

Metric Rod Ends



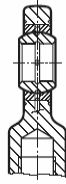
Rod ends are available in a variety of types, sizes, materials and features. PTI stocks the popular versions for immediate delivery. Stock types at PTI are indicated on the following pages. Non-stock items are normally readily available from our warehouse in Europe. Therefore most types and sizes are readily available. Custom types including high performance and hydraulic types are also available on request.

Metric Rod Ends

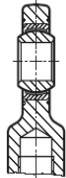


Internal Threads DIN ISO 12240-4

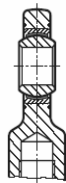
EI..(-2RS) Type
Steel on Steel
Regreasable
Zinc Plated
6-80mm Bores
Compact
Hi Multi-directional Loads



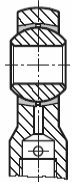
EI..D Type
Maintenance Free
Zinc Plated
6-80mm Bores
Compact
Hi Unidirectional Loads



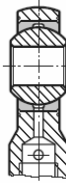
EI..D SS Type
Stainless Steel (Niro)
Maintenance Free
6-80mm Bores
Compact
Hi Unidirectional Loads



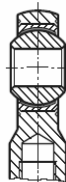
GI Type
Standard
Regreasable
Zinc Plated
5-25mm Bores
Suited For Axial Loads



GIS...GIXS...GIRS... Type
Heavy Duty
Regreasable
Zinc Plated
2-50mm Bores
High Speed



**GISW... GIXSW...
GIRSW...Type**
Heavy Duty
Maintenance Free
5-50mm Bores
OK for Dynamic Loads



External Threads DIN ISO 12240-4

EA..(-2RS) Type
Steel on Steel
Regreasable
Zinc Plated
6-80mm Bores
Compact
Hi Multi-directional Loads



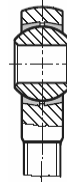
EA..D Type
Maintenance Free
Zinc Plated
6-80mm Bores
Compact
Hi Unidirectional Loads



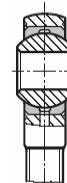
EA..D SS Type
Stainless Steel (Niro)
Maintenance Free
6-80mm Bores
Compact
Hi Unidirectional Loads



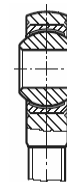
GA Type
Standard
Regreasable
Zinc Plated
5-25mm Bores
Suited For Axial Loads



GAS...GAXS...GARS...Type
Heavy Duty
Regreasable
Zinc Plated
2-50mm Bores
High Speed



**GASW... GAXSW...
GARSW...Type**
Heavy Duty
Maintenance Free
5-50mm Bores
OK for Dynamic Loads



Spherical Plain Bearings DIN ISO 12240-1 with / without outer ring

GE..EC Type
Maintenance Free
Steel on PTFE Liner
6-300mm Bores
Hi Unidirectional Loads



Hydraulic Rod End DIN 812-8.8

FPR..U Type
Regreasable
Steel on Steel, GE..E
20-120mm Bores
For Short Relay Distances
and Maximum Stroke.



Corrosion Protection Accessories

RERS & RELS Type
Neoprene Protector Caps
Protects against Dust &
Chemicals



Shaded units = indicates most sizes are stock. All others available from European warehouse.

Rod Ends



Technical / Selection Information

Shaft and Housing Fit

Type	Bore Tolerance	Shaft Tolerance	Bearing OD Tolerance	Housing Fit Tolerance
G..Type	H7	g6	h6	J7
E..Type	H7	g7	h5	J57

Threads: Standard Metric ISO, DIN 13, Tolerance h6.

Misalignment Capability: See individual Products.

Internal Clearance

Type	Size	Radial Internal Clearance in mm (min/max)
EI..D / EA..D	06 - 12	0.000 - 0.030
EI..D - NIRO	15 - 20	0.000 - 0.040
EA..D - NIRO	25 - 35	0.000 - 0.050
	40 - 60	0.000 - 0.055
	70 - 80	0.000 - 0.060
GISW / GASW	05 - 10	0.005 - 0.030
GIXSW / GAXSW	12 - 18	0.005 - 0.035
GIRSW / GARSW	20 - 25	0.005 - 0.045
	30 - 40	0.005 - 0.055
GE..EC	06 - 12	0.032 - 0.068
	15 - 20	0.040 - 0.082
	25 - 35	0.050 - 0.100
	40 - 60	0.060 - 0.120
	70 - 80	0.072 - 0.142
GL	02 - 10	0.005 - 0.040
	12 - 18	0.010 - 0.050
	20 - 25	0.015 - 0.060
	30 - 40	0.015 - 1.075
GI / GA	02 - 10	0.005 - 0.035
GIS / GAS	12 - 20	0.010 - 0.040
GIRS / GARS	22 - 44	0.010 - 0.050

Lubrication

Maintenance Free Rod Ends and Spherical Plain Bearings do not require lubrication. The Ball is supported by a PTFE Liner in the housing. Rod Ends are available with regreasable options on request. For GE Type Bearings that can be lubricated we recommend Re-Greasing with a Lithium Grease with a Moly Disulfide Additive.

Temperature Range

SERIES	SURFACES	T (°C)	T (°F)
G..Type GISW / GASW GIRSW / GARSW	Steel on PTFE	-50° TO 200°	-58° TO 392°
E..Type EA..D / EI..D EA..D-NIRO / EI..D-NIRO	Steel on PTFE	-50° TO 200°	-58° TO 392°
G..Type GE..EC	Steel on PTFE	-50° TO 200°	-58° TO 392°

Static Load Ratings C₀

C₀ is the max permissible Static Load that a Rod End can withstand without causing permanent distortion or damage. The Static Load is also used to establish the maximum axial (thrust) load during misalignment where: F_r = Radial Load, F_a = Axial or Thrust Load.

$$F_a \text{ (max)} = a \cdot C_0 \text{ where: } \begin{matrix} a = 0.5 \text{ for GI or GA Types} \\ a = 0.3 \text{ for All Others} \end{matrix}$$

Dynamic Load Ratings C_n

Dynamic Load Ratings are used to establish the working life of spherical plain bearings or rod ends under Dynamic Load conditions. Use equivalent load features below.

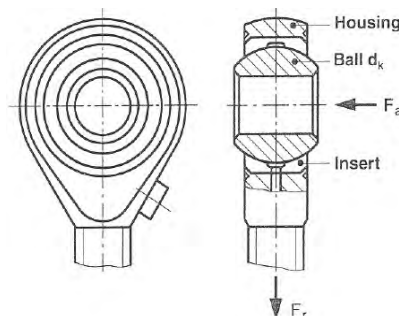
y factor

$\frac{F_a}{F_r}$.1	.2	.3	.4	.5
y	.8	1	1.5	2.5	3

$$F_{eq} = F_r + y \cdot F_a$$

F_r = Radial Load

F_a = Axial Load



For Variable Loads, PTI recommends using the max load for sizing / selection purposes.

Thermal & Load Type Service Factors

Rod Ends or Spherical Bearings that must operate in elevated temperatures or in load conditions that could be harsh, a service factor must be applied to insure proper sizing or selection. Use the factors and formula below to determine the max loads suggested.

Temperature Factor (f_T)

Temperature	80C (175°F)	100C(212°F)	150C (300°F)	200C (392°F)	250C (480°F)
Maintenance Free	1	1	1	0.8	0.5
Re-Lube Type	1	1	0.8	0.5	0.3

Load Type Service Factor (f_B)

Load Type	f _B
Steady / Uniform	1.0
Light Shock / Variable	0.5

Use the following formula to determine the max allowable load.
F_r (max) = C₀ · f_T · f_B

$$\text{also } F_a \text{ (max)} = a \cdot F_r \text{ (max)}$$

If no bearing load is known in the application, the required Static Load Rating can be determined using the same formula re-written for the Static Load:

$$C_{0 \text{ (req)}} \geq \frac{F_r}{f_B \cdot f_T}$$

For an expected Life Calculation, many factors contribute and an approximation is the general result, experience is also a good reference. For more details contact PTI.

Metric Rod Ends

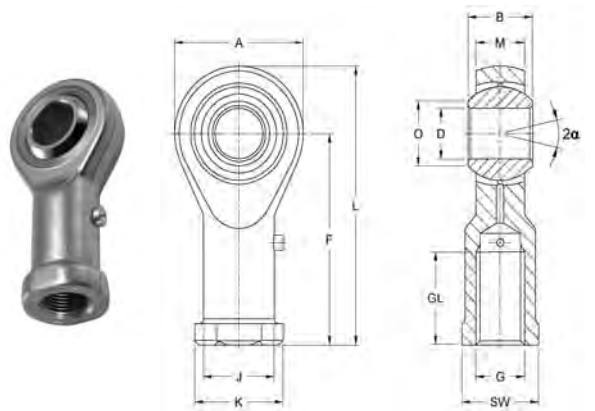
GI Type

Standard Duty, Zinc Plated
Grease Fitting for Re-Lube
Right & Left Hand - Internal Threads
Suited for Axial Loads

Housing: Sizes 5-12 turned from free-cutting steel to 9SMnPb28K, 12L13, sizes 14 and up are forged from heat-treated steel to C22, M1023

Insert: Special brass to CuZn40Al1

Ball: Bearing steel 100Cr6 (Aisi 52100), hardened, ground, polished



Right Hand Part No.	Left Hand Part No.	Size D	Dimensions (mm)											Static Load C _o kN	Dynamic Load C kN	Max Speed RPM	Wt. g
			B	M	A	F	L	K	J	O	SW	G	GL				
GI 5	GIL 5	5	8	6.00	18	27	36	11	9.0	7.7	9	M5 x 0.8	10	9.9	2.5	900	18
GI 6	GIL 6	6	9	6.75	20	30	40	13	10.0	8.9	11	M6 x 1	12	11.9	3.2	760	27
GI 8	GIL 8	8	12	9.00	24	36	48	16	12.5	10.4	13	M8 x 1.25	16	17.1	5.4	620	46
GI 10	GIL 10	10	14	10.50	28	43	57	19	15.0	12.9	17	M10 x 1.5	20	21.4	7.5	500	76
GI 12	GIL 12	12	16	12.00	32	50	66	22	17.5	15.4	19	M12 x 1.75	22	27.0	10.0	450	115
GI 14	GIL 14	14	19	13.50	36	57	75	25	20.0	16.8	22	M14 x 2	25	24.5	13.0	360	170
GI 16	GIL 16	16	21	15.00	42	64	85	27	22.0	19.3	22	M16 x 2	28	37.0	16.0	350	230
GI 18	GIL 18	18	23	16.50	46	71	94	31	25.0	21.8	27	M18 x 1.5	32	43.0	19.5	320	320
GI 20	GIL 20	20	25	18.00	50	77	102	34	27.5	24.3	32	M20 x 1.5	33	49.5	23.5	280	415
GI 22	GIL 22	22	28	20.00	54	84	111	37	30.0	25.8	32	M22 x 1.5	37	57.0	29.0	250	540
GI 25	GIL 25	25	31	22.00	60	94	124	42	33.5	29.6	36	M24 x 2	42	68.0	35.0	230	750

