

Advanced Linear Motion Technology Guide



The complete selection guide for inch size
linear motion components
2000 Edition

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 **THOMSON™**
First in Linear Motion and Control Technology

NEW

Self-Lubricating Linear Bearing Pillow Blocks



Only Available From Thomson

PATENTED SELF-LUBRICATING, SELF-ALIGNING LINEAR BEARING PILLOW BLOCKS

- Maintenance-Free Operation
- Eliminates need for expensive lubrication systems
- Available as an option with Thomson Super type and Super Smart Ball Bushing* bearing Pillow Blocks

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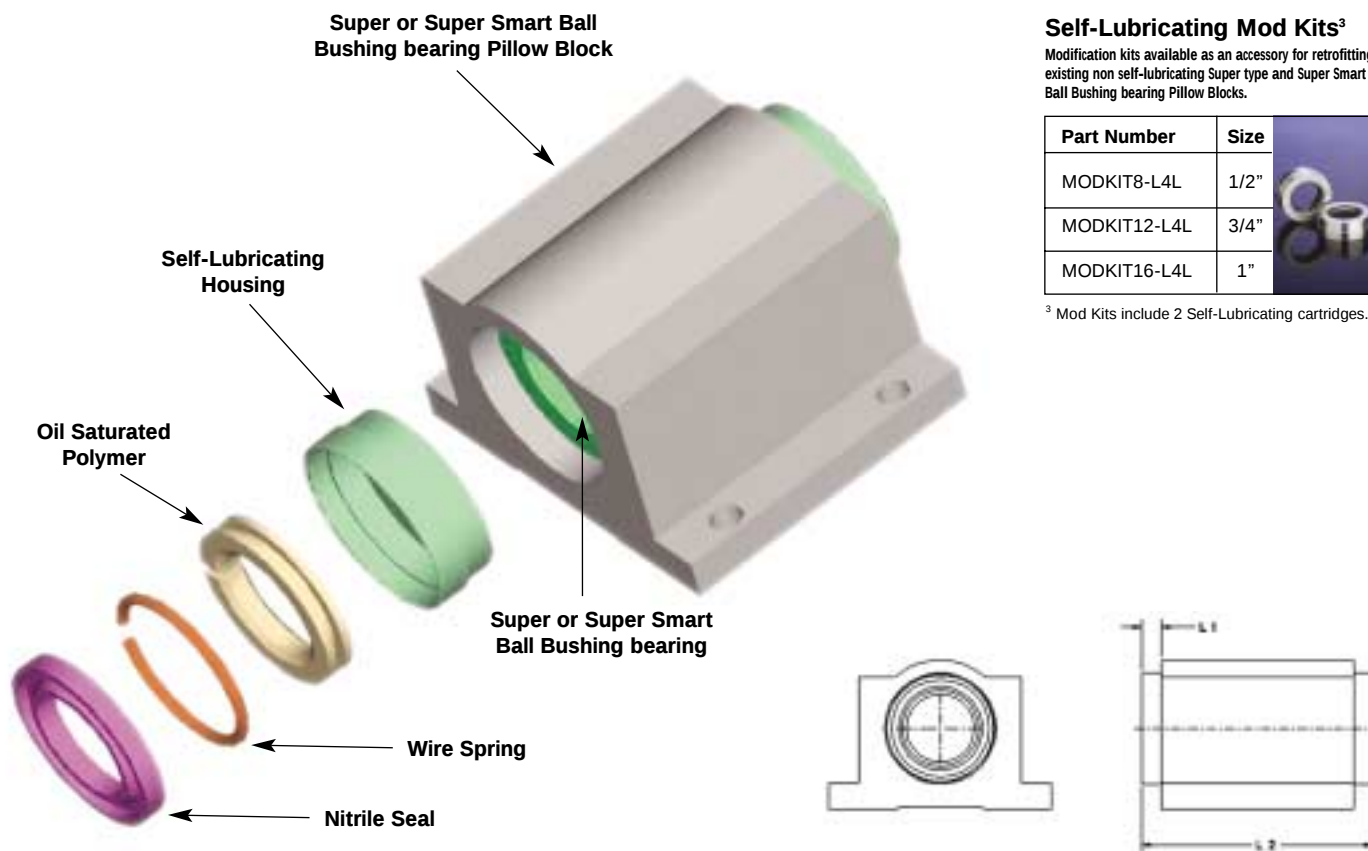
* Trademark of Thomson Industries, Inc. THOMSON is registered in the U.S. Patent and Trademark Office and in other countries.

Self-Lubricating Mod Kits³

Modification kits available as an accessory for retrofitting existing non self-lubricating Super type and Super Smart Ball Bushing bearing Pillow Blocks.

Part Number	Size
MODKIT8-L4L	1/2"
MODKIT12-L4L	3/4"
MODKIT16-L4L	1"

³ Mod Kits include 2 Self-Lubricating cartridges.



Self-Lubricating Super Ball Bushing* bearing Pillow Blocks

PART NUMBER	SHAFT SIZE ¹	L ₁	L ₂	LOAD CAPACITY (lbf) ²
SPB8-L4L	1/2"	.230	2.150	255
SPB12-L4L	3/4"	.243	2.546	600
SPB16-L4L	1"	.303	3.416	1050

Self-Lubricating Super Smart Ball Bushing* bearing Pillow Blocks

PART NUMBER	SHAFT SIZE ¹	L ₁	L ₂	LOAD CAPACITY (lbf) ²
SS6UPB8-L4L	1/2"	.230	2.150	265
SSUPB12-L4L	3/4"	.243	2.546	1130
SSUPB16-L4L	1"	.303	3.416	1900

¹ Super & Super Smart Ball Bushing* bearings require Class "L" 60 Case* shafting for optimal performance.

² The maximum Dynamic load capacity is based upon a rated travel life of 2 million inches. The actual Dynamic load capacity can be affected by orientation of the bearing or the direction of the applied load.

Thomson Ball Bushing* bearing products load and life specifications are based upon actual tests with 60 Case* shafting.



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For other sizes and more information contact the linear bearings group at bearings@thomsonmail.com

History of Innovation & Excellence

The Thomson Industries Group of Companies is a family of interrelated, technology-based, customer-service oriented companies. Thomson Industries, Inc., invented and is the world leader in the design and manufacture of linear anti-friction Ball Bushing* bearings; RoundWay* roller bearings; 60 Case* LinearRace* shafts; ready-to-install RoundRail* systems; AccuGlide* and AccuMax* ProfileRail* linear guides; and Nyliner* engineered polymer bearings. Thomson Saginaw Ball Screw Company pioneered the development of Saginaw ball screw and ball spline technology (the leading name in North America). Thomson IBL Company perfected the manufacture of custom-engineered high-precision ball screws and lead screws for the specific needs of machinery manufacturers. Thomson Precision Ball Company is a leading supplier of precision bearing balls for radial and linear applications. Thomson Micron is a leading manufacturer of high-precision True Planetary* Gearheads and position feedback transducers. Thomson Airpax Mechatronics is a world leader in stepper motor technology.

THE FORTIES:

John B. Thomson, Sr., invented the world's first anti-friction Ball Bushing linear bearing with unlimited travel capability. New manufacturing processes were developed to support this invention.

The Saginaw Actuator Products Group was formed by General Motors to apply the highly efficient Saginaw ball screw actuator to non-automotive uses. Advances developed by this group include: the perfection of induction-hardened, tough ductile-root, gothic-arch ball form and the introduction of multiple circuit ball screws for high load applications.

THE FIFTIES:

Thomson introduced 60 Case LinearRace shafting as a hardened, precision-ground, inner raceway for its linear bearing products. A dedicated manufacturing facility was established in Lancaster, PA.

Thomson licensed Deutsche Star of Germany as manufacturer and distributor of its linear bearing products in Continental Europe. RHP was similarly licensed in the United Kingdom.

Nyliner engineered polymer bearings were invented by Thomson to provide cost and weight savings for linear, oscillating and rotary applications.

A proprietary thread rolling process was developed by the Saginaw Actuator Products Group to produce Saginaw ball screws more cost effectively. Preloaded double-nut assemblies were developed for lash-free actuation.

THE SIXTIES:

Thomson invented the revolutionary RoundWay linear roller bearing. It is self-aligning and provides up to 20 times the load of a conventional linear ball bearing.

Saginaw Performance Pak* electromechanical actuators were developed to provide economical, high load actuation in a relatively small package.

THE SEVENTIES:

Never satisfied with past successes, Thomson invented the Super Ball Bushing* bearing. This new self-aligning bearing provides up to three times more load capacity, or 27 times more travel life than older style Ball Bushing linear bearings.

Single-piece, separated-circuit, preloaded Saginaw ball screw nuts were introduced to improve stiffness and provide lash-free, high precision positioning for machine tool applications.

THE EIGHTIES:

A busy decade for Thomson Industries' inventive genius! The company patented the rigid, high-load-capacity XR* machine tool Ball Bushing bearing and also developed a complete family of pre-engineered, pre-assembled, ready-to-ship, ready-to-install linear motion systems.

Thomson acquired ABEK, Inc. (founded in 1976) and Pioneer Steel Ball Company (founded in 1946) in 1988. The two operations were combined to form Thomson Precision Ball Company, Unionville, CT.

Thomson Precision perfected the process for manufacturing high precision, wear-resistant ceramic balls and developed a unique process for making high-

precision, hollow balls for optimum performance in weight-critical, low-inertia applications.

In 1987, Thomson acquired the "Saginaw" Actuator Products Group from General Motors Corporation and formed Thomson Saginaw Ball Screw Company, Saginaw, MI. Saginaw is the leading name in ball screws, ball splines, and related actuators.

THE NINETIES:

Thomson Industries' tradition of innovation and excellence continues with a new line of metric linear motion products. In 1993, Thomson invented the Super Smart Ball Bushing* linear bearing. It completely outperforms conventional Ball Bushing linear bearings by providing six times the load-carrying capacity, or 216 times the calculated travel life. Its universal, self-alignment feature assures optimum bearing alignment and performance, while simplifying the installation process; making it easier to install in factory environments, thus reducing downtime and costs.

In 1990, Thomson Bay Company, Bay City, MI was organized to manufacture high-volume, ball screw actuators for control-by-wire applications in the automotive industry.

In 1992, Thomson Bay began producing its patented AccuGlide linear ball guide and AccuMax linear roller guide for use in precision machine tools, where high load capacity, accuracy, and rigidity are required.

In 1994, Thomson Industries acquired IBL (Ballscrews) Ltd. in Barnstaple, North Devon, England from FAG Kugelfischer Georg Schäfer AG, Schweinfurt, Germany. Renamed Thomson IBL, this facility is one of the world's most modern ball screw manufacturing plants. It serves as Thomson Industries' European headquarters for the manufacture and support of Thomson linear motion products.

Also in 1994, Thomson Saginaw acquired Precision Kinetics (PK) from Sargent Technologies, a

Dover Diversified Company specializing in the design and manufacture of ball screws for aircraft applications. PK's operations were relocated to Saginaw, MI, as a division of the Thomson Saginaw Aerospace, Government and Defense Products Group.

In the 1990's, all Thomson facilities became ISO 9000 certified. Thomson Industries' Metallurgical Laboratory achieved American Association for Laboratory Accreditation status. And, Thomson was named GM Supplier of the Year in 1995 and 1996 for quality and on-time delivery.

In 1995, Thomson invented the patented AccuGlide T-Series* linear guide, which provides comparable load capacity to the standard linear guide, but is less expensive and easier to install.

Also in 1995, Thomson acquired Micron Instrument Corporation, Ronkonkoma, NY. Renamed Thomson Micron, this facility is a leading manufacturer of True Planetary* precision gearheads, transducers and custom gear assemblies.

In 1995, the Linear Bearings Division introduced a new line of Smart Rail*, precision grade linear guides which provide high load and bolt-down from the top installation convenience.

In 1996, Thomson 60 Case, introduced UltraRace shafting with tolerances at half of current industry standards for optimum bearing performance and life.

In 1997, Thomson acquired the Airpax Mechatronics Group, Cheshire, CT, a world leader in stepper and D.C. brushless motor technology, from Philips Electronics North America Corporation. During 1997, Thomson Industries also formed the Thomson Industries Linear Guide Division.

Two Thomson Industries' facilities -- Port Washington, NY, and Thomson Bay Company, LLC, Bay City, MI -- received registration as QS-9000 manufacturing facilities in 1997.

As Thomson moves toward the 21st century, it will continue to research and develop new technologies designed to meet the current and future needs of its customers. Exceeding the demands of the increasingly competitive, quality-conscious industrial world market is a challenge Thomson gladly accepts.

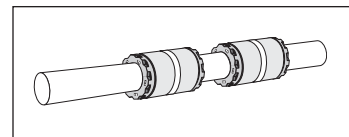


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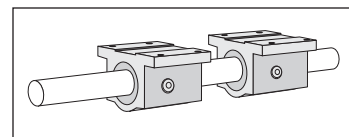
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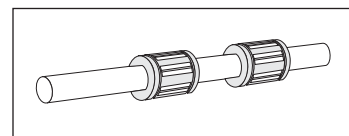
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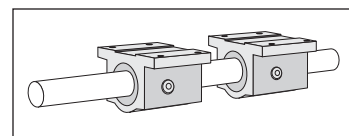
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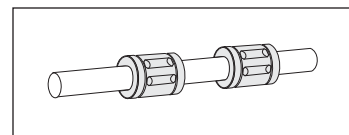
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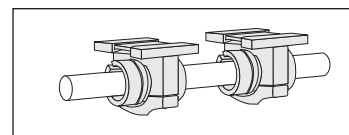
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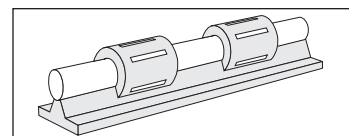
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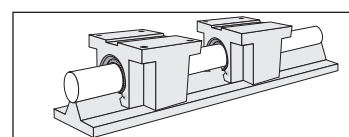
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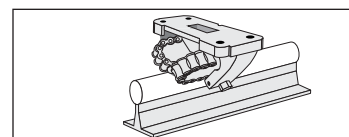
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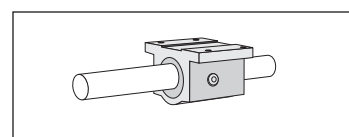
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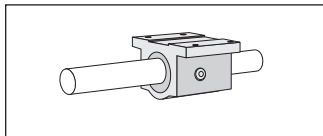
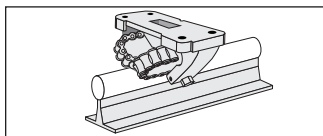
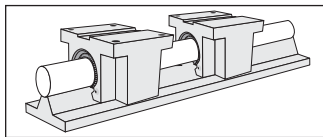
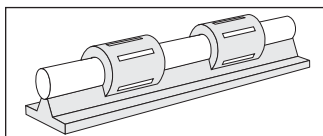
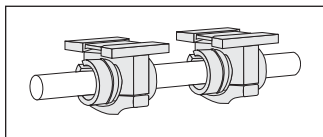
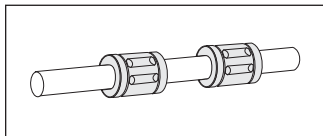
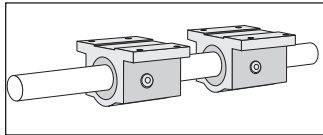
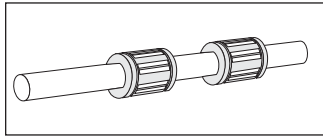
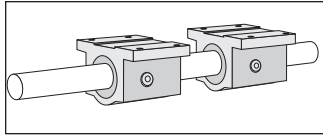
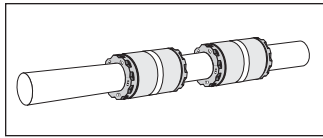


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	Configuration			Load Capacity Range lb _f
	Single	Twin	Adjustable	
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Closed Type (Pages 7–17)	•		•	265 to 3880
Open Type (Pages 24–29)	•		•	360 to 3880
Super Smart Ball Bushing Pillow Blocks				
Closed Type (Pages 18–23)	•	•	•	265 to 7760
Open Type (Pages 30–35)	•	•	•	360 to 7760
Super Ball Bushing* Bearings				
Closed Type (Pages 37–49)	•	•	•	35 to 3000
Open Type (Pages 54–61)	•		•	180 to 2350
Super Ball Bushing Pillow Blocks				
Closed Type (Pages 50–53)	•	•	•	60 to 4000
Open Type (Pages 62–65)	•	•	•	180 to 3120
Precision Steel Ball Bushing Bearings				
Closed Type (Pages 67–79, 82–85)	•			7 to 5000
Open Type (Pages 86–91)	•		•	60 to 3800
Precision Steel Ball Bushing Pillow Blocks				
Closed Type (Pages 80–81)	•		•	85 to 1100
Open Type (Pages 92–93)	•		•	60 to 860
XR* Extra Rigid Ball Bushing Bearings				
Open Type (Pages 95–99)	•			4500 to 10000
XR Extra Rigid Ball Bushing Pillow Blocks				
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Single Type (Pages 103–113)	•		•	970 to 24000
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Integral Seals	Corrosion Resistance	Size and Availability													
		1/8	3/16	1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
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SSU

SUPER

PRECISION

EXTRA RGD

RW
HNYBUA
E

Thomson Linear Motion Components

The RoundRail* Advantage. . .



Super Smart Ball Bushing* Bearings

Thomson Super Smart Ball Bushing Bearings represent a major advancement for Linear bearing technology, worldwide.

This new patented self-aligning linear bearing provides twice the load carrying capacity or eight times the travel life of the industry standard Thomson Super Ball Bushing* bearing. This dramatic increase in load capacity allows the use of less expensive drive motors, linkages, gears and ball screws. The unique Super Smart design allows the bearing to maintain its diametrical fit up when installed in housings that are soft or slightly out-of-round. Super Smart bearings utilize the RoundRail Advantage that eliminates the need for derating factors commonly used with linear guides. The new bearings are called "Smart" because their universally self-aligning, double-track design incorporates engineering concepts that literally render old style conventional bearings obsolete. Available in inch and metric sizes from over 1800 distributors worldwide. (See Page 16)



Super Smart Ball Bushing Pillow Blocks

Thomson Super Smart Ball Bushing Pillow Blocks available in closed, adjustable and open styles in both single and twin versions.

To minimize installation time and cost, the Super Smart Ball Bushing bearing can be ordered factory-installed in an industry standard single or twin pillow block. The closed type pillow block is used in end supported applications for spanning or bridging a gap. The open style is used in continuously supported applications when maximum rigidity and stiffness is required. Each Super Smart Pillow block is complete with integral double acting seals which keep out contaminants, retain lubrication and maximize bearing life. Since each Pillow Block is dimensionally interchangeable with the industry standard Thomson Super Ball Bushing Pillow Block, system performance improvements can be realized immediately. All Pillow Blocks are available and in stock from over 1800 authorized distributors worldwide (See Page 18)



Super Ball Bushing Bearings

Industry standard self-aligning Super Ball Bushing Bearings available in twenty three sizes and configurations.

Super Ball Bushing bearings offer three times the load capacity or twenty seven times the life of conventional linear bearings. Industry standard self-aligning Super Ball Bushing bearings ease installation and minimize wear from minor bore misalignment. Super Ball Bushing bearings can achieve speeds up to 10 ft/s and accelerations up to 450 ft/s² without the derating factors commonly found in linear guide products. With a coefficient of friction as low as .001, Super Ball Bushing bearings provide a quick easy replacement for high friction plain bearings. The wear-resistant, engineered-polymer retainers and outer sleeves reduce inertia and noise in critical, high speed applications. Super Ball Bushing bearings are available in both open and closed versions from over 1800 distributors worldwide. (See Page 44)

...The RoundRail* Advantage- *The inherent ability of a RoundRail 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 the bearing components.*



Super Ball Bushing* Bearing Pillow Blocks

Available in closed, adjustable and open styles in both single and twin versions.

Thomson Super Ball Bushing bearings are also available factory installed in single or twin pillow blocks. Super Ball Bushing bearing pillow blocks are provided with integral, double acting seals that keep out contaminants and retain lubrication, maximizing system performance and life. Twin versions provide up to twice the load capacity or eight times the life of single versions, allowing the use of smaller and less expensive drives, motors and ball screws. When replacing v-ways and flat-ways, the Super Pillow Block's low coefficient of friction reduces power consumption and provides important design economies. In stock and available in sizes from 1/4 to 2 inch from over 1800 distributors worldwide. (See Page 50)



Precision Steel Ball Bushing Bearing Products

Rigid, Precision Steel Ball Bushing Bearing design eliminates binding and chatter found in high friction plain bearings.

Precision Steel Ball Bushing bearings are available in an open version for continuously supported applications and a closed version for end supported applications. Extra precision and adjustable versions are available for end supported applications requiring higher precision and repeatability. Precision Steel Ball Bushing bearing products are also available factory installed in a self-aligning, malleable iron pillow block minimizing installation time and cost. The all-steel design makes the Precision Steel Ball Bushing bearing product line perfect for replacing plain bearings in high temperature applications. Available in 72 sizes and configurations from over 1800 distributors worldwide. (See Page 74)



Miniature Instrument Ball Bushing Bearings

High Accuracy and Compactness for Instrumentation Level Applications.

The accuracy level and compact size make the Instrument Ball Bushing bearing ideal for small mechanisms or devices that require high repeatability and responsiveness. When replacing high friction plain bearings, the Instrument Ball Bushing bearings' constant low coefficient of friction eliminates stick-slip and provides smooth linear performance. Each Instrument Ball Bushing bearing can be provided with a matched 60 Case* LinearRace* shafting for minimum fit-up, optimizing system performance and accuracy. In stock and available in sizes 1/8, 3/16 and 1/4 inch from over 1800 distributors, worldwide. (See Page 82)

Thomson Linear Motion Components

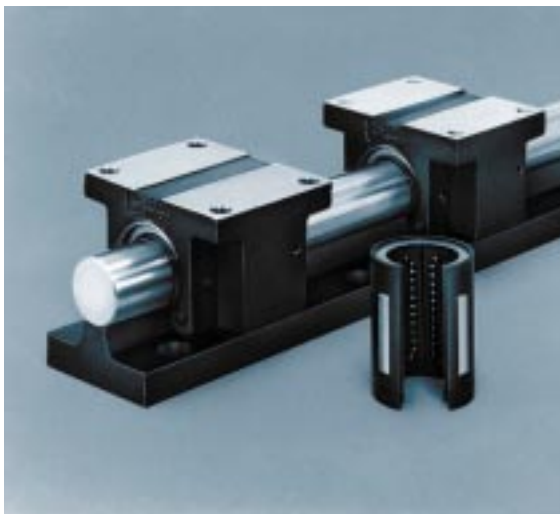
The RoundRail* Advantage



Die Set Ball Bushing* Bearings

Available in two accuracy classes and suitable for a variety of industrial applications.

Thomson Die Set Ball Bushing bearings are designed to fit the mounting holes of the punch holder in standard dies. When replacing high friction plain bearings in standard dies, the result is less machine downtime and increased efficiency. With steady state speeds up to 10 ft/s, the Die Set bearing will provide faster cycle times, with improvements in production rates realized immediately. Matched precision ground 60 Case* LinearRace* allows for a close fit-up between the shaft and the LinearRace shafting and bearing providing critical die alignment. When normal machine service requires bearing replacement, the Die Set bearing can be removed by simply unbolting the toe clamps. Available in 1, 1¼, 1½ and 2 inch sizes from over 1800 distributors worldwide. (See Page 84)



XR* Ball Bushing Bearing Products

High load capacity and rigidity combined with the RoundRail Advantage.

The XR Ball Bushing bearing provides five times the load capacity or 125 times the life of conventional linear bearings. This increase in bearing performance significantly reduces downtime and maintenance, while increasing machine reliability. When replacing v-ways and flat-ways, XR Ball Bushing bearings allow travel speeds up to 5 ft/s and accelerations up to 225 ft/s² without a sharp increase in power consumption. XR Ball Bushing bearings also provide three times the rigidity of conventional Ball Bushing bearings reducing deflection in critical machining applications. Pillow Blocks are available with factory installed XR Ball Bushing bearings and integral seals. 60 Case LinearRace shafting available pre-mounted on standard extra rigid LinearRace support rails. Available in 2, 3 and 4 inch sizes from over 1800 distributors worldwide. (See Page 98)



RoundWay* Linear Roller Bearings

Low friction roller bearings with up to 20 times the load capacity of conventional linear bearings.

These patented, self-aligning linear roller bearings have over 20 times the load capacity of a conventional linear ball bearing. This dramatic increase in bearing load capacity allows designers to optimize system compactness and minimize hardware costs. Combining the self-aligning feature with the RoundRail Advantage minimizes installation time and assures trouble-free operation. RoundWay and RoundWay II bearings can achieve operating speeds up to 10 ft/s without the derating factors commonly seen with linear guides. When normal machine maintenance is required, RoundWay bearings can be quickly and cost-effectively replaced, without scrapping the entire system, a major problem when servicing some linear guides. RoundWay bearings are available from over 1800 authorized distributors worldwide. (See Page 110)

Super Smart Ball Bushing Bearing Products



Thomson Super Smart Ball Bushing* Bearing products offer:

- up to six times the load capacity or 216 times the travel life of conventional linear bearings.
- twice the load capacity or eight times the travel life of industry standard Thomson Super Ball Bushing* bearings.
- a precision super finished, dual track bearing plate for optimum system smoothness and performance.
- a universal self-alignment feature, that compensates for misalignment of housing bores and 60 Case* LinearRace* shaft deflection, optimizes load distribution between ball tracks and assures uniform ball loading over the entire length of the bearing plate. Installation time and cost is minimized while bearing performance and life is maximized.
- a technologically advanced design that allows the bearing to maintain its diametrical fit-up when installed in a housing that is slightly out-of-round.
- longer travel life and minimal machine downtime when replacing conventional linear bearings or the industry standard Super Ball Bushing bearing.
- the RoundRail* Advantage combined with universal self-alignment eliminating the need for derating factors commonly required when using linear guides.
- a coefficient of friction as low as .001. This allows the use of smaller less expensive motors, belts, gears and ball screws, when replacing high friction, plain bearings.
- closed and open configurations.
- double lip integral wipers that keep out dirt while retaining lubrication. Travel life is maximized.
- worldwide availability from over 1800 authorized distributors.

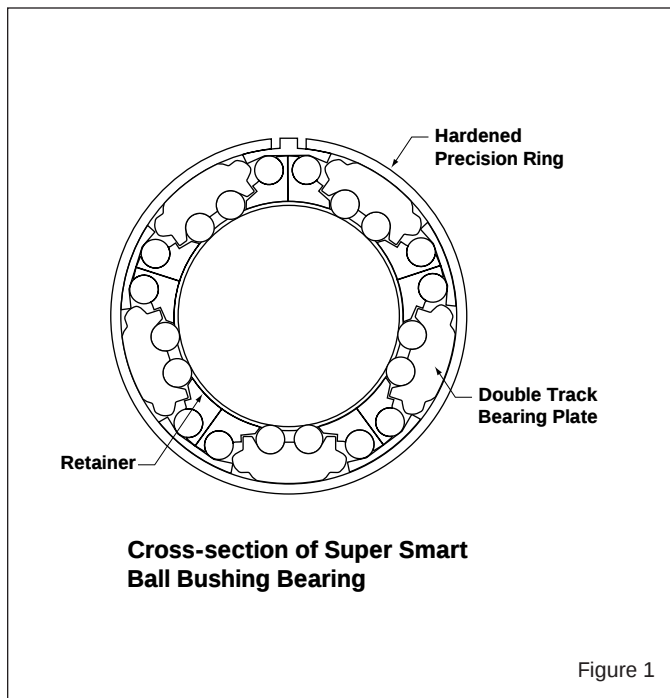
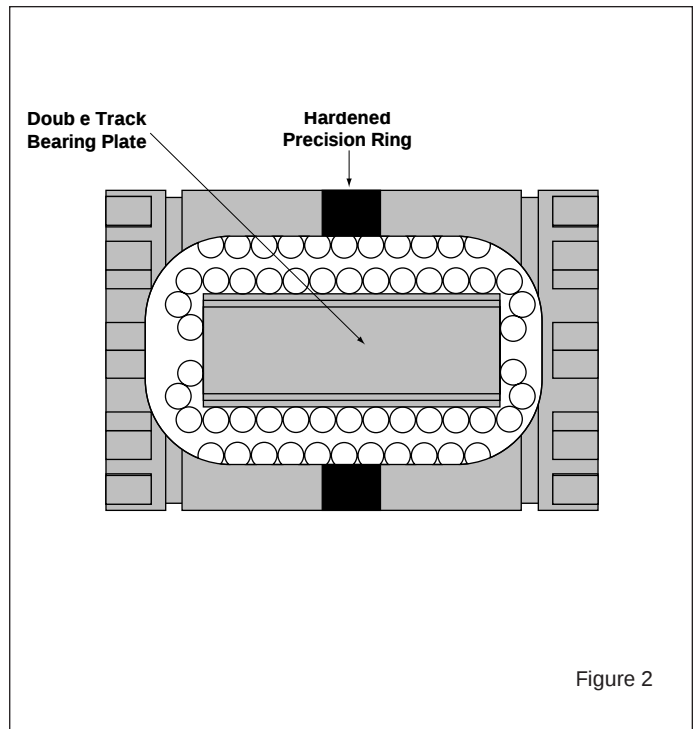
Super Smart Ball Bushing Bearing

The new Super Smart Ball Bushing* bearing represents a major advancement in linear bearing technology worldwide. The Super Smart Ball Bushing bearing offers twice the load capacity or eight times the travel life of the industry standard Thomson Super Ball Bushing* bearing. An enormous technological breakthrough, considering the Super Ball Bushing bearing already offers three times the load capacity or twenty-seven times the travel life of conventional linear bearings.

Technologically Advanced Design

The load carrying component of the Super Smart Ball Bushing bearing is the combination of four hardened bearing quality steel components (Figures 1 & 2).

The first component is the steel outer ring, which allows the bearing to maintain its diametrical fit-up even when installed in a housing that is slightly out-of-round. The unique ring design also allows for bearing adjustment and the removal of diametrical clearance. The second component is the precision super finished double track bearing plate that provides twice the load capacity and features universal self-alignment.



The third component is the rolling element. Each Super Smart Ball Bushing bearing utilizes precision ground balls manufactured to the highest quality standards for roundness and sphericity. The result is maximum load capacity, travel life and performance.

The last component is the 60 Case* LinearRace* shaft that acts as the inner race to the Super Smart Ball Bushing bearing. Each 60 Case LinearRace shaft is manufactured to the highest quality standards for roundness, straightness, surface finish and hardness. Roundness is held under eighty millionths of an inch; straightness to .002 inches per foot; surface finish under twelve microinch and hardness between 60-65 HRC. The combination of inner and outer race or 60 Case LinearRace shaft and Super Smart Ball Bushing bearing provides the basis for the RoundRail* Advantage.

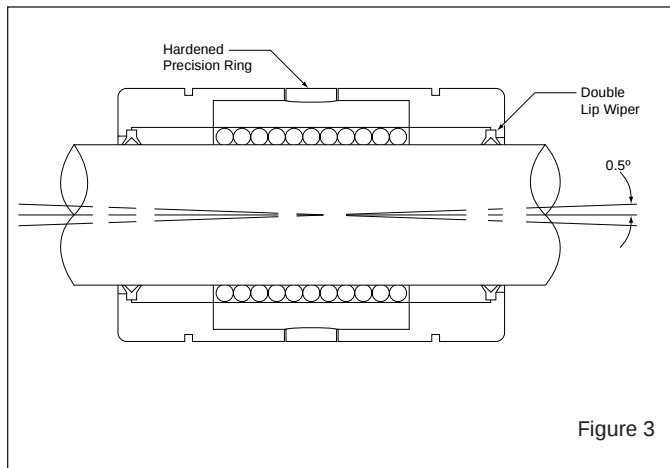
The RoundRail Advantage

The RoundRail Advantage is the inherent ability of a Super Smart 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.

Super Smart Ball Bushing Bearing

Universal Self-Alignment

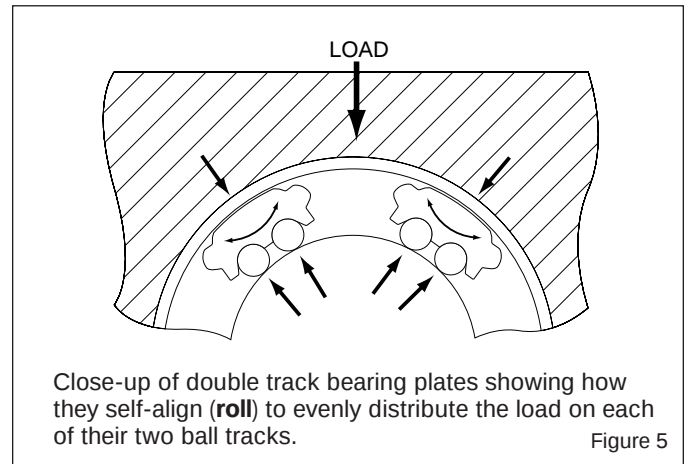
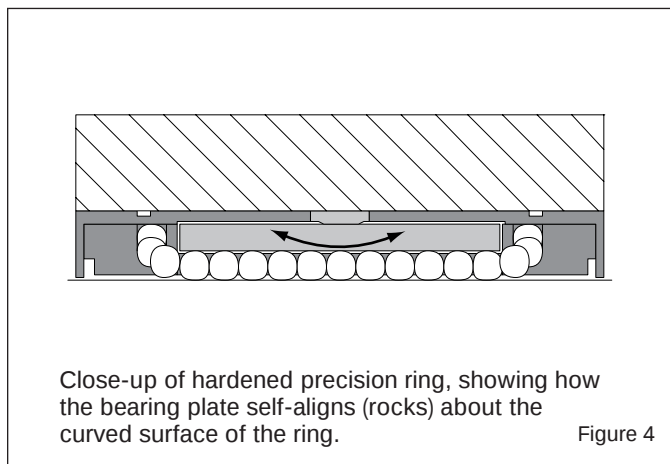
The bearing plate of the Super Smart Ball Bushing* bearing is designed with many unique and technologically advanced features. The universal self-alignment feature assures that the Super Smart Ball Bushing bearing will achieve maximum performance regarding load capacity, travel life, smooth operation and coefficient of friction. The three components that make up universal self-alignment are **Rock**, **Roll** and **Yaw**.



Rock

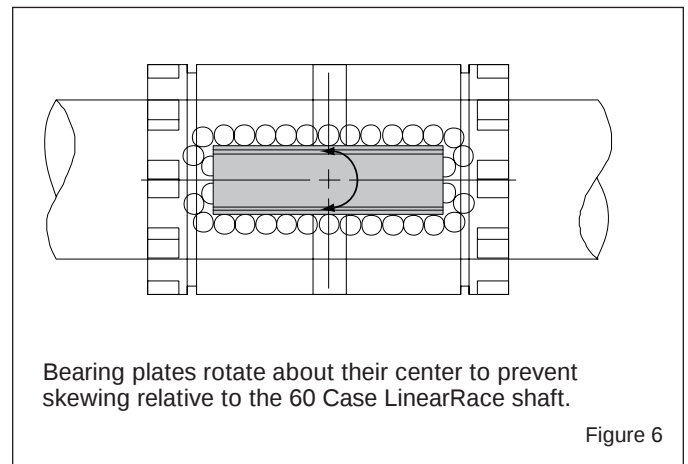
The bearing plate is designed to rock 0.5° about the hardened precision ground outer ring (Figures 3 & 4). This self-aligning feature allows the Super Smart Ball Bushing bearing to absorb misalignment caused by inaccuracies in housing bore alignment or 60 Case* LinearRace* shaft deflection.

This rocking capability provides smooth entry and exit of the precision balls into and out of the load zone assuring a constant low coefficient of friction. By compensating for misalignment, each bearing ball in the load carrying area is uniformly loaded providing maximum load capacity.



Roll

The second key design feature of the Super Smart Ball Bushing bearing plate is its ability to **Roll**. The bearing plate is designed with the radius of its outer surface smaller than the inside radius of the precision outer ring (Figure 5). This allows the bearing plate to compensate for torsional misalignment and evenly distribute the load on each of its two ball tracks. The roll component assures maximum load capacity and travel life.



