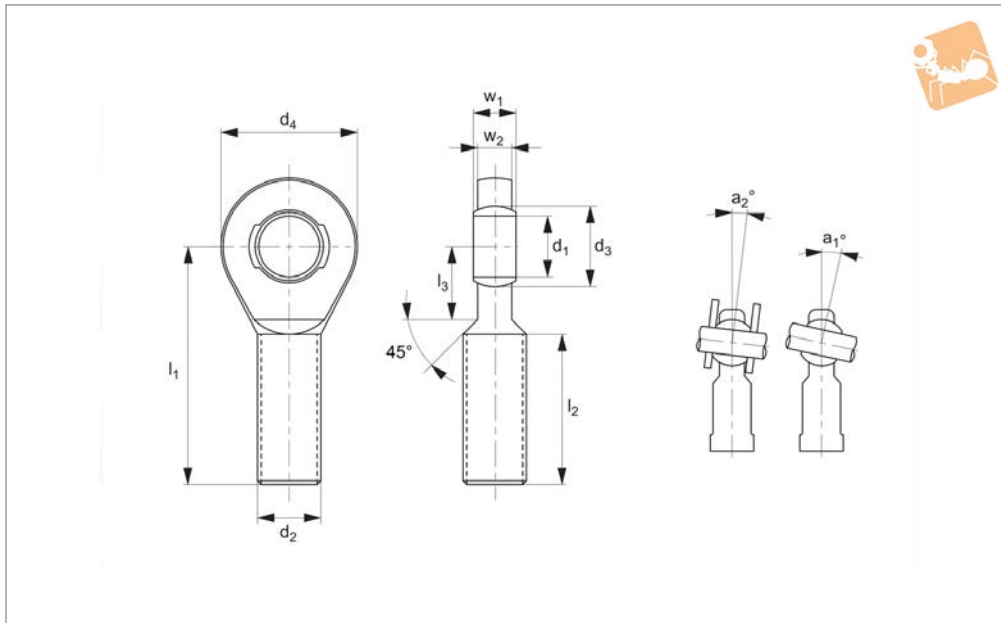




# Stainless Heavy-Duty Rod Ends - Male

with integral spherical plain bearing

Rod Ends



**R3567**

ROD ENDS

**Material**

Housing - stainless steel DIN 1.4301 (AISI 304), forged, rolled thread.

Joint ball - stainless steel DIN 1.4125 (AISI 440C), hardened and ground, polished

Race - polyamid-PTFE-fibreglass-

compound.

**Technical Notes**

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

**Tips**

Standard thread is right hand thread.

**Important Notes**

\*denotes fine pitch thread.

Order No.	Thread hand	d <sub>1</sub>	l <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>	l <sub>2</sub>	d <sub>4</sub>	Weight g
R3567.R006	Right	6	36	M6	10.0	22	20	14
R3567.R008	Right	8	42	M8	13.0	25	23	24
R3567.R010	Right	10	48	M10	16.0	29	28	41
R3567.R012	Right	12	54	M12	18.0	33	32	67
R3567.R015	Right	15	63	M14	22.0	33	38	110
R3567.R017	Right	17	69	M16	25.0	40	44	163
R3567.R020	Right	24	78	M20x1,5*	29.0	47	51	270
R3567.R025	Right	25	94	M24x2*	35.5	57	62	508
R3567.R030	Right	30	110	M30x2*	40.7	66	70	785
R3567.R035	Right	35	140	M36x3*	47.0	92	82	1330
R3567.R040	Right	40	145	M42x3*	53.0	94	92	1890
R3567.R041	Right	40	150	M39x3*	53.0	99	92	1785
R3567.R045	Right	45	165	M45x3*	60.0	100	102	2620
R3567.R046	Right	45	163	M42x3*	60.0	98	102	2430
R3567.R050	Right	50	195	M52x3*	66.0	120	112	3865
R3567.R051	Right	50	185	M45x3*	66.0	110	112	3225
R3567.R060	Right	60	225	M60x4*	80.0	140	135	6400
R3567.R061	Right	60	210	M52x3*	80.0	125	135	5430
R3567.L006	Left	6	36	M6	10.0	22	20	14
R3567.L008	Left	8	42	M8	13.0	25	23	24
R3567.L010	Left	10	48	M10	16.0	29	28	41
R3567.L012	Left	12	54	M12	18.0	33	32	67
R3567.L015	Left	15	63	M14	22.0	33	38	110
R3567.L017	Left	17	69	M16	25.0	40	44	163
R3567.L020	Left	20	78	M20x1,5*	29.0	47	51	270
R3567.L025	Left	25	94	M24x2*	35.5	57	62	508
R3567.L030	Left	30	110	M30x2*	40.7	66	70	785
R3567.L035	Left	35	140	M36x3*	47.0	92	82	1330
R3567.L040	Left	40	145	M42x3*	53.0	94	92	1890
R3567.L041	Left	40	150	M39x3*	53.0	99	92	1785
R3567.L045	Left	45	165	M45x3*	60.0	100	102	2620
R3567.L046	Left	45	163	M42x3*	60.0	98	102	2430

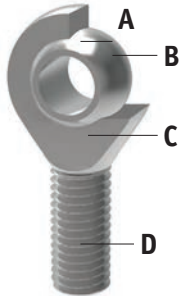


Order No.	Thread hand	d <sub>1</sub>	l <sub>1</sub>	d <sub>2</sub>	d <sub>3</sub>	l <sub>2</sub>	d <sub>4</sub>	Weight g
R3567.L050	Left	50	195	M52x3*	66.0	120	112	3865
R3567.L051	Left	50	185	M45x3*	66.0	110	112	3225
R3567.L060	Left	60	225	M60x4*	80.0	140	135	6400
R3567.L061	Left	60	210	M52x3*	80.0	125	135	5430