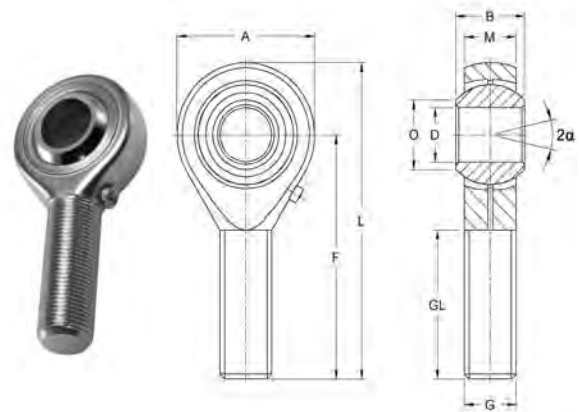
GA Type

Standard Duty, Zinc Plated
Grease Fitting for Re-Lube
Right & Left Hand - External Threads
Suited for Axial Loads

Housing: Sizes 5-12 turned from free-cutting steel to 9SMnPb28K, 12L13
 Sizes 14 and up are forged from heat-treated steel to C22, M1023

Insert: Special brass to CuZn40Al1

Ball: Bearing steel 100Cr6 (Aisi 52100), hardened, ground, polished



Right Hand Part No.	Left Hand Part No.	Size D	Dimensions (mm)								Static Load C _o kN	Dynamic Load C kN	Max Speed RPM	Wt. g
			B	M	A	F	L	O	G	GL				
GA 5*	GAL 5*	5	8	6.00	18	33	42	7.7	M5 x .08	20	4.3	2.5	900	13
GA 6	GAL 6	6	9	6.75	20	36	46	8.9	M6 x 1	22	6.0	3.2	760	20
GA 8	GAL 8	8	12	9.00	24	42	54	10.4	M8 x 1.25	25	11.0	5.4	620	33
GA 10	GAL 10	10	14	10.50	28	48	62	12.9	M10 x 1.5	29	17.4	7.5	500	56
GA 12	GAL 12	12	16	12.00	32	54	70	15.4	M12 x 1.75	33	25.5	10.0	450	87
GA 14	GAL 14	14	19	13.50	36	60	78	16.8	M14 x 2	36	24.5	13.0	360	129
GA 16	GAL 16	16	21	15.00	42	66	87	19.3	M16 x 2	40	36.5	16.0	350	189
GA 18	GAL 18	18	23	16.50	46	72	95	21.8	M18 x 1.5	44	43.0	19.5	320	267
GA 20	GAL 20	20	25	18.00	50	78	103	24.3	M20 x 1.5	47	49.5	23.5	280	348
GA 22	GAL 22	22	28	20.00	54	84	111	25.8	M22 x 1.5	51	57.0	29.0	250	443
GA 25	GAL 25	25	31	22.00	60	94	124	29.6	M24 x 2	57	68.0	35.0	230	600

Note: * Without grease fitting.

Metric Rod Ends



GIS Type

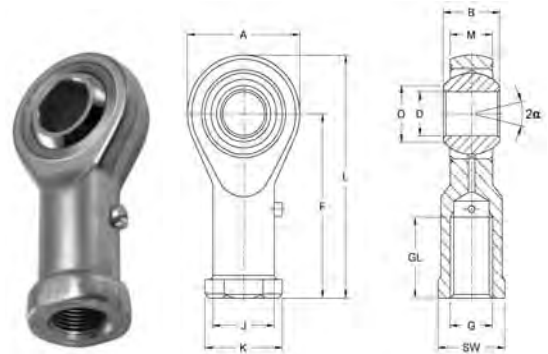
Heavy Duty, Zinc Plated
Grease Fitting for Re-Lube
Right & Left Hand - Internal Threads
Suited for High Speed Applications

Housing: Sizes 2-12 turned from free-cutting steel to 9SMnPb28K, 12L13
 Sizes 14-40 are forged from heat-treated steel to C22, M1023
 Size 50 is turned from heat-treated steel to C45, Aisi 1045

Insert: Special high strength bronze to CuSn8

Ball: Bearing steel to 100Cr6 Aisi 52100, hardened, ground, polished

This series is also available sealed and with CETOP dimensions for Hydraulic Cylinders



Right Hand Part No.	Left Hand Part No.	Size D	Dimensions (mm)											Static Load C ₀ kN	Dynamic Load C kN	Max Speed RPM	Wt. g
			B	M	A	F	L	K	J	O	SW	G	GL				
GIS 2*	GILS 2*	2	4.5	3.60	9	16	20.5	4.5	3.8	2.6	4.0	M2 x 0.4	7	3.0	1.1	—	3
GIS 3	GILS 3	3	6.0	4.50	14	21	27.0	6.5	5.0	5.1	5.5	M3 x 0.5	10	4.1	1.8	—	6
GIS 5	GILS 5	5	8.0	6.00	18	27	36.0	11.0	9.0	7.7	9.0	M5 x 0.8	10	8.0	3.3	—	18
GIS 6	GILS 6	6	9.0	6.75	20	30	40.0	13.0	10.0	8.9	11.0	M6 x 1	12	8.9	4.3	1500	27
GIS 8	GILS 8	8	12.0	9.00	24	36	48.0	16.0	12.5	10.4	13.0	M8 x 1.25	16	14.1	7.1	1200	46
GIS 10	GILS 10	10	14.0	10.50	28	43	57.0	19.0	15.0	12.9	17.0	M10 x 1.5	20	19.3	10.0	1000	76
GIS 12	GILS 12	12	16.0	12.00	32	50	66.0	22.0	17.5	15.4	19.0	M12 x 1.75	22	23.5	13.5	860	115
GIS 14	GILS 14	14	19.0	13.50	36	57	75.0	25.0	20.0	16.8	22.0	M14 x 2	25	21.0	17.0	750	170
GIS 16	GILS 16	16	21.0	15.00	42	64	85.0	27.0	22.0	19.3	22.0	M16 x 2	28	32.0	21.5	660	230
GIS 18	GILS 18	18	23.0	16.50	46	71	94.0	31.0	25.0	21.8	27.0	M18 x 1.5	32	38.5	26.0	600	320
GIS 20	GILS 20	20	25.0	18.00	50	77	102.0	34.0	27.5	24.3	32.0	M20 x 1.5	33	44.0	31.5	540	415
GIS 22	GILS 22	22	28.0	20.00	54	84	111.0	37.0	30.0	25.8	32.0	M22 x 1.5	37	53.0	38.0	500	540
GIS 25	GILS 25	25	31.0	22.00	60	94	124.0	42.0	33.5	29.6	36.0	M24 x 2	42	62.0	47.0	440	750
GIS 30	GILS 30	30	37.0	25.0	70	110	145.0	51.0	40.0	34.8	41.0	M30 x 2	51	82.0	64.0	370	1130
GIS 35	GILS 35	35	43.0	28.0	80	125	165.0	58.0	46.0	37.7	50.0	M36 x 2	56	101.0	80.0	330	1600
GIS 40	GILS 40	40	49.0	35.0	90	142	187.0	69.0	57.0	44.2	60.0	M42 x 2	60	124.0	116.0	290	2770

Note: * Without Grease Fitting. Size 50 available on request.

GAS Type

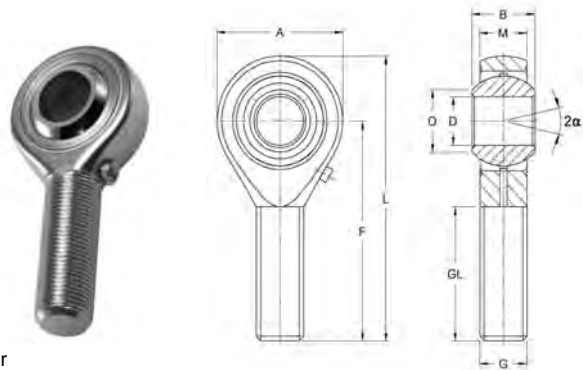
Heavy Duty, Zinc Plated
Grease Fitting for Re-Lube
Right & Left Hand - External Threads
Suited for High Speed Applications

Housing: Sizes 2-12 turned from free-cutting steel to 9SMnPb28K, 12L13
 Sizes 14-40 are forged from heat-treated steel to C22, M1023
 Size 50 is turned from heat-treated steel to C45, Aisi 1045

Insert: Special high strength bronze to CuSn8

Ball: Bearing steel to 100Cr6, Aisi 52100, hardened, ground, polished

This series is also available sealed and with CETOP dimensions for Hydraulic Cylinder



Right Hand Part No.	Left Hand Part No.	Size D	Dimensions (mm)											Static Load C ₀ kN	Dynamic Load C kN	Max Speed RPM	Wt. g
			B	M	A	F	L	O	G	GL							
GAS 2*	GALS 2*	2	4.5	3.60	9	20	24.5	2.6	M2 x 0.4	12	0.6	1.1	—	3			
GAS 3*	GALS 3*	3	6.0	4.50	14	26	33.0	5.1	M3 x 0.5	15	1.5	1.8	—	6			
GAS 5*	GALS 5*	5	8.0	6.00	18	33	42.0	7.7	M5 x 0.8	20	4.3	3.3	—	13			
GAS 6	GALS 6	6	9.0	6.75	20	36	46.0	8.9	M6 x 1	22	6.0	4.3	1500	20			
GAS 8	GALS 8	8	12.0	9.00	24	42	54.0	10.4	M8 x 1.25	25	11.0	7.0	1200	33			
GAS 10	GALS 10	10	14.0	10.50	28	48	62.0	12.9	M10 x 1.5	29	17.4	10.0	1000	56			
GAS 12	GALS 12	12	16.0	12.00	32	54	70.0	15.4	M12 x 1.75	33	23.5	13.5	860	87			
GAS 14	GALS 14	14	19.0	13.50	36	60	78.0	16.8	M14 x 2	36	21.0	17.0	750	129			
GAS 16	GALS 16	16	21.0	15.00	42	66	87.0	19.3	M16 x 2	40	32.0	21.5	660	189			
GAS 18	GALS 18	18	23.0	16.50	46	72	95.0	21.8	M18 x 1.5	44	38.5	26.0	600	267			
GAS 20	GALS 20	20	25.0	18.00	50	78	103.0	24.3	M20 x 1.5	47	44.0	31.5	540	348			
GAS 22	GALS 22	22	28.0	20.00	54	84	111.0	25.8	M22 x 1.5	51	53.0	38.0	500	443			
GAS 25	GALS 25	25	31.0	22.00	60	94	124.0	29.6	M24 x 2	58	62.0	47.0	440	600			
GAS 30	GALS 30	30	37.0	25.00	70	110	145.0	34.8	M30 x 2	71	82.0	64.0	370	1030			
GAS 35	GALS 35	35	43.0	28.00	80	125	165.0	37.7	M36 x 2	73	101.0	80.0	330	1600			
GAS 40	GALS 40	40	49.0	35.00	90	142	187.0	44.2	M42 x 2	78	124.0	116.0	290	2550			

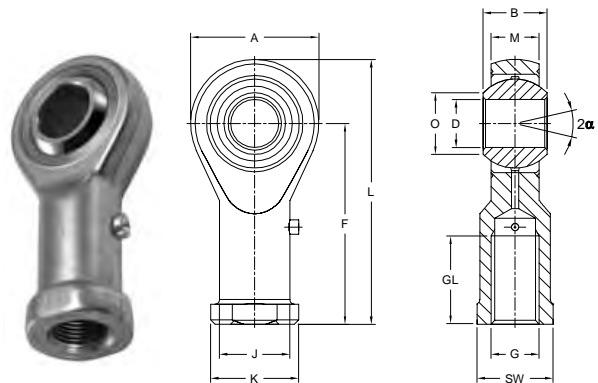
Note: * Without Grease Fitting. Size 50 available on request.