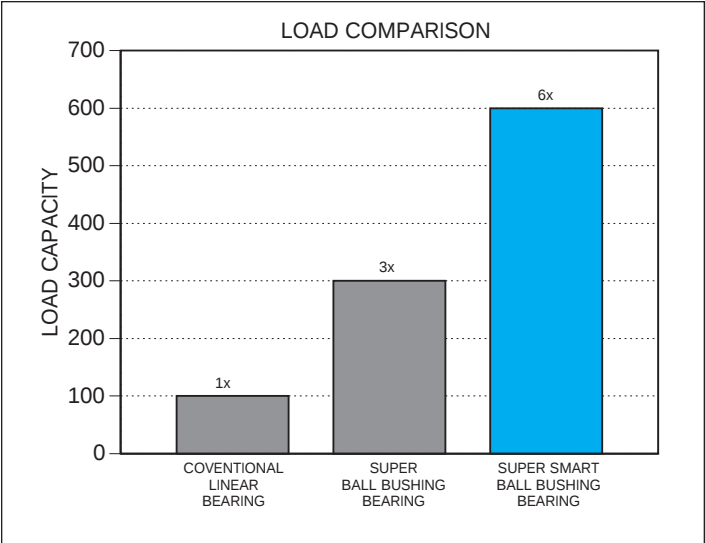
Yaw

The shape formed by the **Rock** and **Roll** features allows the Super Smart Ball Bushing bearing plate to rotate about its center (Figure 6). This allows the Super Smart Ball Bushing bearing to absorb skew caused by misalignment. The result is a constant low coefficient of friction and maximum bearing performance.

Super Smart Ball Bushing Bearing

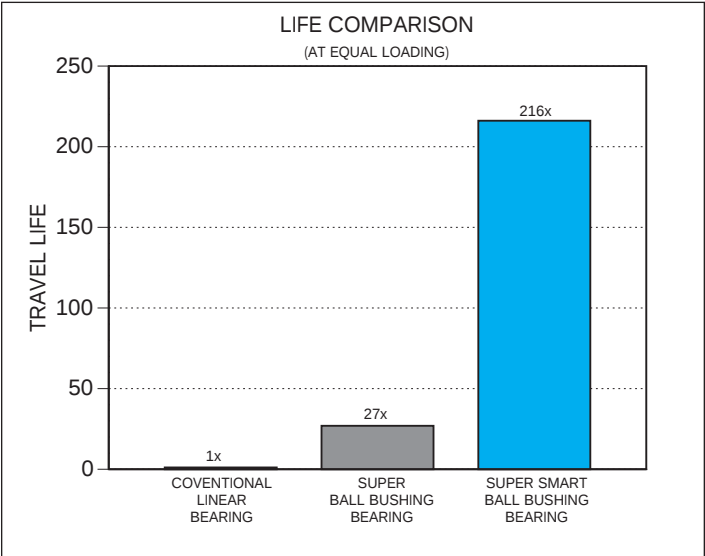
The Super Smart Advantage

Advantage: Load Capacity



The Super Smart Ball Bushing* bearing provides twice the load capacity of the industry standard Thomson Super Ball Bushing* bearing and six times the load capacity of conventional linear bearings.

Advantage: Travel Life



The Super Smart Ball Bushing bearing provides eight times the travel life of the industry standard Thomson Super Ball Bushing bearing and 216 times the travel life of conventional linear bearings.

Super Smart Ball Bushing Bearing Products

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Super Smart Ball Bushing Bearing Products for End Supported Applications

12



Super Smart Ball Bushing* bearing closed type products have been designed specifically for use in end supported applications, where spanning or bridging a gap is required. End supported products are available in a variety of configuration and sizes. For a complete overview of each Super Smart end support product simply turn to page SMT6. For Super Smart Ball Bushing bearing end support product specifications see the corresponding pages referenced below.

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Part Number Description and Specification14

Super Smart Product Specifications

Super Smart Ball Bushing Bearings (Closed Type)16

Super Smart Ball Bushing Pillow Blocks (Closed Type)18

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Super Smart Ball Bushing Bearing Products for Continuously Supported Applications

24



Super Smart Ball Bushing bearing open type products are specifically designed for use in continuously supported applications where rigidity and stiffness is required. Continuously supported products are available in a variety of configurations and sizes. For a complete overview of all Super Smart continuously supported products turn to page SMT18. For Super Smart Ball Bushing bearing continuously supported product specifications see the corresponding pages referenced below.

Product Overview24

Part Number Description and Specification.26

Super Smart Product Specifications

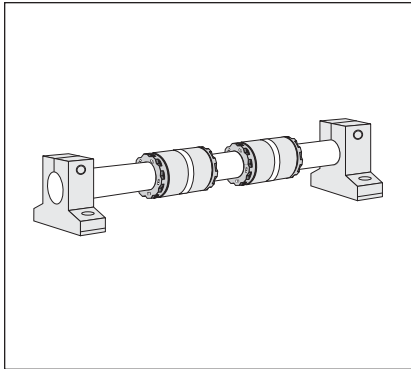
Super Smart Ball Bushing Bearings (Open Type)28

Super Smart Ball Bushing Pillow Blocks (Open Type)30

Super Smart Ball Bushing Twin Pillow Blocks (Open Type)32

Super Smart Ball Bushing Rigid Steel Pillow Blocks (Open Type)34

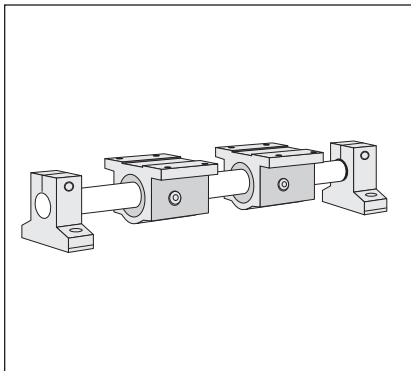
Super Smart Ball Bushing Bearings and Pillow Blocks for End Supported Applications



Super Smart Ball Bushing* Bearings (Closed Type)

Features:

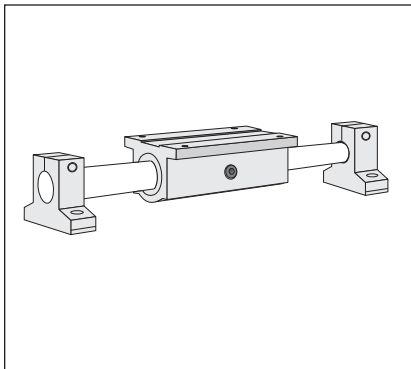
- Available in sizes ½ to 1½ inch diameters.
- Load capacity range from 265 to 3,880 lb_f.
- Available with one, two or without integral double lip wipers.
- Can be adjusted to take out diametrical clearance.
- Can be mounted in a customized housing.
- Travel speeds up to 10 ft/s.
- Interchangeable with the industry standard Thomson Super Ball Bushing* bearing.



Super Smart Ball Bushing Pillow Blocks (Closed and Adjustable Type)

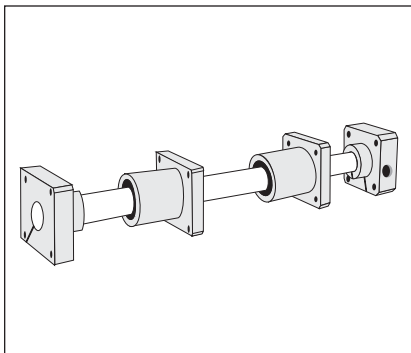
Features:

- Available in sizes ½ to 1½ inch diameters.
- Load capacity range from 265 to 3,880 lb_f.
- Available with standard integral double acting seals.
- Available with or without adjustment capability.
- Can be adjusted to take out diametrical clearance.
- Easily mounted and secured with four mounting bolts.
- Travel speeds up to 10 ft/s.
- Available with standard lubrication fitting.
- Interchangeable with the industry standard Thomson Super Ball Bushing Pillow Blocks.



Super Smart Ball Bushing Twin Pillow Blocks (Closed and Adjustable Type) Features:

- Available in sizes ½ to 1½ inch diameters.
- Load capacity range from 530 to 7,760 lb_f.
- Available with standard integral double acting seals.
- Available with or without adjustment capability.
- Can be adjusted to take out diametrical clearance.
- Travel speeds up to 10 ft/s.
- Easily mounted and secured with four mounting bolts.
- Available with standard lubrication fitting.
- Interchangeable with the industry standard Thomson Super Ball Bushing Twin Pillow Block.

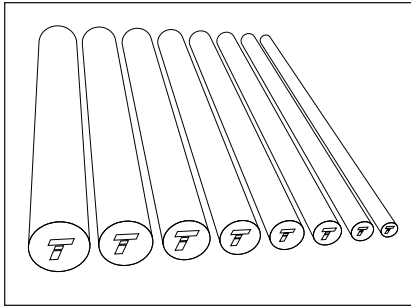


Super Smart Ball Bushing Flanged Single and Twin Pillow Blocks

Features:

- Available in sizes ½ and 1½ inch diameters.
- Load capacity range from 265 to 7,760 lb_f.
- Available with standard integral double acting seals.
- Without adjustment capability.
- Can be mounted perpendicular to table surface.
- Easily mounted and secured with four mounting bolts.
- Travel speeds up to 10 ft/s.
- Available with standard lubrication fitting.
- Interchangeable with the industry standard Thomson Super Ball Bushing Flanged Single and Twin Pillow Block.

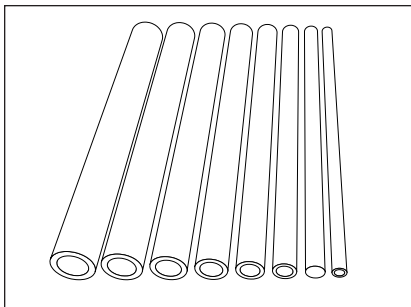
60 Case LinearRace Shafting for End Supported Applications



Solid 60 Case* LinearRace* Shafting

Features:

- Diameter range between $\frac{3}{16}$ and 4 inch.
- Roundness 80 millionths of an inch.
- Case hardness 60-65 HRC.
- Surface finish 12 R_a microinch.
- Available in corrosion resistant 440C stainless steel (50-55 HRC).
- Available with PrePlate* chrome option.
- Standard straightness is .001 inch per foot cumulative (.002 TIR) with special straightness at .0005 inch per foot cumulative (.001 TIR) available.

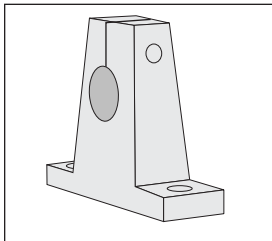


60 Case Tubular Lite* LinearRace Shafting

Features:

- Hollow inner diameter reduces weight and inertia.
- Diameter range between $\frac{3}{4}$ and 4 inch.
- Roundness 80 millionths of an inch.
- Case hardness 58-63 HRC.
- Surface finish 12 R_a microinch.
- Available with PrePlate chrome option.
- Standard straightness is .001 inch per foot cumulative (.002 TIR) with special straightness at .0005 inch per foot cumulative (.001 TIR) available.

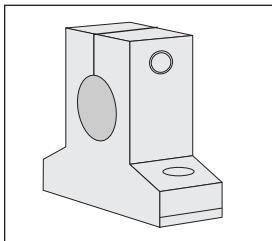
60 Case LinearRace Supports For End Supported Applications



SB 60 Case LinearRace Shafting End Support Block

Features:

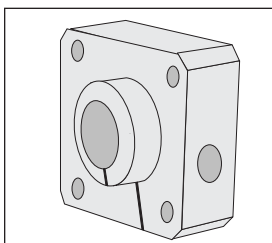
- Size range between $\frac{1}{4}$ and 2 inch.
- Easily secured with two mounting bolts.
- Malleable iron alloy for sizes $\frac{1}{2}$ to 2 inch diameter.
- Protected by corrosion resistant coating.
- Light weight, high strength aluminum alloy construction for sizes $\frac{1}{4}$ and $\frac{3}{8}$ inch.



ASB Low Profile 60 Case LinearRace Shafting End Support Block

Features:

- Size range between $\frac{1}{4}$ and 1 $\frac{1}{2}$ inch.
- Low profile design.
- Easily secured with two mounting bolts.
- Protected by corrosion resistant anodized coating.
- Light weight, high strength aluminum alloy construction.



FSB Flanged 60 Case LinearRace End Support Block

Features:

- Available in $\frac{1}{2}$, $\frac{3}{4}$, 1 and 1 $\frac{1}{4}$ inch diameters.
- Flanged mounting surface for easy assembly.
- Easily secured with four mounting bolts.
- Designed specifically for use with Super Smart Flanged Pillow Blocks.
- Protected by corrosion resistant coating.
- Light weight, high strength aluminum alloy construction.

Part Number Description and Specification:

Super Smart Ball Bushing* Bearings (Closed Type) for End Supported Applications

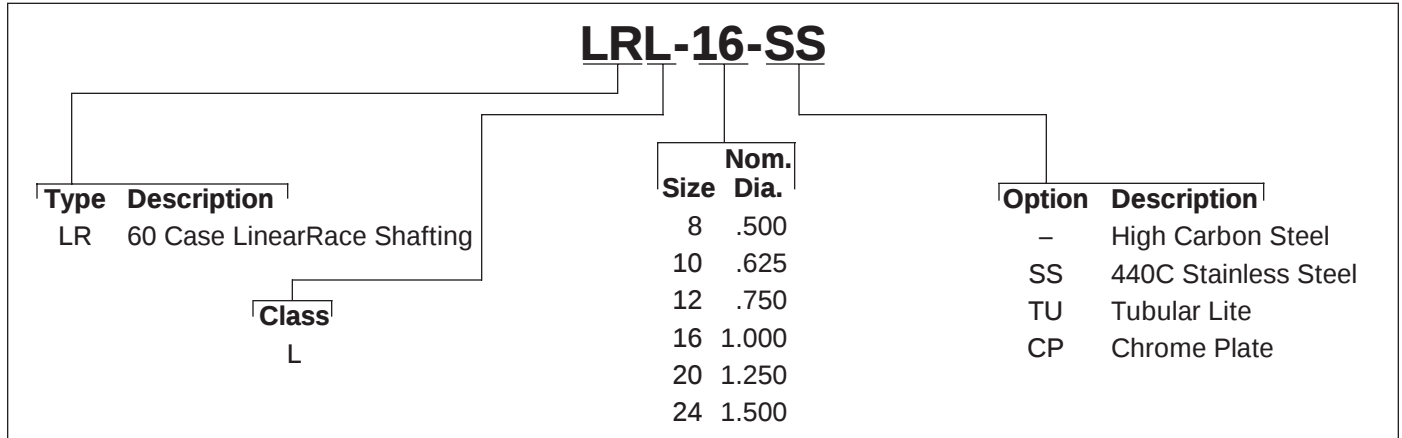
SSU-16-WW-CR				
Type	Description	Size	Nominal Diameter	Option Description
SSU	Super Smart Ball Bushing bearings	8	.500	– Standard
		10	.625	CR Corrosion Resistant
		12	.750	NB Nylon Balls
		16	1.000	CM Ceramic Balls
		20	1.250	DP Dry Packed
		24	1.500	
				Option Description
				– No Wipers
				W One Integral Wiper
				WW Two Integral Wipe

Super Smart Ball Bushing Pillow Blocks (Closed Type) for End Supported Applications

SSUPB-16-CR				
Type	Description	Size	Nominal Diameter	Option Description
SSUPB	Super Smart Ball Bushing Pillow Blocks	8	.500	– Standard
SSUPBA	Super Smart Ball Bushing Adjustable Pillow Blocks	10	.625	CR Corrosion Resistant
		12	.750	NB Nylon Balls
SSUTWN	Super Smart Ball Bushing Twin Pillow Blocks	16	1.000	CM Ceramic Balls
SSUTWNA	Super Smart Ball Bushing Twin Adjustable Pillow Blocks	20	1.250	
		24	1.500	
SSUFB	Super Smart Ball Bushing Flanged Pillow Blocks			
SSUTFB	Super Smart Ball Bushing Flanged Twin Pillow Blocks			

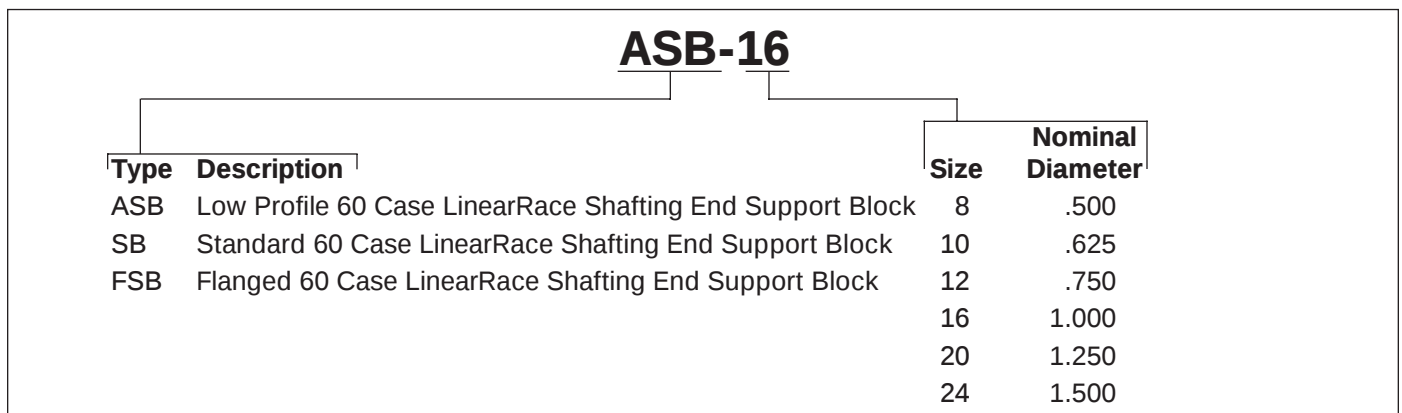
Part Number Description and Specification:

60 Case* LinearRace* Shafting for End Supported Applications

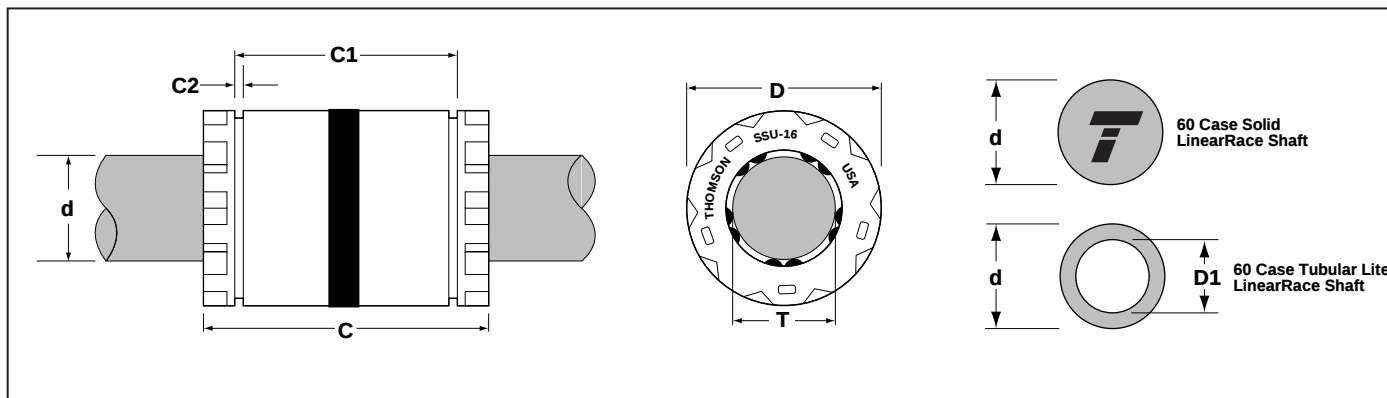
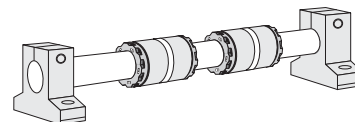


60 Case LinearRace Shafting									
Part Number			Part Number		Part Number		Part Number		Part Number
60 Case Solid LinearRace	60 Case LinearRace Diameter Class L	Max. Length in.	Stainless Steel LinearRace	Max. Length in.	Chrome Plated LinearRace	Max. Length in.	60 Case Tubular Lite LinearRace	Max. Length in.	Chrome Plated Tubular Lite LinearRace
LRL-10	.6245/.6240	180	LRL-10-SS	180	LRL-10-CP	178			
LRL-12	.7495/.7490	204	LRL-12-SS	180	LRL-12-CP	178	LRL-12-TU	180	LRL-12-TU-CP
LRL-16	.9995/.9990	204	LRL-16-SS	180	LRL-16-CP	178	LRL-16-TU	180	LRL-16-TU-CP
LRL-20	1.2495/1.2490	204	LRL-20-SS	180	LRL-20-CP	178			
LRL-24	1.4994/1.4989	204	LRL-24-SS	180	LRL-24-CP	178	LRL-24-TU	180	LRL-24-TU-CP

60 Case LinearRace Shafting Support Blocks for End Supported Applications



Super Smart Ball Bushing Bearings (Closed Type) for End Supported Applications



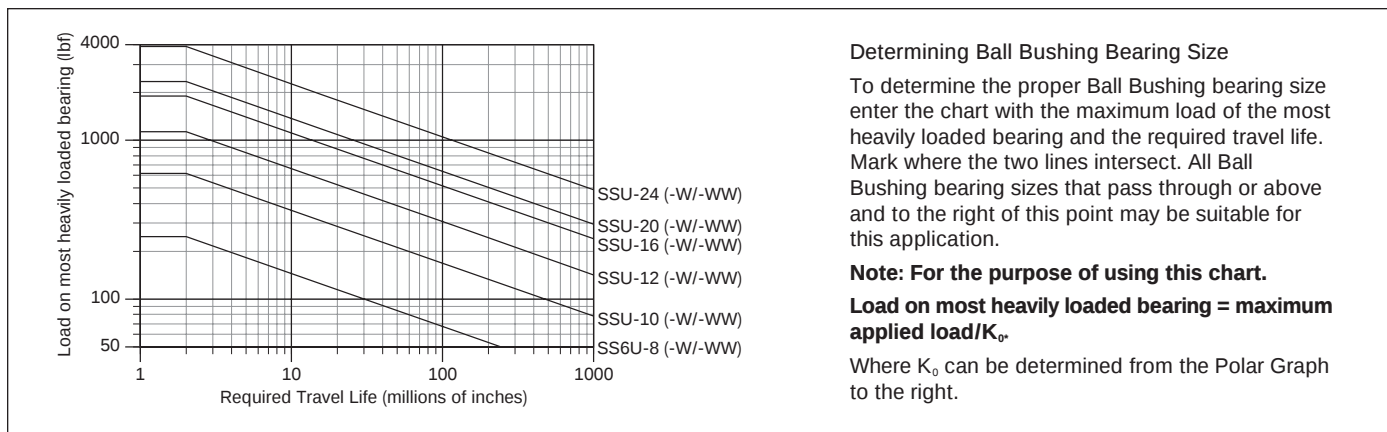
Super Smart Ball Bushing* Bearings (Closed Type) and 60 Case* LinearRace* Shafting (Dimensions in inches)

Part Number ⁽²⁾				Nominal Diameter	Length C	C1	C2 min.	Number of Ball Circuits	Ball Bushing Bearing Mass lb	60 Case LinearRace Minimum Depth of Hardness	60 Case Solid LinearRace Mass lb/in	60 Case Tubular Lite LinearRace Mass lb/in	60 Case Tubular Lite LinearRace ID D1
Without Integral Wipers	With one Integral Wiper	With two Integral Wipers	60 Case LinearRace										
SS6U-8	SS6U-8-W	SS6U-8-WW	LRL-8	.500	1.250/1.230	1.032/1.012	.050	6	.07	.04	.06	—	—
SSU-10	SSU-10-W	SSU-10-WW	LRL-10	.625	1.500/1.480	1.125/1.095	.055	10	.12	.04	.09	—	—
SSU-12	SSU-12-W	SSU-12-WW	LRL-12	.750	1.625/1.605	1.285/1.255	.055	10	.16	.06	.13	.08	.46/.41
SSU-16	SSU-16-W	SSU-16-WW	LRL-16	1.000	2.250/2.230	1.901/1.871	.068	10	.29	.08	.22	.16	.62/.56
SSU-20	SSU-20-W	SSU-20-WW	LRL-20	1.250	2.625/2.600	2.031/1.991	.068	10	.52	.08	.35	—	—
SSU-24	SSU-24-W	SSU-24-WW	LRL-24	1.500	3.000/2.970	2.442/2.402	.086	10	.99	.08	.50	.33	.93/.84

Part Number ⁽²⁾			Working Bore Diameter T	Recommended Housing Bore		60 Case LinearRace Diameter d	Ball Bushing Bearing/60 Case LinearRace Fit Up [‡]		Dynamic ⁽²⁾ Load Capacity lb _f
Without Integral Wipers	With one Integral Wiper	With two Integral Wipers		Fixed D	Adjustable D		Fixed Diameter Housing	Adjustable Diameter Housing (Before Adjustment)	
SS6U-8	SS6U-8-W	SS6U-8-WW	.5000/.4995	.8755/.8750	.8760/.8750	.4995/.4990	.0015C/.0000	.002C/.0000	265
SSU-10	SSU-10-W	SSU-10-WW	.6250/.6245	1.1255/1.1250	1.1260/1.1250	.6245/.6240	.0015C/.0000	.002C/.0000	620
SSU-12	SSU-12-W	SSU-12-WW	.7500/.7495	1.2505/1.2500	1.2510/1.2500	.7495/.7490	.0015C/.0000	.002C/.0000	1130
SSU-16	SSU-16-W	SSU-16-WW	1.0000/.9995	1.5630/1.5625	1.5635/1.5625	.9995/.9990	.0015C/.0000	.002C/.0000	1900
SSU-20	SSU-20-W	SSU-20-WW	1.2500/1.2494	2.0008/2.0000	2.0010/2.0000	1.2495/1.2490	.0018C/.0001P	.002C/.0001P	2350
SSU-24	SSU-24-W	SSU-24-WW	1.5000/1.4994	2.3760/2.3750	2.3760/2.3750	1.4994/1.4989	.0021C/.0000	.0021C/.0000	3880

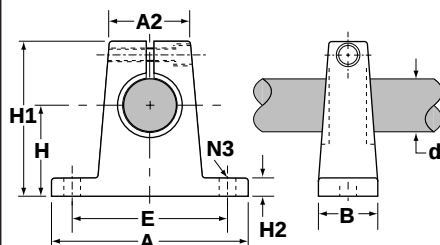
[‡] P=Preload, C=Clearance

Load/Life Graph (Lines indicate limiting load for given Ball Bushing* bearing)



60 Case LinearRace Shaft Support Blocks for End Supported Applications

Type SB LinearRace Shaft Support Block

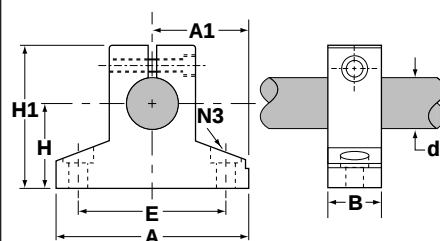


Material: Malleable Iron

Type SB 60 Case* LinearRace* Shaft End Support Blocks (Dimensions in inches)

Part ⁽²⁾ No.	Nom. LinearRace Dia. d	H ±.002	H1	H2	A	A2	B	E ±.010	N3		Mass lb
									Hole	Bolt	
SB-8	.500	1.00	1.63	.25	2.00	.75	.63	1.500	.19	#8	.3
SB-10	.625	1.000	1.75	.31	2.50	.88	.69	1.875	.22	#10	.4
SB-12	.750	1.250	2.13	.31	2.75	1.00	.75	2.000	.22	#10	.5
SB-16	1.000	1.500	2.56	.38	3.25	1.38	1.00	2.500	.28	.25	1.0
SB-20	1.250	1.750	3.00	.44	4.00	1.75	1.13	3.000	.34	.31	2.0
SB-24	1.500	2.000	3.50	.50	4.75	2.00	1.25	3.500	.34	.31	2.6

Type ASB LinearRace Shaft Support Block

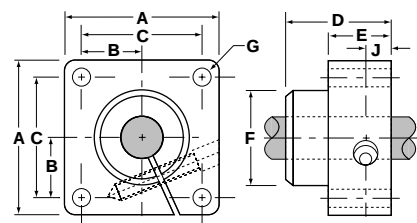


Material: Aluminum Alloy

Type ASB 60 Case LinearRace Shaft End Support Blocks (Dimensions in inches)

Part ⁽²⁾ No.	Nom. LinearRace Dia. d	H ±.001	H1	A	A1 ±.001	B	E	N3		Mass lb
								Hole	Bolt	
ASB-8	.500	.875	1.48	2.00	1.000	.63	1.50	.19	#8	.11
ASB-12	.750	1.125	1.95	2.50	1.250	.75	2.00	.22	#10	.22
ASB-16	1.000	1.375	2.48	3.25	1.625	1.00	2.50	.28	.25	.44
ASB-24	1.500	2.000	3.50	4.75	2.375	1.25	3.50	.34	.31	1.16

Type FSB Flanged LinearRace Support Block



Material: Aluminum Alloy

Type FSB Flanged 60 Case LinearRace Shaft End Support Blocks (Dimensions in inches)

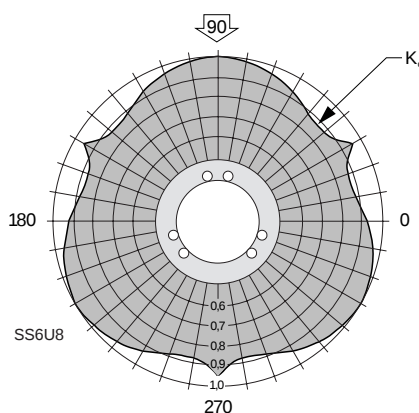
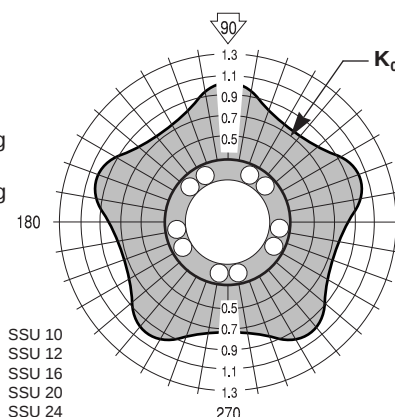
Part ⁽²⁾ No.	Nom. LinearRace Dia. d	A	B	C ±.010	D	E	F	G		J	Mass lb
								Hole	Bolt		
FSB-8	.500	1.63	.81	1.250	.88	.50	1.00	.18	#8	.25	.3
FSB-12	.750	2.38	1.19	1.750	1.00	.63	1.25	.21	#10	.31	.6
FSB-16	1.000	2.75	1.38	2.125	1.25	.63	1.50	.27	1/4	.31	.8
FSB-20	1.250	3.13	1.56	2.375	1.38	.75	1.75	.27	1/4	.38	.9

⁽¹⁾ 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 polar graphs below.

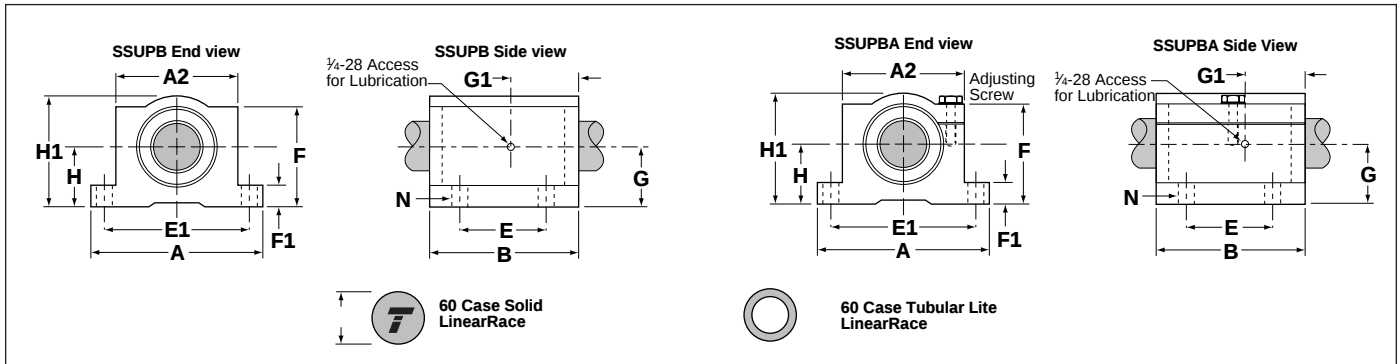
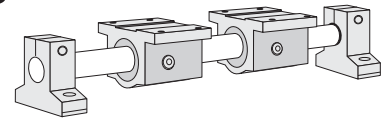
⁽²⁾ For part number description and specifications see page 14 and 15. For specifications on seals and retaining rings see the Accessories section. Note: For additional technical data, see Engineering Support Appendix.

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.



