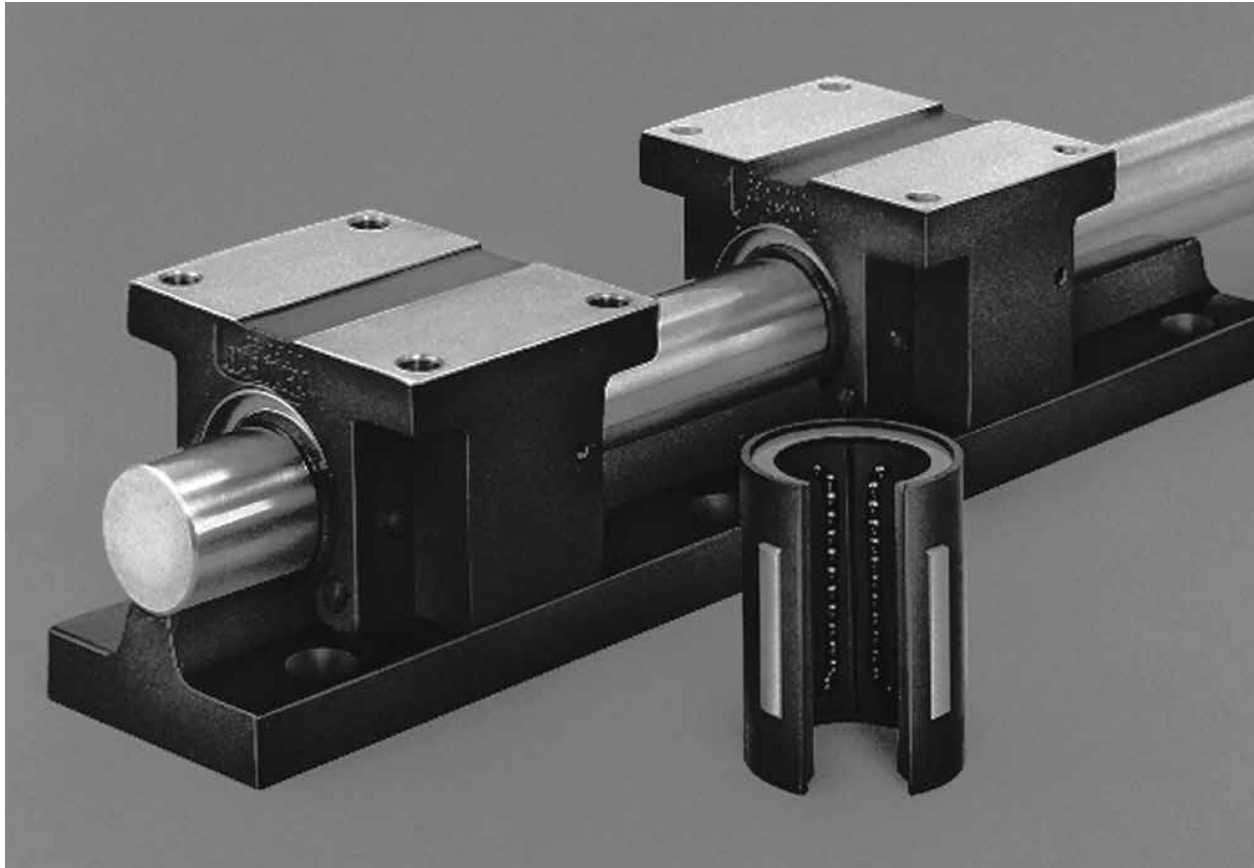


## XR Ball Bushing® Bearing Products



### Thomson XR Ball Bushing Bearing products offer:

- Five times the load capacity or 125 times the travel life of conventional linear bearings. This dramatic increase in travel life reduces downtime and maximizes productivity.
- Three times the rigidity of conventional linear bearings. This increase in stiffness provides immediate improvements in machine positioning accuracy and repeatability.
- The RoundRail Advantage combined with travel speeds up to 5 ft./s. Derating factors commonly found in linear guide products are eliminated.
- Ease of maintenance. When normal maintenance requires bearing replacement, XR Ball Bushing Bearings can be quickly and cost effectively replaced without scrapping the entire system – another shortcoming of some linear guides.
- Double-acting seals at both ends that keep out contamination and retain lubrication.
- Lasting precision alignment by combining the non-wear characteristics of the XR Ball Bushing Bearing with a rigid ductile iron pillow block.
- High accelerations and operating speeds without a dramatic increase in the power consumption commonly seen with high-friction v-way and flat-way systems.