Metric Rod Ends



GIXS Type

- Extra Heavy Duty, Zinc Plated
- Grease Fitting for Re-Lube
- Right & Left Hand- Internal Threads
- Suited for High Pressure and Tension Loads

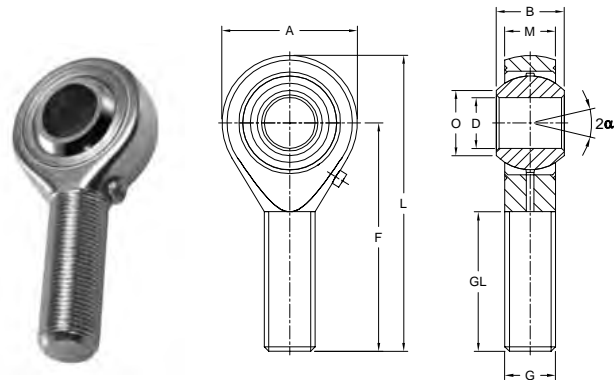


Housing: Heat-treated 42CrMo4 steel, Aisi 4140, forged
Insert: Special high strength bronze to CuSn8
Ball: Bearing steel 100Cr6 (Aisi 52100), hardened, ground, polished
 This series is also available sealed and with CETOP
 (European Fluid Power Committee) dimensions for Hydraulic Cylinders

Right Hand Part No.	Left Hand Part No.	Size D	Dimensions (mm)											Static Load C ₀ kN	Dynamic Load C kN	Max Speed RPM	Wt. g
			B	M	A	F	L	K	J	O	SW	G	GL				
GIXS 6	GILXS 6	6	9	6.75	20	30	40	13	10.0	8.9	11	M6 x 1	12	16.7	4.3	1500	27
GIXS 8	GILXS 8	8	12	9.00	24	36	48	16	12.5	10.4	13	M8 x 1.25	16	25.5	7.1	1200	46
GIXS 10	GILXS 10	10	14	10.50	28	43	57	19	15.0	12.9	17	M10 x 1.5	20	34.8	10.0	1000	76
GIXS 12	GILXS 12	12	16	12.00	32	50	66	22	17.5	15.4	19	M12 x 1.75	22	42.0	13.3	860	115
GIXS 14	GILXS 14	14	19	13.50	36	57	75	25	20.0	16.8	22	M14 x 2	25	57.0	17.0	750	170
GIXS 16	GILXS 16	16	21	15.00	42	64	85	27	22.0	19.3	22	M16 x 2	28	67.5	21.5	660	230
GIXS 18	GILXS 18	18	23	16.50	46	71	94	31	25.0	21.8	27	M18 x 1.5	32	81.5	26.0	600	320
GIXS 20	GILXS 20	20	25	18.00	50	77	102	34	27.5	24.3	32	M20 x 1.5	33	93.5	31.5	540	415
GIXS 22	GILXS 22	22	28	20.00	54	84	111	37	30.0	25.8	32	M22 x 1.5	37	114.0	38.0	500	540
GIXS 25	GILXS 25	25	31	22.00	60	94	124	42	33.5	29.6	36	M24 x 2	42	135.0	47.0	440	750
GIXS 30	GILXS 30	30	37	25.00	70	110	145	51	40.0	34.8	41	M30 x 2	51	184.0	64.0	370	1130

GAXS Type

- Extra Heavy Duty, Zinc Plated
- Grease Fitting for Re-Lube
- Right & Left Hand-External Threads
- Suited for High Pressure and Tension Loads



Housing: Heat-treated 42CrMo4 steel, Aisi 4140, forged
Insert: Special high strength bronze to CuSn8
Ball: Bearing steel 100Cr6 (Aisi 52100), hardened, ground, polished
 This series is also available sealed and with CETOP
 (European Fluid Power Committee) dimensions for Hydraulic Cylinders

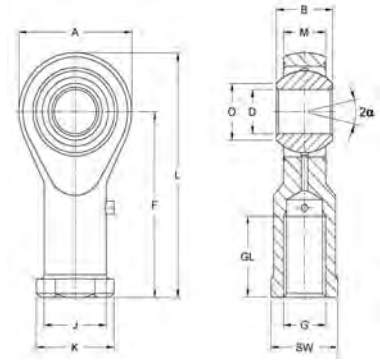
Right Hand Part No.	Left Hand Part No.	Size D	Dimensions (mm)								Static Load C ₀ kN	Dynamic Load C kN	Max Speed RPM	Wt. g
			B	M	A	F	L	O	G	GL				
GAXS 6	GALXS 6	6	9	6.75	20	36	46	8.9	M6 x 1	22	9.8	4.3	1500	20
GAXS 8	GALXS 8	8	12	9.00	24	42	54	10.4	M8 x 1.25	25	19.5	7.1	1200	33
GAXS 10	GALXS 10	10	14	10.50	28	48	62	12.9	M10 x 1.5	29	31.4	10.0	1000	56
GAXS 12	GALXS 12	12	16	12.00	32	54	70	15.4	M12 x 1.75	33	42.0	13.5	860	87
GAXS 14	GALXS 14	14	19	13.50	36	60	78	16.8	M14 x 2	36	57.0	17.0	750	129
GAXS 16	GALXS 16	16	21	15.00	42	66	87	19.3	M16 x 2	40	67.5	21.5	660	189
GAXS 18	GALXS 18	18	23	16.50	46	72	95	21.8	M18 x 1.5	44	81.5	26.0	600	267
GAXS 20	GALXS 20	20	25	18.00	50	78	103	24.3	M20 x 1.5	47	93.5	31.5	540	348
GAXS 22	GALXS 22	22	28	20.00	54	84	111	25.8	M22 x 1.5	51	114.0	38.0	500	443
GAXS 25	GALXS 25	25	31	22.00	60	94	124	29.6	M24 x 2	57	135.0	47.0	440	600
GAXS 30	GALXS 30	30	37	25.00	70	110	145	34.8	M30 x 2	71	184.0	64.0	370	1030

Metric Rod Ends



GIRS Type

- Stainless Steel
- Grease Fitting for Re-Lube
- Right & Left Hand - Internal Threads
- Suited for Corrosive Environments



Housing: Stainless Steel 1.4057, Aisi 431, forged, polished
 Sizes 40 made from stainless steel to 1.4057, Aisi 431, turned

Insert: Special high strength bronze to CuSn8

Ball: Bearing steel 100Cr6, Aisi 52100, hardened, ground, polished, hard chrome plated

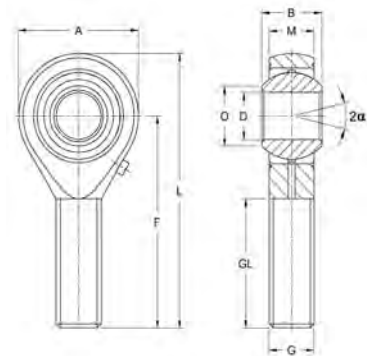
This series is also available sealed on request

Right Hand Part No.	Left Hand Part No.	Size D	Dimensions (mm)											Static Load C ₀ kN	Dynamic Load C kN	Max Speed RPM	Wt. g
			B	M	A	F	L	K	J	O	SW	G	GL				
GIRS 3*	GILRS 3*	3	6.0	4.50	14	21	27	6.5	5.0	5.1	5.5	M3 x 0.5	10	8.0	1.8	—	6
GIRS 5	GILRS 5	5	8.0	6.00	18	27	36	11.0	9.0	7.7	9.0	M5 x 0.8	10	11.8	3.3	1200	18
GIRS 6	GILRS 6	6	9.0	6.75	20	30	40	13.0	10.0	8.9	11.0	M6 x 1.0	12	13.1	4.3	1500	27
GIRS 8	GILRS 8	8	12.0	9.00	24	36	48	16.0	12.5	10.4	13.0	M8 x 1.25	16	20.7	7.1	1200	46
GIRS 10	GILRS 10	10	14.0	10.50	28	43	57	19.0	15.0	12.9	17.0	M10 x 1.50	20	28.3	10.0	1000	76
GIRS 12	GILRS 12	12	16.0	12.00	32	50	66	22.0	17.5	15.4	19.0	M12 x 1.75	22	34.5	13.5	860	115
GIRS 14	GILRS 14	14	19.0	13.50	36	57	75	25.0	20.0	16.8	22.0	M14 x 2	25	39.5	17.0	750	170
GIRS 16	GILRS 16	16	21.0	15.00	42	64	85	27.0	22.0	19.3	22.0	M16 x 2	28	60.5	21.5	660	230
GIRS 18	GILRS 18	18	23.0	16.50	46	71	94	31.0	25.0	21.8	27.0	M18 x 1.5	32	73.0	26.0	600	320
GIRS 20	GILRS 20	20	25.0	18.00	50	77	102	34.0	27.5	24.3	32.0	M20 x 1.5	33	83.0	31.5	540	415
GIRS 22	GILRS 22	22	28.0	20.00	54	84	111	37.0	30.0	25.8	32.0	M22 x 1.5	37	100.0	38.0	500	540
GIRS 25	GILRS 25	25	31.0	22.00	60	94	124	42.0	33.5	29.6	36.0	M24 x 2	42	118.0	47.0	440	750
GIRS 30	GILRS 30	30	37.0	25.00	70	110	145	51.0	40.0	34.8	41.0	M30 x 2	51	155.0	64.0	370	1130
GIRS 35	GILRS 35	35	43.0	28.00	80	125	165	58.0	46.0	37.7	50.0	M36 x 2	56	191.0	80.0	330	1600
GIRS 40	GILRS 40	40	49.0	35.00	90	142	187	69.0	57.0	44.2	60.0	M42 x 2	60	235.0	116.0	290	2770

Note: * Without Lube Fitting

GARS Type

- Stainless Steel
- Grease Fitting for Re-Lube
- Right & Left Hand - External Threads
- Suited for Corrosive Environments



Housing: Stainless Steel 1.4057, Aisi 431, forged, polished
 Sizes 40 made from stainless steel to 1.4057, Aisi 431, turned

Insert: Special high strength bronze to CuSn8

Ball: Bearing steel 100Cr6, Aisi 52100, hardened, ground, polished, hard chrome plated