Super Smart Ball Bushing Pillow Blocks (Closed and Adjustable Type) for End Supported Applications

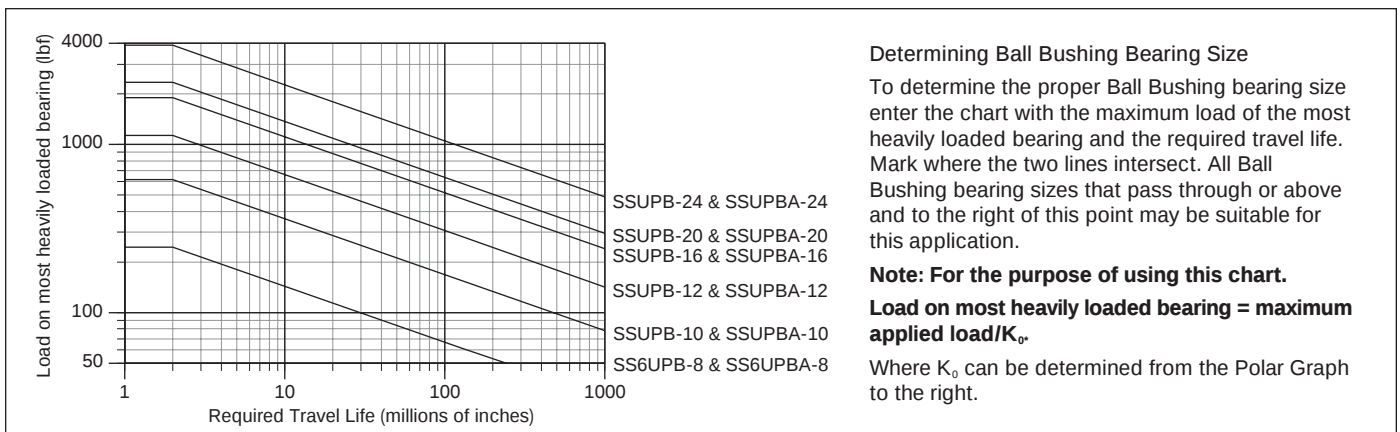


Super Smart Ball Bushing* Pillow Blocks (Closed and Adjustable Types, seal at both ends) and LinearRace* (Dimensions in inches)

Part Number ⁽²⁾		60 Case LinearRace	Nominal Diameter	H ±.003	H1	60 Case LinearRace Diameter d	60 Case LinearRace Minimum Depth of Hardness	60 Case Solid LinearRace Mass lb/in	60 Case Tubular Lite LinearRace Mass lb/in	60 Case Tubular Lite LinearRace ID D1
Fixed	Adjustable									
SS6UPB-8	SS6UPBA-8	LRL-8	.500	.687	1.25	.4995/.4990	.04	.06	—	—
SSUPB-10	SSUPBA-10	LRL-10	.625	.875	1.63	.6245/.6240	.04	.09	—	—
SSUPB-12	SSUPBA-12	LRL-12	.750	.937	1.75	.7495/.7490	.06	.13	.08	.46/.41
SSUPB-16	SSUPBA-16	LRL-16	1.000	1.187	2.19	.9995/.9990	.08	.22	.16	.62/.56
SSUPB-20	SSUPBA-20	LRL-20	1.250	1.500	2.81	1.2495/1.2490	.08	.35	—	—
SSUPB-24	SSUPBA-24	LRL-24	1.500	1.750	3.25	1.4994/1.4989	.08	.50	.33	.93/.84

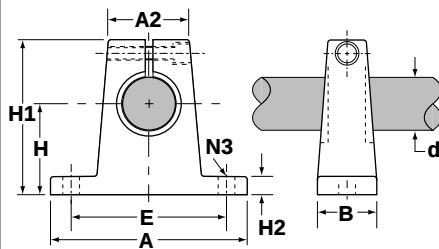
Part Number ⁽²⁾		A	A2	B	E ±.010	E1 ±.010	F	F1	G	G1	N		Pillow Block Mass lb	Dynamic ⁽¹⁾ Load Capacity lbf
Fixed	Adjustable										Hole	Bolt		
SS6UPB-8	SS6UPBA-8	2.00	1.38	1.69	1.000	1.688	1.13	.25	.69	.72	.16	#6	.23	265
SSUPB-10	SSUPBA-10	2.50	1.75	1.94	1.125	2.125	1.44	.28	.88	.83	.19	#8	.51	620
SSUPB-12	SSUPBA-12	2.75	1.88	2.06	1.250	2.375	1.56	.31	.94	.89	.19	#8	.62	1130
SSUPB-16	SSUPBA-16	3.25	2.38	2.81	1.750	2.875	1.94	.38	1.19	1.27	.22	#10	1.24	1900
SSUPB-20	SSUPBA-20	4.00	3.00	3.63	2.000	3.500	2.50	.44	1.50	1.68	.22	#10	2.57	2350
SSUPB-24	SSUPBA-24	4.75	3.50	4.00	2.500	4.125	2.88	.50	1.75	1.86	.28	.25	3.94	3880

Load/Life Graph (Lines indicate limiting load for given Ball Bushing *bearing)



60 Case LinearRace Shaft Support Blocks for End Supported Applications

Type SB LinearRace Shaft Support Block

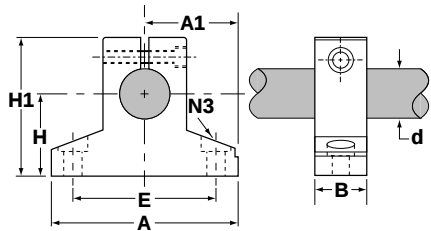


Material: Malleable Iron

Type SB 60 Case* LinearRace* Shaft End Support Blocks (Dimensions in inches)

Part ⁽²⁾ No.	Nom. LinearRace Dia. d	H ±.002	H1	H2	A	A2	B	E ±.010	N3		Mass lb
									Hole	Bolt	
SB-8	.500	1.00	1.63	.25	2.00	.75	.63	1.500	.19	#8	.3
SB-10	.625	1.000	1.75	.31	2.50	.88	.69	1.875	.22	#10	.4
SB-12	.750	1.250	2.13	.31	2.75	1.00	.75	2.000	.22	#10	.5
SB-16	1.000	1.500	2.56	.38	3.25	1.38	1.00	2.500	.28	.25	1.0
SB-20	1.250	1.750	3.00	.44	4.00	1.75	1.13	3.000	.34	.31	2.0
SB-24	1.500	2.000	3.50	.50	4.75	2.00	1.25	3.500	.34	.31	2.6

Type ASB LinearRace Shaft Support Block

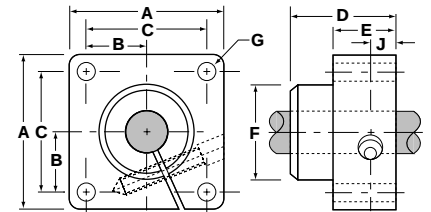


Material: Aluminum Alloy

Type ASB 60 Case LinearRace Shaft End Support Blocks (Dimensions in inches)

Part ⁽²⁾ No.	Nom. LinearRace Dia. d	H ±.001	H1	A	A1 ±.001	B	E	N3		Mass lb
								Hole	Bolt	
ASB-8	.500	.875	1.48	2.00	1.000	.63	1.50	.19	#8	.11
ASB-12	.750	1.125	1.95	2.50	1.250	.75	2.00	.22	#10	.22
ASB-16	1.000	1.375	2.48	3.25	1.625	1.00	2.50	.28	.25	.44
ASB-24	1.500	2.000	3.50	4.75	2.375	1.25	3.50	.34	.31	1.16

Type FSB Flanged LinearRace Support Block



Material: Aluminum Alloy

Type FSB Flanged 60 Case LinearRace Shaft End Support Blocks (Dimensions in inches)

Part ⁽²⁾ No.	Nom. LinearRace Dia. d	A	B	C ±.010	D	E	F	G		J	Mass lb
								Hole	Bolt		
FSB-8	.500	1.63	.81	1.250	.88	.50	1.00	.18	#8	.25	.3
FSB-12	.750	2.38	1.19	1.750	1.00	.63	1.25	.21	#10	.31	.6
FSB-16	1.000	2.75	1.38	2.125	1.25	.63	1.50	.27	1/4	.31	.8
FSB-20	1.250	3.13	1.56	2.375	1.38	.75	1.75	.27	1/4	.38	.9

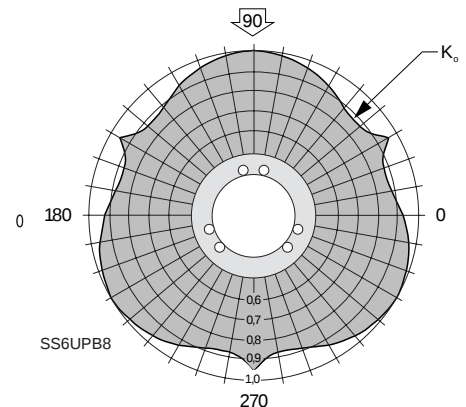
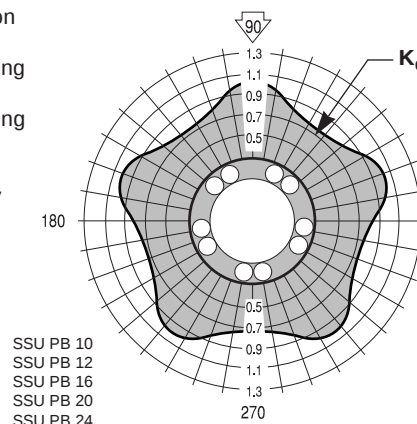
⁽¹⁾ The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.

⁽²⁾ For part number description and specifications see page 14 and 15.

Note: For additional technical data, see Engineering Support Appendix.

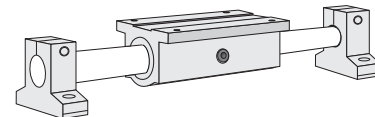
Polar Graphs

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_o 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.

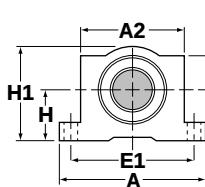


Super Smart Ball Bushing Twin Pillow Blocks

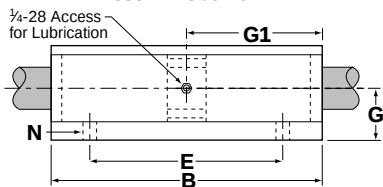
(Closed and Adjustable Type)
for End Supported Applications



SSUTWN End view

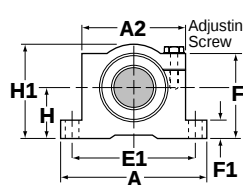


SSUTWN Side View

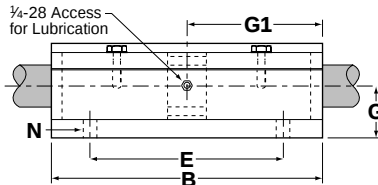


60 Case Solid
LinearRace

SSUTWNA End view



SSUTWNA Side View



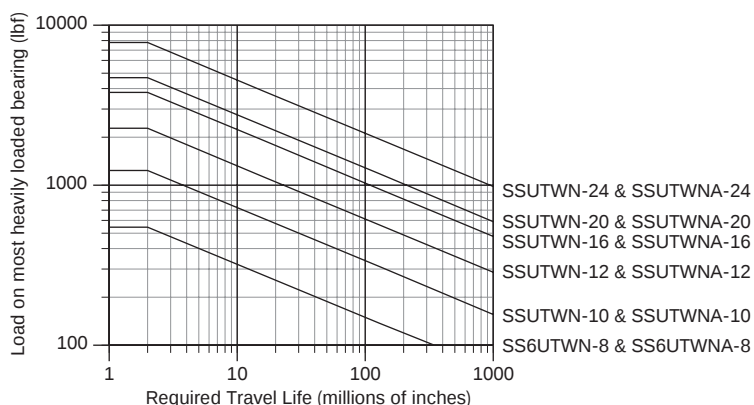
60 Case Tubular Lite
LinearRace

Super Smart Ball Bushing* Twin Pillow Blocks (Closed Type, seal at both ends) and 60 Case* LinearRace* Shaft (Dimensions in inches)

Part Number ⁽²⁾		60 Case LinearRace	Nominal Diameter	H ±.003	H1	60 Case LinearRace Diameter d	60 Case LinearRace Minimum Depth of Hardness	60 Case Solid LinearRace Mass lb/in	60 Case Tubular Lite LinearRace Mass lb/in	60 Case Tubular Lite LinearRace ID D1
Fixed	Adjustable									
SS6UTWN-8	SS6UTWNA-8	LRL-8	.500	.687	1.25	.4995/.4990	.04	.06	—	—
SSUTWN-10	SSUTWNA-10	LRL-10	.625	.875	1.63	.6245/.6240	.04	.09	—	—
SSUTWN-12	SSUTWNA-12	LRL-12	.750	.937	1.75	.7495/.7490	.06	.13	.08	.46/.41
SSUTWN-16	SSUTWNA-16	LRL-16	1.000	1.187	2.19	.9995/.9990	.08	.22	.16	.62/.56
SSUTWN-20	SSUTWNA-20	LRL-20	1.250	1.500	2.81	1.2495/1.2490	.08	.35	—	—
SSUTWN-24	SSUTWNA-24	LRL-24	1.500	1.750	3.25	1.4994/1.4989	.08	.50	.33	.93/.84

Part Number ⁽²⁾		A	A2	B	E	E1	F	F1	G	G1	N		Pillow Block Mass lb	Dynamic ⁽¹⁾ Load Capacity lb _f
Fixed	Adjustable										Hole	Bolt		
SS6UTWN-8	SS6UTWNA-8	2.00	1.38	3.50	2.500	1.688	1.13	.25	.59	1.75	.16	#6	.46	530
SSUTWN-10	SSUTWNA-10	2.50	1.75	4.00	3.000	2.125	1.44	.28	.85	2.00	.19	#8	1.02	1240
SSUTWN-12	SSUTWNA-12	2.75	1.88	4.50	3.500	2.375	1.56	.31	.94	2.25	.19	#8	1.24	2260
SSUTWN-16	SSUTWNA-16	3.25	2.38	6.00	4.500	2.875	1.94	.38	1.19	3.00	.22	#10	2.48	3800
SSUTWN-20	SSUTWNA-20	4.00	3.00	7.50	5.500	3.500	2.50	.44	1.50	3.75	.22	#10	5.14	4700
SSUTWN-24	SSUTWNA-24	4.75	3.50	9.00	6.500	4.125	2.88	.50	1.75	4.50	.28	.25	8.08	7760

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.

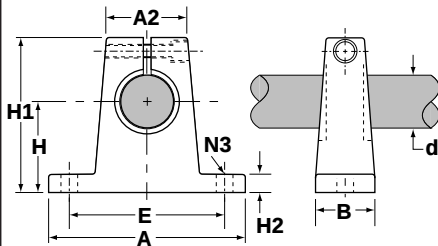
Note: For the purpose of using this chart.

Load on most heavily loaded bearing = maximum applied load/ K_o

Where K_o can be determined from the Polar Graph to the right.

60 Case LinearRace Shaft Support Blocks for End Supported Applications

Type SB LinearRace Shaft Support Block

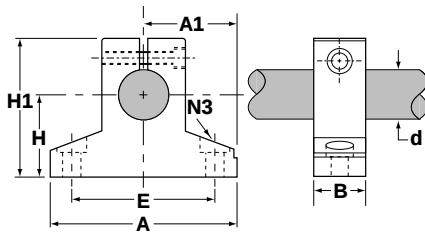


Material: Malleable Iron

Type SB 60 Case* LinearRace* Shaft End Support Blocks (Dimensions in inches)

Part ⁽²⁾ No.	Nom. LinearRace Dia. d	H ±.002	H1	H2	A	A2	B	E ±.010	N3		Mass lb
									Hole	Bolt	
SB-8	.500	1.00	1.63	.25	2.00	.75	.63	1.500	.19	#8	.3
SB-10	.625	1.000	1.75	.31	2.50	.88	.69	1.875	.22	#10	.4
SB-12	.750	1.250	2.13	.31	2.75	1.00	.75	2.000	.22	#10	.5
SB-16	1.000	1.500	2.56	.38	3.25	1.38	1.00	2.500	.28	.25	1.0
SB-20	1.250	1.750	3.00	.44	4.00	1.75	1.13	3.000	.34	.31	2.0
SB-24	1.500	2.000	3.50	.50	4.75	2.00	1.25	3.500	.34	.31	2.6

Type ASB LinearRace Shaft Support Block

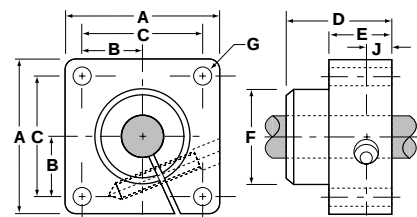


Material: Aluminum Alloy

Type ASB 60 Case LinearRace Shaft End Support Blocks (Dimensions in inches)

Part ⁽²⁾ No.	Nom. LinearRace Dia. d	H ±.001	H1	A	A1 ±.001	B	E	N3		Mass lb
								Hole	Bolt	
ASB-8	.500	.875	1.48	2.00	1.000	.63	1.50	.19	#8	.11
ASB-12	.750	1.125	1.95	2.50	1.250	.75	2.00	.22	#10	.22
ASB-16	1.000	1.375	2.48	3.25	1.625	1.00	2.50	.28	.25	.44
ASB-24	1.500	2.000	3.50	4.75	2.375	1.25	3.50	.34	.31	1.16

Type FSB Flanged LinearRace Support Block



Material: Aluminum Alloy

Type FSB Flanged 60 Case LinearRace Shaft End Support Blocks (Dimensions in inches)

Part ⁽²⁾ No.	Nom. LinearRace Dia. d	A	B	C ±.010	D	E	F	G		J	Mass lb
								Hole	Bolt		
FSB-8	.500	1.63	.81	1.250	.88	.50	1.00	.18	#8	.25	.3
FSB-12	.750	2.38	1.19	1.750	1.00	.63	1.25	.21	#10	.31	.6
FSB-16	1.000	2.75	1.38	2.125	1.25	.63	1.50	.27	1/4	.31	.8
FSB-20	1.250	3.13	1.56	2.375	1.38	.75	1.75	.27	1/4	.38	.9

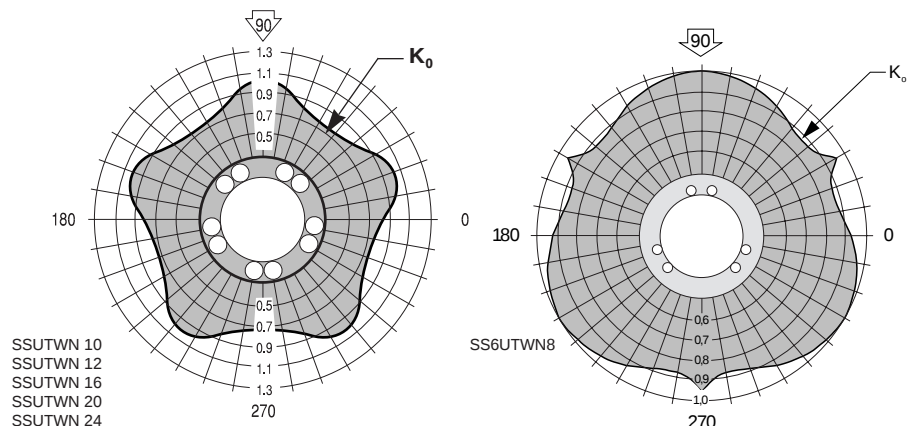
⁽¹⁾ The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below. Dynamic load capacity is based on two bearings equally loaded.

⁽²⁾ For part number description and specifications see page 14 and 15.

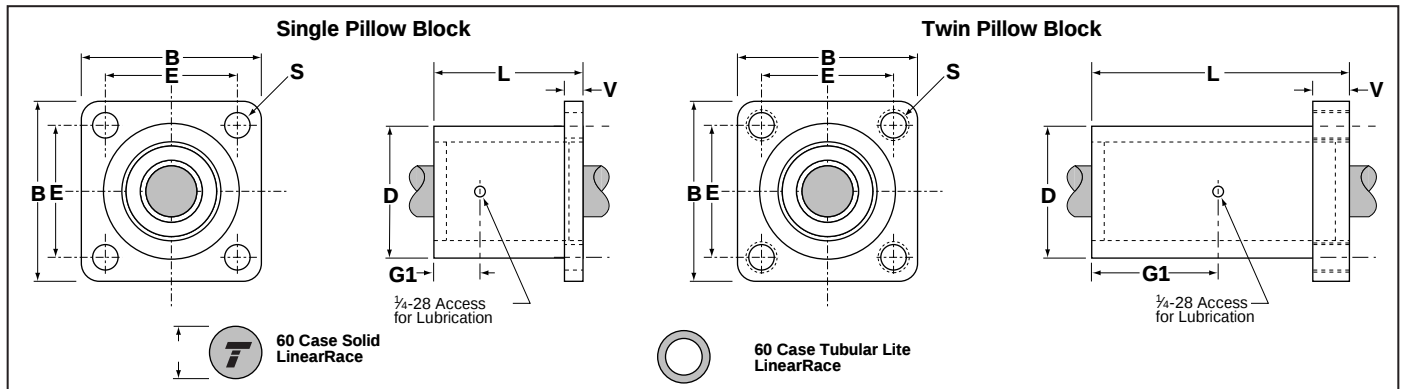
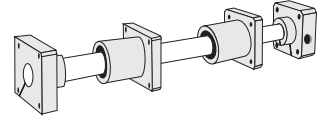
Note: For additional technical data, see Engineering Support Appendix.

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_o 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.



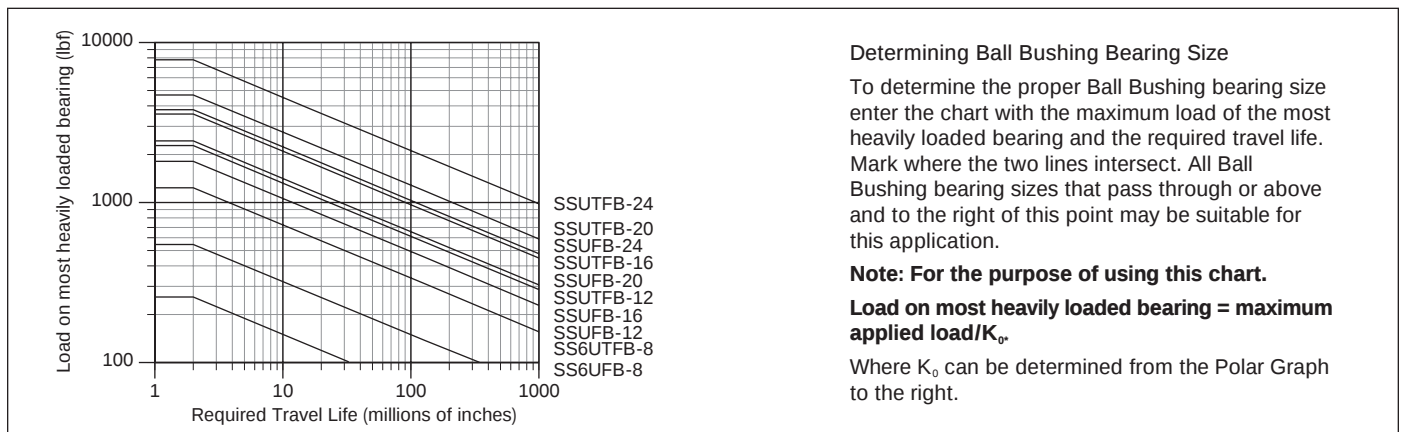
Super Smart Ball Bushing Flanged Single and Twin Pillow Blocks for End Supported Applications



Super Smart Ball Bushing* Flanged Pillow Blocks and 60 Case* LinearRace* Shaft															(Dimensions in inches)	
Part Number ⁽²⁾		Nom. Dia.	B	E	L	D	V	G1	S	60 Case LinearRace Diameter d	60 Case LinearRace Minimum Depth of Hardness	60 Case Solid LinearRace Mass lb/in	60 Case Tubular Light LinearRace Mass lb/in	60 Case Tubular Lite LinearRace ID D1	Pillow Block Mass lb	Dyn. ⁽¹⁾ Load Cap. lb _f
Super Smart Ball Bushing Flanged Pillow Block	60 Case LinearRace			±.010					Hole Dia.							
SS6UFB-8	LRL-8	.500	1.63	1.25	1.69	1.25	.25	.72	.19	.4995/.4990	.06	.04	—	—	.23	265
SSUFB-12	LRL-12	.750	2.38	1.750	2.06	1.75	.38	.89	.22	.7495/.7490	.06	.13	.08	.460/.416	.52	1130
SSUFB-16	LRL-16	1.000	2.75	2.125	2.81	2.25	.50	1.27	.28	.9995/.9990	.08	.22	.16	.629/.569	1.04	1900
SSUFB-20	LRL-20	1.250	3.50	2.750	3.63	3.00	.63	1.67	.35	1.2495/1.2490	.08	.35	—	—	—	2350
SSUFB-24	LRL-24	1.500	4.00	3.125	4.00	3.62	.75	1.86	.41	1.4994/1.4989	.08	.50	.33	.93/.84	—	3880

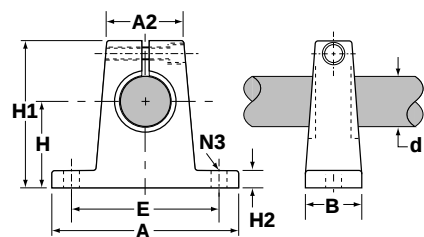
Super Smart Ball Bushing Flanged Twin Pillow Blocks and 60 Case LinearRace Shaft															(Dimensions in inches)	
Part Number ⁽²⁾		Nom. Dia.	B	E	L	D	V	G1	S	60 Case LinearRace Diameter d	60 Case LinearRace Minimum Depth of Hardness	60 Case Solid LinearRace Mass lb/in	60 Case Tubular Light LinearRace Mass lb/in	60 Case Tubular Lite LinearRace ID D1	Pillow Block Mass lb	Dyn. ⁽¹⁾ Load Cap. lb _f
Super Smart Ball Bushing Flanged Twin Pillow Block	60 Case LinearRace															
SS6UTFB-8	LRL-8	.500	1.63	1.250	3.20	1.25	.90	1.48	¼-20	.4995/.4990	.06	.04	—	—	—	530
SSUTFB-12	LRL-12	.750	2.38	1.750	3.95	1.75	.90	1.98	¼-20	.7495/.7490	.06	.13	.08	.460/.416	1.05	2260
SSUTFB-16	LRL-16	1.000	2.75	2.125	5.33	2.25	.90	2.67	⅝-18	.9995/.9990	.08	.22	.16	.629/.569	1.95	3800
SSUTFB-20	LRL-20	1.250	3.50	2.750	6.70	3.00	.90	3.35	⅝-18	1.2495/1.2490	.08	.35	—	—	—	4700
SSUTFB-24	LRL-24	1.500	4.00	3.125	7.50	3.62	1.00	3.75	⅝-16	1.4994/1.4989	.08	.50	.33	.93/.84	—	7760

Load/Life Graph (Lines indicate limiting load for given Ball Bushing* Pillow Block)



60 Case LinearRace Shaft Support Blocks for End Supported Applications

Type SB LinearRace Shaft Support Block

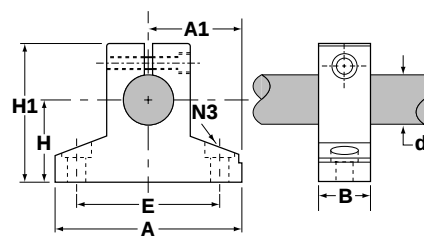


Material: Malleable Iron

Type SB 60 Case* LinearRace* Shaft End Support Blocks (Dimensions in inches)

Part ⁽²⁾ No.	Nom. LinearRace Dia. d	H ±.002	H1	H2	A	A2	B	E ±.010	N3		Mass lb
									Hole	Bolt	
SB-8	.500		1.63	.25	2.00	.75	.63	1.500	.19	#8	.3
SB-12	.750	1.250	2.13	.31	2.75	1.00	.75	2.000	.22	#10	.5
SB-16	1.000	1.500	2.56	.38	3.25	1.38	1.00	2.500	.28	.25	1.0

Type ASB LinearRace Shaft Support Block

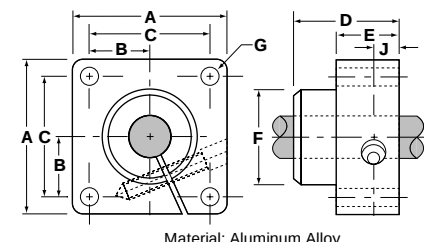


Material: Aluminum Alloy

Type ASB 60 Case LinearRace Shaft End Support Blocks (Dimensions in inches)

Part ⁽²⁾ No.	Nom. LinearRace Dia. d	H ±.001	H1	A	A1 ±.001	B	E	N3		Mass lb
								Hole	Bolt	
ASB-8	.500	.875	1.48	2.00	1.000	.63	1.50	.19	#8	.11
ASB-12	.750	1.125	1.95	2.50	1.250	.75	2.00	.22	#10	.22
ASB-16	1.000	1.375	2.48	3.25	1.625	1.00	2.50	.28	.25	.44

Type FSB Flanged LinearRace Support Block



Material: Aluminum Alloy

Type FSB Flanged 60 Case LinearRace Shaft End Support Blocks (Dimensions in inches)

Part ⁽²⁾ No.	Nom. LinearRace Dia. d	A	B	C ±.010	D	E	F	G		J	Mass lb
								Hole	Bolt		
FSB-8	.500	1.63	.81	1.250	.88	.50	1.00	.18	#8	.25	.3
FSB-12	.750	2.38	1.19	1.750	1.00	.63	1.25	.21	#10	.31	.6
FSB-16	1.000	2.75	1.38	2.125	1.25	.63	1.50	.27	1/4	.31	.8
FSB-20	1.250	3.13	1.56	2.375	1.38	.75	1.75	.27	1/4	.38	.9

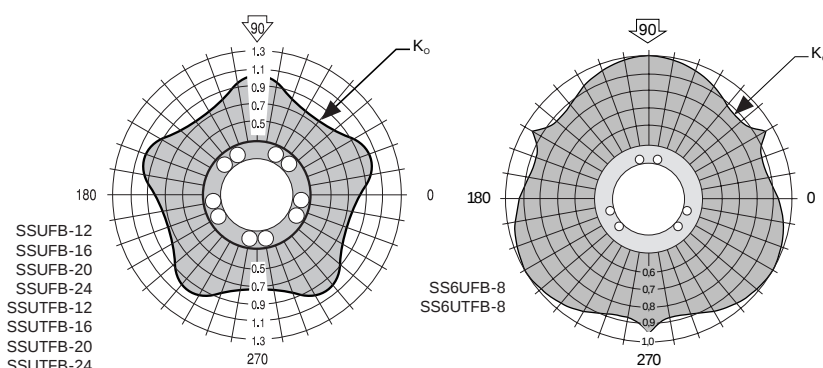
⁽¹⁾ The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below. Dynamic load capacity of Twin Super Smart Flanged Pillow blocks is based on two bearings equally loaded.

⁽²⁾ For part number description and specifications see page 14 & 15.

Note: For additional technical data, see the Engineering Support Appendix.

Polar Graphs

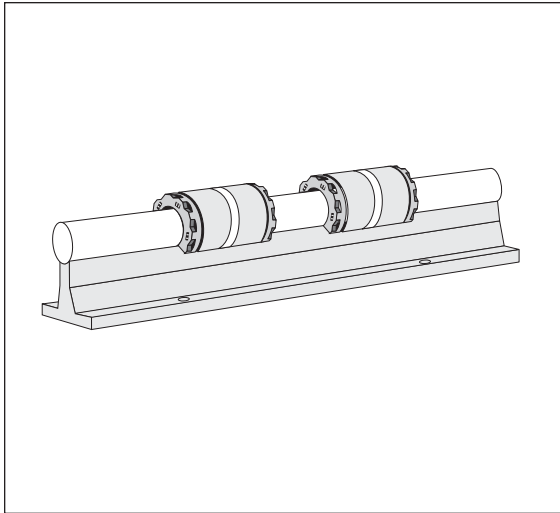
The actual Dynamic Load Capacity of a Ball Bushing* bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor K_o is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the 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.



Super Smart Ball Bushing Bearings and Pillow Blocks

(Open Type)

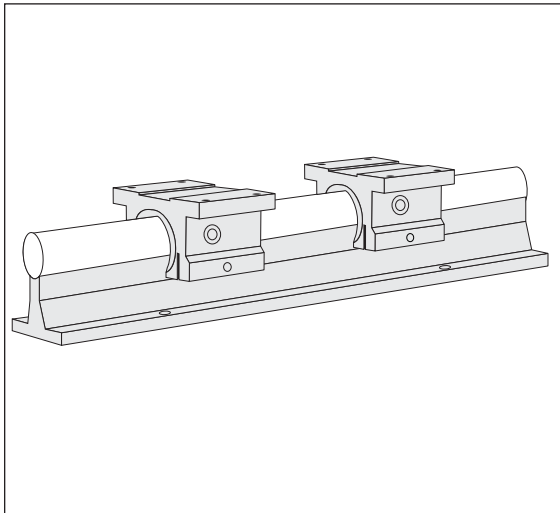
for Continuously Supported Applications



Super Smart Ball Bushing* Bearing (Open Type)

Features:

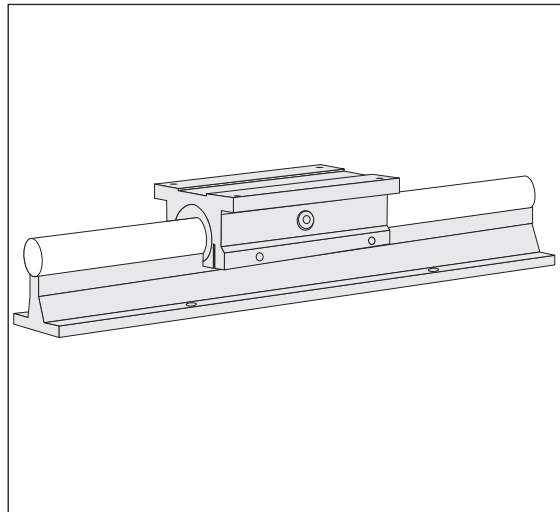
- Available in sizes ½ to 1½ inch diameter.
- Load capacity range from 360 to 3,880 lb_f.
- Pull off load capacity range from 250 to 1,750 lb_f.
- Available with one, two or without double lip integral wipers.
- Can be adjusted to take out diametrical clearance.
- Can be mounted in a customized open style pillow block.
- Travel speeds up to 10 ft/s.
- Interchangeable with the industry standard Thomson Super Ball Bushing* bearing (open type).



Super Smart Ball Bushing Pillow Blocks (Open Type)

Features:

- Available in sizes ½ to 1½ inch diameter.
- Load Capacity range from 360 to 3,880 lb_f.
- Pull off load capacity range from 250 to 1,750 lb_f.
- Available with standard double acting integral seals.
- Can be adjusted to take out diametrical clearance.
- Easily mounted and secured with four mounting bolts.
- Travel speeds up to 10 ft/s.
- Available with standard lubrication access.
- Interchangeable with the industry standard Thomson Super Ball Bushing Pillow Block (Open Type).

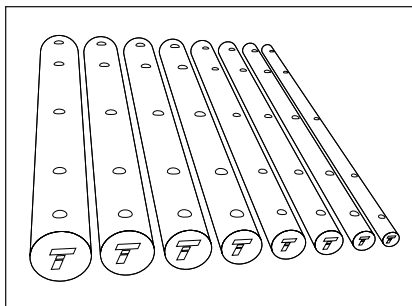


Super Smart Ball Bushing Twin Pillow Blocks (Open Type)

Features:

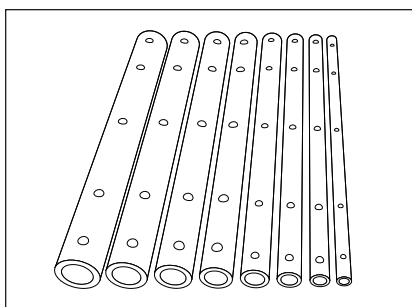
- Available in sizes ½ to 1½ inch diameter.
- Load Capacity range from 720 to 7,760 lb_f.
- Pull off load capacity range from 500 to 3,500 lb_f.
- Available with standard double acting integral seals.
- Can be adjusted to take out diametrical clearance.
- Easily mounted and secured with four mounting bolts.
- Travel speeds up to 10 ft/s.
- Available with standard lubrication access.
- Interchangeable with the industry standard Thomson Super Ball Bushing Twin Pillow Block (Open Type).

60 Case LinearRace Shafting (PreDrilled) for Continuously Supported Applications



Solid 60 Case* LinearRace* shafting with Mounting Holes Features:

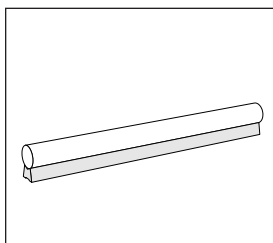
- Radial drilled and tapped holes ready for immediate use with standard hole spacing to match standard 60 Case LinearRace support rails.
- Diameter range between ½ and 4 inch.
- Surface finish 12 R_a microinch.
- Hardness 60-65 HRC.
- Roundness 80 millionths of an inch.
- Available in corrosion resistant 440C stainless steel (50-55 HRC).
- Available with Preplate chrome option.
- Standard straightness .001 inch per foot cumulative (.002 TIR) with special straightness at .0005 inch per foot cumulative (.001 TIR) available.



60 Case Tubular Lite LinearRace shafting with Mounting Holes Features:

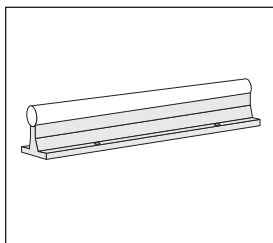
- Hollow design reduces weight and inertia.
- Radial drilled and tapped holes ready for immediate use.
- Standard hole spacing to match standard 60 Case LinearRace support rails.
- Diameter range between 1½ and 4 inch.
- Roundness 80 millionths of an inch.
- Case hardness 58-63 HRC.
- Surface finish 12 R_a microinch.
- Available with Preplate chrome option.
- Standard straightness .001 inch per foot cumulative (.002 TIR) with special straightness at .0005 inch per foot cumulative (.001 TIR) available.

60 Case LinearRace Support Rails and Assemblies for Continuously Supported Applications



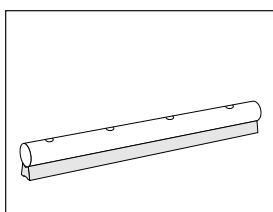
LSR Low Profile 60 Case LinearRace Support Rail Features:

- Diameter range between ½ and 4 inch.
- Available with standard mounting holes for immediate use.
- Available without mounting holes for custom hole spacing.
- Low Profile design.
- Unlimited travel lengths.



SR 60 Case LinearRace Support Rail SRA 60 Case LinearRace Support Rail Assembly Features:

- Diameter range between ½ and 2 inch.
- Available with standard mounting holes for immediate use.
- Available without mounting holes for customized hole spacing.
- Available as a pre-engineered, ready to install assembly.
- Light weight, high strength aluminum alloy rail.
- Unlimited travel lengths.