## Thomson RoundRail Linear Guides and Components

XR Ball Bushing Bearing products provide five times the load capacity or 125 times the travel life and three times the rigidity of conventional linear bearings. These improvements are centered around four technologically advanced components: the XR Ball Bushing Bearing, the XPBO Ball Bushing pillow block, the XL 60 Case® LinearRace® (shaft) and the XSR 60 Case LinearRace support rail.

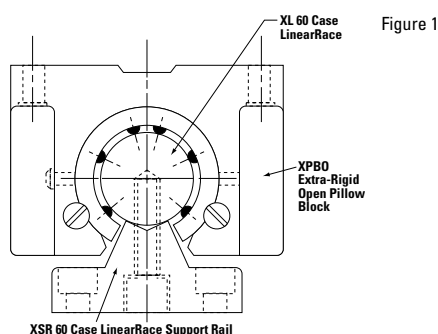


Figure 1

**XR Ball Bushing Bearing**

The dramatic increase in load capacity and/or travel life is provided by the XR Ball Bushing Bearing's advanced plate design. Each ball-conforming bearing plate is precision ground, providing smooth and virtually friction-free linear movement. The bearing plate length has also been maximized to increase the number of rolling elements in the load carrying zone. The position of each XR bearing plate helps to maximize the load capacity in both pull-off and down-loading conditions.

**XPBO Ball Bushing Pillow Block**

Each XR Ball Bushing Bearing can be housed in a rigid ductile iron pillow block (Figure 1). The XPBO pillow block provides the stiffness required in high load applications (Figure 2). Each XPBO is equipped with four mounting holes for easy assembly to the table surface.

**XL 60 Case LinearRace**

Available factory mounted to XSR 60 Case LinearRace support rail is a hardened and precision-ground 60 Case LinearRace (Figure 1). Each 60 Case LinearRace is ground to a surface finish less than 10 Ra microinch and is straight to .001 inch per foot cumulative. Roundness of each 60 Case LinearRace is controlled through proprietary techniques that result in a roundness of 80 millionths of an inch. Each XL 60 Case LinearRace is held to these world-class quality standard to assure maximum system performance and travel life.

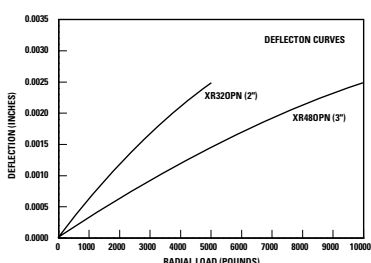


Figure 2

**XSR 60 Case LinearRace Support Rails**

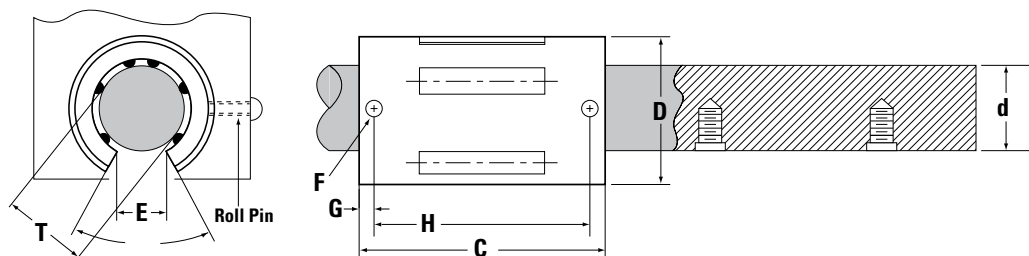
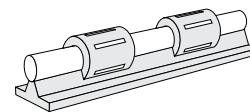
Rigidity always starts by continuously supporting the 60 Case LinearRace and bearing system (Figure 1). The large ductile iron alloy cross-section of the XSR provides maximum rigidity and stiffness (Figure 2). The increased number of standard 60 Case LinearRace mounting holes add further stiffness and stability to the system.

**The RoundRail Advantage**

The RoundRail Advantage is the inherent ability of an XR Ball Bushing Bearing system to accommodate torsional misalignment (caused by inaccuracies in carriage or base machining or by machine deflection) with little increase in stress-to-bearing components. Installation time and cost are minimized, and system performance is maximized.