This series is also available sealed on request

Right Hand Part No.	Left Hand Part No.	Size D	Dimensions (mm)								Static Load C ₀ kN	Dynamic Load C kN	Max Speed RPM	Wt. g
			B	M	A	F	L	O	G	GL				
GARS 3*	GALRS 3*	3	6.0	4.50	14	26	33.0	5.1	M3 x 0.5	15	7.0	1.8	—	6
GARS 5*	GALRS 5*	5	8.0	6.00	18	33	42.0	7.7	M5 x 0.8	20	6.2	3.3	—	13
GARS 6	GALRS 6	6	9.0	6.75	20	36	46.0	8.9	M6 x 1.0	22	8.8	4.3	1500	20
GARS 8	GALRS 8	8	12.0	9.00	24	42	54.0	10.4	M8 x 1.25	25	16.1	7.0	1200	33
GARS 10	GALRS 10	10	14.0	10.50	28	48	62.0	12.9	M10 x 1.5	29	25.5	10.0	1000	56
GARS 12	GALRS 12	12	16.0	12.00	32	54	70.0	15.4	M12 x 1.75	33	34.5	13.5	860	87
GARS 14	GALRS 14	14	19.0	13.50	36	60	78.0	16.8	M14 x 2	36	39.5	17.0	750	129
GARS 16	GALRS 16	16	21.0	15.00	42	66	87.0	19.3	M16 x 2	40	60.5	21.5	660	189
GARS 18	GALRS 18	18	23.0	16.50	46	72	95.0	21.8	M18 x 1.5	44	73.0	26.0	600	267
GARS 20	GALRS 20	20	25.0	18.00	50	78	103.0	24.3	M20 x 1.5	47	83.0	31.5	540	348
GARS 22	GALRS 22	22	28.0	20.00	54	84	111.0	25.8	M22 x 1.5	51	100.0	38.0	500	443
GARS 25	GALRS 25	25	31.0	22.00	60	94	124.0	29.6	M24 x 2	58	118.0	47.0	440	600
GARS 30	GALRS 30	30	37.0	25.00	70	110	145.0	34.8	M30 x 2	71	155.0	64.0	370	1030
GARS 35	GALRS 35	35	43.0	28.00	80	125	165.0	37.7	M36 x 2	73	191.0	80.0	330	1600
GARS 40	GALRS 40	40	49.0	35.00	90	142	187.0	44.2	M42 x 2	78	235.0	116.0	290	2570

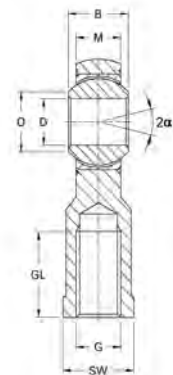
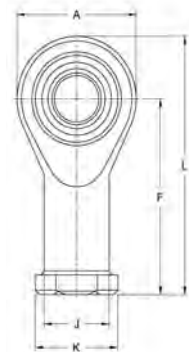
Note: * Without Lube Fitting

Metric Rod Ends



GISW Type

- Maintenance Free**
- PTFE Teflon Liner**
- Zinc Plated**
- Right & Left Hand - Internal Threads**
- Suited for Dynamic Loads**



Housing: Sizes 5-12 turned from free-cutting steel to 9SMnPb28K, 12L13

Sizes 14-40 are forged from heat-treated steel to C22, M1023

Size 50 turned from C45, Aisi 1045, heat-treated steel

Insert: Free-cutting steel to 9SMnPb28K, 12L13, with PTFE Teflon liner bonded to the inner surface

Ball: Bearing steel 100Cr6 (Aisi 52100), hardened, ground, polished

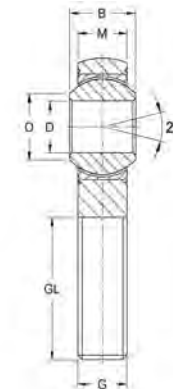
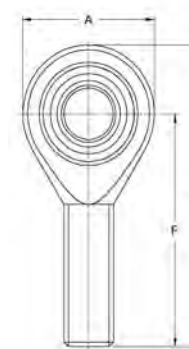
Sizes 8-20 available as a sealed version on request

Right Hand Part No.	Left Hand Part No.	Size D	Dimensions (mm)											Static Load C _o kN	Dynamic Load C kN	Max Speed RPM *	Wt. g
			B	M	A	F	L	K	J	O	SW	G	GL				
GISW 5	GILSW 5	5	8	6.00	18	27	36	11	9.0	7.7	9	M5 x 0.8	10	8.0	7.5	600	18
GISW 6	GILSW 6	6	9	6.75	20	30	40	13	10.0	8.9	11	M6 x 1.0	12	8.9	9.3	530	27
GISW 8	GILSW 8	8	12	9.00	24	36	48	16	12.5	10.4	13	M8 x 1.25	16	14.1	16.7	420	46
GISW 10	GILSW 10	10	14	10.50	28	43	57	19	15.0	12.9	17	M10 x 1.5	20	19.3	23.4	350	76
GISW 12	GILSW 12	12	16	12.00	32	50	66	22	17.5	15.4	19	M12 x 1.75	22	23.5	32.0	300	115
GISW 14	GILSW 14	14	19	13.50	36	57	75	25	20.0	16.8	22	M14 x 2	25	21.0	42.0	260	170
GISW 16	GILSW 16	16	21	15.00	42	64	85	27	22.0	19.3	22	M16 x 2	28	32.0	52.5	230	230
GISW 18	GILSW 18	18	23	16.50	46	71	94	31	25.0	21.8	27	M18 x 1.5	32	38.5	64.0	210	320
GISW 20	GILSW 20	20	25	18.00	50	77	102	34	27.5	24.3	32	M20 x 1.5	33	44.0	78.0	190	415
GISW 22	GILSW 22	22	28	20.00	54	84	111	37	30.0	25.8	32	M22 x 1.5	37	53.0	97.0	170	540
GISW 25	GILSW 25	25	31	22.00	60	94	124	42	33.5	29.6	36	M24 x 2	42	62.0	122.0	150	750
GISW 30	GILSW 30	30	37	25.00	70	110	145	51	40.0	34.8	41	M30 x 2	51	82.0	168.0	130	1130
GISW 35	GILSW 35	35	43	28.00	80	125	165	58	46.0	37.7	50	M36 x 2	56	101.0	206.0	110	1600
GISW 40	GILSW 40	40	49	35.00	90	142	187	69	57.0	44.2	60	M42 x 2	60	124.0	286.0	100	2770

Note: * Only recommended for short term revolutions. Size 50 available on request.

GASW Type

- Maintenance Free**
- PTFE Teflon Liner**
- Zinc Plated**
- Right & Left Hand - External Threads**
- Suited for Dynamic Loads**



Housing: Sizes 5-12 turned from free-cutting steel to 9SMnPb28K, 12L13

Sizes 14-40 are forged from heat-treated steel to C22, M1023

Size 50 turned from C45, Aisi 1045, heat-treated steel

Insert: Free-cutting steel to 9SMnPb28K, 12L13, with PTFE Teflon liner bonded to the inner surface

Ball: Bearing steel 100Cr6 (Aisi 52100), hardened, ground, polished

Sizes 8-20 available as a sealed version on request

Right Hand Part No.	Left Hand Part No.	Size D	Dimensions (mm)								Static Load C _o kN	Dynamic Load C kN	Max Speed RPM *	Wt. g
			B	M	A	F	L	O	G	GL				
GASW 5	GALSW 5	5	8	6.00	18	33	42	7.7	M5 x 0.8	20	4.3	7.5	600	13
GASW 6	GALSW 6	6	9	6.75	20	36	46	8.9	M6 x 1.0	22	6.0	9.3	530	20
GASW 8	GALSW 8	8	12	9.00	24	42	54	10.4	M8 x 1.25	25	11.0	16.7	420	33
GASW 10	GALSW 10	10	14	10.50	28	48	62	12.9	M10 x 1.50	29	17.4	23.4	350	56
GASW 12	GALSW 12	12	16	12.00	32	54	70	15.4	M12 x 1.75	33	23.5	32.0	300	87
GASW 14	GALSW 14	14	19	13.50	36	60	78	16.8	M14 x 2	36	21.0	42.0	260	129
GASW 16	GALSW 16	16	21	15.00	42	66	87	19.3	M16 x 2	40	32.0	52.5	230	189
GASW 18	GALSW 18	18	23	16.50	46	72	95	21.8	M18 x 1.5	44	38.5	64.0	210	267
GASW 20	GALSW 20	20	25	18.00	50	78	103	24.3	M20 x 1.5	47	44.0	78.0	190	348
GASW 22	GALSW 22	22	28	20.00	54	84	111	25.8	M22 x 1.5	51	53.0	97.0	170	443
GASW 25	GALSW 25	25	31	22.00	60	94	124	29.6	M24 x 2	58	62.0	122.0	150	600
GASW 30	GALSW 30	30	37	25.00	70	110	145	34.8	M30 x 2	71	82.0	168.0	130	1030
GASW 35	GALSW 35	35	43	28.00	80	125	165	37.7	M36 x 2	73	101.0	206.0	110	1600
GASW 40	GALSW 40	40	49	35.00	90	142	187	44.2	M42 x 2	78	124.0	286.0	100	2570

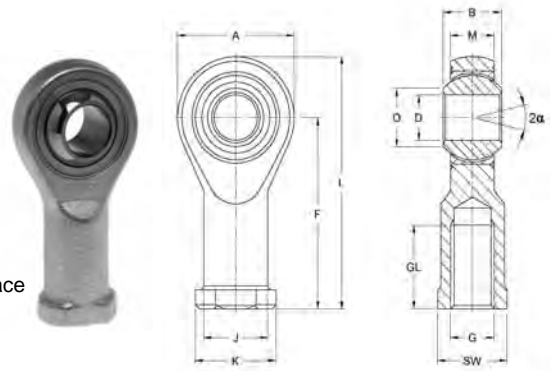
Note: * Only recommended for short term revolutions. Size 50 available on request.

Metric Rod Ends



GIXSW Type

- Heat Treated Steel
- Maintenance Free
- PTFE Teflon Liner
- Right & Left Hand - Internal Threads
- Suited for High Pressure and Tension Loads



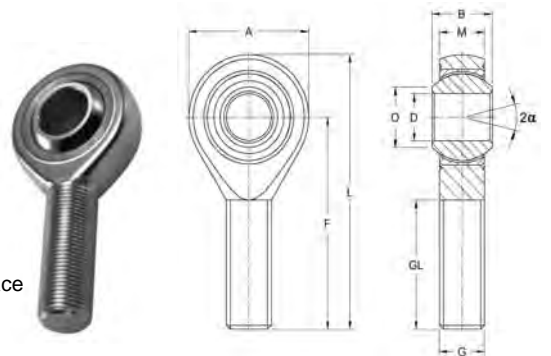
Housing: Heat -treated 42CrMo4, Aisi 4140, forged
Insert: Free-cutting steel 9SMnPb28K, 12L13, with PTFE liner bonded to the inner surface
Ball: Bearing steel 100Cr6, Aisi 52100, hardened, ground, polished
 Sealed version available on request

Right Hand Part No.	Left Hand Part No.	Size D	Dimensions (mm)											Static Load C ₀ kN	Dynamic Load C kN	Max Speed RPM *	Wt. g
			B	M	A	F	L	K	J	O	SW	G	GL				
GIXSW 6	GILXSW 6	6	9	6.75	20	30	40	13	10.0	8.9	11	M6 x 1.0	12	16.7	9.3	530	27
GIXSW 8	GILXSW 8	8	12	9.00	24	36	48	16	12.5	10.4	13	M8 x 1.25	16	25.5	16.7	420	46
GIXSW 10	GILXSW 10	10	14	10.50	28	43	57	19	15.0	12.9	17	M10 x 1.5	20	34.8	23.4	350	76
GIXSW 12	GILXSW 12	12	16	12.00	32	50	66	22	17.5	15.4	19	M12 x 1.75	22	42.0	32.0	300	115
GIXSW 14	GILXSW 14	14	19	13.50	36	57	75	25	20.0	16.8	22	M14 x 2	25	57.0	42.0	260	170
GIXSW 16	GILXSW 16	16	21	15.00	42	64	85	27	22.0	19.3	22	M16 x 2	28	67.5	52.5	230	230
GIXSW 18	GILXSW 18	18	23	16.50	46	71	94	31	25.0	21.8	27	M18 x 1.5	32	81.5	64.0	210	320
GIXSW 20	GILXSW 20	20	25	18.00	50	77	102	34	27.5	24.3	32	M20 x 1.5	33	93.5	78.0	190	415
GIXSW 22	GILXSW 22	22	28	20.00	54	84	111	37	30.0	25.8	32	M22 x 1.5	37	114.0	97.0	170	540
GIXSW 25	GILXSW 25	25	31	22.00	60	94	124	42	33.5	29.6	36	M24 x 2	42	135.0	122.0	150	750
GIXSW 30	GILXSW 30	30	37	25.00	70	110	145	51	40.0	34.8	41	M30 x 2	51	184.0	168.0	130	1130

Note: *Only recommended for short term revolutions. Size 35 available on request.