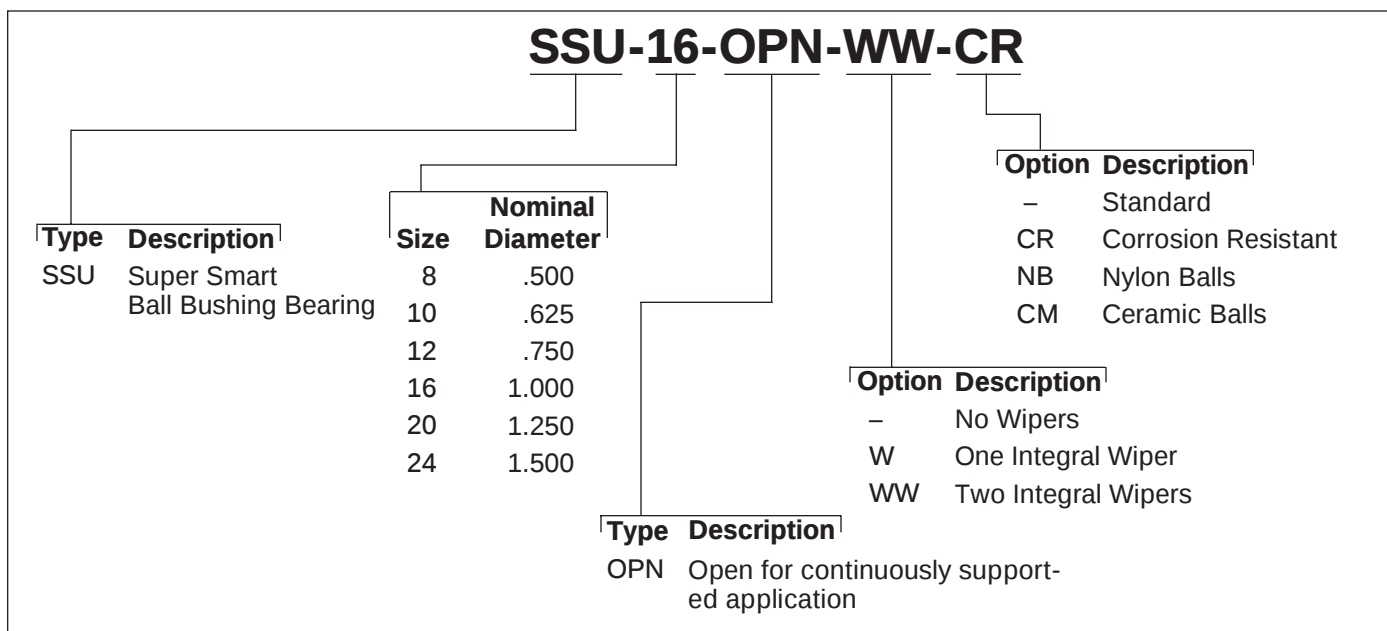


LSRA Smart Rail* Assembly Features:

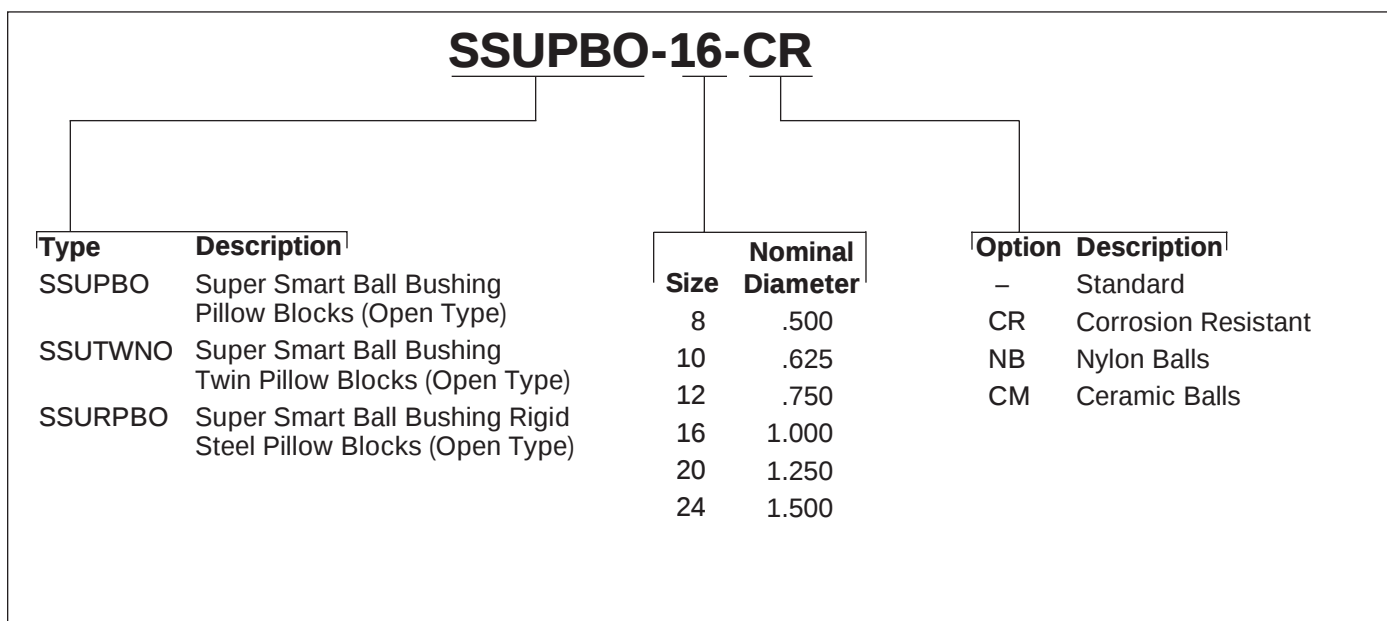
- Diameter range between 5/8 and 1½ inch.
- Bolt-down-from-the-top mounting.
- Two mounting hole patterns.
- Single piece lengths up to 15 feet long.
- Low profile design.

Part Number Description and Specification:

Super Smart Ball Bushing* Bearings (Open type) for Continuously Supported Applications



Super Smart Ball Bushing Pillow Blocks (Open type) for Continuously Supported Applications



Part Number Description and Specification:

60 Case* LinearRace* Shafting (PreDrilled) for Continuously Supported Applications

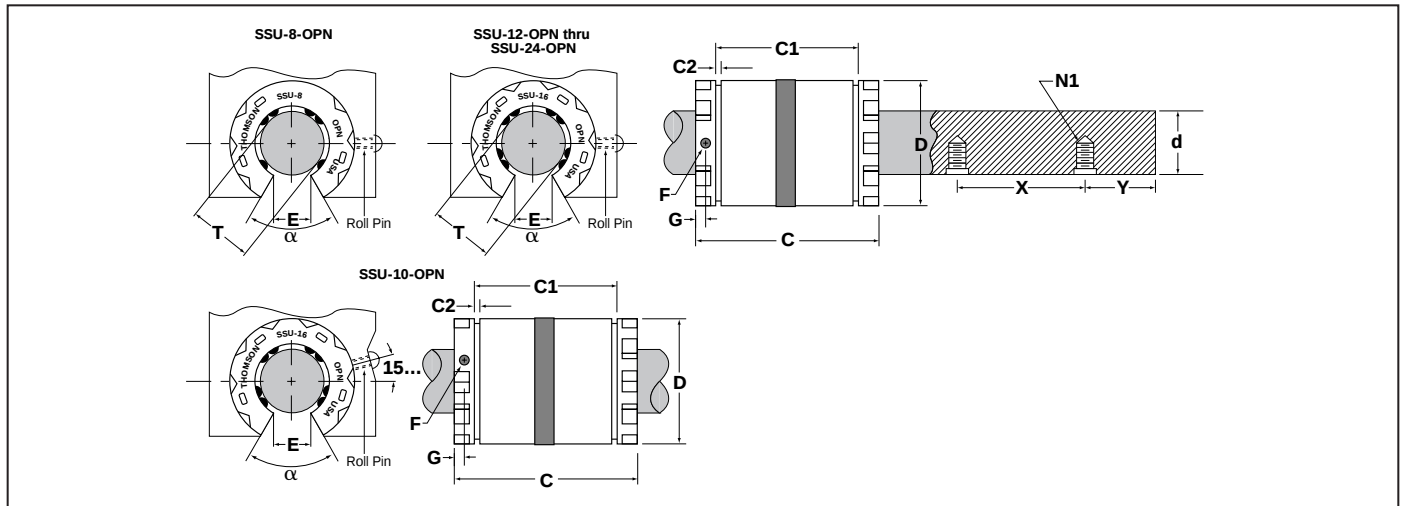
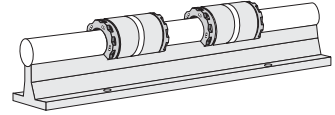
LRL-16-SS-PD						
Type	Description	Class	Size	Nominal Diameter	Type	Description
LR	60 Case LinearRace	L	8	.500	PD	PreDrilled
			10	.625		
			12	.750		
			16	1.000	Option	Description
			20	1.250	—	Standard Carbon Steel
			24	1.500	SS	440 C Stainless Steel
					TU	Tubular Lite
					CP	Preplate Chrome

60 Case LinearRace Shafts						
Part Number			Part Number		Part Number	
60 Case Solid LinearRace	60 Case LinearRace Diameter Class L	Max. Length in.	Stainless Steel 60 Case LinearRace	Max. Length in.	Chrome Plated 60 Case LinearRace	Max. Length in.
LRL-8-PD	.4995/.4990	168	—	—	LRL-8-CP-PD	168
LRL-10-PD	.6245/.6240	178	LRL-10-SS-PD	178	LRL-10-CP-PD	178
LRL-12-PD	.7495/.7490	178	LRL-12-SS-PD	178	LRL-12-CP-PD	178
LRL-16-PD	.9995/.9990	178	LRL-16-SS-PD	178	LRL-16-CP-PD	178
LRL-20-PD	1.2495/1.2490	178	LRL-20-SS-PD	178	LRL-20-CP-PD	178
LRL-24-PD	1.4994/1.4989	178	LRL-24-SS-PD	178	LRL-24-CP-PD	178

60 Case LinearRace Support Rails and Assemblies for Continuously Supported Applications

Type	Description	SR-16-PD x Length		Type	Description
LSR	Low Profile 60 Case LinearRace Support Rail			—	w/o PreDrilled holes
SR	60 Case LinearRace Support Rail			PD	with PreDrilled holes
SRA-16-SS x Length					
Type	Description	Size	Nom. Dia.	Type	Description
SRA	60 Case LinearRace Support Rail Assembly	8	.500	—	Standard Assembly
LSRA	Smart Rail* Assembly	10	.625	SS	With Stainless Steel 60 Case LinearRace
		12	.750	TU	With Tubular Lite 60 Case LinearRace
		16	1.000	CP	With PrePlate Chrome 60 Case LinearRace
		20	1.250		
		24	1.500		

Super Smart Ball Bushing Bearings (Open Type) for Continuously Supported Applications

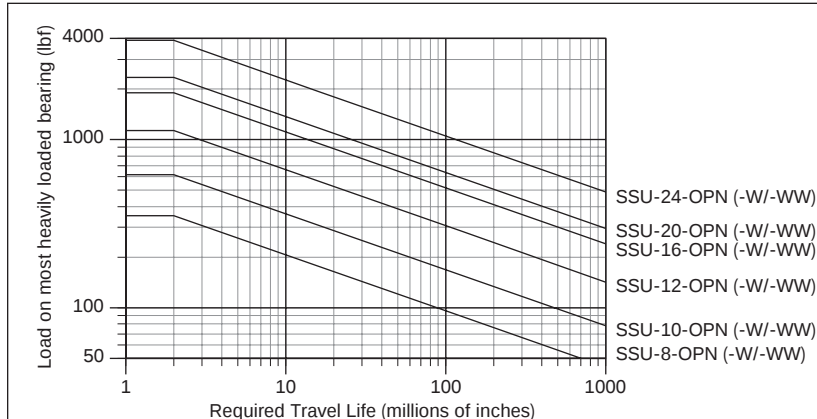


Super Smart Ball Bushing* Bearings (Open Type) and 60 Case* LinearRace* Shafting																(Dimensions in inches)				
Part Number ⁽³⁾				Nom. Dia.	Length C	C1	C2 min.	Min. Slot Width E	Retention Hole			Angle deg α	Number of Ball Circuits	Ball Bushing Bearing Mass lb	60 Case LinearRace Minimum Depth of Hardness	60 Case Solid LinearRace Mass lb/in	60 Case LinearRace			
Without Integral Wipers	With one Integral Wiper	With two Integral Wipers	60 Case LinearRace						Dia. F	Loc. G	Mounting Holes									
											X						Y	N1		
SSU-8-OPN	SSU-8-OPN-W	SSU-8-OPN-WW	LRL-8-PD	.500	1.25/1.23	1.032/1.012	.050	.31	.13	.62	40	6	.07	.04	.06	4	2	6-32		
SSU-10-OPN	SSU-10-OPN-W	SSU-10-OPN-WW	LRL-10-PD	.625	1.500/1.480	1.125/1.095	.055	.34	.11	.13	30	8	.09	.04	.09	4	2	8-32		
SSU-12-OPN	SSU-12-OPN-W	SSU-12-OPN-WW	LRL-12-PD	.750	1.625/1.605	1.285/1.255	.055	.41	.14	.13	30	8	.13	.06	.13	6	3	10-32		
SSU-16-OPN	SSU-16-OPN-W	SSU-16-OPN-WW	LRL-16-PD	1.000	2.250/2.230	1.901/1.871	.068	.53	.14	.13	30	8	.24	.08	.22	6	3	¼-20		
SSU-20-OPN	SSU-20-OPN-W	SSU-20-OPN-WW	LRL-20-PD	1.250	2.625/2.600	2.031/1.991	.068	.62	.20	.19	30	8	.43	.08	.35	6	3	⅜-18		
SSU-24-OPN	SSU-24-OPN-W	SSU-24-OPN-WW	LRL-24-PD	1.500	3.000/2.970	2.442/2.402	.086	.74	.20	.19	30	8	.80	.08	.50	8	4	⅝-16		

Part Number ⁽³⁾			Working Bore Diameter T	Recommended Housing Bore Dia.		60 Case LinearRace Diameter d	Ball Bushing Bearing/LinearRace Fit Up [†]		Dynamic ⁽¹¹⁾ Load Capacity lb _f
Without Integral Wipers	With one Integral Wiper	With two Integral Wipers		Fixed D	Adjustable D		Fixed Diameter Housing	Adjustable Diameter Housing (Before Adjustment)	
SSU-8-OPN	SSU-8-OPN-W	SSU-8-OPN-WW	.5000/.4995	.8755/.8750	.8760/.8750	.4995/.4990	.0015C/.0000	.002C/.0000	360
SSU-10-OPN	SSU-10-OPN-W	SSU-10-OPN-WW	.6250/.6245	1.1255/1.1250	1.1260/1.1250	.6245/.6240	.0015C/.0000	.002C/.0000	620
SSU-12-OPN	SSU-12-OPN-W	SSU-12-OPN-WW	.7500/.7495	1.2505/1.2500	1.2510/1.2500	.7495/.7490	.0015C/.0000	.002C/.0000	1130
SSU-16-OPN	SSU-16-OPN-W	SSU-16-OPN-WW	1.0000/.9995	1.5630/1.5625	1.5635/1.5625	.9995/.9990	.0015C/.0000	.002C/.0000	1900
SSU-20-OPN	SSU-20-OPN-W	SSU-20-OPN-WW	1.2500/1.2494	2.0008/2.0000	2.0010/2.0000	1.2495/1.2490	.0018C/.0001P	.002C/.0001P	2350
SSU-24-OPN	SSU-24-OPN-W	SSU-24-OPN-WW	1.5000/1.4994	2.3760/2.3750	2.3760/2.3750	1.4994/1.4989	.0021C/.0000	.0021C/.0000	3880

[†]P= Preload, C= Clearance

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.

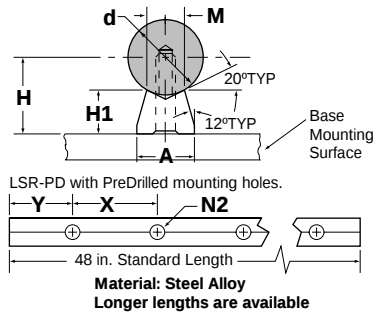
Note: For the purpose of using this chart.

Load on most heavily loaded bearing = maximum applied load/K_o.

Where K_o can be determined from the Polar Graph to the right.

60 Case LinearRace Support Rails and Assemblies for Continuously Supported Applications

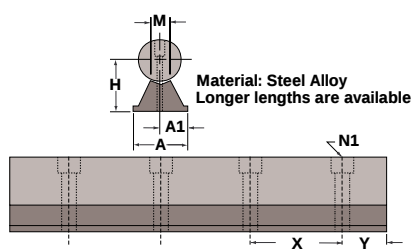
Type LSR and LSR-PD LinearRace Support Rails



Type LSR and LSR-PD 60 Case* LinearRace* Support Rails (Dimensions in inches)

LSR Standard Without Holes	LSR-PD Standard w/PreDrilled Holes	Nominal LinearRace Diameter d	H ±.002	H1	A	M	N2 Hole	N1 Bolt	X	Y	LSR Mass lb/ft
LSR-8	LSR-8-PD	.500	.562	.34	.37	.25	.17	#6-32	4	2	.32
LSR-10	LSR-10-PD	.625	.687	.41	.45	.31	.19	#8-32	4	2	.49
LSR-12	LSR-12-PD	.750	.750	.42	.51	.38	.22	#10-32	6	3	.59
LSR-16	LSR-16-PD	1.000	1.000	.56	.69	.50	.28	1/4-20	6	3	1.01
LSR-20	LSR-20-PD	1.250	1.187	.63	.78	.56	.34	5/16-18	6	3	1.27
LSR-24	LSR-24-PD	1.500	1.375	.70	.93	.69	.41	3/8-16	8	4	1.68

Type LSRA 60 Case Smart Rail Assemblies

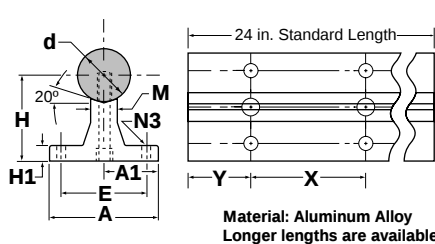


Type LSRA Smart Rail* Assemblies (Dimensions in inches)

Part Number ⁽³⁾	LinearRace Diameter	H ±.002	A	A1	Y Std.	Mounting Holes
Smart Rail Assembly ⁽¹⁾	Smart Rail Assembly ⁽²⁾					X1 X2 ⁽⁴⁾ N1
LSRA10	LSRA10 CR	0.625	0.687	0.45	0.225	1.0 2 3 #5
LSRA12	LSRA12 CR	0.750	0.750	0.51	0.255	1.5 3 4 #6
LSRA16	LSRA16 CR	1.000	1.000	0.69	0.345	1.5 3 4 #10
LSRA20	LSRA20 CR	1.250	1.187	0.78	0.390	1.5 3 6 5/16
LSRA24	LSRA24 CR	1.500	1.375	0.93	0.465	2.0 4 8 3/8

(1) = Consists of steel rail and high carbon steel LinearRace (HRC 60-65). (2) = Consists of zinc plated steel rail and 440C St. S'l. LinearRace (HRC 50-55). (3) = Specify length of assembly and mounting hole spacing (X1 or X2) when ordering. For example, LSRA12 CR X1 x 24.00 inches. (4) = Made to order.

Type SR and SR-PD 60 Case LinearRace Support Rails and Assemblies



Type SR/ SR-PD LinearRace Support Rails and Assemblies (Dimensions in inches)

SR Without Holes	SR-PD With PreDrilled Holes	Assembly With Solid 60 Case LinearRace	Nom. LinearRace Dia. d	H ±.002	H1	A ±.002	E	M	N3		LinearRace Mounting Bolt N1	X	Y	SR Mass lb/ft	
									Hole	Bolt					
SR-8	SR-8-PD	SRA-8	.50	1.125	.19	1.50	.750	1.00	.25	.17	#6	#6-32 x .88	4	2	.60
SR-10	SR-10-PD	SRA-10	.625	1.125	.25	1.63	.813	1.13	.31	.19	#8	#8-32 x .88	4	2	.80
SR-12	SR-12-PD	SRA-12	.750	1.500	.25	1.75	.875	1.25	.38	.22	#10	#10-32 x 1.25	6	3	1.00
SR-16	SR-16-PD	SRA-16	1.000	1.750	.25	2.13	1.063	1.50	.50	.28	1/4	1/4-20 x 1.5	6	3	1.40
SR-20	SR-20-PD	SRA-20	1.250	2.125	.31	2.50	1.250	1.88	.56	.34	5/16	5/16-18 x 1.75	6	3	2.10
SR-24	SR-24-PD	SRA-24	1.500	2.500	.38	3.00	1.500	2.25	.69	.34	5/16	3/8-16 x 2.00	8	4	2.60

(*) 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 polar graphs below.

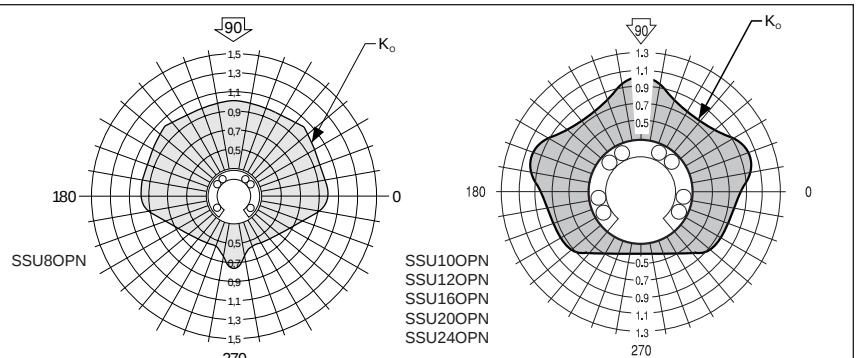
(†) For the maximum length of all 60 Case LinearRace Support Rail Assemblies without 60 Case LinearRace Joints see maximum length table on page 27. 60 Case LinearRace Support Rail Assemblies are available with 60 Case LinearRace joints for unlimited travel lengths.

(‡) For part number description and specifications see page 26 and 27.

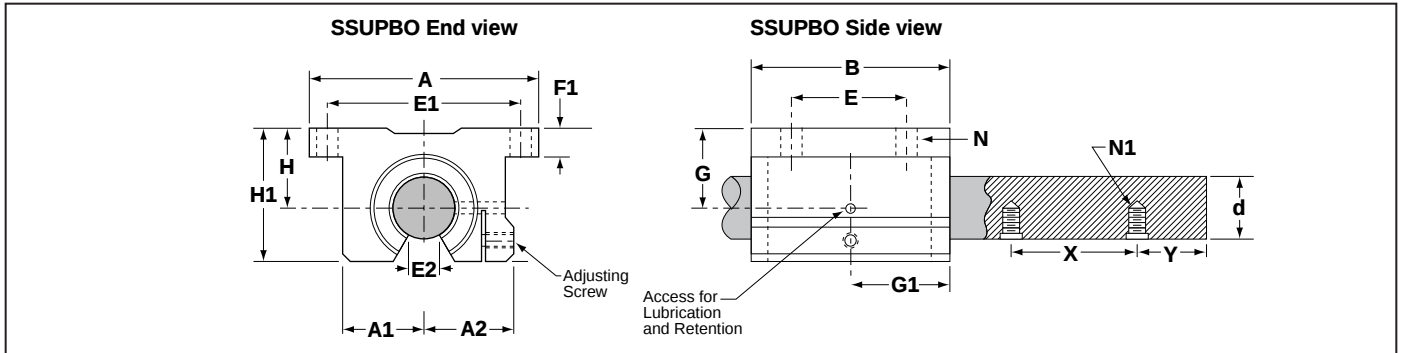
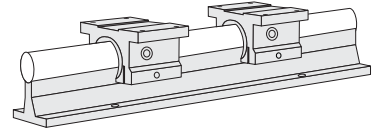
Standard Without Holes	Standard With PreDrilled Holes	Assembly With Solid 60 Case LinearRace	Standard Single Piece Length ^(†) in	Maximum Single Piece Length ^(†) in
LSR	LSR-PD	—	48	96
		LSRA	—	180
SR	SR-PD	SRA	24	72

Polar Graph

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_o 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.



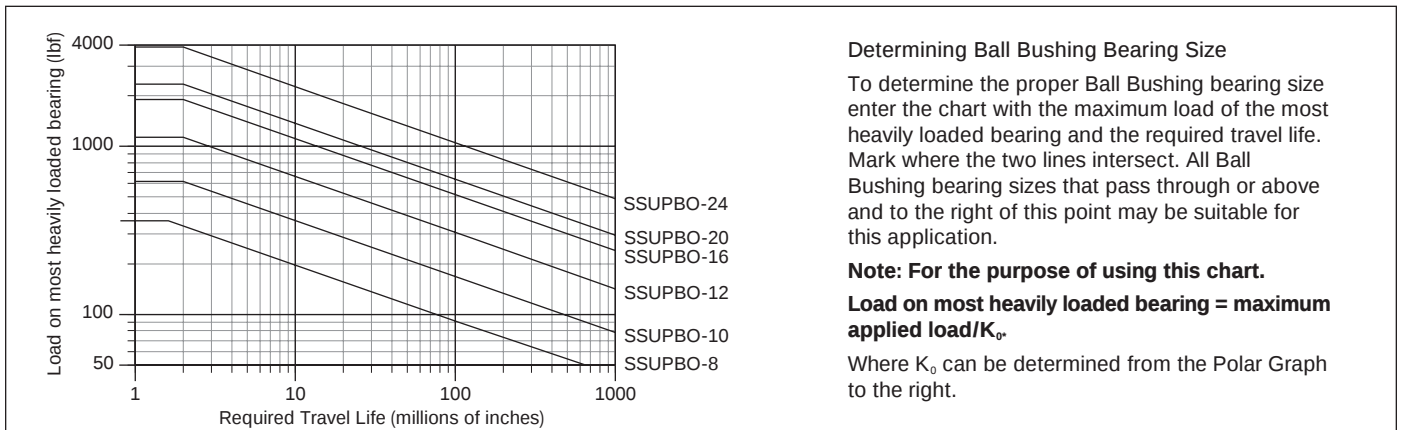
Super Smart Ball Bushing Pillow Blocks (Open Type) for Continuously Supported Applications



Super Smart Ball Bushing* Pillow Blocks (Open Type) and 60 Case* LinearRace*									(Dimensions in inches)	
Part Number ⁽³⁾		Nominal Diameter	H ±.003	H1	60 Case LinearRace Diameter d	60 Case LinearRace Minimum Depth of Hardness	60 Case Solid LinearRace Mass lb/in	60 Case LinearRace		
Super Smart Ball Bushing Pillow Block	60 Case LinearRace							Mounting Holes		
								X	Y	N1
SSUPBO-8	LRL-8-PD	.500	.687	1.13	.4995/.4990	.04	.06	4	2	6-32
SSUPBO-10	LRL-10-PD	.625	.875	1.44	.6245/.6240	.04	.09	4	2	8-32
SSUPBO-12	LRL-12-PD	.750	.937	1.56	.7495/.7490	.06	.13	6	3	10-32
SSUPBO-16	LRL-16-PD	1.000	1.187	2.00	.9995/.9990	.08	.22	6	3	¼-20
SSUPBO-20	LRL-20-PD	1.250	1.500	2.56	1.2495/1.2490	.08	.35	6	3	⅝ ₁₆ -18
SSUPBO-24	LRL-24-PD	1.500	1.750	2.94	1.4994/1.4989	.08	.50	8	4	⅝ ₈ -16

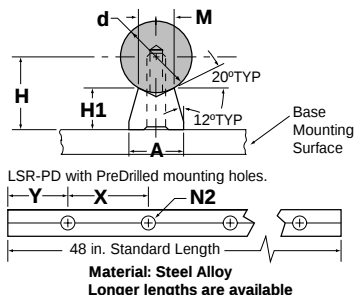
Part Number ⁽³⁾	A	A1	A2	B	E ±.010	E1 ±.010	E2 min.	F1	G	G1	N Hole	N1 Bolt	Pillow Block Mass lb	Dynamic ^(1††) Load Capacity lb _f
SSUPBO-8	2.00	.69	.75	1.50	1.000	1.688	.31	.25	.69	.69	.16	#6	.23	360
SSUPBO-10	2.50	.88	.94	1.75	1.125	2.125	.34	.28	.88	.88	.19	#8	.41	620
SSUPBO-12	2.75	.94	1.00	1.88	1.250	2.375	.41	.31	.94	.94	.19	#8	.51	1130
SSUPBO-16	3.25	1.19	1.25	2.63	1.750	2.875	.53	.38	1.19	1.32	.22	#10	1.03	1900
SSUPBO-20	4.00	1.50	1.63	3.38	2.000	3.500	.62	.44	1.50	1.69	.22	#10	2.15	2350
SSUPBO-24	4.75	1.75	1.88	3.75	2.500	4.125	.74	.50	1.75	1.88	.28	.25	3.29	3880

Load/Life Graph (Lines indicate limiting load for given Ball Bushing Pillow Block)



60 Case LinearRace Support Rails and Assemblies for Continuously Supported Applications

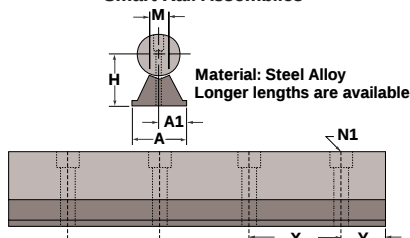
Type LSR and LSR-PD LinearRace Support Rails



Type LSR and LSR-PD 60 Case* LinearRace* Support Rails (Dimensions in inches)

LSR Standard Without Holes	LSR-PD Standard w/PreDrilled Holes	Nominal LinearRace Diameter d	H	H1	A	M	N2 Hole	N1 Bolt	X	Y	LSR Mass lb/ft
LSR-8	LSR-8-PD	.500	.562	.34	.37	.25	.17	#6-32	4	2	.32
LSR-10	LSR-10-PD	.625	.687	.41	.45	.31	.19	#8-32	4	2	.49
LSR-12	LSR-12-PD	.750	.750	.42	.51	.38	.22	#10-32	6	3	.59
LSR-16	LSR-16-PD	1.000	1.000	.56	.69	.50	.28	1/4-20	6	3	1.01
LSR-20	LSR-20-PD	1.250	1.187	.63	.78	.56	.34	5/16-18	6	3	1.27
LSR-24	LSR-24-PD	1.500	1.375	.70	.93	.69	.41	3/8-16	8	4	1.68

Type LSRA 60 Case Smart Rail Assemblies

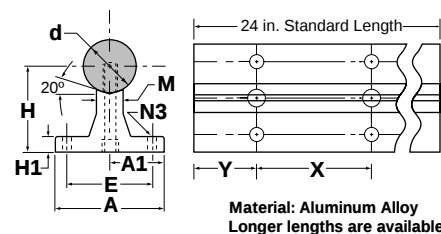


Type LSRA Smart Rail* Assemblies (Dimensions in inches)

Part Number ⁽³⁾	Smart Rail Assembly ⁽²⁾	LinearRace Diameter	H	A	A1	Y	Mounting Holes
			+/- 0.002			Std.	X1 X2 ⁽⁴⁾ N1
LSRA10	LSRA10 CR	0.625	0.687	0.45	0.225	1.0	2 3 #5
LSRA12	LSRA12 CR	0.750	0.750	0.51	0.255	1.5	3 4 #6
LSRA16	LSRA16 CR	1.000	1.000	0.69	0.345	1.5	3 4 #10
LSRA20	LSRA20 CR	1.250	1.187	0.78	0.390	1.5	3 6 5/16
LSRA24	LSRA24 CR	1.500	1.375	0.93	0.465	2.0	4 8 3/8

(1) = Consists of steel rail and high carbon steel LinearRace (HRC 60-65). (2) = Consists of zinc plated steel rail and 440C St. 1. LinearRace (HRC 50-55). (3) = Specify length of assembly and mounting hole spacing (X1 or X2) when ordering. For example, LSRA12 CR X1 x 24.00 inches. (4) = Made to order.

Type SR and SR-PD 60 Case LinearRace Support Rails and Assemblies



Type SR/ SR-PD LinearRace Support Rails and Assemblies (Dimensions in inches)

SR Without Holes	SR-PD With PreDrilled Holes	Assembly With Solid 60 Case LinearRace	Nom. LinearRace Dia. d	H	H1	A	A1	E	M	N Hole	N3 Bolt	LinearRace Mounting Bolt N1	X	Y	SR Mass lb/ft
				±.002			±.002								
SR-8	SR-8-PD	SRA-8	.50	1.125	.19	1.50	.750	1.00	.25	.17	#6	#6-32 x .88	4	2	.60
SR-10	SR-10-PD	SRA-10	.625	1.125	.25	1.63	.813	1.13	.31	.19	#8	#8-32 x .88	4	2	.80
SR-12	SR-12-PD	SRA-12	.750	1.500	.25	1.75	.875	1.25	.38	.22	#10	#10-32 x 1.25	6	3	1.00
SR-16	SR-16-PD	SRA-16	1.000	1.750	.25	2.13	1.063	1.50	.50	.28	1/4	1/4-20 x 1.50	6	3	1.40
SR-20	SR-20-PD	SRA-20	1.250	2.125	.31	2.50	1.250	1.88	.56	.34	5/16	5/16-18 x 1.75	6	3	2.10
SR-24	SR-24-PD	SRA-24	1.500	2.500	.38	3.00	1.500	2.25	.69	.34	5/16	3/8-16 x 2.00	8	4	2.60

⁽¹⁾ 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 polar graphs below.

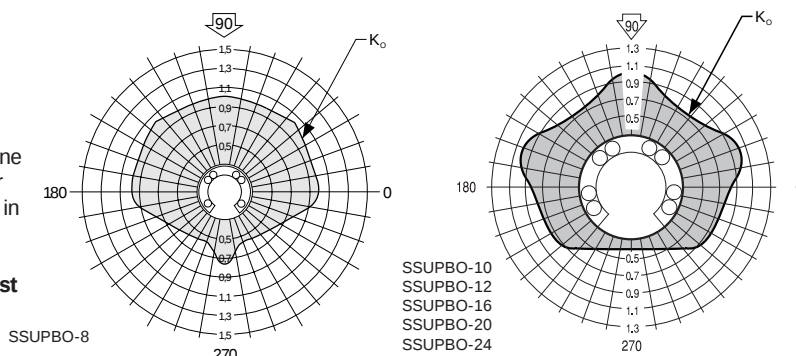
⁽²⁾ For the maximum length of all 60 Case LinearRace Support Rail Assemblies without 60 Case LinearRace Joints see maximum length table on page 27. 60 Case LinearRace Support Rail Assemblies are available with 60 Case LinearRace joints for unlimited travel lengths.

⁽³⁾ For part number description and specifications see page 26 and 27.

Standard Without Holes	Standard With PreDrilled Holes	Assembly With Solid 60 Case LinearRace	Standard Single Piece Length ⁽¹⁾ in	Maximum Single Piece Length ⁽¹⁾ in
LSR	LSR-PD	-	48	96
		LSRA	-	180
SR	SR-PD	SRA	24	72

Polar Graph

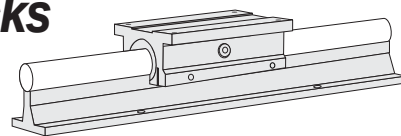
The actual Dynamic Load Capacity of a Ball Bushing bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor K_o is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the 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. **When using LSRA Smart Rail* assemblies, the dynamic load capacity for side loaded or pull off applications must be de-rated by 75% or .25 times the Dynamic Load Capacity.**



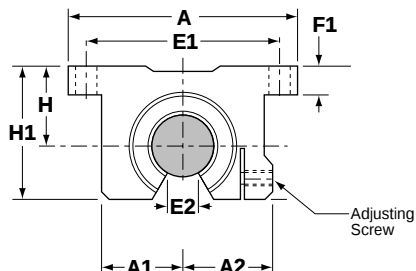
Super Smart Ball Bushing Twin Pillow Blocks

(Open Type)

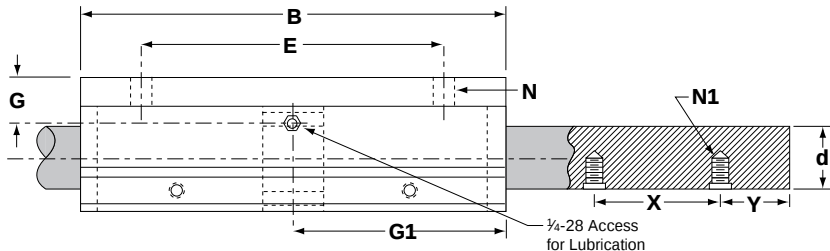
for Continuously Supported Applications



SSUTWNO End view



SSUTWNO Side view

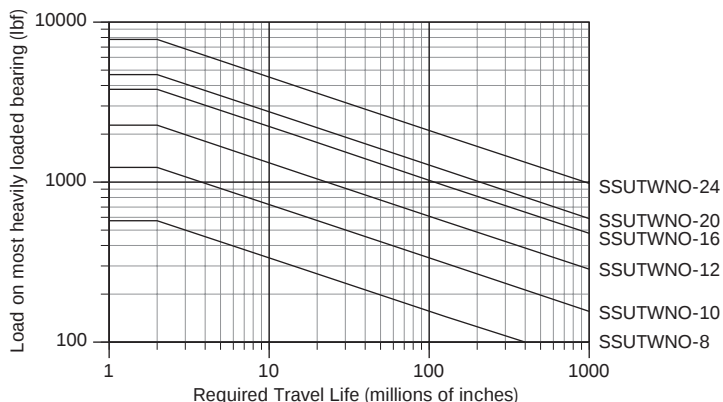


Super Smart Ball Bushing* Twin Pillow Blocks (Open Type, seal at both ends) and 60 Case* LinearRace* (Dimensions in inches)

Part Number		Nominal Diameter	H ±.003	H1	60 Case LinearRace Diameter d	60 Case LinearRace Minimum Depth of Hardness	60 Case Solid LinearRace Mass lb/in	60 Case LinearRace Mounting Holes		
Super Smart Ball Bushing Pillow Block	60 Case LinearRace							X	Y	N1
SSUTWNO-8	LRL-8-PD	.500	.687	1.13	.4995/.4990	.04	.06	4	2	6-32
SSUTWNO-10	LRL-10-PD	.625	.875	1.44	.6245/.6240	.04	.09	4	2	8-32
SSUTWNO-12	LRL-12-PD	.750	.937	1.56	.7495/.7490	.06	.13	6	3	10-32
SSUTWNO-16	LRL-16-PD	1.000	1.187	2.00	.9995/.9990	.08	.22	6	3	¼-20
SSUTWNO-20	LRL-20-PD	1.250	1.500	2.56	1.2495/1.2490	.08	.35	6	3	5/16-18
SSUTWNO-24	LRL-24-PD	1.500	1.750	2.94	1.4994/1.4989	.08	.50	8	4	¾-16

Part Number	A	A1	A2	B	E	E1	E2	F1	G	G1	N		Pillow Block Mass lb	Dynamic Load Capacity ^{††} lb _f
											Hole	Bolt		
Super Smart Ball Bushing Pillow Block					±.010	±.010	min.							
SSUTWNO-8	2.00	.69	.75	3.50	2.500	1.688	.31	.25	.56	1.75	.16	#6	.46	720
SSUTWNO-10	2.50	.88	.94	4.00	3.000	2.125	.34	.28	.67	2.00	.19	#8	.82	1240
SSUTWNO-12	2.75	.94	1.00	4.50	3.500	2.375	.41	.31	.94	2.25	.19	#8	1.02	2260
SSUTWNO-16	3.25	1.19	1.25	6.00	4.500	2.875	.53	.38	1.20	3.00	.22	#10	2.06	3800
SSUTWNO-20	4.00	1.50	1.63	7.50	5.500	3.500	.62	.44	1.50	3.75	.22	#10	4.30	4700
SSUTWNO-24	4.75	1.75	1.88	9.00	6.500	4.125	.74	.50	1.75	4.50	.28	.25	6.88	7760

Load/Life Graph (Lines indicate limiting load for given Ball Bushing Pillow Block)



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.