## XR Ball Bushing® Bearings for Continuously Supported Applications



### XR Ball Bushing Bearings and 60 Case® LinearRace® (Dimensions in inches)

Part Number		Nom. Dia.	Length C	60 Case LinearRace Diameter d
XR Ball Bushing Bearing	60 Case LinearRace*			
XR320PN	2 XL PD	2	4.000/3.970	1.9994/1.9991
XR480PN	3 XL PD	3	6.000/5.940	2.9992/2.9989

\* 60 Case begins on page 174.

Part Number	Working Bore Diameter T	Recommended Housing Bore Diameter D	Minimum Slot Width E	Retention Hole <sup>(2)</sup>			Angle deg $\alpha$	Number of Ball Circuits	Ball Diameter	Bearing Mass lb	Dynamic Load Capacity lb <sub>r</sub> <sup>(3)</sup>
				Diameter F	Loc. G	H					
XR320PN	2.0000/1.9992	3.0000	1.00	.27	.31	3.36	27	6	.25	1.3	4500
XR480PN	3.0000/2.9988	4.5000	1.50	.27	.42	5.145	30	6	.38	4.4	10000

(1) When installed in a nominal housing bore D, before adjustment. Any deviation from nominal housing bore diameter will change the working bore T, an equal amount. Minimum recommended housing bores are 2.9980 for XR320PN and 4.4975 for XR480PN.

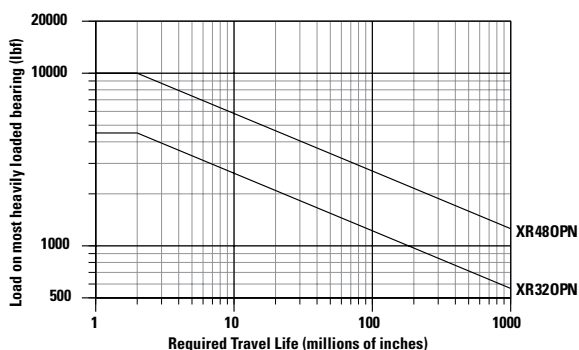
(2) Retention hole does not go through bearing retainer.

(3) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For Dynamic Load Correction Factors, see following polar graphs.

Thomson RoundRail Linear Guides and Components

Load/Life Graph

(Lines indicate limiting load for given Ball Bushing Bearing)



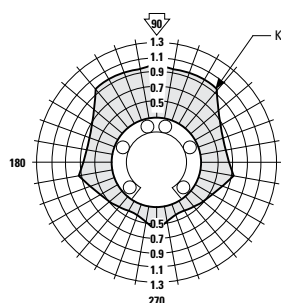
Determining Ball Bushing Bearing Size

To determine the proper Ball Bushing Bearing size, enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing Bearing sizes that pass through or above and to the right of this point may be suitable for this application.

**Note:** For the purpose of using this chart, load on most heavily loaded bearing = maximum applied load/ $K_0$ . Where  $K_0$  can be determined from the Polar Graph to the right.

Polar Graphs

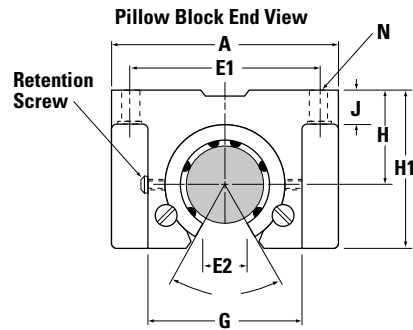
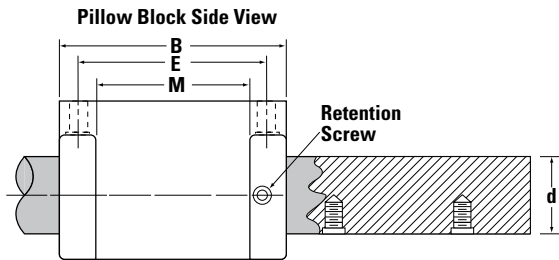
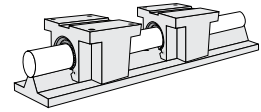
The actual dynamic load capacity of a Ball Bushing Bearing is determined by the orientation of the bearing or direction of the applied load. The load correction factor  $K_0$  is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual dynamic load capacity, multiply the proper correction factor by the dynamic load capacity listed in the product table on the previous page.



Inch Ball Bushing Bearings



# XR Ball Bushing® Pillow Blocks for Continuously Supported Applications



## XR Ball Bushing Pillow Blocks (seal at both ends) and 60 Case® LinearRace® (Dimensions in inches)

Part Number		Nominal Diameter	H +0.000 -0.001	H1
Extra Rigid Ball Bushing Bearing	60 Case LinearRace*			
XPB0320PN	2 XL PD	2	2.375	3.875
XPB0480PN	3 XL PD	3	3.500	5.875

\* 60 Case begins on page 174.