GAXSW Type

- Heat Treated Steel
- Maintenance Free
- PTFE Teflon Liner
- Right & Left Hand - External Threads
- Suited for High Pressure and Tension Loads



Housing: Heat -treated 42CrMo4, Aisi 4140, forged
Insert: Free-cutting steel 9SMnPb28K, 12L13, with PTFE liner bonded to the inner surface
Ball: Bearing steel 100Cr6, Aisi 52100, hardened, ground, polished
 Sealed version available on request

Right Hand Part No.	Left Hand Part No.	Size D	Dimensions (mm)									Static Load C ₀ kN	Dynamic Load C kN	Max Speed RPM *	Wt. g
			B	M	A	F	L	O	G	GL					
GAXSW 6	GALXSW 6	6	9	6.75	20	36	46	8.9	M6 x 1.0	22	9.8	9.3	530	20	
GAXSW 8	GALXSW 8	8	12	9.00	24	42	54	10.4	M8 x 1.25	25	19.5	16.7	420	33	
GAXSW 10	GALXSW 10	10	14	10.50	28	48	62	12.9	M10 x 1.5	29	31.4	23.4	350	56	
GAXSW 12	GALXSW 12	12	16	12.00	32	54	70	15.4	M12 x 1.75	33	42.0	32.0	300	87	
GAXSW 14	GALXSW 14	14	19	13.50	36	60	78	16.8	M14 x 2	36	57.0	42.0	260	129	
GAXSW 16	GALXSW 16	16	21	15.00	42	66	87	19.3	M16 x 2	40	67.5	52.5	230	189	
GAXSW 18	GALXSW 18	18	23	16.50	46	72	95	21.8	M18 x 1.5	44	81.5	64.0	210	267	
GAXSW 20	GALXSW 20	20	25	18.00	50	78	103	24.3	M20 x 1.5	47	93.5	78.0	190	348	
GAXSW 22	GALXSW 22	22	28	20.00	54	84	111	25.8	M22 x 1.5	51	114.0	97.0	170	443	
GAXSW 25	GALXSW 25	25	31	22.00	60	94	124	29.6	M24 x 2	57	135.0	122.0	150	600	
GAXSW 30	GALXSW 30	30	37	25.00	70	110	145	34.8	M30 x 2	71	184.0	168.0	130	1030	

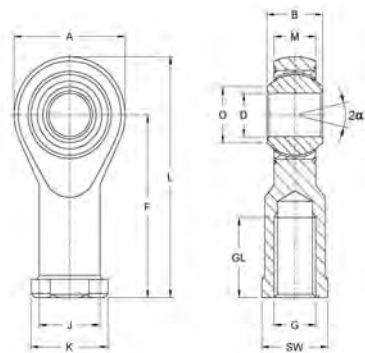
Note: *Only recommended for short term revolutions. Size 35 available on request.



Metric Rod Ends

GIRSW Type

- Stainless Steel**
- Maintenance Free**
- PTFE Teflon Liner**
- Right & Left Hand - Internal Threads**
- Suited for High Dynamic Pressure and Tension Loads in Corrosive Environment**



Housing: Stainless Steel 1.4057, Aisi 431, forged, polished

Size 40 turned from stainless steel 1.4057, Aisi 431

Insert: Special high strength bronze CuSn8 with PTFE teflon liner bonded to the inner surface

Ball: Bearing steel 100Cr6, Aisi 52100, hardened, ground, polished, hard chrome plated

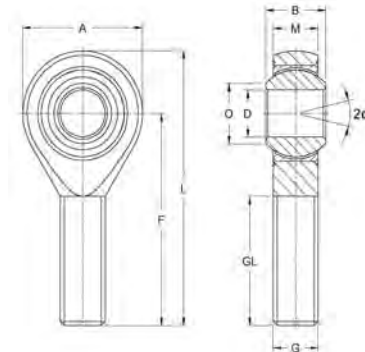
On request: Insert: Stainless steel 1.4571, aisi 316Ti Ball: Stainless steel 1.4034, Aisi 420C hardened, ground, polished or in stainless steel 1.4401, Aisi 316 ground, polished

Right Hand Part No.	Left Hand Part No.	Size D	Dimensions (mm)											Static Load C _o kN	Dynamic Load C kN	Max Speed RPM **	Wt. g
			B	M	A	F	L	K	J	O	SW	G	GL				
GIRSW 4*	GILRSW 4*	4	7	5.25	14	24	31	9.5	7.8	6.5	8	M4 x 0.7	12	7.0	5.3	—	11
GIRSW 5	GILRSW 5	5	8	6.00	18	27	36	11.0	9.0	7.7	9	M5 x 0.8	10	8.0	6.0	600	18
GIRSW 6	GILRSW 6	6	9	6.75	20	30	40	13.0	10.0	8.9	11	M6 x 1	12	9.0	6.8	530	27
GIRSW 8	GILRSW 8	8	12	9.00	24	36	48	16.0	12.5	10.4	13	M8 x 1.25	16	12.0	9.0	420	46
GIRSW 10	GILRSW 10	10	14	10.50	28	43	57	19.0	15.0	12.9	17	M10 x 1.5	20	28.3	23.4	350	76
GIRSW 12	GILRSW 12	12	16	12.00	32	50	66	22.0	17.5	15.4	19	M12 x 1.75	22	34.5	32.0	300	115
GIRSW 14	GILRSW 14	14	19	13.50	36	57	75	25.0	20.0	16.8	22	M14 x 2	25	39.5	42.0	260	170
GIRSW 16	GILRSW 16	16	21	15.00	42	64	85	27.0	22.0	19.3	22	M16 x 2	28	60.5	52.5	230	230
GIRSW 18	GILRSW 18	18	23	16.50	46	71	94	31.0	25.0	21.8	27	M18 x 1.5	32	73.0	64.0	210	320
GIRSW 20	GILRSW 20	20	25	18.00	50	77	102	34.0	27.5	24.3	32	M20 x 1.5	33	83.0	78.0	190	415
GIRSW 22	GILRSW 22	22	28	20.00	54	84	111	37.0	30.0	25.8	32	M22 x 1.5	37	100.0	97.0	170	540
GIRSW 25	GILRSW 25	25	31	22.00	60	94	124	42.0	33.5	29.6	36	M24 x 2	42	118.0	122.0	150	750
GIRSW 30	GILRSW 30	30	37	25.00	70	110	145	51.0	40.0	34.8	41	M30 x 2	51	155.0	168.0	130	1130
GIRSW 35	GILRSW 35	35	43	28.00	80	125	165	58.0	46.0	37.7	50	M36 x 2	56	191.0	206.0	110	1600
GIRSW 40	GILRSW 40	40	49	35.00	90	142	187	69.0	57.0	44.2	60	M42 x 2	60	235.0	286.0	100	2770

Note: * Size 4 on request and housing from Aisi 303. **Only recommended for short term revolutions.

GARSW Type

- Stainless Steel**
- Maintenance Free**
- PTFE Teflon Liner**
- Right & Left Hand - External Threads**
- Suited for High Dynamic Pressure and Tension Loads in Corrosive Environment**



Housing: Stainless Steel 1.4057, Aisi 431, forged, polished

Size 40 turned from stainless steel 1.4057, Aisi 431

Insert: Special high strength bronze CuSn8 with PTFE teflon liner bonded to the inner surface

Ball: Bearing steel 100Cr6, Aisi 52100, hardened, ground, polished, hard chrome plated

On request: Insert: Stainless steel 1.4571, aisi 316Ti Ball: Stainless steel 1.4034, Aisi 420C hardened, ground, polished or in stainless steel 1.4401, Aisi 316 ground, polished

Right Hand Part No.	Left Hand Part No.	Size D	Dimensions (mm)								Static Load C _o kN	Dynamic Load C kN	Max Speed RPM **	Wt. g
			B	M	A	F	L	O	G	GL				
GARSW 4*	GALRSW 4*	4	7	5.25	14	30	37	6.5	M4 x 0.7	19	1.3	0.8	—	9
GARSW 5	GALRSW 5	5	8	6.00	18	33	42	7.7	M5 x 0.8	20	6.2	7.5	600	13
GARSW 6	GALRSW 6	6	9	6.75	20	36	46	8.9	M6 x 1	22	8.8	9.3	530	20
GARSW 8	GALRSW 8	8	12	9.00	24	42	54	10.4	M8 x 1.25	25	16.1	16.7	420	33
GARSW 10	GALRSW 10	10	14	10.50	28	48	62	12.9	M10 x 1.5	29	25.5	23.4	350	56
GARSW 12	GALRSW 12	12	16	12.00	32	54	70	15.4	M12 x 1.75	33	34.5	32.0	300	87
GARSW 14	GALRSW 14	14	19	13.50	36	60	78	16.8	M14 x 2	36	39.5	42.0	260	129
GARSW 16	GALRSW 16	16	21	15.00	42	66	87	19.3	M16 x 2	40	60.5	52.5	230	189
GARSW 18	GALRSW 18	18	23	16.50	46	72	95	21.8	M18 x 1.5	44	73.0	64.0	210	267
GARSW 20	GALRSW 20	20	25	18.00	50	78	103	24.3	M20 x 1.5	47	83.0	78.0	190	348
GARSW 22	GALRSW 22	22	28	20.00	54	84	111	25.8	M22 x 1.5	51	100.0	97.0	170	443
GARSW 25	GALRSW 25	25	31	22.00	60	94	124	29.6	M24 x 2	58	118.0	122.0	150	600
GARSW 30	GALRSW 30	30	37	25.00	70	110	145	34.8	M30 x 2	71	155.0	168.0	130	1030
GARSW 35	GALRSW 35	35	43	28.00	80	125	165	37.7	M36 x 2	73	191.0	206.0	110	1600
GARSW 40	GALRSW 40	40	49	35.00	90	142	187	44.2	M42 x 2	78	235.0	286.0	100	2570

Note: * Size 4 on request and housing from Aisi 303. **Only recommended for short term revolutions.