Order No.	a°	l <sub>3</sub>	w <sub>1</sub>	w <sub>2</sub>	Dyn. load C kN max.	Static load C <sub>0</sub> kN max.
R3567.R006	13.0	11	6	4	2.5	3.0
R3567.R008	15.0	12	8	5	4.2	5.0
R3567.R010	12.0	15	9	6	6.4	7.6
R3567.R012	10.5	15	10	7	9.2	10.4
R3567.R015	8.5	18	12	9	13.4	17.6
R3567.R017	10.0	23	14	10	19.2	24.3
R3567.R020	9.0	25	16	12	25.2	34.5
R3567.R025	7.5	32	20	16	42.4	53.6
R3567.R030	6.0	35	22	18	54.0	63.8
R3567.R035	6.5	38	25	20	70.4	81.4
R3567.R040	7.0	42	28	22	86.0	100.2
R3567.R041	7.0	42	28	22	86.0	100.2
R3567.R045	7.5	50	32	25	107.0	124.3
R3567.R046	7.5	50	32	25	107.0	124.3
R3567.R050	6.5	60	35	28	132.0	152.6
R3567.R051	6.5	60	35	28	132.0	152.6
R3567.R060	6.5	70	44	36	208.0	239.5
R3567.R061	6.5	70	44	36	208.0	239.5
R3567.L006	13.0	11	6	4	2.5	3.0
R3567.L008	15.0	12	8	5	4.2	5.0
R3567.L010	12.0	15	9	6	6.4	7.6
R3567.L012	10.5	15	10	7	9.2	10.4
R3567.L015	8.5	18	12	9	13.4	17.8
R3567.L017	10.0	23	14	10	19.2	24.3
R3567.L020	9.0	25	16	12	25.2	34.5
R3567.L025	7.5	32	20	16	42.4	53.6
R3567.L030	6.0	35	22	18	54.0	63.8
R3567.L035	6.5	38	25	20	70.4	81.4
R3567.L040	7.0	42	28	22	86.0	100.2
R3567.L041	7.0	42	28	22	86.0	100.2
R3567.L045	7.5	50	32	25	107.0	124.3
R3567.L046	7.5	50	32	25	107.0	124.3
R3567.L050	6.5	60	35	28	132.0	152.6
R3567.L051	6.5	60	35	28	132.0	152.6
R3567.L060	6.5	70	44	36	208.0	239.5
R3567.L061	6.5	70	44	36	208.0	239.5

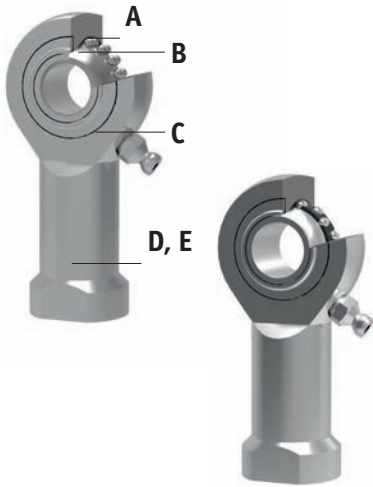
All of our rod ends incorporate either a plain spherical bearing, ball bearing, or roller bearing. Below is an overview of each type.

### Plain spherical bearings



- A** Made from Polyamid-PTFE-fibreglass-compound, maintenance free, absorbs any foreign particles
- B** Ball made of bearing steel, hardened, ground, polished and hard chromium plated, ensures reliable corrosion protection
- C** No clearance - radial clearance 0-10µm
- D** All rod ends housings made of forged steel, tempered, extremely high loads resistant

### Ball and roller bearings



- A** Radial clearance: 10-30µm, low friction
- B** Inner ring made of bearing steel, hardened ball grooves polished
- C** Shields on both sides protect against rough dirt penetration
- D** All rod ends housings are made of forged steel, case hardened bearing race
- E** 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



#### Rod ends with integral maintenance-free spherical plain bearings

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.

#### Rod ends with integral ball bearings

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.

#### Rod ends with integral roller bearings

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 have essentially 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.



### Static load capacity $C_0$ (plain bearings)

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.

### Static load capacity $C_0$ (roller and ball bearings)

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 1/10,000<sup>th</sup> of the ball diameter).

### Dynamic load capacity $C$ (plain bearings)

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.

### Dynamic load capacity $C$ (roller and ball bearings)

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).



**Low cost rod ends load ratings**

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):

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

Angle of  $\frac{T}{2}$  expressed in radians

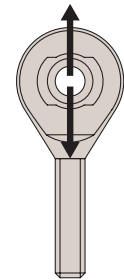
3: Shank strength (S Value) male threaded rod end:

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

female threaded rod end:

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

- Where: 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

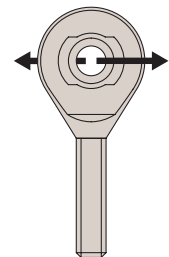


The axial static load capacity is measured as the force required to cause failure via a load parallel to the axis of the bore. Depending on the material types and construction methods, the ultimate axial load is generally 10-20% of the ultimate radial static load. The formula does not account for the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

Axial strength (A Value):

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

- Where: X = Allowable stress (see table below)  
 E = Ball diameter  
 T = Housing width



Material	Allowable stress (PSI)
300 Series Stainless Steel	35,000
Low Carbon Steel	52,000

Rod Ends from Automation Components

ROD ENDS