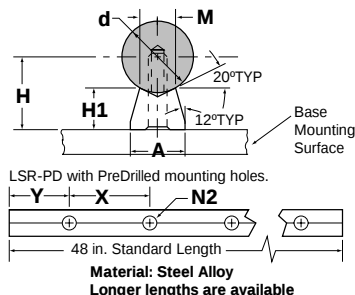
Note: For the purpose of using this chart.

Load on most heavily loaded bearing = maximum applied load/ K_0 .

Where K_0 can be determined from the Polar Graph to the right.

60 Case LinearRace Support Rails and Assemblies for Continuously Supported Applications

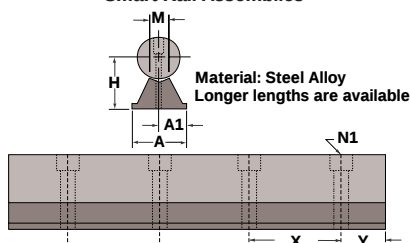
Type LSR and LSR-PD LinearRace Support Rails



Type LSR and LSR-PD 60 Case LinearRace Support Rails (Dimensions in inches)

LSR Standard Without Holes	LSR-PD Standard w/PreDrilled Holes	Nominal LinearRace Diameter d	H	H1	A	M	N2 Hole	N1 Bolt	X	Y	LSR Mass lb/ft
LSR-8	LSR-8-PD	.500	.562	.34	.37	.25	.17	#6-32	4	2	.32
LSR-10	LSR-10-PD	.625	.687	.41	.45	.31	.19	#8-32	4	2	.49
LSR-12	LSR-12-PD	.750	.750	.42	.51	.38	.22	#10-32	6	3	.59
LSR-16	LSR-16-PD	1.000	1.000	.56	.69	.50	.28	1/4-20	6	3	1.01
LSR-20	LSR-20-PD	1.250	1.187	.63	.78	.56	.34	5/16-18	6	3	1.27
LSR-24	LSR-24-PD	1.500	1.375	.70	.93	.69	.41	3/8-16	8	4	1.68

Type LSRA 60 Case Smart Rail Assemblies

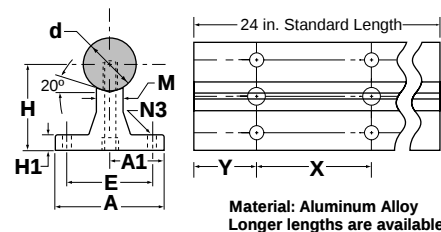


Type LSRA Smart Rail* Assemblies (Dimensions in inches)

Part Number ⁽³⁾	Smart Rail Assembly ⁽¹⁾	Smart Rail Assembly ⁽²⁾	LinearRace Diameter	H	A	A1	Y	Mounting Holes
				+/-0.002			Std.	X1 X2 ⁽⁴⁾ N1
LSRA10	LSRA10 CR	0.625	0.687	0.45	0.225	1.0	2	3 #5
LSRA12	LSRA12 CR	0.750	0.750	0.51	0.255	1.5	3	4 #6
LSRA16	LSRA16 CR	1.000	1.000	0.69	0.345	1.5	3	4 #10
LSRA20	LSRA20 CR	1.250	1.187	0.78	0.390	1.5	3	6 5/16
LSRA24	LSRA24 CR	1.500	1.375	0.93	0.465	2.0	4	8 3/8

(1) = Consists of steel rail and high carbon steel LinearRace (HRC 60-65). (2) = Consists of zinc plated steel rail and 440C St. Steel LinearRace (HRC 50-55).
(3) = Specify length of assembly and mounting hole spacing (X1 or X2) when ordering. For example, LSRA12 CR X1 x 24.00 inches. (4) = Made to order.

Type SR and SR-PD 60 Case LinearRace Support Rails and Assemblies



Type SR/ SR-PD LinearRace Support Rails and Assemblies (Dimensions in inches)

SR Without Holes	SR-PD With PreDrilled Holes	Assembly With Solid 60 Case LinearRace	Nom. LinearRace Dia. d	H	H1	A	A1	E	M	N	N13 Hole Bolt	LinearRace Mounting Bolt N1	X	Y	SR Mass lb/ft
SR-8	SR-8-PD	SRA-8	.50	1.125	.19	1.50	.750	1.00	.25	.17	#6	#6-32 x .88	4	2	.60
SR-10	SR-10-PD	SRA-10	.625	1.125	.25	1.63	.813	1.13	.31	.19	#8	#8-32 x .88	4	2	.80
SR-12	SR-12-PD	SRA-12	.750	1.500	.25	1.75	.875	1.25	.38	.22	#10	#10-32 x 1.25	6	3	1.00
SR-16	SR-16-PD	SRA-16	1.000	1.750	.25	2.13	1.063	1.50	.50	.28	1/4	1/4-20 x 1.50	6	3	1.40
SR-20	SR-20-PD	SRA-20	1.250	2.125	.31	2.50	1.250	1.88	.56	.34	5/16	5/16-18 x 1.75	6	3	2.10
SR-24	SR-24-PD	SRA-24	1.500	2.500	.38	3.00	1.500	2.25	.69	.34	5/16	3/8-16 x 2.00	8	4	2.60

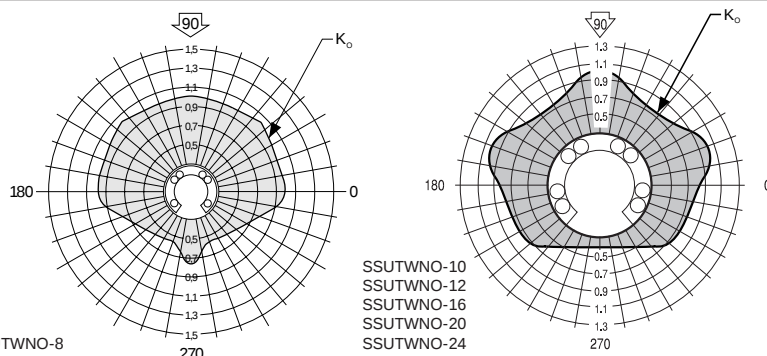
(*) The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.

(*) For the maximum length of all 60 Case LinearRace Support Rail Assemblies without 60 Case LinearRace Joints see maximum length table on page 27. 60 Case LinearRace Support Rail Assemblies are available with 60 Case LinearRace joints for unlimited travel lengths.

For part number description and specifications see page 26 and 27.

Polar Graph

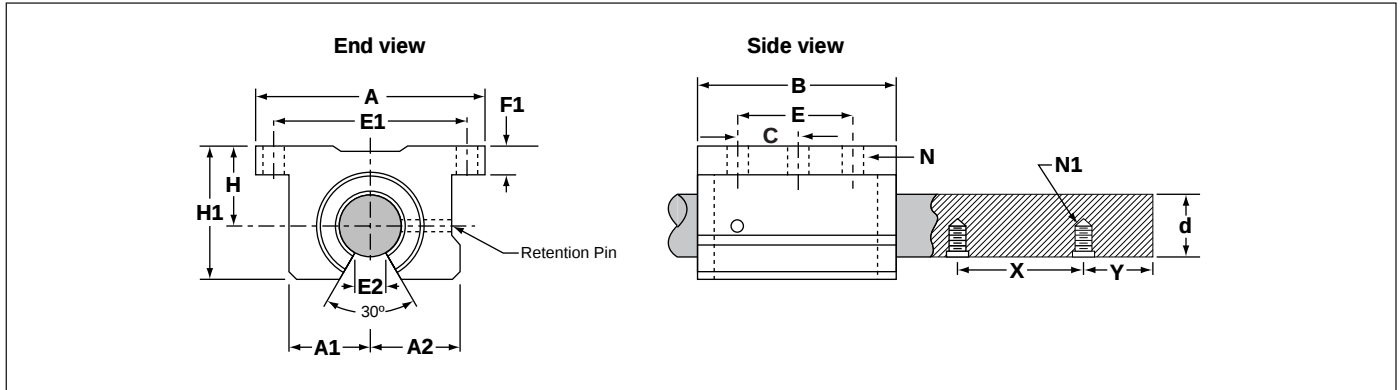
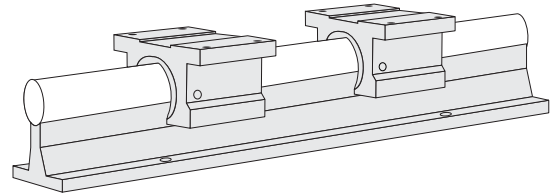
The actual Dynamic Load Capacity of a Ball Bushing bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor K_o is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the 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. **When using LSRA Smart Rail* assemblies, the dynamic load capacity for side loaded or pull off applications must be de-rated by 75% or .25 times the Dynamic Load Capacity.**



Super Smart Ball Bushing Rigid Steel Pillow Blocks

(Open Type) for Continuously Supported Applications

**Rigid steel housing and high performance
Super Smart Ball Bushing* bearing combine to
reduce deflection and cost up to 66%.**



Super Smart Ball Bushing bearing Rigid Steel Pillow Blocks (Open Type, seal at both ends) and 60 Case* LinearRace* shaft (Dimensions in inches)													
Part Number		Nominal Diameter	H ±.003	H1	A	A1	A2	B	60 Case LinearRace shaft Minimum Depth of Hardness	60 Case Solid LinearRace shaft Mass lb/in	60 Case LinearRace shaft		
Super Smart Ball Bushing Rigid Steel Pillow Block	60 Case LinearRace shaft										Mounting Holes		
											X	Y	N1
SSURPB012	LRL-12-PD	.750	.937	1.56	2.75	.94	1.00	1.88	.06	.13	6	3	#10-32
SSURPB016	LRL-16-PD	1.000	1.187	2.00	3.25	1.19	1.25	2.63	.08	.22	6	3	¼-20
SSURPB024	LRL-24-PD	1.500	1.750	2.94	4.75	1.75	1.88	3.75	.08	.50	8	4	⅜-16

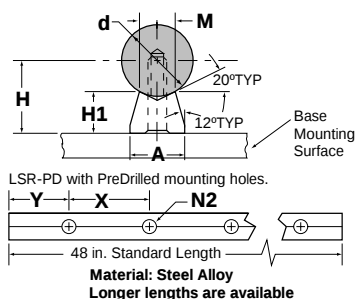
Part Number	60 Case LinearRace shaft Diameter d	E	C	E1	E2	F1	N		Pillow Block Mass lb	Dynamic ^(††) Load Capacity lb _f
							Hole	Bolt		
SSURPB012	.7495/.7490	±.010	±.010	±.010	Min.	.31	.19	#8	1.10	1130
SSURPB016	.9995/.9990	±.010	±.010	±.010	Min.	.38	.22	#10	2.30	1900
SSURPB024	1.4994/1.4989	±.010	±.010	±.010	Min.	.50	.28	.25	7.00	3880

Super Smart Ball Bushing Rigid Steel Pillow Blocks provide:

- **Faster settling time...** Greater Productivity
- **Less deflection...** Greater Accuracy
- **Highest load capacity...** Smallest envelope
- **Longest bearing life...** Greater reliability

60 Case LinearRace Support Rails and Assemblies for Continuously Supported Applications

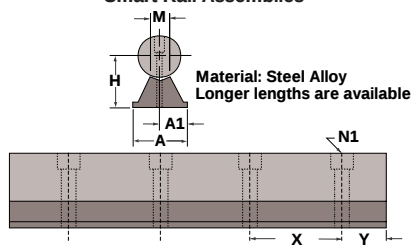
Type LSR and LSR-PD LinearRace* Support Rails



Type LSR and LSR-PD 60 Case* LinearRace* Support Rails (Dimensions in inches)

LSR Standard Without Holes	LSR-PD Standard w/Pre-Drilled Holes	Nominal LinearRace shaft Diameter d	H	H1	A	M	N2	N1	X	Y	LSR Mass lb/ft
			±.002				Hole	Bolt			
LSR-12	LSR-12-PD	.750	.750	.42	.51	.38	.22	#10-32	6	3	.59
LSR-16	LSR-16-PD	1.000	1.000	.56	.69	.50	.28	1/4-20	6	3	1.01
LSR-24	LSR-24-PD	1.500	1.375	.70	.93	.69	.41	3/8-16	8	4	1.68

Type LSRA 60 Case Smart Rail Assemblies

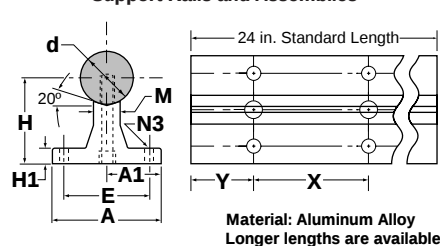


Type LSRA Smart Rail* Guides (Dimensions in inches)

Part Number ⁽³⁾		LinearRace* shaft Diameter	H	A	A1	Y	Mounting Holes		
Smart Rail Assembly ⁽¹⁾	Smart Rail Assembly ⁽²⁾		+/- 0.002			Std.	X1	X2 ⁽⁴⁾	N1
LSRA12	LSRA12 CR	0.750	0.750	0.51	0.255	1.5	3	4	#6
LSRA16	LSRA16 CR	1.000	1.000	0.69	0.345	1.5	3	4	#10
LSRA24	LSRA24 CR	1.500	1.375	0.93	0.465	2.0	4	8	3/8

(1) = Consists of steel rail and high carbon steel LinearRace (HRC 60-65). (2) = Consists of zinc plated steel rail and 440C St. St'l. LinearRace (HRC 50-55).
(3) = Specify length of assembly and mounting hole spacing (X1 or X2) when ordering. For example, LSRA12 CR X1 x 24.00 inches. (4) = Made to order.

Type SR and SR-PD 60 Case LinearRace Support Rails and Assemblies



Type SR/ SR-PD LinearRace Support Rails and Assemblies (Dimensions in inches)

SR Without Holes	SR-PD With Pre-Drilled Holes	Assembly With Solid 60 Case LinearRace shaft	Nom. LinearRace shaft Dia. d	H ±.002	H1	A	A1 ±.002	E	M	N3		LinearRace Mounting shaft Bolt N1	X	Y	SR Mass lb/ft
										Hole	Bolt				
SR-12	SR-12-PD	SRA-12	.750	1.500	.25	1.75	.875	1.25	.38	.22	#10	#10-32 x 1.25	6	3	1.00
SR-16	SR-16-PD	SRA-16	1.000	1.750	.25	2.13	1.063	1.50	.50	.28	¼	¼-20 x 1.50	6	3	1.40
SR-24	SR-24-PD	SRA-24	1.500	2.500	.38	3.00	1.500	2.25	.69	.34	5/16	¾-16 x 2.00	8	4	2.60

^(††)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 polar graphs below.

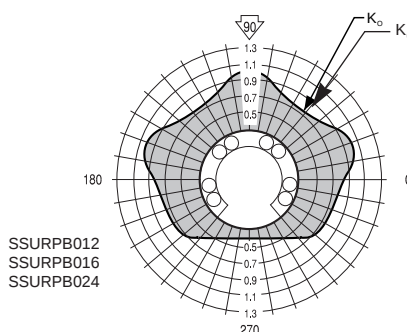
^(†) 60 Case LinearRace Support Rail Assemblies are available with 60 Case LinearRace shaft joints for unlimited travel lengths.

For part number description and specifications see page 26 and 27.

Standard Without Holes	Standard With Pre-Drilled Holes	Assembly With Solid 60 Case LinearRace shaft	Standard Single Piece Length ^(†) in	Maximum Single Piece Length ^(†) in
LSR	LSR-PD	—	48	96
		LSRA	—	180
SR	SR-PD	SRA	24	72

Polar Graph

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_o 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. **When using LSRA Smart Rail* assemblies, the dynamic load capacity for side loaded or pull off applications must be de-rated by 75% or .25 times the Dynamic Load Capacity.**



Pick and Place X-Y System

Objective

Build an X-Y System that transfers the work piece between two separate machining stations.

Solution

Assemble the X-Y System utilizing Super Smart pillow blocks on end supported 60 Case* LinearRace* for the X-axis and continuously supported 60 Case LinearRace on the Y-axis. Utilize Thomson Saginaw* Ball Screw Assemblies for high speed positioning.

Benefits

The 60 Case LinearRace and 60 Case LinearRace end support blocks provided an important bridge between machining stations. The Super Smart Ball Bushing pillow blocks and Thomson Saginaw ball screws provided uninterrupted high speed movement of the work piece. Productivity increased by 200%.

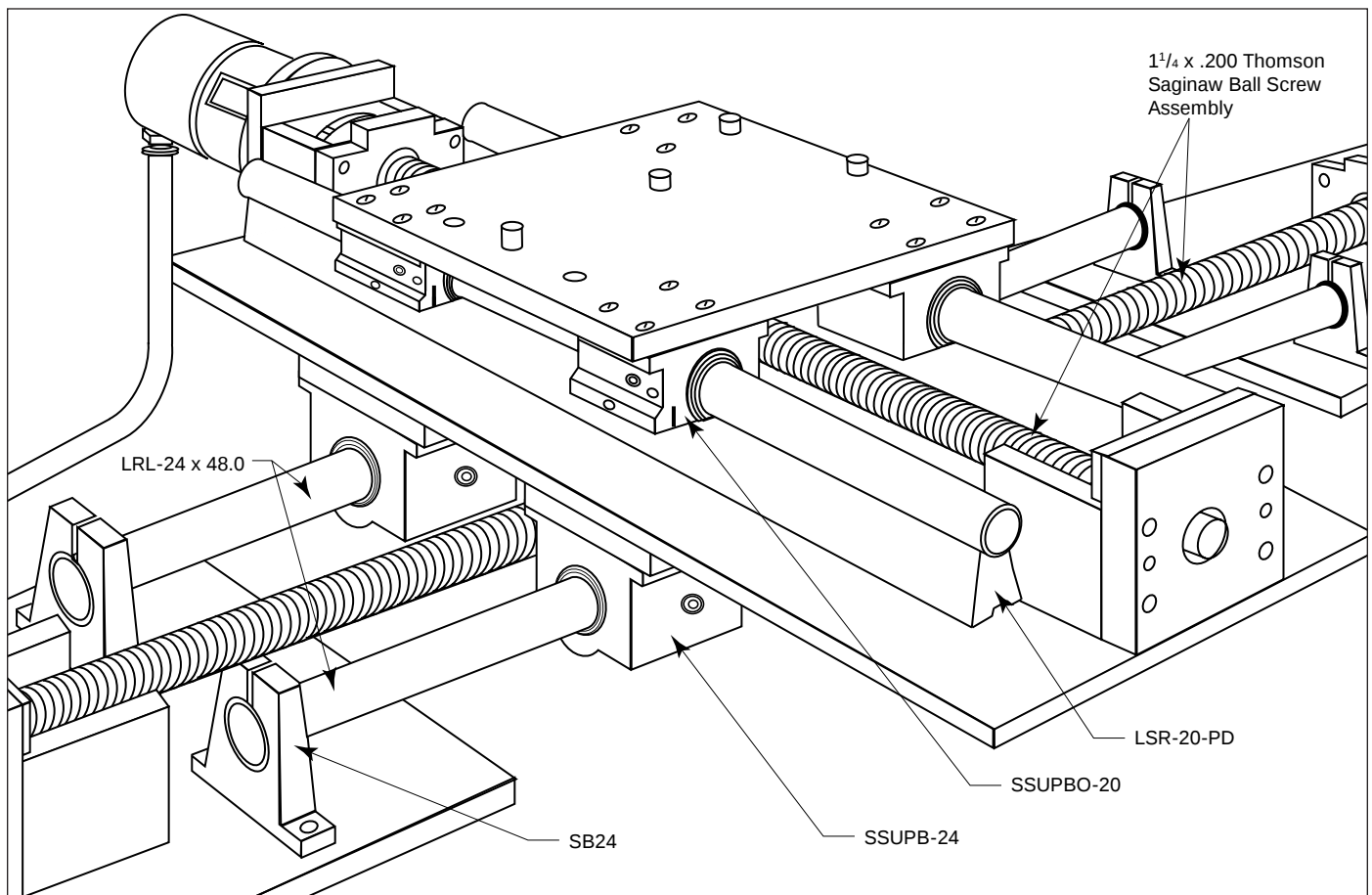
Products Specified

X-axis

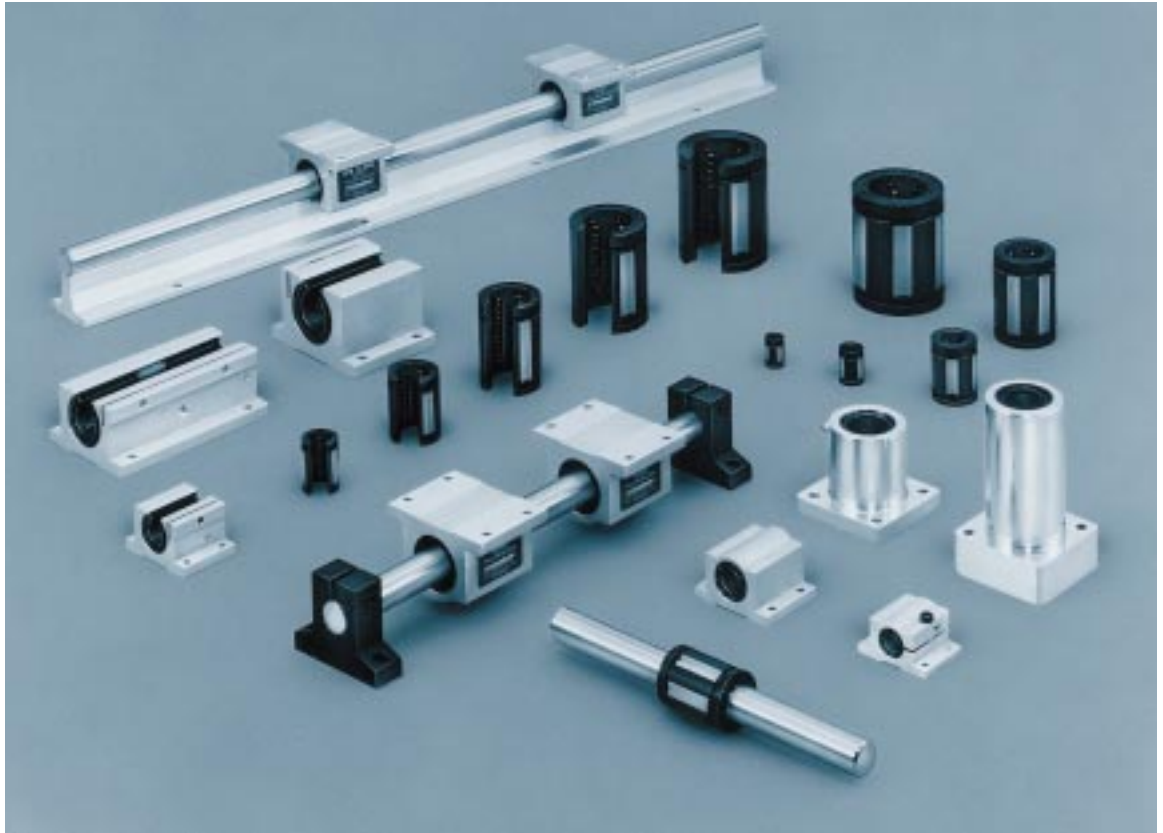
- 2 – LRL-24 x 48.00 in (60 Case LinearRace)
- 4 – SB24 (60 Case LinearRace End Support Blocks)
- 4 – SSUPB-24 (Super Smart Ball Bushing* Pillow Blocks)
- 1 – 1¼ x .200 (Thomson Saginaw Ball Screw Assembly)

Y-axis

- 2 – LSR-20 x 48.00 in (Low Profile 60 Case LinearRace Support Rail)
- 4 – SSUPBO-20 (Super Smart Ball Bushing Pillow Blocks)
- 1 – 1¼ x .200 (Thomson Saginaw Ball Screw Assembly)
- 2 – LRL-20 x 48.00 in (60 Case LinearRace)



Super Ball Bushing Bearing Products

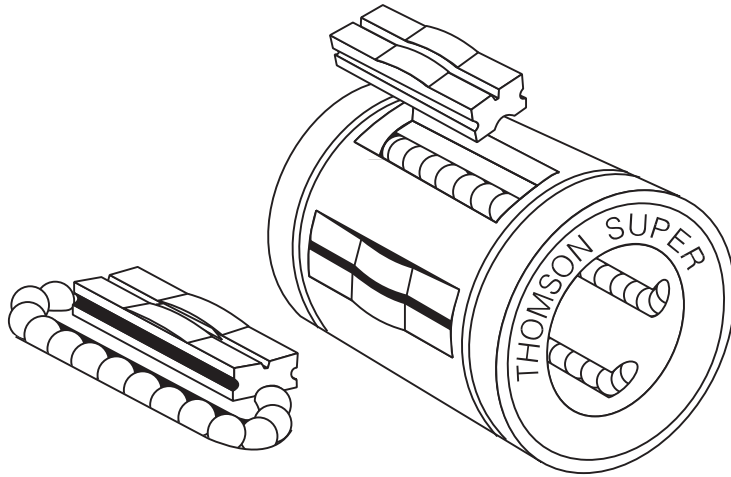


Thomson Super Ball Bushing* Bearing Products offer:

- a self-aligning capability up to $.5^\circ$ compensating for inaccuracies in base flatness or carriage machining.
- the RoundRail* Advantage combined with the self-aligning feature, eliminating the need for derating factors commonly required for linear guides.
- travel speeds up to 10 ft/s without a reduction in load capacity.
- light weight, wear-resistant, engineered-polymer retainers and outer sleeves that reduce inertia and noise.
- radially floating bearing plates. When installed in an adjustable housing, the Super Ball Bushing bearing may be adjusted to a specific diametrical fit-up for accurate and repeatable movement.
- a constant coefficient of friction as low as .001.
- the use of smaller, less expensive drive motors, belts, linkages, gears and ball screws, when replacing high friction plain bearings.
- a closed configuration for end supported applications and an open configuration for continuously supported applications.
- ready to install pillow blocks with double acting seals and an access for lubrication. Installation and downtime is minimized.
- availability from over 1800 distributors, worldwide.

Super Ball Bushing Bearing Products

Figure 1



The Super Ball Bushing* bearing has been the industry standard for self-aligning linear bearings for over twenty years. This bearing provides three times the load capacity or 27 times the travel life of conventional linear bearings. This dramatic improvement in bearing performance significantly reduces downtime and maintenance, while increasing machine reliability. Thomson Industries, Inc. invented the Super Ball Bushing bearing with many unique design features. Besides the dramatic increase in load capacity, the Super Ball Bushing bearing is self-aligning, light weight and adjustable with a low coefficient of friction (Figure 1).

Three Times the Load Capacity

The bearing plates are hardened, bearing quality steel with ball conforming grooves (Figure 2). The groove is slightly larger than the ball diameter, providing an optimal area for ball contact. The greater ball to bearing plate contact provides the increase in load capacity or travel life.

Zero Clearance Fit

The bearing plates are also designed to float radially (Figure 3). When the bearing is mounted in an adjustable housing, selected fit-ups can be achieved on the 60 Case* LinearRace* (shaft).

Self-Aligning

The Super Ball Bushing bearing plates pivot .5° about their centers (Figure 4) to assure smooth entry and exit of the precision bearing balls. Each plate aligns itself automatically to compensate for inaccurate housing bore alignment, base flatness or carriage machining. This provides uniform ball loading, smooth ball recirculation and a constant coefficient of friction.

Smooth, Quiet Operation

The Super Ball Bushing bearing's outer sleeve and retainer are made of wear-resistant, low-friction engineering polymer. It reduces inertia and operating noise levels significantly.

Figure 2

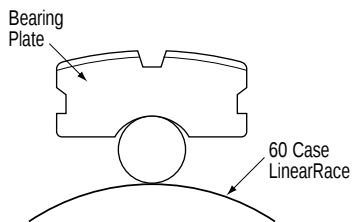
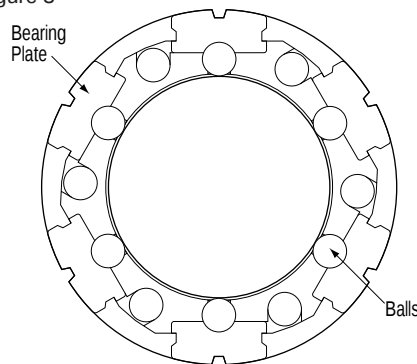
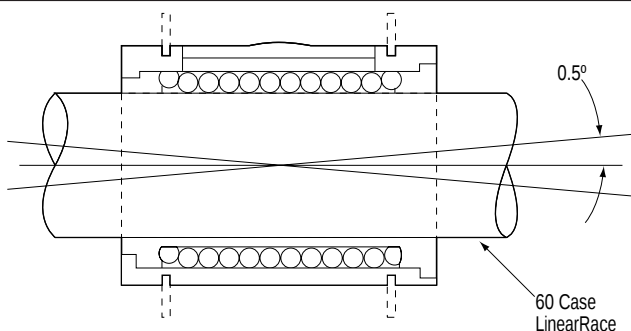


Figure 3



Cross-Section of Super Ball Bushing Bearing

Figure 4



Super Ball Bushing Bearing Products

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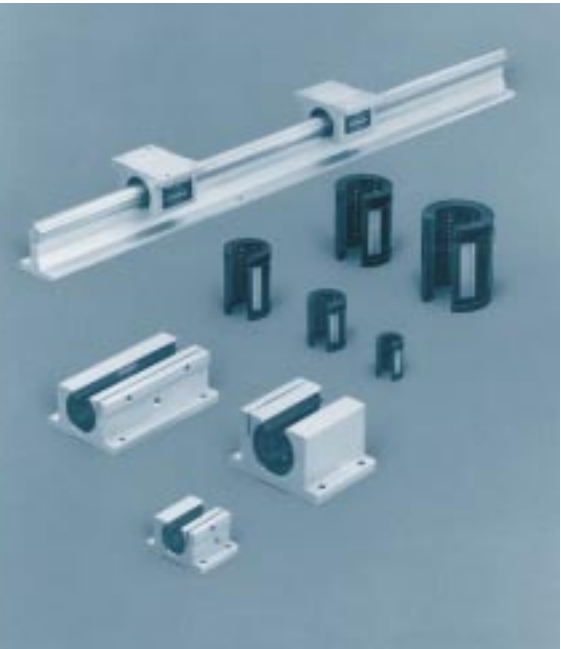
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Super Ball Bushing* bearing closed type products are designed specifically for use in end supported applications where spanning or bridging a gap is required. End support products are available in a variety of configurations and sizes. For a complete overview of each Super Ball Bushing end support product turn to page S4. For product specifications see the pages referenced below.

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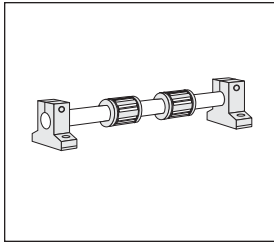
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Super Ball Bushing Bearing open type products are specifically designed for use in continuously supported applications, where rigidity and stiffness is required. Continuously supported products are available in a variety of configurations and sizes. For a complete overview of all Super Ball Bushing bearing continuously supported products turn to page S20. For Super Ball Bushing continuously supported product specifications, see the corresponding pages referenced below.

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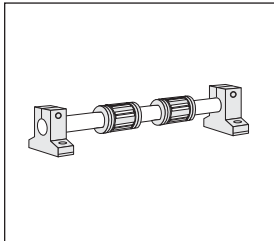
Super Ball Bushing Bearings and Pillow Blocks for End Supported Applications



Super Ball Bushing* Bearings (Closed type)

Features:

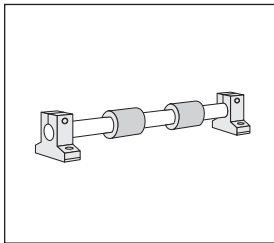
- Available in sizes $\frac{3}{16}$ to 2 inch diameter.
- Load Capacity range from 35 to 3,000 lb_f.
- Self-aligning in all directions.
- Can be mounted in a custom housing.
- Can be adjusted to take out diametrical clearance.
- Travel speeds up to 10 ft/s.
- Available with corrosion resistant components.



Sealed Super Ball Bushing Bearings (Closed type)

Features:

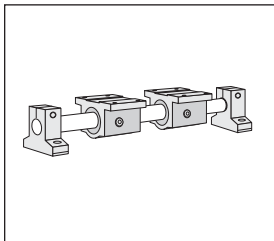
- Integral double acting seals retain lubrication and keep out contamination.
- Available in sizes $\frac{1}{2}$, $\frac{3}{4}$ and 1 inch nominal diameter.
- Load capacity range from 255 to 1,050 lb_f.
- Self-aligning in all directions.
- Can be adjusted to take out diametrical clearance.
- Can be mounted in a custom housing.
- Travel speeds up to 10 ft/s.
- Available with corrosion resistant components.



Super Ball Bushing Cartridge Bearings

Features:

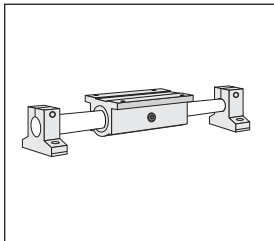
- Available in sizes $\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$ inch diameter.
- Can be easily installed into a soft or slightly out-of-round housing.
- Available in both single or twin versions and with or without integral double acting seals.
- Single versions are self-aligning in all directions.
- Twin versions minimize installation time and cost.
- Available with corrosion resistant components.



Super Ball Bushing Pillow Blocks (Closed and Adjustable Type)

Features:

- Available in sizes $\frac{1}{4}$ to 2 inch diameter.
- Load capacity range between 60 and 3,000 lb_f.
- Available with standard integral double acting seals.
- Travel speeds up to 10 ft/s.
- Available with or without diameter adjustment capability.
- Easily mounted and secured with four mounting bolts (sizes $\frac{1}{4}$ and $\frac{3}{8}$ secured with two mounting bolts).
- Available with a standard lubrication access.

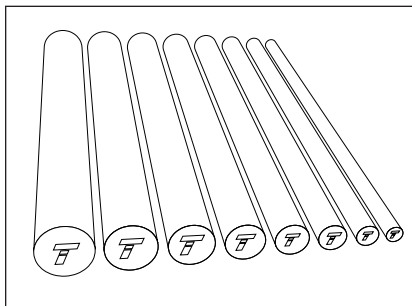


Super Ball Bushing Twin Pillow Blocks (Closed and Adjustable Type)

Features:

- Available in sizes $\frac{1}{4}$ to $1\frac{1}{2}$ inch diameter.
- Load capacity range between 120 and 4,000 lb_f.
- Available with standard integral double acting seals.
- Travel speeds up to 10 ft/s.
- Available with or without diameter adjustment capability.
- Easily mounted and secured with four mounting bolts.
- Available with a standard lubrication access.