Metric Rod Ends

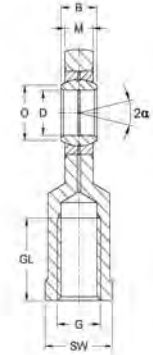
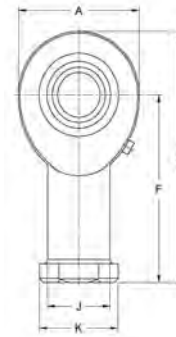


EI Type

- Steel on Steel
- Grease Fitting for Re-Lube
- Right & Left Hand-Internal Threads
- Suited for High Multi-directional Loads and Narrow Width

Housing: Sizes 6-10 turned from free-cutting steel to 9SMnPb28K, 12L13
 Sizes 12 and up forged from heat-treated steel to C45, Aisi1045

Bearing: Steel on steel bearing GE...E, requiring lubrication
 Size 20 and up available sealed from both sides (-2RS)
 Size 6-17 without grease fitting
 Size 20 and up with grease fitting
 Size 20,25 & 30 available with or without 2RS Seals
 Size 35 and larger all with 2RS Seals



Right Hand Part No.	Left Hand Part No.	Size D	Dimensions (mm)											Static Load C ₀ kN	Dynamic Load C kN	Max Speed RPM	Wt. g
			B	M	A	F	L	K	J	O	SW	G	GL				
EI 6	EIL 6	6	6	4.4	20	30	40.0	13	10.0	8.0	11	M6 x 1	12	10.3	3.4	13	21
EI 8	EIL 8	8	8	6.0	24	36	48.0	16	12.5	10.2	14	M8 x 1.25	16	15.8	5.5	15	38
EI 10	EIL10	10	9	7.0	28	43	57.0	19	15.0	13.2	17	M10 x 1.5	20	23.4	8.1	12	60
EI 12	EIL 12	12	10	8.0	34	50	67.0	22	17.5	14.9	19	M12 x 1.75	23	31.0	10.8	11	96
EI 15	EIL 15	15	12	10.0	40	61	81.0	26	21.0	18.4	22	M14 x 2	29	42.5	17.0	8	180
EI 16	EIL 16	16	14	11.0	46	67	90.0	30	24.0	20.7	27	M16 x 2	33	54.5	21.2	10	220
EI 17	EIL 17	17	14	11.0	46	67	90.0	30	24.0	20.7	27	M16 x 2	33	54.5	21.2	10	220
EI 20 (-2RS)*	EIL 20 (-2RS)*	20	16	13.0	53	77	103.5	35	27.5	24.2	32	M20 x 1.5	40	62.5	30.0	9	350
EI 25 (-2RS)*	EIL 25 (-2RS)*	25	20	17.0	64	94	126.0	42	33.5	29.3	36	M24 x 2	48	92.0	48.0	7	640
EI 30 (-2RS)*	EIL 30 (-2RS)*	30	22	19.0	73	110	146.5	50	40.0	34.2	41	M30 x 2	56	124.0	62.0	6	930
EI 35 -2RS	EIL 35 -2RS	35	25	21.0	82	125	166.0	58	47.0	39.8	50	M36 x 3	60	144.0	80.0	6	1300
EI 40 -2RS	EIL 40 -2RS	40	28	23.0	92	142	188.0	65	52.0	45.0	55	M39 x 3	65	178.0	100.0	7	2000

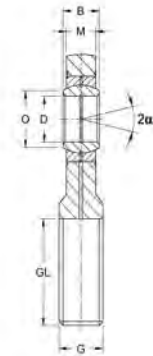
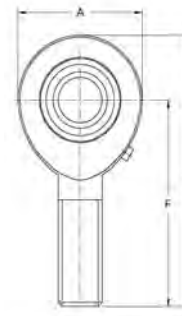
Note: Size 45,50,60,70 and 80mm units available on request. * Available with or without seals.

EA Type

- Steel on Steel
- Grease Fitting for Re-Lube
- Right & Left Hand-External Threads
- Suited for High Multi-directional Loads and Narrow Width

Housing: Sizes 6-10 turned from free-cutting steel to 9SMnPb28K, 12L13
 Sizes 12 and up forged from heat-treated steel to C45, Aisi1045

Bearing: Steel on steel bearing GE...E, requiring lubrication
 Size 20 and up available sealed from both sides (-2RS)
 Size 6-17 without grease fitting
 Size 20 and up with grease fitting
 Size 20,25 & 30 available with or without 2RS Seals
 Size 35 and larger all with 2RS Seals



Right Hand Part No.	Left Hand Part No.	Size D	Dimensions (mm)											Static Load C ₀ kN	Dynamic Load C kN	Max Speed RPM	Wt. g
			B	M	A	F	L	O	G	GL							
EA 6	EAL 6	6	6	4.4	20	36	46.0	8.0	M6 x 1	18	6.9	3.4	13	16			
EA 8	EAL 8	8	8	6.0	24	42	54.0	10.2	M8 x 1.25	22	12.7	5.5	15	28			
EA 10	EAL10	10	9	7.0	28	48	62.0	13.2	M10 x 1.5	26	19.9	8.1	12	50			
EA 12	EAL 12	12	10	8.0	34	54	71.0	14.9	M12 x 1.75	28	29.0	10.8	11	86			
EA 15	EAL 15	15	12	10.0	40	63	83.0	18.4	M14 x 2	34	39.5	17.0	8	140			
EA 16	EAL 16	16	14	11.0	46	69	92.0	20.7	M16 x 2	36	54.0	21.2	10	190			
EA 17	EAL 17	17	14	11.0	46	69	92.0	20.7	M16 x 2	36	54.0	21.2	10	190			
EA 20 (-2RS)*	EAL 20 (-2RS)*	20	16	13.0	53	78	104.5	24.2	M20 x 1.5	43	62.5	30.0	9	320			
EA 25 (-2RS)*	EAL 25 (-2RS)*	25	20	17.0	64	94	126.0	29.3	M24 x 2	43	92.0	48.0	7	560			
EA 30 (-2RS)*	EAL 30 (-2RS)*	30	22	19.0	73	110	146.5	34.2	M30 x 2	65	124.0	62.0	6	890			
EA 35 -2RS	EAL 35 -2RS	35	25	21.0	82	140	181.0	39.8	M36 x 3	82	144.0	80.0	6	1400			
EA 40 -2RS	EAL 40 -2RS	40	28	23.0	92	150	196.0	45.0	M39 x 3	86	178.0	100.0	7	1800			

Note: Size 45,50,60,70 and 80mm units available on request. * Available with or without seals.

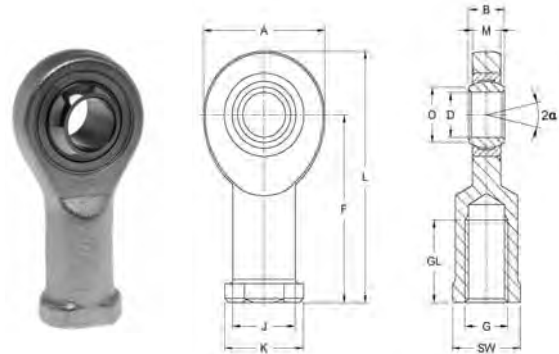
Metric Rod Ends

EI..D Type

- Steel-Zinc Plated
- Maintenance Free
- Right & Left Hand-Internal Threads
- Suited for High Uni-directional Loads and Narrow Width

Housing: Up to size 10 turned, from free-cutting steel to 9SMnPb28K, 12L13
From size 12 forged, from heat-treated steel to C45, Aisi 1045

Bearing: maintenance free steel / PTFE bearing GE...EC
From size 20 available sealed from both sides (-2RS)
From size 35 only available sealed from both sides (-2RS)
Size 20,25 & 30 available with or without 2RS Seals
Size 35 and larger all with 2RS Seals



Right Hand Part No.	Left Hand Part No.	Size D	Dimensions (mm)											Static Load C ₀ kN	Dynamic Load C kN	Max Speed RPM	Wt. g
			B	M	A	F	L	K	J	O	SW	G	GL				
EI 6 D	EIL 6 D	6	6	4.4	20	30	40.0	13	10.0	8.0	11	M6 x 1	12	10.3	3.6	13	21
EI 8 D	EIL 8 D	8	8	6.0	24	36	48.0	16	12.5	10.2	14	M8 x 1.25	16	15.8	5.8	15	38
EI 10 D	EIL 10 D	10	9	7.0	28	43	57.0	19	15.0	13.2	17	M10 x 1.5	20	23.4	8.6	12	60
EI 12 D	EIL 12 D	12	10	8.0	34	50	67.0	22	17.5	14.9	19	M12 x 1.75	23	31.0	11.5	11	96
EI 15 D	EIL 15 D	15	12	10.0	40	61	81.0	26	21.0	18.4	22	M14 x 2	29	42.5	17.5	8	180
EI 16 D	EIL 16 D	16	14	11.0	46	67	90.0	30	24.0	20.7	27	M16 x 2	33	54.5	22.5	10	220
EI 17 D	EIL 17 D	17	14	11.0	46	67	90.0	30	24.0	20.7	27	M16 x 2	33	54.5	22.5	10	220
EI 20 D (-2RS)*	EIL 20 D (-2RS)*	20	16	13.0	53	77	103.5	35	27.5	24.2	32	M20 x 1.5	40	62.5	31.5	9	350
EI 25 D (-2RS)*	EIL 25 D (-2RS)*	25	20	17.0	64	94	126.0	42	33.5	29.3	36	M24 x 2	48	92.0	51.0	7	640
EI 30 D (-2RS)*	EIL 30 D (-2RS)*	30	22	19.0	73	110	146.5	50	40.0	34.2	41	M30 x 2	56	124.0	66.0	6	930
EI 35 D	EIL 35 D	35	25	21.0	82	125	166.0	58	47.0	39.8	50	M36 x 3	60	144.0	140.0	6	1300
EI 40 D	EIL 40 D	40	28	23.0	92	142	188.0	65	52.0	45.0	55	M39 x 3	65	178.0	185.0	7	2000

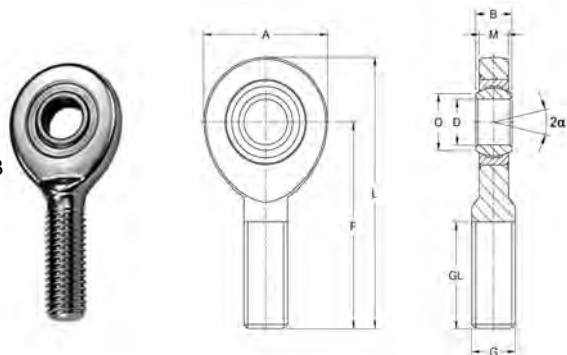
Note: Size 45,50,60,70 and 80mm units available on request. *Available with and without 2RS Seals

EA..D Type

- Steel-Zinc Plated
- Maintenance Free
- Right & Left Hand-External Threads
- Suited for High Uni-directional Loads and Narrow Width

Housing: Up to size 10 turned, from free-cutting steel to 9SMnPb28K, 12L13
From size 12 forged, from heat-treated steel to C45, Aisi 1045

Bearing: maintenance free steel / PTFE bearing GE...EC
From size 20 available sealed from both sides (-2RS)
From size 35 only available sealed from both sides (-2RS)
Size 20,25 & 30 available with or without 2RS Seals
Size 35 and larger all with 2RS Seals