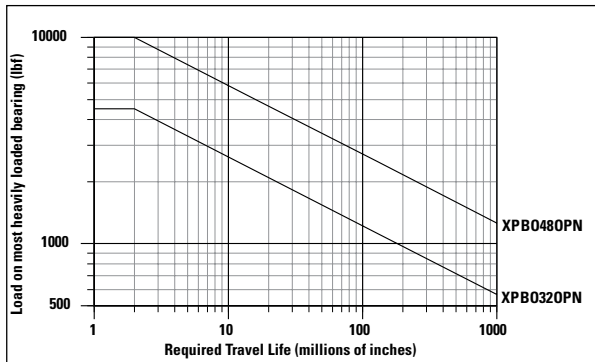
Part Number	Working Bore Diameter T	60 Case LinearRace Diameter d	Ball Bushing <sup>(1)</sup> Bearing/LinearRace Fit Up	A	B	E ±.010	E1 ±.010	E2 min.	G	J	α deg	M	N	Pillow Block Mass lb	Dynamic Load Capacity <sup>(2)</sup> lb <sub>f</sub>
XPB0320PN	1.9985/1.9972	1.9994/1.9991	.0022P/.006P	6.00	4.88	3.750	5.000	1.00	3.75	.88	27	2.63	.53 1/2	18	4500
XPB0480PN	2.9980/2.9963	2.9992/2.9989	.0029/.0009P	8.38	7.25	5.875	7.000	1.50	5.50	1.25	30	4.13	.66 5/8	55	10000

- (1) XPB0 pillow blocks are designed to give extra rigid support and are therefore dimensioned to provide the interference fits when used with 60 Case LinearRace class XL. If used with class L 60 Case LinearRace the fit-up values would be .0022P/.0002P for the 2 inch size and .0029P/.0003P for the 3 inch size.
- (2) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For Dynamic Load Correction Factors, see following polar graphs.

Thomson RoundRail Linear Guides and Components

Load/Life Graph

(Lines indicate limiting load for given Ball Bushing Bearing)



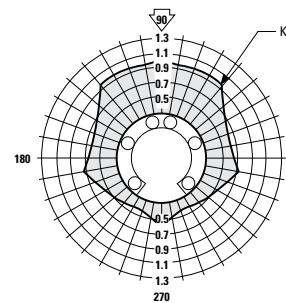
Determining Ball Bushing Bearing Size

To determine the proper Ball Bushing Bearing size, enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing Bearing sizes that pass through or above and to the right of this point may be suitable for this application.

**Note:** For the purpose of using this chart, load on most heavily loaded bearing = maximum applied load/ $K_0$ . Where  $K_0$  can be determined from the Polar Graph to the right.

Polar Graphs

The actual dynamic load capacity of a Ball Bushing Bearing is determined by the orientation of the bearing or direction of the applied load. The load correction factor  $K_0$  is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the polar graph. To determine the actual dynamic load capacity, multiply the proper correction factor by the dynamic load capacity listed in the product table on the previous page.





## X-Y-Z System

### Objective

Build a rigid X-Y-Z System designed to perform welding and flame-cutting tasks.

### Solution

Extra Rigid Ball Bushing® Bearings will be used on the X-axis to minimize deflection of the cantilevered Y-axis. Self-aligning Super Smart Ball Bushing Bearings are used on the Y and Z axis to simplify the assembly.

### Products Specified

#### X-axis

- 4 - XR320PN (XR Ball Bushing Bearing)
- 2 - XSRA32 x 108 in (60 Case® LinearRace® support rail assembly)

#### Y-axis

- 4 - SSU120PN (Super Smart Ball Bushing Bearing [Open Type])
- 2 - LSR-12-PD x 48 in (Low Profile 60 Case LinearRace Support Rail)
- 2 - 3/4 L PD CTL x 48 in (60 Case LinearRace)

#### Z-axis

- 4 - SSU12 (Super Smart Ball Bushing Bearing)
- 2 - 3/4 L CTL x 36 in (60 Case LinearRace)

### Benefits

The high load capacity, rigidity and RoundRail Advantage of the Super Smart and XR Ball Bushing Bearings provided an easy to assemble system with a repeatability of  $\pm 0.005$  in.