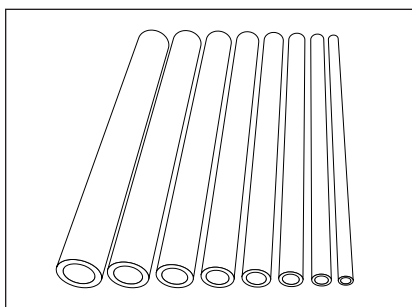
60 Case LinearRace Shafting for End Supported Applications



60 Case* Solid LinearRace* Shafting

Features:

- Diameter range between $\frac{3}{16}$ and 4 inch.
- Roundness 80 millionths of an inch.
- Case hardness 60-65 HRC.
- Surface finish 12 R_a microinch.
- Available in corrosion resistant 440C stainless steel (50-55 HRC).
- Available with PrePlate* chrome option.
- Standard straightness is .001 inch per foot cumulative (.002 TIR) with special straightness at .0005 inch per foot cumulative (.001 TIR) available.

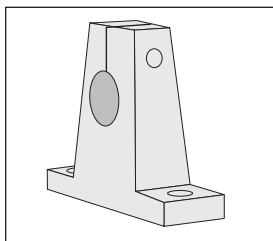


60 Case Tubular Lite* LinearRace Shafting

Features:

- Hollow inner diameter reduces weight and inertia.
- Diameter range between $\frac{3}{4}$ and 4 inch.
- Roundness 80 millionths of an inch.
- Case hardness 58-63 HRC.
- Surface finish 12 R_a microinch.
- Available with Preplate chrome option.
- Standard straightness is .001 inch per foot cumulative (.002 TIR) with special straightness at .0005 inch per foot cumulative (.001 TIR) available.

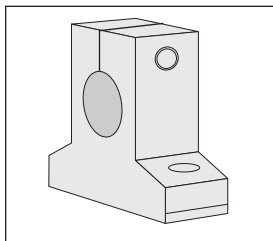
60 Case LinearRace Supports For End Supported Applications



SB 60 Case LinearRace End Support Block

Features:

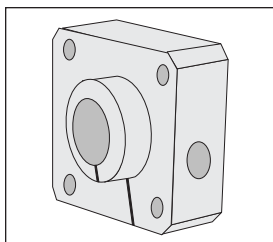
- Size range between $\frac{1}{4}$ and 2 inch.
- Easily secured with two mounting bolts.
- Malleable iron alloy for sizes $\frac{1}{2}$ to 2 inch diameter.
- Protected by corrosion resistant coating.
- Light weight, high strength aluminum alloy construction for sizes $\frac{1}{4}$ and $\frac{3}{8}$ inch.



ASB Low Profile 60 Case LinearRace End Support Block

Features:

- Size range between $\frac{1}{4}$ and 1 $\frac{1}{2}$ inch.
- Low profile design.
- Easily secured with two mounting bolts.
- Protected by corrosion resistant anodized coating.
- Light weight, high strength aluminum alloy construction.



FSB Flanged 60 Case LinearRace End Support Block

Features:

- Available in $\frac{1}{2}$, $\frac{3}{4}$, 1 and 1 $\frac{1}{4}$ inch diameters.
- Flanged mounting surface for easy assembly.
- Easily secured with four mounting bolts.
- Designed specifically for use with Super Ball Bushing Flanged Pillow Blocks
- Protected by corrosion resistant coating.
- Light weight, high strength aluminum alloy construction.

Part Number Description and Specification:

Super Ball Bushing* Bearings (Closed Type) for End Supported Applications

SUPER 16-CR				
Type	Description	Size	Nominal Diameter	Option Description
SUPER	Super Ball Bushing bearings	3	.188	– Standard
SCB	Super Ball Bushing Cartridge bearings	4	.250	CR Corrosion Resistant
		6	.375	DD Integral Seals
		8	.500	NB Nylon Balls
		10	.625	TWN Twin (SCB only)
		12	.750	DP Dry Packed
		16	1.000	
		20	1.250	
		24	1.500	
		32	2.000	

Super Ball Bushing Pillow Blocks (Closed Type) for End Supported Applications

SPB 16-ADJ-CR				
Type	Description	Size	Nominal Diameter	Option Description
SPB	Super Ball Bushing Pillow Blocks	8	.500	– Standard
TWN	Super Ball Bushing Twin Pillow Blocks	10	.625	CR Corrosion
		12	.750	NB Resistant
		16	1.000	Nylon Balls
		20	1.250	
		24	1.500	
		32	2.000	
Type	Description			
–	Closed Type, Non-Adjustable			
ADJ	Closed Type, Adjustable Pillow Block			

Part Number Description and Specification:

60 Case* LinearRace* for End Supported Applications

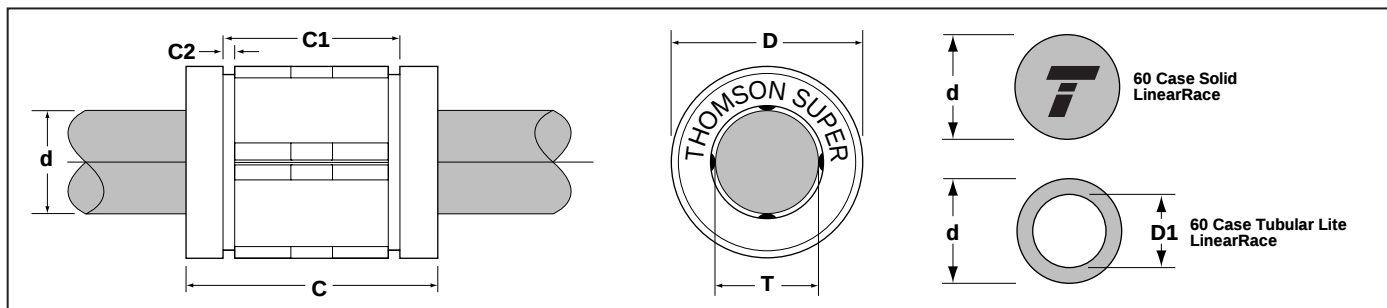
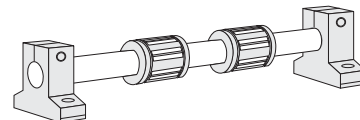
LRL-16-SS										
Type	Description	Nom.				Option				
LR	60 Case LinearRace	Size	Dia.	Size	Dia.	–	High Carbon Steel			
		3	.188	12	.750	SS	440C Stainless Steel			
		4	.250	16	1.000	TU	Tubular Lite			
		6	.375	20	1.250	CP	Chrome Plate			
		8	.500	24	1.500					
		10	.625	32	2.000					

60 Case LinearRace										
Part Number	60 Case LinearRace Diameter Class L	Max. Length in.	Part Number	Max. Length in.	Part Number	Max. Length in.	Part Number	Max. Length in.	Part Number	Max. Length in.
LRL-3	.1870/.1865	12	–	–	LRL-3-CP	12				
LRL-4	.2495/.2490	96	LRL-4-SS	60	LRL-4-CP	92				
LRL-6	.3745/.3740	180	LRL-6-SS	180	LRL-6-CP	166				
LRL-8	.4995/.4990	180	LRL-8-SS	180	LRL-8-CP	168				
LRL-10	.6245/.6240	180	LRL-10-SS	180	LRL-10-CP	178				
LRL-12	.7495/.7490	204	LRL-12-SS	180	LRL-12-CP	178	LRL-12-TU	180	LRL-12-TU-CP	178
LRL-16	.9995/.9990	204	LRL-16-SS	180	LRL-16-CP	178	LRL-16-TU	180	LRL-16-TU-CP	178
LRL-20	1.2495/1.2490	204	LRL-20-SS	180	LRL-20-CP	178				
LRL-24	1.4994/1.4989	204	LRL-24-SS	180	LRL-24-CP	178	LRL-24-TU	180	LRL-24-TU-CP	178
LRL-32	1.9994/1.9987	204	LRL-32-SS	180	LRL-32-CP	178	LRL-32-TU	180	LRL-32-TU-CP	178

60 Case LinearRace Support Blocks for End Supported Applications

ASB-16										
Type	Description	Size	Nominal Diameter							
ASB	Low Profile 60 Case LinearRace End Support Block	4	.250							
SB	Standard 60 Case LinearRace End Support Block	6	.375							
FSB	Flanged 60 Case LinearRace End Support Block	8	.500							
		10	.625							
		12	.750							
		16	1.000							
		20	1.250							
		24	1.500							
		32	2.000							

Super Ball Bushing Bearings (Closed Type) for End Supported Applications



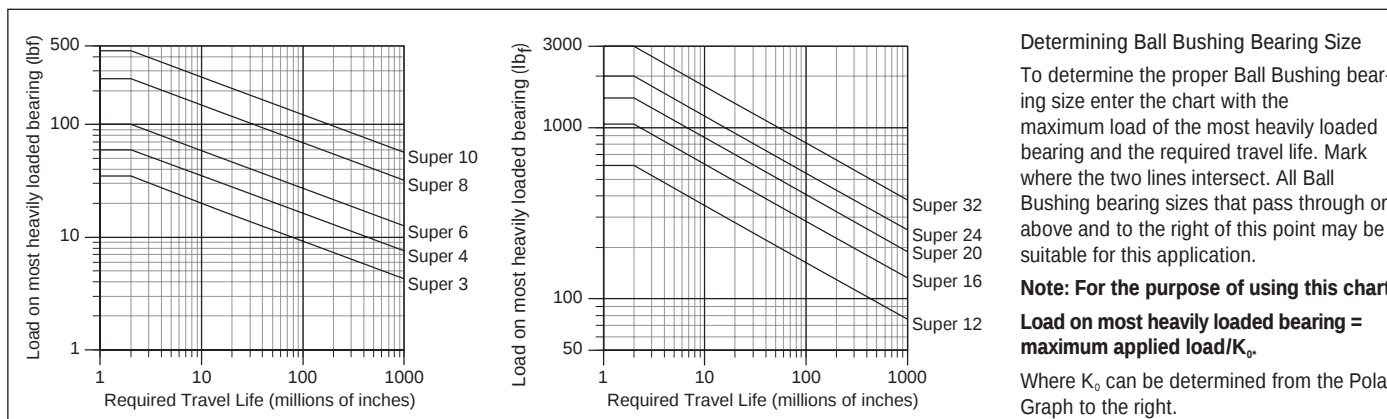
Super Ball Bushing* Bearings (Closed Type) and 60 Case* LinearRace* (Dimensions in inches)

Part Number ⁽²⁾											
Ball Bushing Bearing	60 Case LinearRace	Nominal Diameter	Length C	Distance Between Retaining Ring Grooves C1	Retaining Ring Groove min. C2	Number of Ball Circuits	Ball Bushing Bearing Mass lb	60 Case LinearRace Minimum Depth of Hardness	60 Case Solid LinearRace Mass lb/in	60 Case Tubular Lite LinearRace Mass lb/in	60 Case Tubular Lite LinearRace ID D1
SUPER 3	LRL-3	.188	.562/.547	—	—	4	.003	.04	.008	—	—
SUPER 4	LRL-4	.250	.750/.735	.511/.501	.039	4	.01	.027	.01	—	—
SUPER 6	LRL-6	.375	.875/.860	.699/.689	.039	4	.02	.027	.03	—	—
SUPER 8	LRL-8	.500	1.250/1.230	1.032/1.012	.050	4	.04	.04	.06	—	—
SUPER 10	LRL-10	.625	1.500/1.480	1.105/1.095	.056	5	.10	.04	.09	—	—
SUPER 12	LRL-12	.750	1.625/1.605	1.270/1.250	.056	6	.14	.06	.13	.08	.46/.41
SUPER 16	LRL-16	1.000	2.250/2.230	1.884/1.864	.070	6	.25	.08	.22	.16	.62/.56
SUPER 20	LRL-20	1.250	2.625/2.600	2.004/1.984	.068	6	.45	.08	.35	—	—
SUPER 24	LRL-24	1.500	3.000/2.970	2.410/2.390	.086	6	.85	.08	.50	.33	.93/.84
SUPER 32	LRL-32	2.000	4.000/3.960	3.193/3.163	.105	6	1.45	.10	.89	.54	1.31/1.18

Part Number ⁽²⁾	Working Bore Diameter T	Recommended Housing Bore Diameter		60 Case LinearRace Diameter d	Ball Bushing Bearing/LinearRace Fit Up [†]		Dynamic ⁽¹⁾ Load Capacity lb _f
Ball Bushing Bearing		Fixed D	Adjustable D		Fixed Diameter Housing	Adjustable Diameter Housing (Before Adjustment)	
SUPER 3	.1875/.1870	.3755/.3750	.3760/.3750	.1870/.1865	.0015C/.0000	.002C/.0000	35
SUPER 4	.2500/.2495	.5005/.5000	.5010/.5000	.2495/.2490	.0015C/.0000	.002C/.0000	60
SUPER 6	.3750/.3745	.6255/.6250	.6260/.6250	.3745/.3740	.0015C/.0000	.002C/.0000	100
SUPER 8	.5000/.4995	.8755/.8750	.8760/.8750	.4995/.4990	.0015C/.0000	.002C/.0000	255
SUPER 10	.6250/.6245	1.1255/1.1250	1.1260/1.1250	.6245/.6240	.0015C/.0000	.002C/.0000	450
SUPER 12	.7500/.7495	1.2505/1.2500	1.2510/1.2500	.7495/.7490	.0015C/.0000	.002C/.0000	600
SUPER 16	1.0000/.9995	1.5630/1.5625	1.5635/1.5625	.9995/.9990	.0015C/.0000	.002C/.0000	1050
SUPER 20	1.2500/1.2494	2.0008/2.0000	2.0010/2.0000	1.2495/1.2490	.0018C/.0001P	.002C/.0000	1500
SUPER 24	1.5000/1.4994	2.3760/2.3750	2.3760/2.3750	1.4994/1.4989	.0021C/.0000	.0021C/.0000	2000
SUPER 32	2.0000/1.9992	3.0010/3.0000	3.0010/3.0000	1.9994/1.9987	.0023C/.0002P	.0023C/.0002P	3000

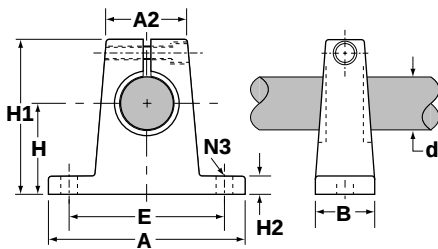
Load/Life Graph (Lines indicate limiting load for given Ball Bushing bearing)

[†] P=Preload, C=Clearance



60 Case LinearRace Support Blocks for End Supported Applications

Type SB LinearRace Support Block



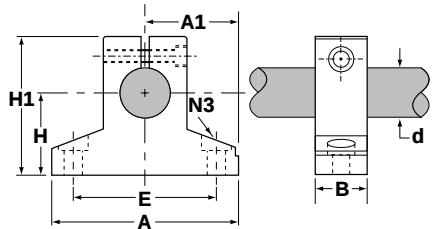
Material: Malleable Iron for sizes .5 to 2 in.
Aluminum Alloy for sizes .25 and .375 in.

Type SB 60 Case* LinearRace* End Support Blocks

(Dimensions in inches)

Part ⁽²⁾ No.	Nominal LinearRace Diameter d	H ±.002	H1	H2	A	A2	B	E ±.010	N3		Mass lb
									Hole	Bolt	
SB-4	.250	.687	1.06	.25	1.50	.63	.50	1.125	.16	#6	.03
SB-6	.375	.750	1.19	.25	1.63	.69	.56	1.250	.16	#6	.05
SB-8	.500	1.000	1.63	.25	2.00	.75	.63	1.500	.19	#8	.30
SB-10	.625	1.000	1.75	.31	2.50	.88	.69	1.875	.22	#10	.40
SB-12	.750	1.250	2.13	.31	2.75	1.00	.75	2.000	.22	#10	.50
SB-16	1.000	1.500	2.56	.38	3.25	1.38	1.00	2.500	.28	1/4	1.00
SB-20	1.250	1.750	3.00	.44	4.00	1.75	1.13	3.000	.34	5/16	2.00
SB-24	1.500	2.000	3.50	.50	4.75	2.00	1.25	3.500	.34	5/16	2.60
SB-32	2.000	2.500	4.50	.63	6.00	2.63	1.50	4.500	.41	3/8	4.80

Type ASB LinearRace Support Block



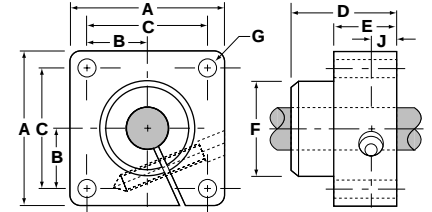
Material: Aluminum Alloy

Type ASB 60 Case LinearRace End Support Blocks

(Dimensions in inches)

Part ⁽²⁾ No.	Nominal LinearRace Diameter d	H ±.001	H1	A	A1 ±.001	B	E	N3		Mass lb
								Hole	Bolt	
ASB-4	.250	.500	.88	1.50	.750	.50	1.12	.16	#6	.06
ASB-6	.375	.562	1.00	1.62	.813	.56	1.25	.16	#6	.08
ASB-8	.500	.875	1.48	2.00	1.000	.63	1.50	.19	#8	.11
ASB-12	.750	1.125	1.95	2.50	1.250	.75	2.00	.22	#10	.22
ASB-16	1.000	1.375	2.48	3.25	1.625	1.00	2.50	.28	1/4	.44
ASB-24	1.500	2.000	3.50	4.75	2.375	1.25	3.50	.34	5/16	1.16

Type FSB Flanged LinearRace Support Block



Material: Aluminum Alloy

Type FSB Flanged 60 Case LinearRace End Support Blocks

(Dimensions in inches)

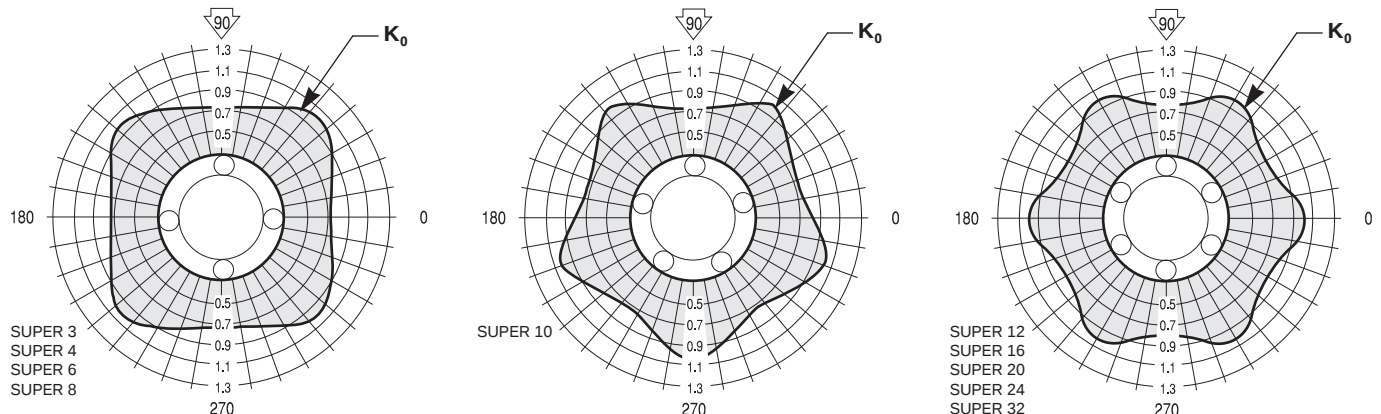
Part ⁽²⁾ No.	Nominal LinearRace Diameter d	A	B	C ±.010	D	E	F	G		J	Mass lb
								Hole	Bolt		
FSB-8	.500	1.63	.81	1.250	.88	.50	1.00	.18	#8	.25	.3
FSB-12	.750	2.38	1.19	1.750	1.00	.63	1.25	.21	#10	.31	.6
FSB-16	1.000	2.75	1.38	2.125	1.25	.63	1.50	.27	1/4	.31	.8
FSB-20	1.250	3.13	1.56	2.375	1.38	.75	1.75	.27	1/4	.38	.9

⁽¹⁾ 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 polar graphs below.

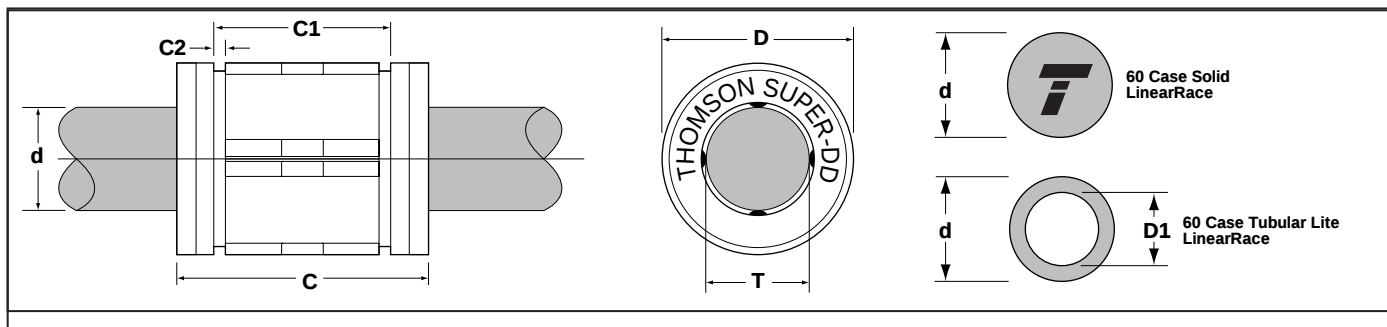
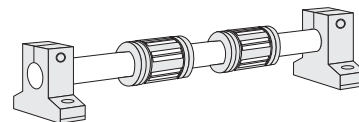
⁽²⁾ For part number description and specifications see page 42 and 43. Note: For additional technical data, see **Engineering Support Appendix**.

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.



Sealed Super Ball Bushing Bearings (Closed Type) for End Supported Applications



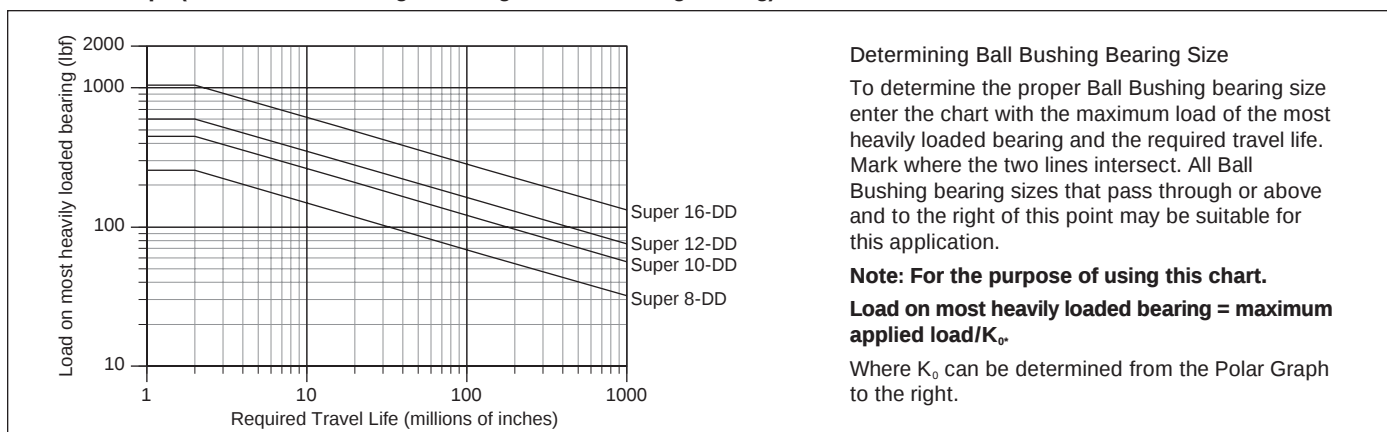
Sealed Super Ball Bushing* Bearings (Closed Type, seal at both ends) and 60 Case* LinearRace* (Dimensions in inches)

Part Number ⁽²⁾		Nominal Diameter d	Length C	Distance Between Retaining Ring Grooves C1	Retaining Ring Groove min. C2	Number of Ball Circuits	Ball Bushing Bearing Mass lb	60 Case LinearRace Minimum Depth of Hardness	60 Case Solid LinearRace Mass lb/in	60 Case Tubular Lite LinearRace Mass lb/in	60 Case Tubular Lite LinearRace ID D1
Ball Bushing Bearing	60 Case LinearRace										
SUPER-8-DD	LRL-8	.500	1.500/1.460	1.032/1.012	.050	4	.05	.04	.06	—	—
SUPER-10-DD	LRL-10	.625	1.750/1.710	1.105/1.095	.056	5	.11	.04	.09	—	—
SUPER-12-DD	LRL-12	.750	1.875/1.835	1.270/1.250	.056	6	.15	.06	.13	.08	.46/.41
SUPER-16-DD	LRL-16	1.000	2.625/2.585	1.884/1.864	.070	6	.27	.08	.22	.16	.62/.56

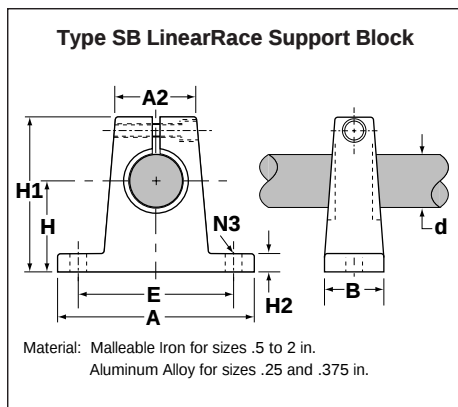
Part Number ⁽²⁾	Working Bore Diameter T	Recommended Housing Bore Diameter		60 Case LinearRace Diameter d	Ball Bushing Bearing/LinearRace Fit Up [†]		Dynamic Load Capacity lb _f ⁽¹⁾
		Fixed D	Adjustable D		Fixed Diameter Housing	Adjustable Diameter Housing (Before Adjustment)	
SUPER-8-DD	.5000/.4995	.8750/.8755	.8750/.8760	.4995/.4990	.0015C/.0000	.002C/.0000	255
SUPER-10-DD	.6250/.6245	1.1250/1.1255	1.1250/1.1260	.6245/.6240	.0015C/.0000	.002C/.0000	450
SUPER-12-DD	.7500/.7495	1.2500/1.2505	1.2500/1.2510	.7495/.7490	.0015C/.0000	.002C/.0000	600
SUPER-16-DD	1.0000/.9995	1.5625/1.5630	1.5625/1.5635	.9995/.9990	.0015C/.0000	.002C/.0000	1050

[†] P=Preload, C=Clearance

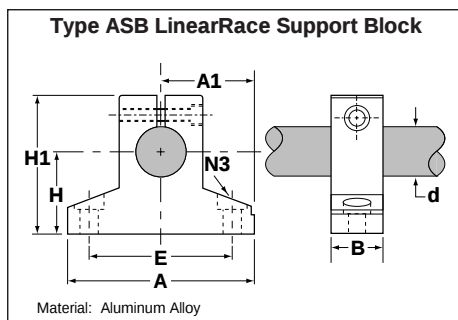
Load/Life Graph (Lines indicate limiting load for given Ball Bushing bearing)



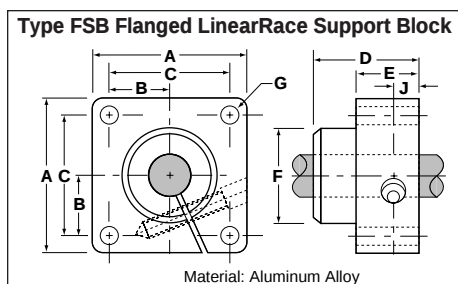
60 Case LinearRace Support Blocks for End Supported Applications



Type SB 60 Case* LinearRace* End Support Blocks										(Dimensions in inches)	
Part ⁽²⁾ No.	Nominal LinearRace Diameter d	H ±.002	H1	H2	A	A2	B	E ±.010	N3		Mass lb
									Hole	Bolt	
SB-8	.500	1.000	1.63	.25	2.00	.75	.63	1.500	.19	#8	.3
SB-10	.625	1.000	1.75	.31	2.50	.88	.69	1.875	.22	#10	.4
SB-12	.750	1.250	2.13	.31	2.75	1.00	.75	2.000	.22	#10	.5
SB-16	1.000	1.500	2.56	.38	3.25	1.38	1.00	2.500	.28	¼	1.0



Type ASB 60 Case LinearRace End Support Blocks										(Dimensions in inches)	
Part ⁽²⁾ No.	Nominal LinearRace Diameter d	H ±.001	H1	A	A1 ±.001	B	E	N3		Mass lb	
								Hole	Bolt		
ASB-8	.500	.875	1.48	2.00	1.000	.63	1.50	.19	#8	.11	
ASB-12	.750	1.125	1.95	2.50	1.250	.75	2.00	.22	#10	.22	
ASB-16	1.000	1.375	2.48	3.25	1.625	1.00	2.50	.28	¼	.44	



Type FSB Flanged 60 Case LinearRace End Support Blocks										(Dimensions in inches)	
Part ⁽²⁾ No.	Nominal LinearRace Diameter d	A	B	C ±.010	D	E	F	G		J	Mass lb
								Hole	Bolt		
FSB-8	.500	1.63	.81	1.250	.88	.50	1.00	.18	#8	.25	.3
FSB-12	.750	2.38	1.19	1.750	1.00	.63	1.25	.21	#10	.31	.6
FSB-16	1.000	2.75	1.38	2.125	1.25	.63	1.50	.27	¼	.31	.8

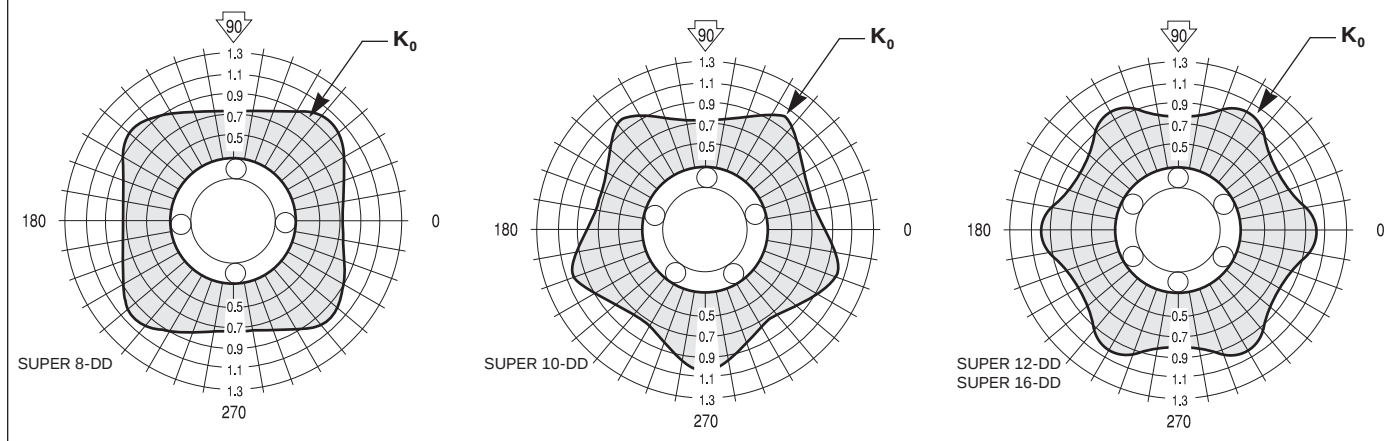
⁽¹⁾ The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.

⁽²⁾ For part number description and specifications see page 42 and 43.

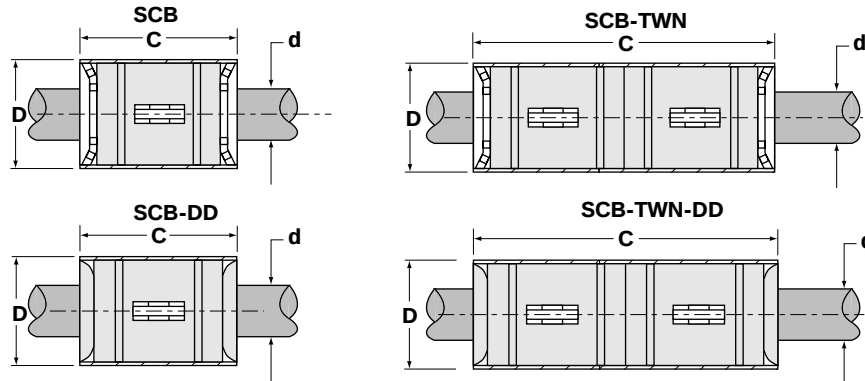
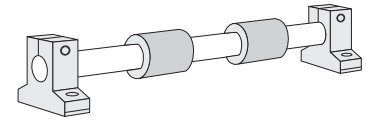
Note: For additional technical data, see **Engineering Support Appendix**.

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.



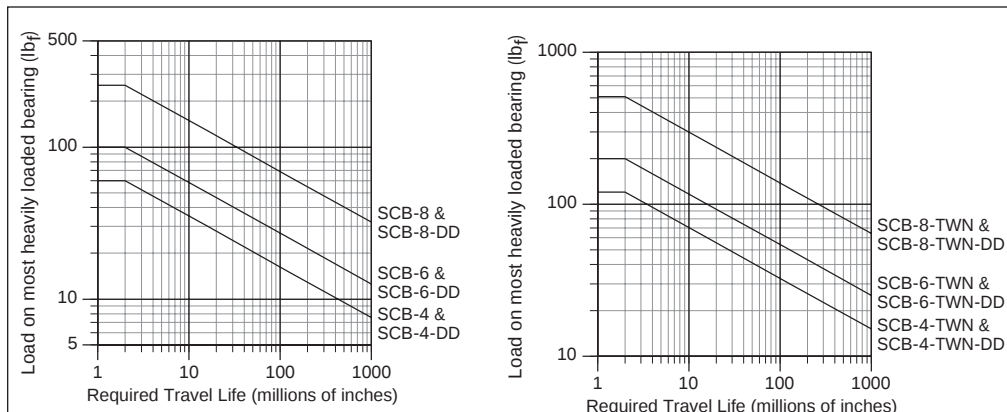
Super Ball Bushing Cartridge Bearing for End Supported Applications



Super Ball Bushing* Cartridge Bearings and 60 Case* LinearRace* (Dimensions in inches)													
Part Number ⁽²⁾			Nominal Diameter	Length C ±.005	Number of Ball Circuits	Ball Bushing Mass w/o Seals lb	Ball Bushing Mass With Seals lb	60 Case LinearRace Diameter d	Nominal Outside Dia. D	Rec. Housing Bore Dia. Fixed	60 Case LinearRace Minimum Depth of Hardness	60 Case LinearRace Mass lb/in	Dynamic ⁽¹⁾ Load Capacity lb _f
Without Seals	With Seals	60 Case LinearRace											
SCB-4	SCB-4-DD	LRL-4	.250	1.000	4	.01	.02	.2495/.2490	.531/.529	.535/.533	.027	.01	60
SCB-6	SCB-6-DD	LRL-6	.375	1.125	4	.02	.03	.3745/.3740	.656/.654	.660/.658	.027	.03	100
SCB-8	SCB-8-DD	LRL-8	.500	1.500	4	.06	.07	.4995/.4990	.906/.904	.910/.908	.04	.06	255

Super Ball Bushing Twin Cartridge Bearings and 60 Case LinearRace													(Dimensions in inches)
Part Number ⁽²⁾			Nominal Diameter	Length C ±.005	Number of Ball Circuits	Ball Bushing Mass w/o Seals lb	Ball Bushing Mass With Seals lb	60 Case LinearRace Diameter d	Nominal Outside Dia. D	Rec. Housing Bore Dia. Fixed	60 Case LinearRace Minimum Depth of Hardness	60 Case LinearRace Mass lb/in	Dynamic ⁽¹⁾ Load Capacity lb _f
Without Seals	With Seals	60 Case LinearRace											
SCB-4-TWN	SCB-4-TWN-DD	LRL-4	.250	1.750	4	.02	.04	.2495/.2490	.531/.529	.535/.533	.027	.01	120
SCB-6-TWN	SCB-6-TWN-DD	LRL-6	.375	2.000	4	.03	.04	.3745/.3740	.656/.654	.660/.658	.027	.03	200
SCB-8-TWN	SCB-8-TWN-DD	LRL-8	.500	2.750	4	.12	.13	.4995/.4990	.906/.904	.910/.908	.04	.06	510

Load/Life Graph (Lines indicate limiting load for given Ball Bushing Cartridge 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.