Right Hand Part No.	Left Hand Part No.	Size D	Dimensions (mm)								Static Load C ₀ kN	Dynamic Load C kN	Max Speed RPM	Wt. g
			B	M	A	F	L	O	G	GL				
EA 6 D	EAL 6 D	6	6	4.4	20	36	46.0	8.0	M6	18	6.9	3.6	13	16
EA 8 D	EAL 8 D	8	8	6.0	24	42	54.0	10.2	M8 x 1.25	22	12.7	5.8	15	28
EA 10 D	EAL 10 D	10	9	7.0	28	48	62.0	13.2	M10 x 1.5	26	19.9	8.6	12	50
EA 12 D	EAL 12 D	12	10	8.0	34	54	71.0	14.9	M12 x 1.75	28	29.0	11.5	11	86
EA 15 D	EAL 15 D	15	12	10.0	40	63	83.0	18.4	M14 x 2	34	39.5	17.5	8	140
EA 16 D	EAL 16 D	16	14	11.0	46	69	92.0	20.7	M16 x 2	36	54.0	22.5	10	190
EA 17 D	EAL 17 D	17	14	11.0	46	69	92.0	20.7	M16 x 2	36	54.0	22.5	10	190
EA 20 D (-2RS)*	EAL 20 D (-2RS)*	20	16	13.0	53	78	104.5	24.2	M20 x 1.5	43	62.5	31.5	9	320
EA 25 D (-2RS)*	EAL 25 D (-2RS)*	25	20	17.0	64	94	126.0	29.3	M24 x 2	43	92.0	51.0	7	560
EA 30 D (-2RS)*	EAL 30 D (-2RS)*	30	22	19.0	73	110	146.5	34.2	M30 x 2	65	124.0	66.0	6	890
EA 35 D	EAL 35 D	35	25	21.0	82	140	181.0	39.8	M36 x 3	82	144.0	140.0	6	1400
EA 40 D	EAL 40 D	40	28	23.0	92	150	196.0	45.0	M39 x 3	86	178.0	185.0	7	1800

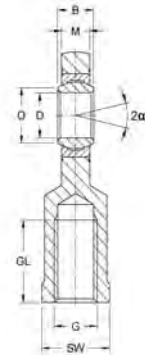
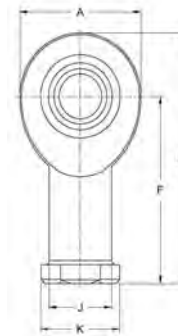
Note: Size 45,50,60,70 and 80mm units available on request. *Available with and without 2RS Seals.

Metric Rod Ends



EI..D SS Type

- Stainless Steel**
- Maintenance Free**
- Right & Left Hand - Internal Threads**
- Suited for High Uni-directional Loads,**
- Corrosive Environments, Narrow Widths**



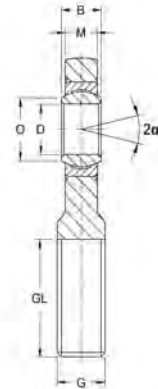
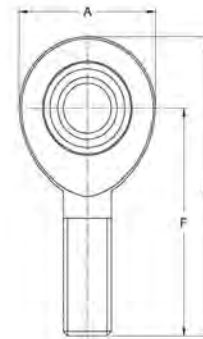
Housing: Size 6 to 40 stainless steel to 1.4301, Aisi 304, forged, polished
 Size 45 stainless steel to 1.4301, Aisi 304, turned
 Size 50 stainless steel to 1.4571, Aisi 316Ti, turned
Bearing: Maintenance free stainless steel Spherical Plain Bearing GE..EC-NIRO

Right Hand Part No.	Left Hand Part No.	Size D	Dimensions (mm)											Static Load C ₀ kN	Dynamic Load C kN	Max Speed RPM	Wt. g
			B	M	A	F	L	K	J	O	SW	G	GL				
EI 6 D-SS	EIL 6 D-SS	6	6	4.4	20	30	40.0	13	10.0	8.0	11	M6 x 1	12	6.0	4	13	21
EI 8 D-SS	EIL 8 D-SS	8	8	6.0	24	36	48.0	16	12.5	10.2	14	M8 x 1.25	16	9.2	7	15	38
EI 10 D-SS	EIL 10 D-SS	10	9	7.0	28	43	57.0	19	15.0	13.2	17	M10 x 1.5	20	13.6	10	12	60
EI 12 D-SS	EIL 12 D-SS	12	10	8.0	34	50	67.0	22	17.5	14.9	19	M12 x 1.75	23	18.0	14	11	96
EI 15 D-SS	EIL 15 D-SS	15	12	10.0	40	61	81.0	26	21.0	18.4	22	M14 x 2	29	26.5	30	8	180
EI 16 D-SS	EIL 16 D-SS	16	14	11.0	46	67	90.0	30	24.0	20.7	27	M16 x 2	33	34.0	39	10	220
EI 17 D-SS	EIL 17 D-SS	17	14	11.0	46	67	90.0	30	24.0	20.7	27	M16 x 2	33	34.0	39	10	220
EI 20 D-SS	EIL 20 D-SS	20	16	13.0	53	77	103.5	35	27.5	24.2	32	M20 x 1.5	40	45.0	54	9	350
EI 25 D-SS	EIL 25 D-SS	25	20	17.0	64	94	126.0	42	33.5	29.3	36	M24 x 2	48	73.0	96	7	640
EI 30 D-SS	EIL 30 D-SS	30	22	19.0	73	110	146.5	50	40.0	34.2	41	M30 x 2	56	97.0	118	6	930
EI 35 D-SS	EIL 35 D-SS	35	25	21.0	82	125	166.0	58	47.0	39.8	50	M36 x 3	60	111.0	153	6	1300
EI 40 D-SS	EIL 40 D-SS	40	28	23.0	92	142	188.0	65	52.0	45.0	55	M39 x 3	65	135.0	190	7	2000

Note: Sizes 45, 50, 60, 70 and 80 available on request

EA..D SS Type

- Stainless Steel**
- Maintenance Free**
- Right & Left Hand - External Threads**
- Suited for High Uni-directional Loads,**
- Corrosive Environments, Narrow Widths**



Housing: Size 6 to 40 stainless steel to 1.4301, Aisi 304, forged, polished
 Size 45 stainless steel to 1.4301, Aisi 304, turned
 Size 50 stainless steel to 1.4571, Aisi 316Ti, turned
Bearing: Maintenance free stainless steel Spherical Plain Bearing GE..EC-NIRO

Right Hand Part No.	Left Hand Part No.	Size D	Dimensions (mm)								Static Load C ₀ kN	Dynamic Load C kN	Max Speed RPM	Wt. g
			B	M	A	F	L	O	G	GL				
EA 6 D-SS	EAL 6 D-SS	6	6	4.4	20	36	46.0	8.0	M6 x 1	18	4.0	4	13	16
EA 8 D-SS	EAL 8 D-SS	8	8	6.0	24	42	54.0	10.2	M8 x 1.25	22	7.4	7	15	28
EA 10 D-SS	EAL 10 D-SS	10	9	7.0	28	48	62.0	13.2	M10 x 1.5	26	11.6	10	12	50
EA 12 D-SS	EAL 12 D-SS	12	10	8.0	34	54	71.0	14.9	M12 x 1.75	28	17.0	14	11	86
EA 15 D-SS	EAL 15 D-SS	15	12	10.0	40	63	83.0	18.4	M14 x 2	34	23.0	30	8	140
EA 16 D-SS	EAL 16 D-SS	16	14	11.0	46	69	92.0	20.7	M16 x 2	36	31.5	39	10	190
EA 17 D-SS	EAL 17 D-SS	17	14	11.0	46	69	92.0	20.7	M16 x 2	36	31.5	39	10	190
EA 20 D-SS	EAL 20 D-SS	20	16	13.0	53	78	104.5	24.2	M20 x 1.5	43	45.0	54	9	320
EA 25 D-SS	EAL 25 D-SS	25	20	17.0	64	94	126.0	29.3	M24 x 2	43	73.0	96	7	560
EA 30 D-SS	EAL 30 D-SS	30	22	19.0	73	110	146.5	34.2	M30 x 2	65	97.0	118	6	890
EA 35 D-SS	EAL 35 D-SS	35	25	21.0	82	140	181.0	39.8	M36 x 3	82	111.0	153	6	1400
EA 40 D-SS	EAL 40 D-SS	40	28	23.0	92	150	196.0	45.0	M39 x 3	86	135.0	190	7	1800

Note: Sizes 45, 50, 60, 70 and 80 available on request

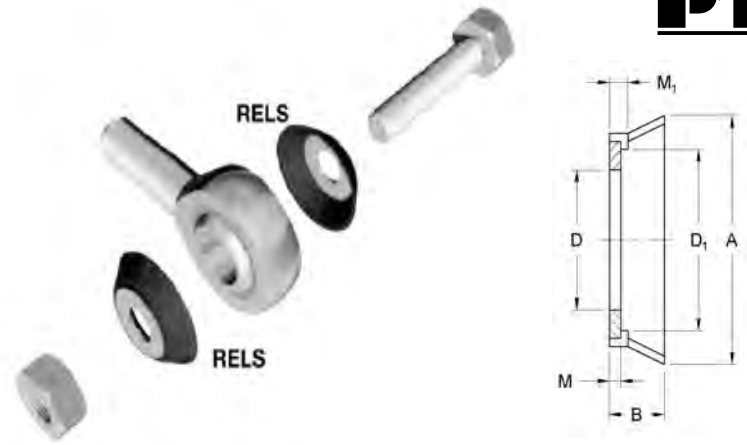


Rod End Seals

RELS Series

Rubber Seals Vulcanized
to Stainless Steel Washer

Helps to prevent contamination of the bearing
Max temp 230°F (110°C)



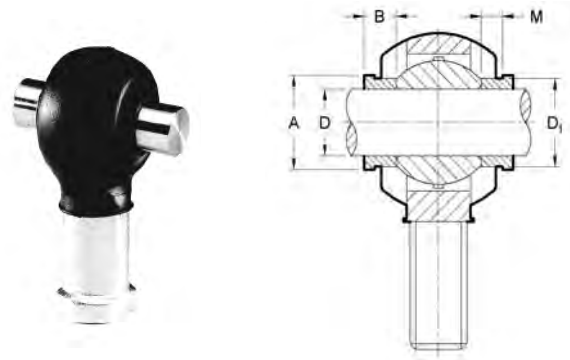
Washer Seal Part No.	Shaft Size mm	D	D1	B	M	M1	A
RELS 5	5	5.25	8.3	2.4	0.5	0.8	11.2
RELS 6	6	6.25	9.5	3.1	0.7	0.9	12.7
RELS 8	8	8.25	12.4	5.1	1.2	1.4	17.8
RELS 10	10	10.25	13.5	5.6	1.2	1.4	20.3
RELS 12	12	12.25	18.5	6.4	1.2	1.7	28.6
RELS 14	14	14.25	18.5	6.4	1.2	1.7	28.6
RELS 16	16	16.25	22.4	6.8	1.2	1.7	31.7
RELS 18	18	18.25	22.6	8.3	1.2	1.7	32.7
RELS 20	20	20.25	25.2	10.2	1.2	1.7	38.1
RELS 25	25	25.25	33.8	12.7	1.5	2.3	53.3
RELS 30	30	30.25	55.9	14.0	1.5	2.3	56.7

Note: Part number includes a pair, one for each side.

Rod End Protector Caps

RERS Series

Neoprene Protector Caps
Protects Against Dust & Chemicals
Temp Range -4°F to +248°F (-20°C to 120°C)
Easy Mounting with Retaining Ring Pliers



Rubber Protector Cap Part No.	Spacer Part No.	Rod End Size	D	D1	B	M	A
RERS 1	DR 6	6	6	8.7	6	4	11
RERS 1	DR 8	8	8	10.3	6	4	12
RERS 2	DR 10	10	10	12.5	6	4	14
RERS 2	DR 12	12	12	15.0	8	6	17
RERS 3	DR 14	14	14	16.8	8	6	19
RERS 3	DR 16	16	16	19.0	8	6	21
RERS 3	DR 18	18	18	21.8	8	6	25
RERS 4	DR 20	20	20	24.3	10	8	28
RERS 4	DR 22	22	22	25.7	10	8	29
RERS 4	DR 25	25	25	29.7	10	8	33
RERS 5	—	30	—	—	—	—	—
RERS 5	—	35	—	—	—	—	—

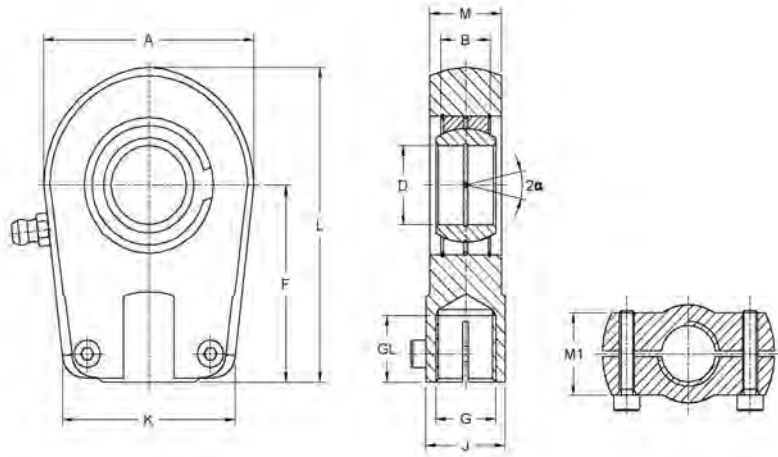
Metric Hydraulic Rod Ends



FPR..U Type

- Steel-Zinc Plated
- Regreasable
- Right & Left Hand - Internal Threads
- Suited for Short Relay Distance and Maximum Stroke

Housing: up to size 80 forged, C45, Aisi 1045
 Housings 90 up from nodular cast iron GS 400
Bearing: steel on steel GE...E, requires lubrication



Dimensions in mm

Right Hand Part No.	Left Hand Part No.	Shaft Size D	Dimensions (mm)										Cap Screw Size	Cap Screw Torque Nm	Static Load C ₀ kN	Dynamic Load C kN	Pivoting Angle α°	Wt. kg
			B	M	M1	A	F	L	K	J	G	GL						
FPR20U	FPL20U	20	16	19	21	56	50	80.0	46	25	M16 x 1.5	17	M8 x 20	25	81.1	30	9	0.40
FPR25U	FPL25U	25	20	23	21	56	50	80.0	46	25	M16 x 1.5	17	M8 x 20	25	72.0	48	7	0.48
FPR30U	FPL30U	30	22	28	26	64	60	94.0	50	32	M22 x 1.5	23	M8 x 25	25	106.0	62	6	0.70
FPR35U	FPL35U	35	25	30	28	78	70	112.0	66	40	M28 x 1.5	29	M10 x 30	49	153.0	80	6	1.15
FPR40U	FPL40U	40	28	35	33	94	85	135.0	76	49	M35 x 1.5	36	M10 x 30	49	250.0	100	7	2.08
FPR50U	FPL50U	50	35	40	37	116	105	168.0	90	61	M45 x 1.5	46	M12 x 40	86	365.0	156	6	3.58
FPR60U	FPL60U	60	44	50	46	130	130	200.0	120	75	M58 x 1.5	59	M16 x 45	210	400.0	245	6	6.20
FPR70U	FPL70U	70	49	55	51	154	150	232.0	130	86	M65 x 1.5	66	M16 x 45	210	540.0	315	6	9.20
FPR80U	FPL80U	80	55	60	55	176	170	265.0	160	105	M80 x 2	81	M20 x 55	410	670.0	400	6	13.20
FPR90U	FPL90U	90	60	65	60	206	210	322.0	180	124	M100 x 2	101	M20 x 55	410	980.0	490	5	19.60
FPR100U	FPL100U	100	70	70	65	231	235	360.0	200	138	M110 x 2	111	M24 x 75	710	1120.0	610	7	26.31
FPR110U	FPL110U	110	70	80	74	265	265	407.5	220	152	M120 x 3	125	M24 x 75	710	1700.0	655	6	39.20
FPR120U	FPL120U	120	85	90	84	340	310	490.0	257	172	M130 x 3	135	M24 x 75	710	2900.0	950	6	78.00

Other Custom Types



FPR..N Type
(Hydraulic)



FS..C Type
(Weld-On)



FS..N Type
(Weld-On)



GXSW Type
(with Custom Link)

Spherical Plain Bearing

GE..EC (2RS) Type



Steel on PTFE Teflon Liner

Normal Duty

Maintenance Free

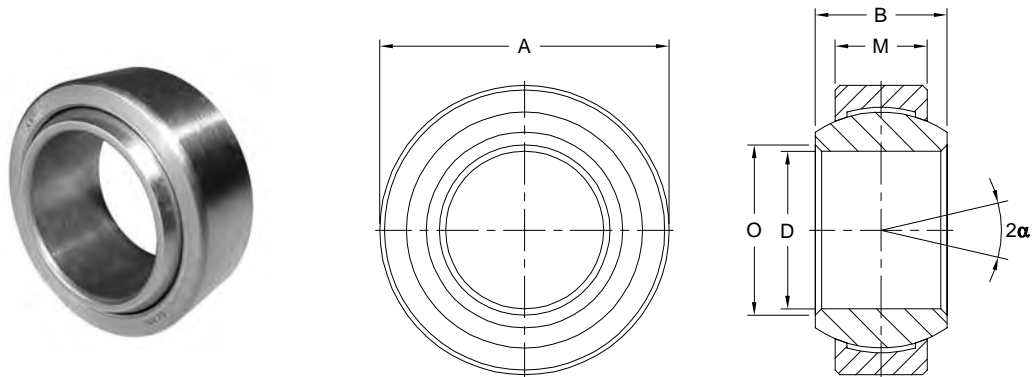
Suited for High Uni-directional Loads

Insert: Bearing steel 100Cr6, Aisi 52100, PTFE Teflon liner, bonded to the inner surface

Size 15 and up available sealed from both sides (-2RS)

from size 55 only sealed from both sides (-2RS)

Ball: Bearing steel to 100Cr6, Aisi 52100, hardened, ground, polished, hard chrome plated



Part No.	Dimensions (mm)							Static Load C ₀ kN	Static Load C ₀ kN (2RS)	Dynamic Load C kN	Dynamic Load C kN (2RS)	Misalignment Angle	Wt. g	
	Size (D)	B	M	A		O	dK							
GE 4 EC	4	0-0.008	5	3	12	0-0.008	6.0	8.0	5.4	—	2.1	—	16	3
GE 5 EC	5	0-0.008	6	4	14	0-0.008	8.0	10.0	9.1	—	3.6	—	13	4
GE 6 EC	6	0-0.008	6	4	14	0-0.008	8.0	10.0	9.1	—	3.6	—	13	4
GE 8 EC	8	0-0.008	8	5	16	0-0.008	10.2	13.0	14.0	—	5.8	—	15	7
GE 10 EC	10	0-0.008	9	6	19	0-0.009	13.2	16.0	21.0	—	8.6	—	12	11
GE 12 EC	12	0-0.008	10	7	22	0-0.009	14.9	18.0	28.0	—	11.0	—	11	17
GE 15 EC	15	0-0.008	12	9	26	0-0.009	18.4	22.0	45.0	59	18.0	17.5	8	26
GE 16 EC	16	0-0.008	14	10	30	0-0.009	20.7	25.0	56.0	56	22.0	22.5	10	40
GE 17 EC	17	0-0.008	14	10	30	0-0.009	20.7	25.0	56.0	75	22.0	22.5	10	40
GE 20 EC	20	0-0.010	16	12	35	0-0.011	24.1	29.0	78.0	104	31.0	31.5	9	64
GE 25 EC	25	0-0.010	20	16	42	0-0.011	29.3	35.5	127.0	204	51.0	51.0	7	115
GE 30 EC	30	0-0.010	22	18	47	0-0.011	34.2	40.7	166.0	263	65.0	66.0	6	149
GE 35 EC	35	0-0.012	25	20	55	0-0.013	39.7	47.0	211.0	338	84.0	140.0	6	228
GE 40 EC	40	0-0.012	28	22	62	0-0.013	45.0	53.0	262.0	419	104.0	185.0	7	318
GE 45 EC	45	0-0.012	32	25	68	0-0.013	50.7	60.0	337.0	540	135.0	240.0	7	421
GE 50 EC	50	0-0.012	35	28	75	0-0.013	55.9	66.0	415.0	665	166.0	295.0	6	562
GE 60 EC	60	0-0.015	44	36	90	0-0.015	66.8	80.0	—	1030	—	460.0	6	1030
GE 70 EC	70	0-0.015	49	40	105	0-0.015	77.8	92.0	—	1320	—	590.0	6	1570
GE 80 EC	80	0-0.015	55	45	120	0-0.015	89.4	105.0	—	1700	—	750.0	6	2320
GE 90 EC	90	0-0.020	60	50	130	0-0.018	98.1	115.0	—	2070	—	920.0	5	2790

Note: Larger sizes available on request.

Metric Rod Ends



Inquiry Template

Fax or email to: Maryland Metrics

(410)358-3142 or
(800)872-9329

Attn: _____

From: _____

Company: _____

Phone: _____

Comments: _____

Center Distance = _____ mm

Thickness t = _____ mm (observe Spherical width!)

Material: _____ with 2x Sphericals: _____

Please indicate: Form A Form B

Center Distance = _____ mm Adjustable Range = +/- _____ mm

Ridge to identify left hand thread

Left hand thread

Hexagon SW = _____ alternative: Pipe Ø _____ with cross bore

Length = _____ mm Material: _____

Lock Nut DIN 439 (flat) Material: _____

Rod End

Center Distance = _____ mm Adjustable Range = +/- _____ mm

Left hand thread

Threaded Rod Length = _____ mm Material: _____

Lock Nut DIN 439 (flat) Material: _____

Rod End

with incorporated Spherical Type: _____

Head Width M = _____ mm, Ball Width B = _____ mm

Thread Length GL = _____ mm, Thread G = _____

Material Ball: _____

Material Outer Ring: _____

Maintenance free: Yes No

Nomenclature:

Female Thread: The letter **I** is the second letter in the product reference e.g. GI or EI

Male Thread: The letter **A** is the second letter in the product reference e.g. GA or EA

Left Hand Thread: The letter **L** is the third place in the product reference e.g. GAL or EAL

Non-Standard Thread: Bearing reference with additional thread specification e.g. GISW 30, **M 27x2**

Stainless Steel Ball: The letter **R** will be added after size reference e.g. GIRSW 10 **R**, GXSW 10 **R**, stainless version

Completely Stainless: The letters **SS** will be added after size reference e.g. GE 10 EC-**SS** or EI 16 D-**SS**

Ball Hard Chrome Plated: **ICR** will be added after size reference e.g. GASW 10 **ICR**

Seals: -2RS will be added after size reference e.g. GISW 10-**2RS**

Threaded Bolt: **Bo** will be added after size reference e.g. GISW 10 **Bo**

Nickel Plated Housing: **NI** will be added after size reference e.g. GISW 14 **NI** (improved corrosion resistance for the housing)

Left Hand Thread for Hydraulic Rod Ends: The letter **L** will be added at the third place replacing the letter R e.g. **FPL...N**