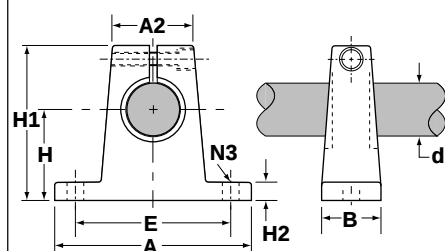
Note: For the purpose of using this chart.

Load on most heavily loaded bearing = maximum applied load/ K_0 .

Where K_0 can be determined from the Polar Graph to the right.

60 Case LinearRace Support Blocks for End Supported Applications

Type SB LinearRace Support Block

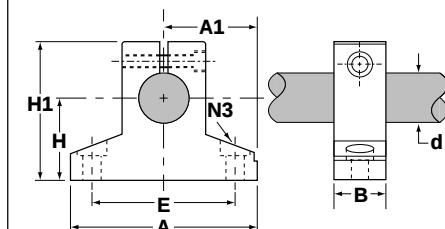


Material: Malleable Iron for sizes .5 to 2 in.
Aluminum Alloy for sizes .25 and .375 in.

Type SB 60 Case* LinearRace* End Support Blocks (Dimensions in inches)

Part ⁽²⁾ No.	Nominal LinearRace Diameter d	H ±.002	H1	H2	A	A2	B	E ±.010	N3		Mass lb
									Hole	Bolt	
SB-4	.250	.687	1.06	.25	1.50	.63	.50	1.125	.16	#6	.03
SB-6	.375	.750	1.19	.25	1.63	.69	.56	1.250	.16	#6	.05
SB-8	.500	1.000	1.63	.25	2.00	.75	.63	1.500	.19	#8	.30

Type ASB LinearRace Support Block

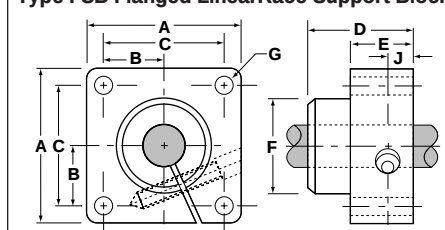


Material: Aluminum Alloy

Type ASB 60 Case LinearRace End Support Blocks (Dimensions in inches)

Part ⁽²⁾ No.	Nominal LinearRace Diameter d	H ±.001	H1	A	A1 ±.001	B	E	N3		Mass lb
								Hole	Bolt	
ASB-4	.250	.500	.88	1.50	.750	.50	1.12	.16	#6	.06
ASB-6	.375	.562	1.00	1.62	.813	.56	1.25	.16	#6	.08
ASB-8	.500	.875	1.48	2.00	1.000	.63	1.50	.19	#8	.11

Type FSB Flanged LinearRace Support Block



Material: Aluminum Alloy

Type FSB Flanged 60 Case LinearRace End Support Blocks (Dimensions in inches)

Part ⁽²⁾ No.	Nominal LinearRace Diameter d	A	B	C ±.010	D	E	F	G		J	Mass lb
								Hole	Bolt		
FSB-8	.500	1.63	.81	1.250	.88	.50	1.00	.18	#8	.25	.3

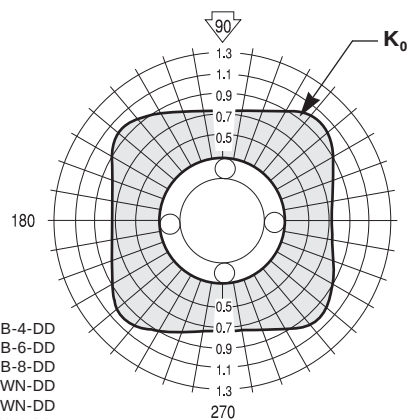
⁽¹⁾ The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below. Dynamic load capacity of Twin Super Cartridge bearing is based on two bearings equally loaded.

⁽²⁾ For part number description and specifications see page 42 and 43.

Note: For additional technical data, see **Engineering Support Appendix**.

Polar Graph

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.

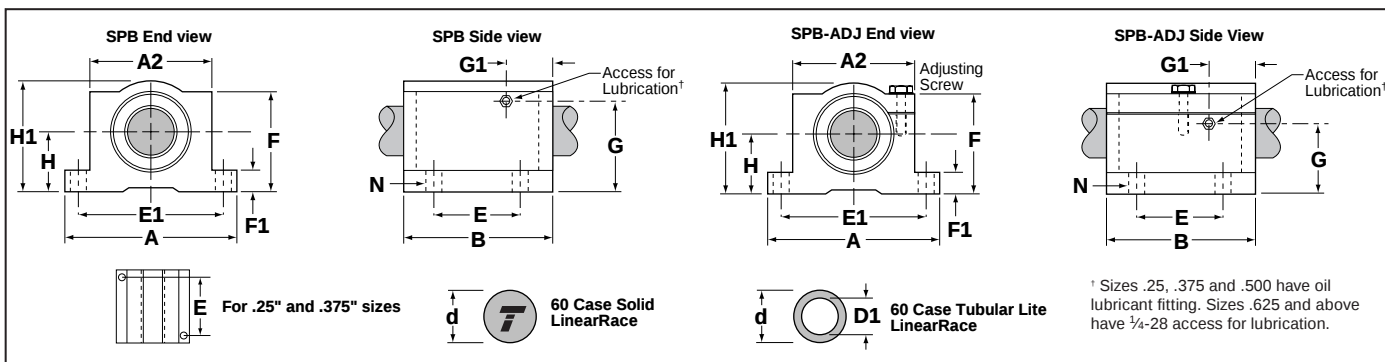
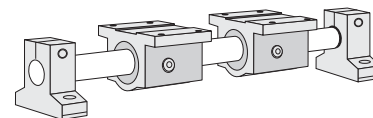


SCB-4 & SCB-4-DD
SCB-6 & SCB-6-DD
SCB-8 & SCB-8-DD
SCB-4-TWN & SCB-4-TWN-DD
SCB-6-TWN & SCB-6-TWN-DD
SCB-8-TWN & SCB-8-TWN-DD

Super Ball Bushing Pillow Blocks

(Closed and Adjustable Type)

for End Supported Applications

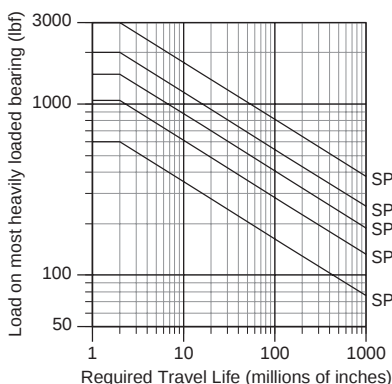
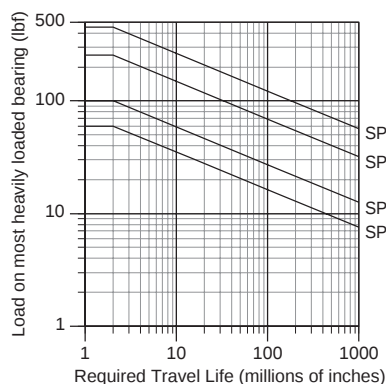


Super Ball Bushing* Pillow Blocks (Closed and Adjustable Types, seal at both ends) and 60* Case LinearRace* (Dimensions in inches)

Part Number ⁽²⁾			Nominal Diameter	H ±.003	H1	60 Case LinearRace Diameter d	60 Case LinearRace Minimum Depth of Hardness	60 Case Solid LinearRace Mass lb/in	60 Case Tubular Lite LinearRace Mass lb/in	60 Case Tubular Lite LinearRace ID D1
Super Ball Bushing Pillow Block		60 Case LinearRace								
Fixed	Adjustable									
SPB-4	SPB-4-ADJ	LRL-4	.250	.437	.81	.2495/.2490	.027	.01	—	—
SPB-6	SPB-6-ADJ	LRL-6	.375	.500	.94	.3745/.3740	.027	.03	—	—
SPB-8	SPB-8-ADJ	LRL-8	.500	.687	1.25	.4995/.4990	.04	.06	—	—
SPB-10	SPB-10-ADJ	LRL-10	.625	.875	1.63	.6245/.6240	.04	.09	—	—
SPB-12	SPB-12-ADJ	LRL-12	.750	.937	1.75	.7495/.7490	.06	.13	.08	.46/.41
SPB-16	SPB-16-ADJ	LRL-16	1.000	1.187	2.19	.9995/.9990	.08	.22	.16	.62/.56
SPB-20	SPB-20-ADJ	LRL-20	1.250	1.500	2.81	1.2495/1.2490	.08	.35	—	—
SPB-24	SPB-24-ADJ	LRL-24	1.500	1.750	3.25	1.4994/1.4989	.08	.50	.33	.93/.84
SPB-32	SPB-32-ADJ	LRL-32	2.000	2.125	4.06	1.9994/1.9987	.10	.89	.54	1.31/1.18

Part Number ⁽²⁾		A	A2	B	E ±.010	E1 ±.010	F	F1	G	G1	N		Pillow Block Mass lb	Dynamic Load Capacity lb _f
Super Ball Bushing Pillow Block											Hole	Bolt		
Fixed	Adjustable													
SPB-4	SPB-4-ADJ	1.63	1.00	1.19	.750	1.313	.75	.19	.61	.22	.16	#6	.10	60
SPB-6	SPB-6-ADJ	1.75	1.13	1.31	.875	1.438	.88	.19	.72	.22	.16	#6	.13	100
SPB-8	SPB-8-ADJ	2.00	1.38	1.69	1.000	1.688	1.13	.25	.69	.84	.16	#6	.20	255
SPB-10	SPB-10-ADJ	2.50	1.75	1.94	1.125	2.125	1.44	.28	.70	.68	.19	#8	.50	450
SPB-12	SPB-12-ADJ	2.75	1.88	2.06	1.250	2.375	1.56	.31	.94	.72	.19	#8	.60	600
SPB-16	SPB-16-ADJ	3.25	2.38	2.81	1.750	2.875	1.94	.38	1.20	.86	.22	#10	1.20	1050
SPB-20	SPB-20-ADJ	4.00	3.00	3.63	2.000	3.500	2.50	.44	1.50	1.20	.22	#10	2.50	1500
SPB-24	SPB-24-ADJ	4.75	3.50	4.00	2.500	4.125	2.88	.50	1.75	1.25	.28	¼	3.80	2000
SPB-32	SPB-32-ADJ	6.00	4.50	5.00	3.250	5.250	3.63	.63	2.12	1.58	.41	⅜	7.00	3000

Load/Life Graph (Lines indicate limiting load for given Ball Bushing Pillow Block)



Determining Ball Bushing Bearing Size

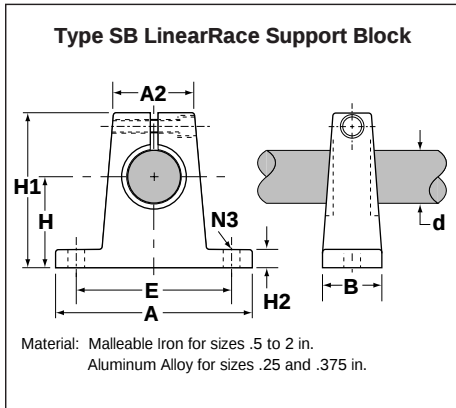
To determine the proper Ball Bushing bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing bearing sizes that pass through or above and to the right of this point may be suitable for this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

Note: For the purpose of using this chart.

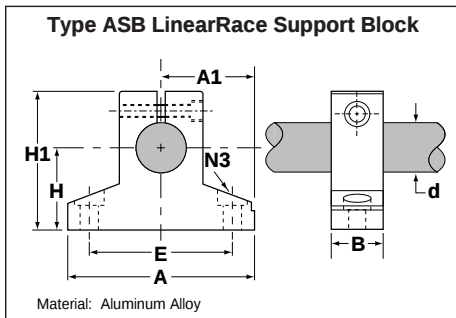
Load on most heavily loaded bearing = maximum applied load/K₀.

Where K₀ can be determined from the Polar Graph to the right.

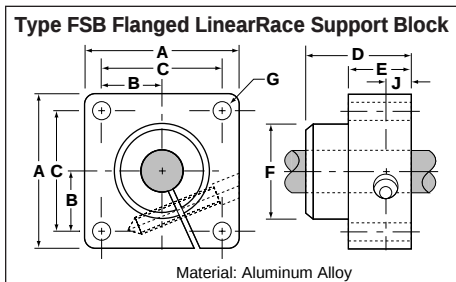
60 Case LinearRace Support Blocks for End Supported Applications



Type SB 60 Case* LinearRace* End Support Blocks (Dimensions in inches)											
Part ⁽²⁾ No.	Nominal LinearRace Diameter d	H	H1	H2	A	A2	B	E	N3		Mass lb
		±.002							±.010	Hole	
SB-4	.250	.687	1.06	.25	1.50	.63	.50	1.125	.16	#6	.03
SB-6	.375	.750	1.19	.25	1.63	.69	.56	1.250	.16	#6	.05
SB-8	.500	1.000	1.63	.25	2.00	.75	.63	1.500	.19	#8	.30
SB-10	.625	1.000	1.75	.31	2.50	.88	.69	1.875	.22	#10	.40
SB-12	.750	1.250	2.13	.31	2.75	1.00	.75	2.000	.22	#10	.50
SB-16	1.000	1.500	2.56	.38	3.25	1.38	1.00	2.500	.28	¼	1.00
SB-20	1.250	1.750	3.00	.44	4.00	1.75	1.13	3.000	.34	5/16	2.00
SB-24	1.500	2.000	3.50	.50	4.75	2.00	1.25	3.500	.34	5/16	2.60
SB-32	2.000	2.500	4.50	.63	6.00	2.63	1.50	4.500	.41	¾	4.80



Type ASB 60 Case LinearRace End Support Blocks (Dimensions in inches)										
Part ⁽²⁾ No.	Nominal LinearRace Diameter d	H ±.001	H1	A	A1 ±.001	B	E	N3		Mass lb
								Hole	Bolt	
ASB-4	.250	.500	.88	1.50	.750	.50	1.12	.16	#6	.06
ASB-6	.375	.562	1.00	1.62	.813	.56	1.25	.16	#6	.08
ASB-8	.500	.875	1.48	2.00	1.000	.63	1.50	.19	#8	.11
ASB-12	.750	1.125	1.95	2.50	1.250	.75	2.00	.22	#10	.22
ASB-16	1.000	1.375	2.48	3.25	1.625	1.00	2.50	.28	1/4	.44
ASB-24	1.500	2.000	3.50	4.75	2.375	1.25	3.50	.34	5/16	1.16



Type FSB Flanged 60 Case LinearRace End Support Blocks (Dimensions in inches)											
Part ⁽²⁾ No.	Nominal LinearRace Diameter d	A	B	C ±.010	D	E	F	G		J	Mass lb
								Hole	Bolt		
FSB-8	.500	1.63	.81	1.250	.88	.50	1.00	.18	#8	.25	.3
FSB-12	.750	2.38	1.19	1.750	1.00	.63	1.25	.21	#10	.31	.6
FSB-16	1.000	2.75	1.38	2.125	1.25	.63	1.50	.27	¼	.31	.8
FSB-20	1.250	3.13	1.56	2.375	1.38	.75	1.75	.27	¼	.38	.9

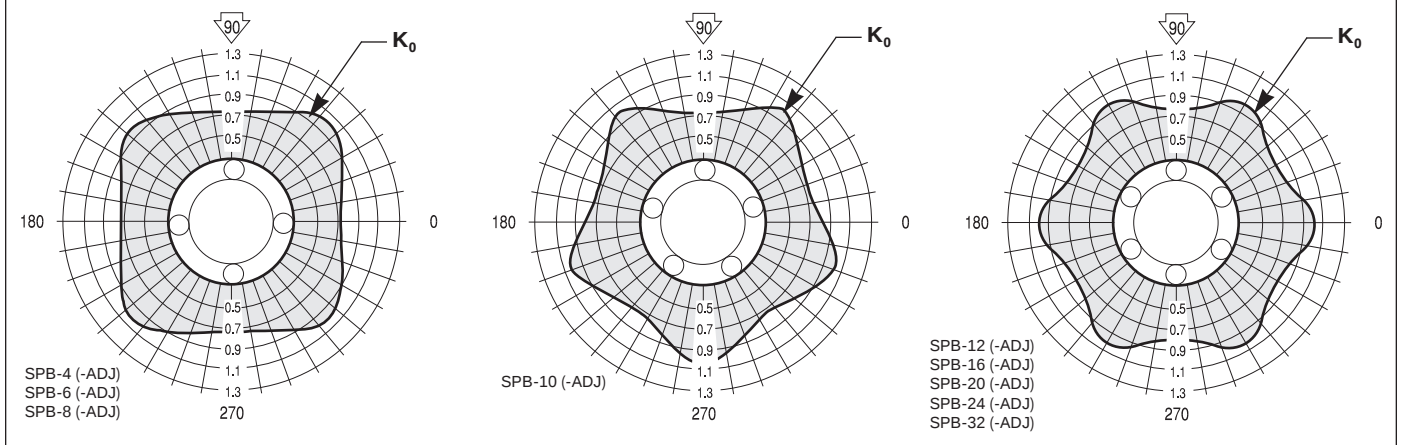
⁽¹⁾ The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.

⁽²⁾ For part number description and specifications see page 42 and 43.

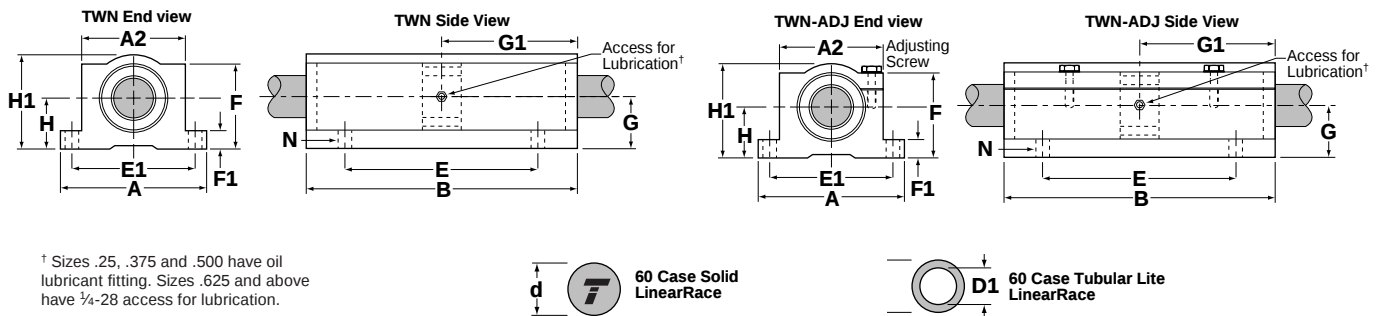
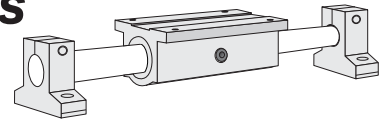
Note: For additional technical data, see **Engineering Support Appendix**.

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.



Super Ball Bushing Twin Pillow Blocks (Closed Type) for End Supported Applications

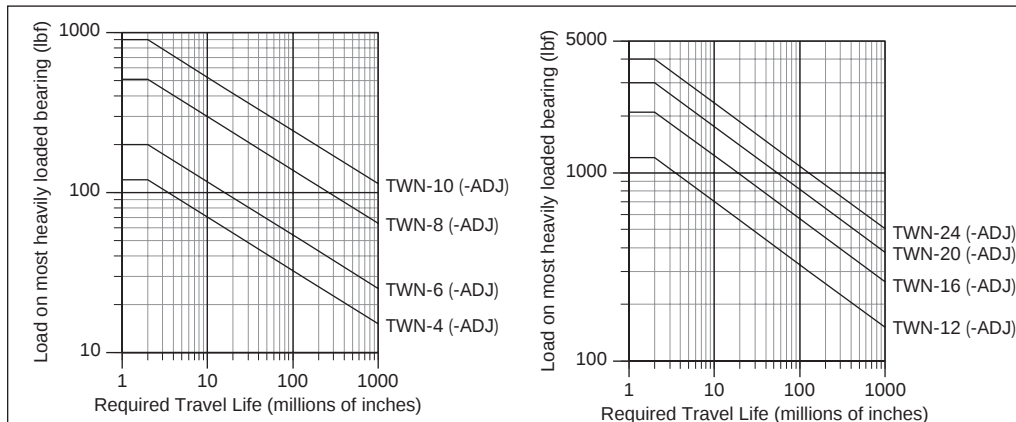


Super Ball Bushing* Twin Pillow Blocks (Closed Type, seal at both ends) and 60 Case* LinearRace* (Dimensions in inches)

Part Number ⁽²⁾		60 Case LinearRace	Nominal Diameter	H ±.003	H1	60 Case LinearRace Diameter d	60 Case LinearRace Minimum Depth of Hardness	60 Case Solid LinearRace Mass lb/in	60 Case Tubular Lite LinearRace Mass lb/in	60 Case Tubular Lite LinearRace ID D1
Fixed	Adjustable									
TWN-4	TWN-4-ADJ	LRL-4	.250	.437	.81	.2495/.2490	.027	.01	—	—
TWN-6	TWN-6-ADJ	LRL-6	.375	.500	.94	.3745/.3740	.027	.03	—	—
TWN-8	TWN-8-ADJ	LRL-8	.500	.687	1.25	.4995/.4990	.04	.06	—	—
TWN-10	TWN-10-ADJ	LRL-10	.625	.875	1.63	.6245/.6240	.04	.09	—	—
TWN-12	TWN-12-ADJ	LRL-12	.750	.937	1.75	.7495/.7490	.06	.13	.08	.46/.41
TWN-16	TWN-16-ADJ	LRL-16	1.000	1.187	2.19	.9995/.9990	.08	.22	.16	.62/.56
TWN-20	TWN-20-ADJ	LRL-20	1.250	1.500	2.81	1.2495/1.2490	.08	.35	—	—
TWN-24	TWN-24-ADJ	LRL-24	1.500	1.750	3.25	1.4994/1.4989	.08	.50	.33	.93/.84

Part Number ⁽²⁾		A	A2	B	E ±.010	E1 ±.010	F	F1	G	G1	N		Pillow Block Mass lb	Dynamic ⁽¹⁾ Load Capacity lb _f
Fixed	Adjustable										Hole	Bolt		
TWN-4	TWN-4-ADJ	1.63	1.00	2.50	2.000	1.313	.75	.19	.44	1.25	.16	#6	.19	120
TWN-6	TWN-6-ADJ	1.75	1.13	2.75	2.250	1.438	.88	.19	.50	1.37	.16	#6	.25	200
TWN-8	TWN-8-ADJ	2.00	1.38	3.50	2.500	1.688	1.13	.25	.59	1.75	.16	#6	.40	510
TWN-10	TWN-10-ADJ	2.50	1.75	4.00	3.000	2.125	1.44	.28	.85	2.00	.19	#8	1.00	900
TWN-12	TWN-12-ADJ	2.75	1.88	4.50	3.500	2.375	1.56	.31	.94	2.25	.19	#8	1.20	1200
TWN-16	TWN-16-ADJ	3.25	2.38	6.00	4.500	2.875	1.94	.38	1.19	3.00	.22	#10	2.40	2100
TWN-20	TWN-20-ADJ	4.00	3.00	7.50	5.500	3.500	2.50	.44	1.50	3.75	.22	#10	5.00	3000
TWN-24	TWN-24-ADJ	4.75	3.50	9.00	6.500	4.125	2.88	.50	1.75	4.50	.28	¼	7.80	4000

Load/Life Graph (Lines indicate limiting load for given Ball Bushing Pillow Block)



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.

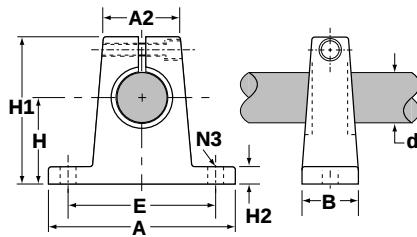
Note: For the purpose of using this chart.

Load on most heavily loaded bearing = maximum applied load/K_o.

Where K_o can be determined from the Polar Graph to the right.

60 Case LinearRace Support Blocks for End Supported Applications

Type SB LinearRace Support Block

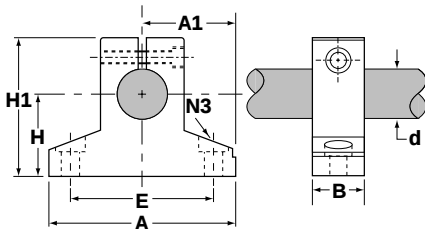


Material: Malleable Iron for sizes .5 to 2 in.
Aluminum Alloy for sizes .25 and .375 in.

Type SB 60 Case* LinearRace* End Support Blocks (Dimensions in inches)

Part ⁽²⁾ No.	Nominal LinearRace Diameter d	H ±.002	H1	H2	A	A2	B	E ±.010	N3		Mass lb
									Hole	Bolt	
SB-4	.250	.687	1.06	.25	1.50	.63	.50	1.125	.16	#6	.03
SB-6	.375	.750	1.19	.25	1.63	.69	.56	1.250	.16	#6	.05
SB-8	.500	1.000	1.63	.25	2.00	.75	.63	1.500	.19	#8	.30
SB-10	.625	1.000	1.75	.31	2.50	.88	.69	1.875	.22	#10	.40
SB-12	.750	1.250	2.13	.31	2.75	1.00	.75	2.000	.22	#10	.50
SB-16	1.000	1.500	2.56	.38	3.25	1.38	1.00	2.500	.28	1/4	1.00
SB-20	1.250	1.750	3.00	.44	4.00	1.75	1.13	3.000	.34	5/16	2.00
SB-24	1.500	2.000	3.50	.50	4.75	2.00	1.25	3.500	.34	5/16	2.60

Type ASB LinearRace Support Block

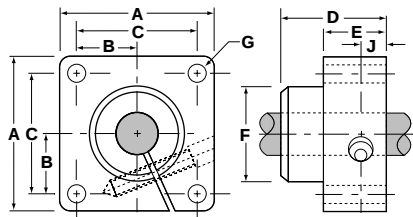


Material: Aluminum Alloy

Type ASB 60 Case LinearRace End Support Blocks (Dimensions in inches)

Part ⁽²⁾ No.	Nominal LinearRace Diameter d	H ±.001	H1	A	A1 ±.001	B	E	N3		Mass lb
								Hole	Bolt	
ASB-4	.250	.500	.88	1.50	.750	.50	1.12	.16	#6	.06
ASB-6	.375	.562	1.00	1.62	.813	.56	1.25	.16	#6	.08
ASB-8	.500	.875	1.48	2.00	1.000	.63	1.50	.19	#8	.11
ASB-12	.750	1.125	1.95	2.50	1.250	.75	2.00	.22	#10	.22
ASB-16	1.000	1.375	2.48	3.25	1.625	1.00	2.50	.28	1/4	.44
ASB-24	1.500	2.000	3.50	4.75	2.375	1.25	3.50	.34	5/16	1.16

Type FSB Flanged LinearRace Support Block



Material: Aluminum Alloy

Type FSB Flanged 60 Case LinearRace End Support Blocks (Dimensions in inches)

Part ⁽²⁾ No.	Nominal LinearRace Diameter d	A	B	C ±.010	D	E	F	G		J	Mass lb
								Hole	Bolt		
FSB-8	.500	1.63	.81	1.250	.88	.50	1.00	.18	#8	.25	.3
FSB-12	.750	2.38	1.19	1.750	1.00	.63	1.25	.21	#10	.31	.6
FSB-16	1.000	2.75	1.38	2.125	1.25	.63	1.50	.27	1/4	.31	.8
FSB-20	1.250	3.13	1.56	2.375	1.38	.75	1.75	.27	1/4	.38	.9

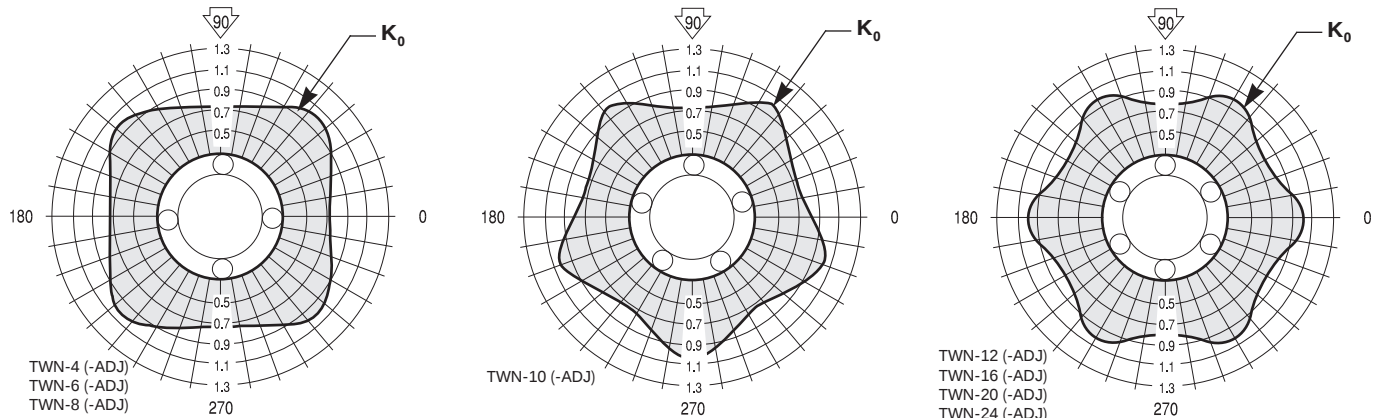
⁽¹⁾ The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below. Dynamic load capacity of Super Ball Bushing Twin Pillow Blocks is based on two bearings equally loaded.

⁽²⁾ For part number description and specifications see page 42 and 43.

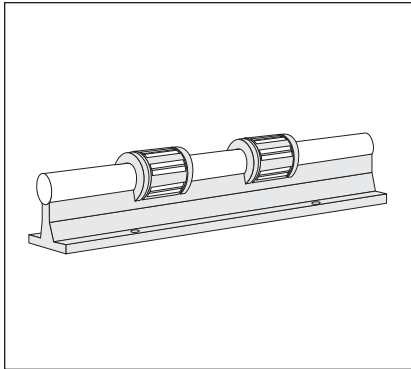
Note: For additional technical data, see **Engineering Support Appendix**.

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.



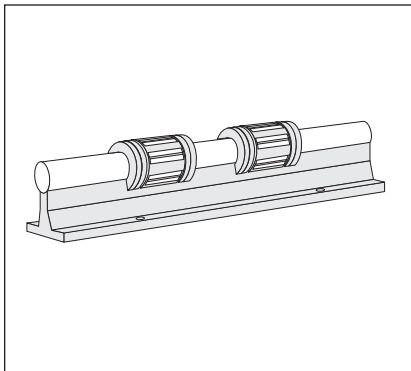
Super Ball Bushing Bearings and Pillow Blocks for Continuously Supported Applications



Super Ball Bushing* Bearings (Open Type)

Features:

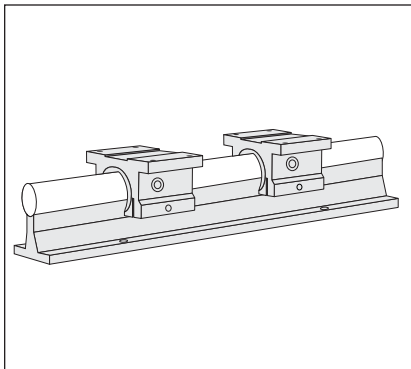
- Available in sizes ½-2 inch diameter.
- Load capacity ranges from 230 to 2,350 lb_f.
- Self-aligning in all directions.
- Can be adjusted to take out diametrical clearance.
- Can be mounted in customized housing.
- Travel speeds up to 10 ft/s.
- Available with corrosion resistant components.



Sealed Super Ball Bushing Bearings (Open Type)

Features:

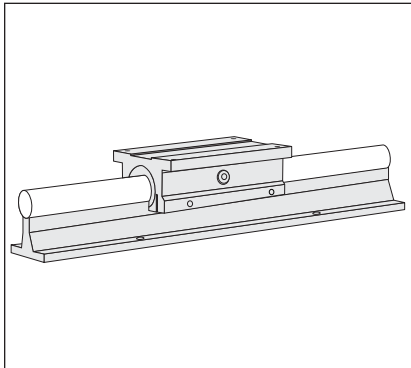
- Standard integral double acting seals retain lubrication and keep out contaminants.
- Available in sizes ½, ¾ and 1 inch diameter.
- Load capacity ranges from 230 to 780 lb_f.
- Self-aligning in all directions.
- Can be adjusted to take out diametrical clearance.
- Can be mounted in customized housing.
- Travel speeds up to 10 ft/s.
- Available with corrosion resistant components.



Super Ball Bushing Pillow Blocks (Open Type)

Features:

- Available in sizes ½-2 inch diameter.
- Load capacity ranges from 230 to 2,350 lb_f.
- Self-aligning in all directions.
- Can be adjusted to take out diametrical clearance.
- Travel speeds up to 10 ft/s.
- Standard integral double acting seals retain lubrication and keep out contaminants.
- Available with corrosion resistant components.
- Easily mounted and secured with four mounting bolts.
- Available with standard lubrication access. Sizes .25, .375 and .500 have oil lubricant fitting. Sizes .625 and above have ¼-28 access for lubrication.

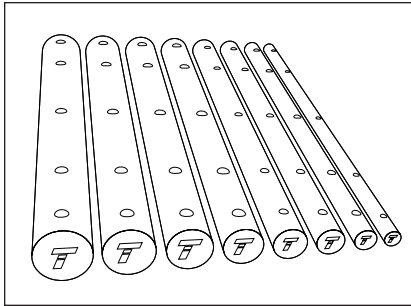


Super Ball Bushing Twin Pillow Blocks (Open Type)

Features:

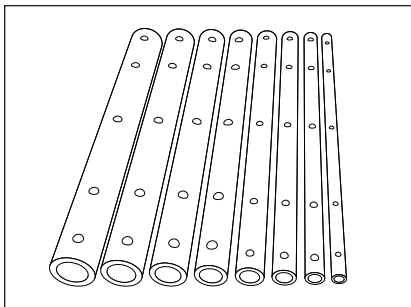
- Available in sizes ½-1½ inch diameter.
- Load capacity ranges from 460 to 3,120 lb_f.
- Can be adjusted to take out diametrical clearance.
- Available with corrosion resistant components.
- Standard integral double acting seals retain lubrication and keep out contaminants.
- Easily mounted and secured with four mounting bolts.
- Maximum travel speeds up to 10 ft/s.
- Available with standard lubrication access. Sizes .25, .375 and .500 have oil lubricant fitting. Sizes .625 and above have ¼-28 access for lubrication.
- Built-in lubrication wick for continuous lubrication.

60 Case LinearRace Shafting (PreDrilled) for Continuously Supported Applications



Solid 60 Case* LinearRace* Shafting with Mounting Holes Features:

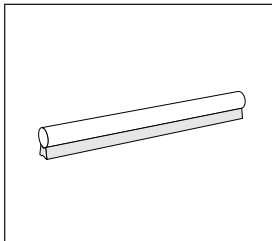
- Radial drilled and tapped holes ready for immediate use with standard hole spacing to match standard 60 Case LinearRace support rails.
- Diameter range between ½ and 4 inch.
- Surface finish 12 R_a microinch.
- Hardness 60-65 HRC.
- Roundness 80 millionths of an inch.
- Available in corrosion resistant 440C stainless steel (50-55 HRC).
- Available with Preplate chrome option.
- Standard straightness .001 inch per foot cumulative (.002 TIR) with special straightness at .0005 inch per foot cumulative (.001 TIR) available.



60 Case Tubular Lite LinearRace Shafting with Mounting Holes Features:

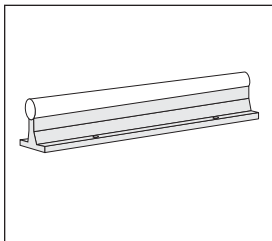
- Hollow design reduces weight and inertia.
- Radial drilled and tapped holes ready for immediate use.
- Standard hole spacing to match standard 60 Case LinearRace support rails.
- Diameter range between 1½ and 4 inch.
- Roundness 80 millionths of an inch.
- Case hardness 60-65 HRC.
- Surface finish 12 R_a microinch.
- Available with Preplate chrome option.
- Standard straightness .001 inch per foot cumulative (.002 TIR) with special straightness at .0005 inch per foot cumulative (.001 TIR) available.

60 Case LinearRace Support Rails and Assemblies for Continuously Supported Applications



LSR Low Profile 60 Case LinearRace Support Rail Features:

- Diameter range between ½ and 4 inch.
- Available with standard mounting holes for immediate use.
- Available without mounting holes for custom hole spacing.
- Low Profile design.
- Unlimited travel lengths.



SR 60 Case LinearRace Support Rail SRA 60 Case LinearRace Support Rail Assembly Features:

- Diameter range between ½ and 2 inch.
- Available with standard mounting holes for immediate use.
- Available without mounting holes for customized hole spacing.
- Available as a pre-engineered, ready to install assembly.
- Light weight, high strength aluminum alloy rail.
- Unlimited travel lengths.

Part Number Description and Specification:

Super Ball Bushing* Bearings (Open Type) for Continuously Supported Applications

SUPER 16-OPN-CR				
Type	Description	Size	Nominal Diameter	Option Description
SUPER	Super Ball Bushing bearings	8	.500	– Standard
		10	.625	CR Corrosion Resistant
		12	.750	DD Integral Seals
		16	1.000	NB Nylon Balls
		20	1.250	DP Dry Packed
		24	1.500	
		32	2.000	
Type	Description			
OPN	Open Type for continuously supported application			

Super Ball Bushing Pillow Blocks (Open Type) for Continuously Supported Applications

SPB 16-OPN-CR				
Type	Description	Size	Nominal Diameter	Option Description
SPB	Super Ball Bushing Pillow Blocks	8	.500	– Standard
TWN	Super Ball Bushing Twin Pillow Blocks	10	.625	CR Corrosion Resistant
		12	.750	NB Nylon Balls
		16	1.000	
		20	1.250	
		24	1.500	
		32	2.000	
Type	Description			
OPN	Open Type for continuously supported application			

Part Number Description and Specification:

60 Case* LinearRace* Shafting (PreDrilled) for Continuously Supported Applications

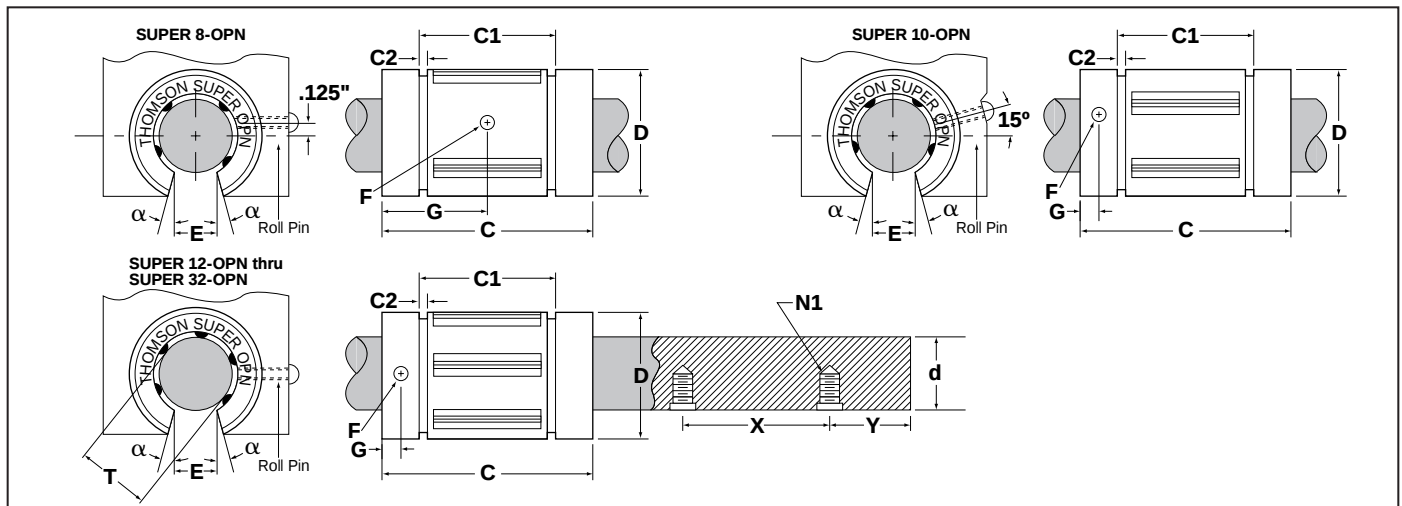
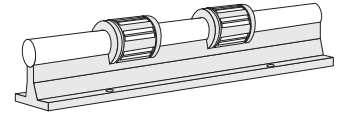
LRL-16-SS-PD						
Type	Description	Class	Size	Nominal Diameter	Type	Description
LR	60 Case LinearRace	L	8	.500	PD	PreDrilled
			10	.625		
			12	.750		
			16	1.000		
			20	1.250		
			24	1.500		
			32	2.000		
Option	Description					
–	High Carbon Steel					
SS	440C Stainless Steel					
TU	Tubular Lite					
CP	Preplate Chrome					

60 Case LinearRace Shafting						
Part Number			Part Number		Part Number	
60 Case Solid LinearRace	60 Case LinearRace Diameter Class L	Max. Length in.	Stainless Steel 60 Case LinearRace	Max. Length in.	Chrome Plated 60 Case LinearRace	Max. Length in.
LRL-8-PD	.4995/.4990	168	—	—	LRL-8-CP-PD	168
LRL-10-PD	.6245/.6240	178	LRL-10-SS-PD	178	LRL-10-CP-PD	178
LRL-12-PD	.7495/.7490	178	LRL-12-SS-PD	178	LRL-12-CP-PD	178
LRL-16-PD	.9995/.9990	178	LRL-16-SS-PD	178	LRL-16-CP-PD	178
LRL-20-PD	1.2495/1.2490	178	LRL-20-SS-PD	178	LRL-20-CP-PD	178
LRL-24-PD	1.4994/1.4989	178	LRL-24-SS-PD	178	LRL-24-CP-PD	178
LRL-32-PD	1.9994/1.9987	178	LRL-32-SS-PD	178	LRL-32-CP-PD	178

60 Case LinearRace Support Rails and Assemblies for Continuously Supported Applications

Type	Description	SR-16-PD x Length				Type	Description
LSR	Low Profile 60 Case LinearRace Support Rail					–	w/o PreDrilled holes
SR	60 Case LinearRace Support Rail					PD	with PreDrilled holes
		SRA-16-SS x Length				Type	Description
Type	Description	Size	Nom. Dia.	Size	Nom. Dia.	–	Standard Assembly
SRA	60 Case LinearRace Support Rail Assembly	8	.500	20	1.250	SS	With stainless steel 60 Case LinearRace
		10	.625	24	1.500	TU	With Tubular Lite 60 Case LinearRace
		12	.750	32	2.000	CP	With PrePlate Chrome 60 Case LinearRace
		16	1.000				

Super Ball Bushing Bearings (Open Type) for Continuously Supported Applications

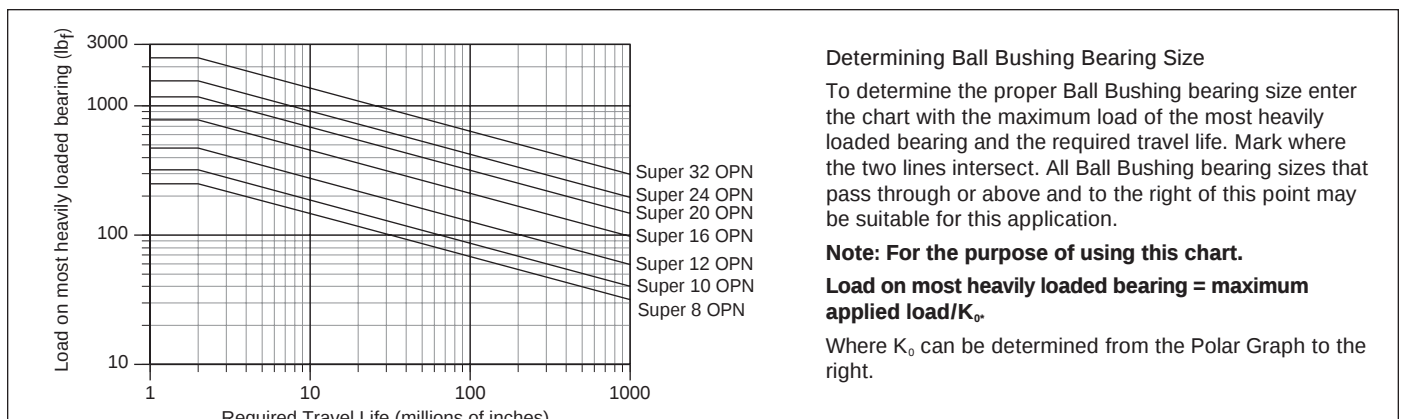


Super Ball Bushing Bearings (Open Type) and 60 Case LinearRace														(Dimensions in inches)		
Part Number ⁽²⁾		Nominal Diameter	Length C	Distance Between Retaining Rings C1	Ret. Ring Groove min. C2	Min. Slot Width E	Retention Hole		Angle deg α	Number of Ball Circuits	Ball Bushing Bearing Mass lb	60 Case LinearRace Minimum Depth of Hardness	60 Case Solid LinearRace Mass lb/in	60 Case LinearRace Mounting Holes		
Ball Bushing Bearing	60 Case LinearRace						Dia. F	Loc. G						X	Y	N1
SUPER 8-OPN	LRL-8-PD	.500	1.250/1.230	1.032/1.012	.050	.31	.14	.63	15	4	.04	.04	.06	4	2	#6-32
SUPER 10-OPN	LRL-10-PD	.625	1.500/1.480	1.105/1.095	.056	.37	.11	.13	15	4	.08	.04	.09	4	2	#8-32
SUPER 12-OPN	LRL-12-PD	.750	1.625/1.605	1.270/1.250	.056	.43	.14	.13	15	5	.12	.06	.13	6	3	#10-32
SUPER 16-OPN	LRL-16-PD	1.000	2.250/2.230	1.884/1.864	.070	.56	.14	.13	15	5	.21	.08	.22	6	3	1/4-20
SUPER 20-OPN	LRL-20-PD	1.250	2.625/2.600	2.004/1.984	.068	.62	.20	.19	15	5	.38	.08	.35	6	3	5/16-18
SUPER 24-OPN	LRL-24-PD	1.500	3.000/2.970	2.410/2.390	.086	.75	.20	.19	15	5	.71	.08	.50	8	4	3/8-16
SUPER 32-OPN	LRL-32-PD	2.000	4.000/3.960	3.193/3.163	.105	1.00	.27	.31	15	5	1.20	.10	.89	8	4	1/2-13

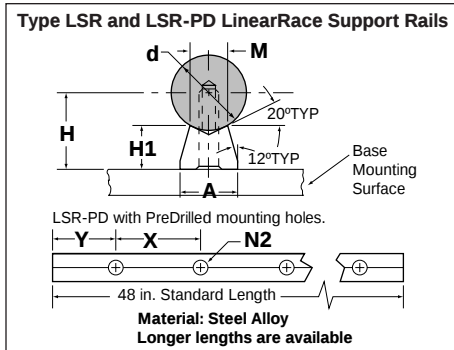
Part Number ⁽²⁾	Working Bore Diameter T	Recommended Housing Bore Diameter		60 Case LinearRace Diameter d	Ball Bushing Bearing/LinearRace Fit Up [†]		Dynamic ⁽¹⁾ Load Capacity lb _f
		Fixed D	Adjustable D		Fixed Diameter Housing	Adjustable Diameter Housing (Before Adjustment)	
SUPER 8-OPN	.5000/.4995	.8755/.8750	.8760/.8750	.4995/.4990	.0015C/.0000	.0020C/.0000	230
SUPER 10-OPN	.6250/.6245	1.1255/1.1250	1.1260/1.1250	.6245/.6240	.0015C/.0000	.0020C/.0000	320
SUPER 12-OPN	.7500/.7495	1.2505/1.2500	1.2510/1.2500	.7495/.7490	.0015C/.0000	.0020C/.0000	470
SUPER 16-OPN	1.0000/.9995	1.5630/1.5625	1.5635/1.5625	.9995/.9990	.0015C/.0000	.0020C/.0000	780
SUPER 20-OPN	1.2500/1.2494	2.0008/2.0000	2.0010/2.0000	1.2495/1.2490	.0018C/.0001P	.0020C/.0001P	1170
SUPER 24-OPN	1.5000/1.4994	2.3760/2.3750	2.3760/2.3750	1.4994/1.4989	.0021C/.0000	.0021C/.0000	1560
SUPER 32-OPN	2.0000/1.9992	3.0010/3.0000	3.0010/3.0000	1.9994/1.9987	.0023C/.0002P	.0023C/.0002P	2350

Load/Life Graph (Lines indicate limiting load for given Ball Bushing bearing)

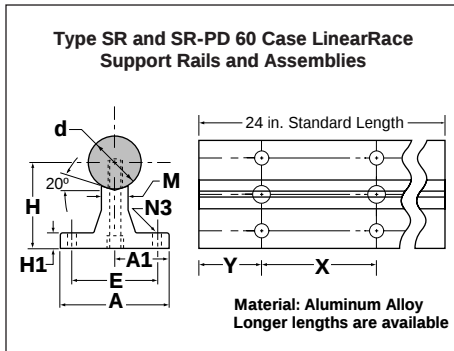
[†] P=Preload, C=Clearance



60 Case LinearRace Support Rails and Assemblies for Continuously Supported Applications



Type LSR and LSR-PD 60 Case* LinearRace* Support Rails (Dimensions in inches)											
LSR Standard Without Holes	LSR-PD Standard w/PreDrilled Holes	Nominal LinearRace Diameter d	H ±.002	H1	A	M	Mounting Holes		X	Y	LSR Mass lb/ft
							N2 Hole	N1 Bolt			
LSR-8	LSR-8-PD	.500	.562	.34	.37	.25	.17	#6-32	4	2	.32
LSR-10	LSR-10-PD	.625	.687	.41	.45	.31	.19	#8-32	4	2	.49
LSR-12	LSR-12-PD	.750	.750	.42	.51	.38	.22	#10-32	6	3	.59
LSR-16	LSR-16-PD	1.000	1.000	.56	.69	.50	.28	1/4-20	6	3	1.01
LSR-20	LSR-20-PD	1.250	1.187	.63	.78	.56	.34	5/16-18	6	3	1.27
LSR-24	LSR-24-PD	1.500	1.375	.70	.93	.69	.41	3/8-16	8	4	1.68
LSR-32	LSR-32-PD	2.000	1.750	.85	1.18	.88	.53	1/2-13	8	4	2.59



Type SR/ SR-PD LinearRace Support Rails and Assemblies														(Dimensions in inches)		
SR Without Holes	SR-PD With PreDrilled Holes	Assy. W/Solid LinearRace	Nom. LinearRace Dia. d	H ±.002	H1	A	A1 ±.002	E	M	N3		LinearRace Mounting Bolt N1	X	Y	SR Mass lb/ft	
										Hole	Bolt					
SR-8	SR-8-PD	SRA-8	.500	1.125	.19	1.50	.750	1.00	.25	.17	#6	#6-32 x .88	4	2	.60	
SR-10	SR-10-PD	SRA-10	.625	1.125	.25	1.63	.813	1.13	.31	.19	#8	#8-32 x .88	4	2	.80	
SR-12	SR-12-PD	SRA-12	.750	1.500	.25	1.75	.875	1.25	.38	.22	#10	#10-32 x 1.25	6	3	1.00	
SR-16	SR-16-PD	SRA-16	1.000	1.750	.25	2.13	1.063	1.50	.50	.28	¼	¼-20 x 1.50	6	3	1.40	
SR-20	SR-20-PD	SRA-20	1.250	2.125	.31	2.50	1.250	1.88	.56	.34	⅝	⅝-18 x 1.75	6	3	2.10	
SR-24	SR-24-PD	SRA-24	1.500	2.500	.38	3.00	1.500	2.25	.69	.34	⅝	⅝-16 x 2.00	8	4	2.60	
SR-32	SR-32-PD	SRA-32	2.000	3.250	.50	3.75	1.875	2.75	.88	.41	¾	½-13 x 2.50	8	4	4.20	

⁽¹⁾ 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 polar graphs below.

⁽²⁾ For the maximum length of all 60 Case LinearRace Support Rail Assemblies without 60 Case LinearRace Joints see maximum length table on page 57. 60 Case LinearRace Support Rail Assemblies are available with 60 Case LinearRace joints for unlimited travel lengths.

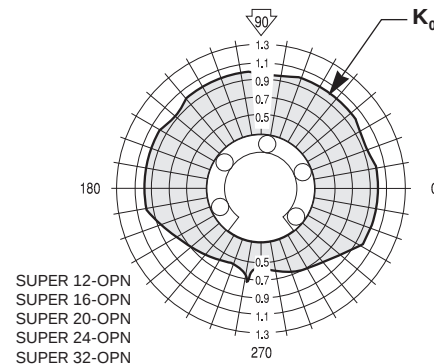
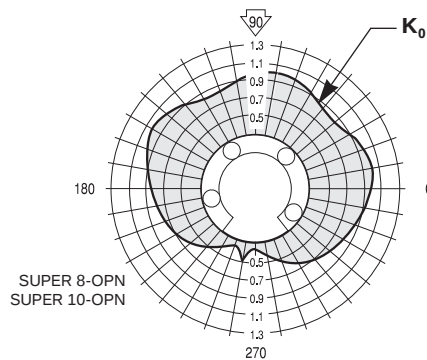
⁽³⁾ For part number description and specifications see page 56 and 57.

Note: For additional technical data, see **Engineering Support Appendix**.

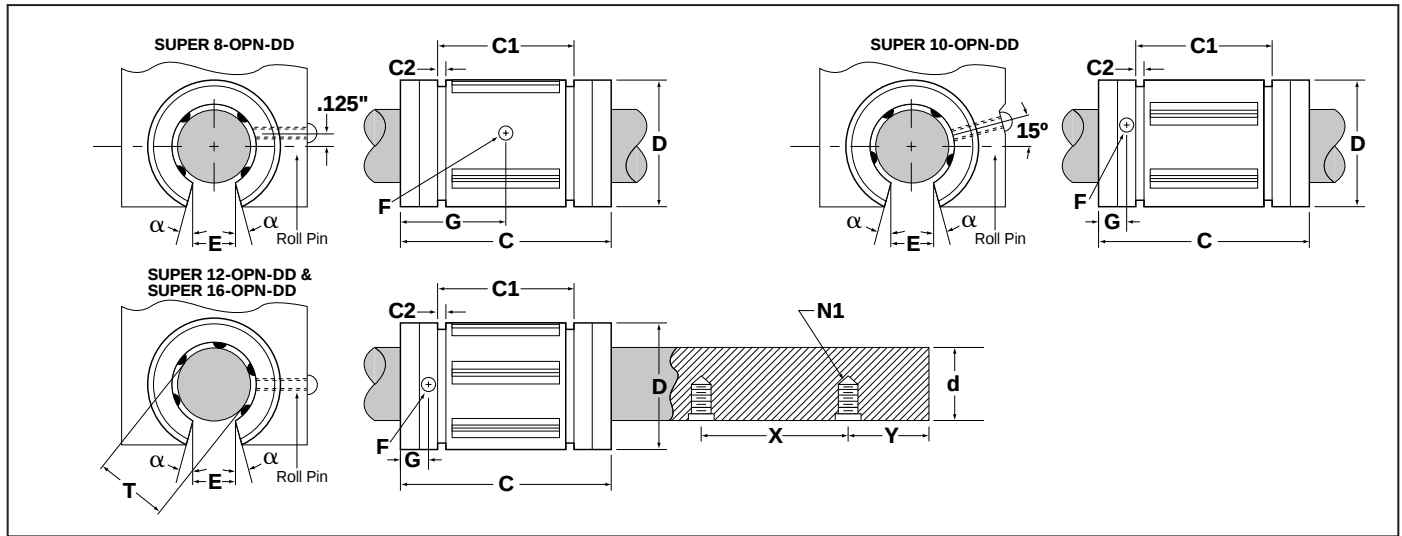
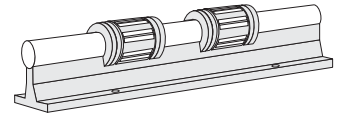
Standard Without Holes	Standard With PreDrilled Holes	Assembly With Solid 60 Case LinearRace	Standard Single Piece Length ⁽²⁾ in	Maximum Single Piece Length ⁽²⁾ in
LSR	LSR-PD	—	48	96
SR	SR-PD	SRA	24	72

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.



Sealed Super Ball Bushing Bearing (Open Type) for Continuously Supported Applications

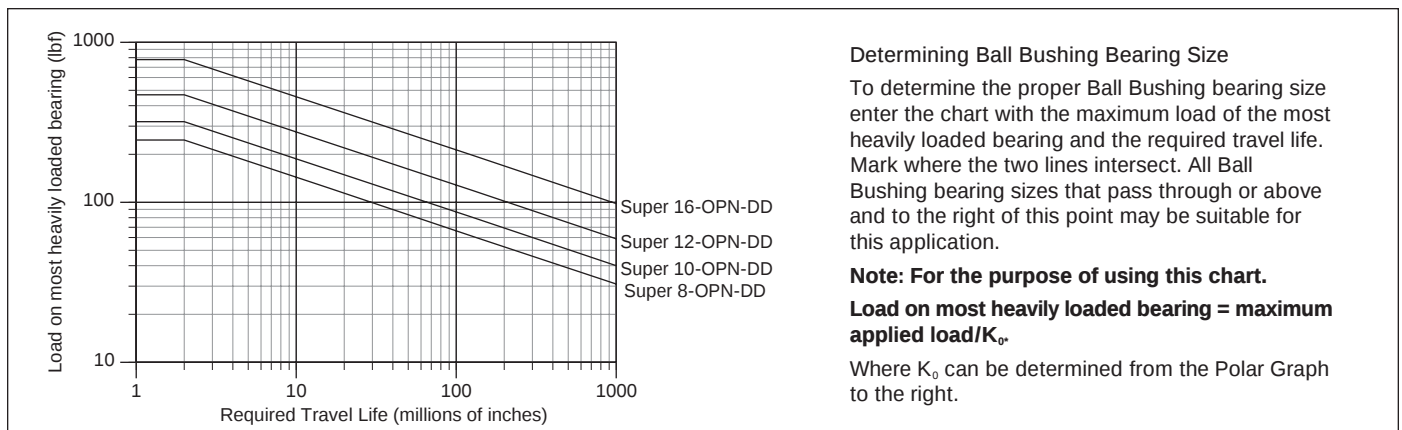


Sealed Super Ball Bushing* Bearings (Open Type, seal at both ends) and 60 Case* LinearRace* (Dimensions in inches)																
Part Number ⁽³⁾		Nominal Diameter	Length C	Distance Between Retaining Ring Grooves C1	Ret. Ring Groove min. C2	Min. Slot Width E	Retention Hole		Angle deg α	Number of Ball Circuits	Ball Bushing Bearing Mass lb	60 Case LinearRace Minimum Depth of Hardness	60 Case Solid LinearRace Mass lb/in	60 Case LinearRace		
Ball Bushing Bearing	60 Case LinearRace						Mounting Holes									
							Dia. F	Loc. G						N1		
															X	Y
SUPER 8-OPN-DD	LRL-8-PD	.500	1.500/1.460	1.032/1.012	.050	.31	.14	.750	15	4	.03	.04	.06	4	2	#6-32
SUPER 10-OPN-DD	LRL-10-PD	.625	1.750/1.710	1.105/1.095	.056	.37	.11	.250	15	4	.08	.06	.09	4	2	#8-32
SUPER 12-OPN-DD	LRL-12-PD	.750	1.875/1.835	1.270/1.250	.056	.43	.14	.250	15	5	.12	.06	.13	6	3	#10-32
SUPER 16-OPN-DD	LRL-16-PD	1.000	2.625/2.585	1.884/1.864	.070	.56	.14	.313	15	5	.21	.08	.22	6	3	¼-20

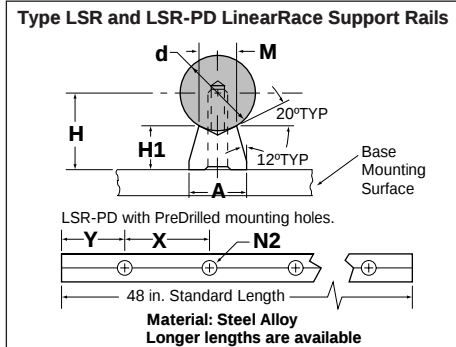
Part Number ⁽³⁾	Working Bore Diameter T	Recommended Housing Bore Diameter		60 Case LinearRace Diameter Tolerance d	Ball Bushing Bearing/LinearRace Fit Up [†]		Dynamic ⁽¹⁾ Load Capacity lb _f
		Fixed D	Adjustable D		Fixed Diameter Housing	Adjustable Diameter Housing (Before Adjustment)	
SUPER 8-OPN-DD	.5000/.4995	.8755/.8750	.8760/.8750	.4995/.4990	.0015C/.0000	.002C/.0000	230
SUPER 10-OPN-DD	.6250/.6245	1.1255/1.1250	1.1260/1.1250	.6245/.6240	.0015C/.0000	.002C/.0000	320
SUPER 12-OPN-DD	.7500/.7495	1.2505/1.2500	1.2510/1.2500	.7495/.7490	.0015C/.0000	.002C/.0000	470
SUPER 16-OPN-DD	1.0000/.9995	1.5630/1.5625	1.5635/1.5625	.9995/.9990	.0015C/.0000	.002C/.0000	780

[†] P=Preload, C=Clearance

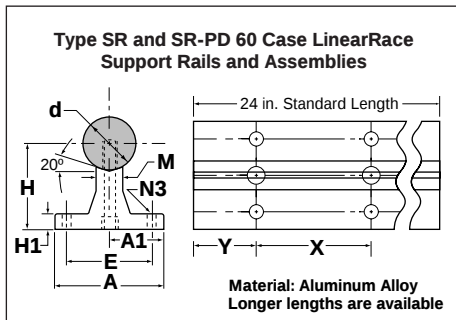
Load/Life Graph (Lines indicate limiting load for given Ball Bushing bearing)



60 Case LinearRace Support Rails and Assemblies for Continuously Supported Applications



Type LSR and LSR-PD 60 Case* LinearRace* Support Rails (Dimensions in inches)											
LSR Standard Without Holes	LSR-PD Standard w/PreDrilled Holes	Nominal LinearRace Diameter d	H ±.002	H1	A	M	Mounting Holes		X	Y	LSR Mass lb/ft
							N Hole	N1 Bolt			
LSR-8	LSR-8-PD	.500	.562	.34	.37	.25	.17	#6-32	4	2	.32
LSR-10	LSR-10-PD	.625	.687	.41	.45	.31	.19	#8-32	4	2	.49
LSR-12	LSR-12-PD	.750	.750	.42	.51	.38	.22	#10-32	6	3	.59
LSR-16	LSR-16-PD	1.000	1.000	.56	.69	.50	.28	¼-20	6	3	1.01



Type SR/ SR-PD LinearRace Support Rails and Assemblies														(Dimensions in inches)			
SR Without Holes	SR-PD With PreDrilled Holes	Assy. W/Solid LinearRace	Nom. LinearRace Dia. d	H ±.002	H1	A	A1 ±.002	E	M	N3		LinearRace Mounting Bolt N1	X	Y	SR Mass lb/ft		
										Hole	Bolt						
SR-8	SR-8-PD	SRA-8	.500	1.125	.19	1.50	.750	1.00	.25	.17	#6	#6-32 x .88	4	2	.60		
SR-10	SR-10-PD	SRA-10	.625	1.125	.25	1.63	.813	1.13	.31	.19	#8	#8-32 x .88	4	2	.80		
SR-12	SR-12-PD	SRA-12	.750	1.500	.25	1.75	.875	1.25	.38	.22	#10	#10-32 x 1.25	6	3	1.00		
SR-16	SR-16-PD	SRA-16	1.000	1.750	.25	2.13	1.063	1.50	.50	.28	¼	¼-20 x 1.50	6	3	1.40		

⁽¹⁾ 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 polar graphs below.

⁽²⁾ For the maximum length of all 60 Case LinearRace Support Rail Assemblies without 60 Case LinearRace Joints see maximum length table on page 57. 60 Case LinearRace Support Rail Assemblies are available with 60 Case LinearRace joints for unlimited travel lengths.

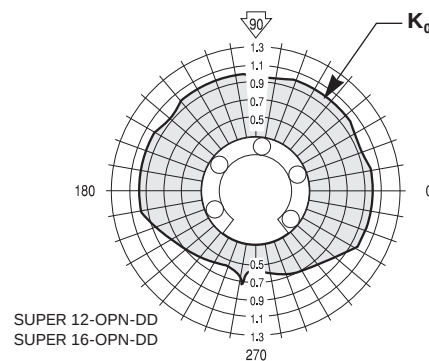
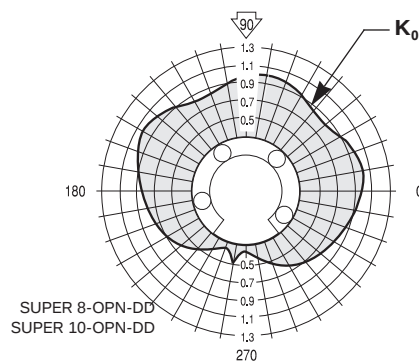
⁽³⁾ For part number description and specifications see page 56 and 57.

Note: For additional technical data, see **Engineering Support Appendix**.

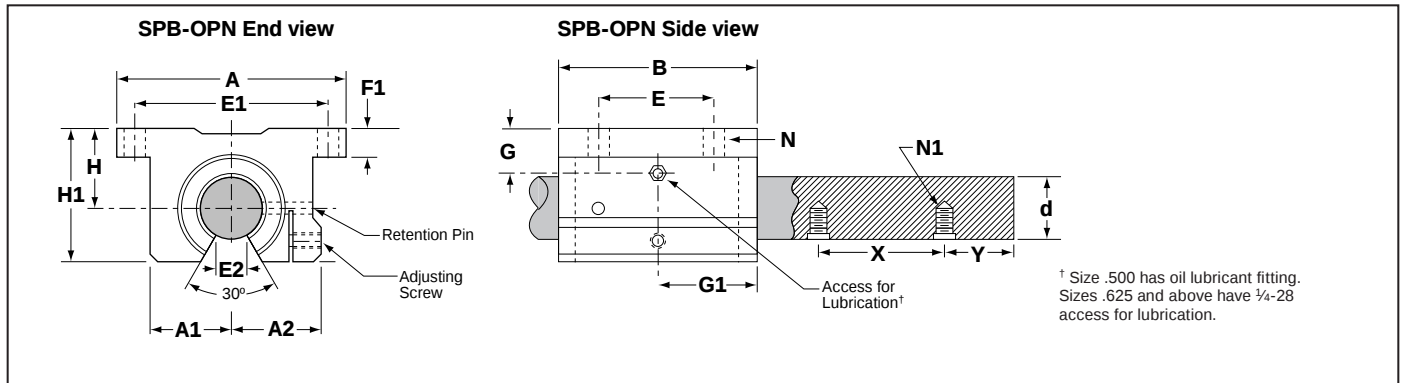
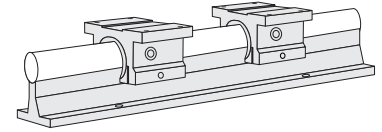
Standard Without Holes	Standard With PreDrilled Holes	Assembly With Solid 60 Case LinearRace	Standard Single Piece Length ⁽²⁾ in	Maximum Single Piece Length ⁽²⁾ in
LSR	LSR-PD	—	48	96
SR	SR-PD	SRA	24	72

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.



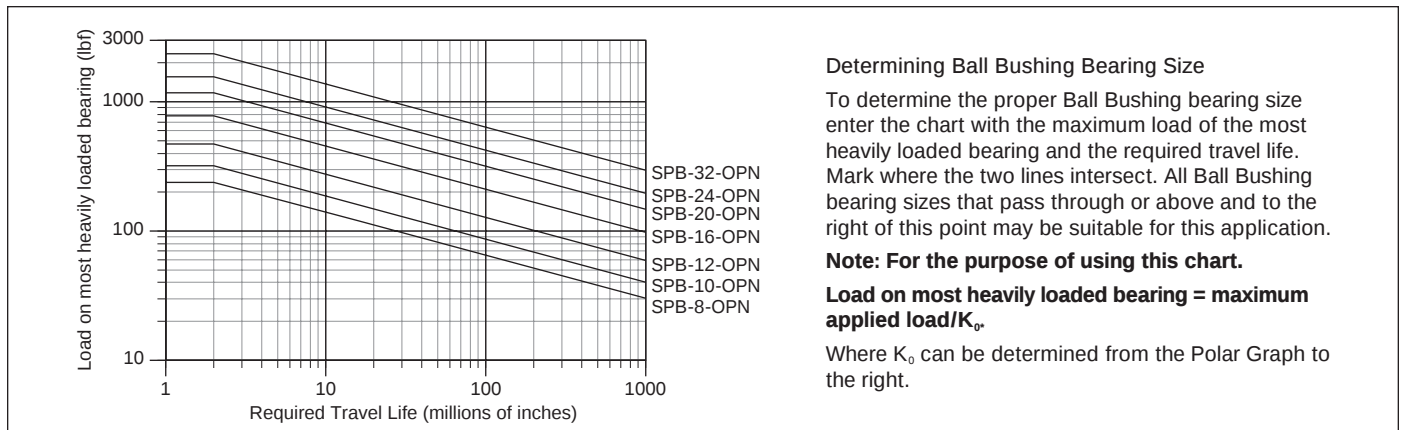
Super Ball Bushing Pillow Blocks (Open Type) for Continuously Supported Applications



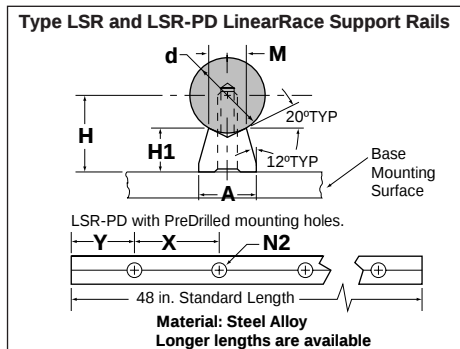
Super Ball Bushing* Pillow Blocks (Open Type, seal at both ends) and 60 Case* LinearRace* (Dimensions in inches)													
Part Number ⁽³⁾		Nominal Diameter	H ±.003	H1	A	A1	A2	B	60 Case LinearRace Minimum Depth of Hardness	60 Case Solid LinearRace Mass lb/in	60 Case LinearRace		
Super Ball Bushing Pillow Block	60 Case LinearRace										Mounting Holes		
											X	Y	N1
SPB-8-OPN	LRL-8-PD	.500	.687	1.13	2.00	.69	.75	1.50	.04	.06	4	2	#6-32
SPB-10-OPN	LRL-10-PD	.625	.875	1.44	2.50	.88	.94	1.75	.04	.09	4	2	#8-32
SPB-12-OPN	LRL-12-PD	.750	.937	1.56	2.75	.94	1.00	1.88	.06	.13	6	3	#10-32
SPB-16-OPN	LRL-16-PD	1.000	1.187	2.00	3.25	1.19	1.25	2.63	.08	.22	6	3	¼-20
SPB-20-OPN	LRL-20-PD	1.250	1.500	2.56	4.00	1.50	1.63	3.38	.08	.35	6	3	5/16-18
SPB-24-OPN	LRL-24-PD	1.500	1.750	2.94	4.75	1.75	1.88	3.75	.08	.50	8	4	¾-16
SPB-32-OPN	LRL-32-PD	2.000	2.125	3.63	6.00	2.25	2.44	4.75	.10	.89	8	4	½-13

Part Number ⁽³⁾		60 Case LinearRace Diameter d	E ±.010	E1 ±.010	E2 Min.	F1	G	G1	N		Pillow Block Mass lb	Dynamic ⁽¹⁾ Load Capacity lb _f
Super Ball Bushing Pillow Block	60 Case LinearRace								Hole	Bolt		
SPB-8-OPN	.4995/.4990	1.000	1.000	1.688	.31	.25	.69	.75	.16	#6	.2	230
SPB-10-OPN	.6245/.6240	1.125	1.125	2.125	.37	.28	.42	.53	.19	#8	.4	320
SPB-12-OPN	.7495/.7490	1.250	1.250	2.375	.43	.31	1.08	.55	.19	#8	.5	470
SPB-16-OPN	.9995/.9990	1.750	1.750	2.875	.56	.38	1.37	.76	.22	#10	1.0	780
SPB-20-OPN	1.2495/1.2490	2.000	2.000	3.500	.62	.44	1.73	1.05	.22	#10	2.1	1170
SPB-24-OPN	1.4994/1.4989	2.500	2.500	4.125	.75	.50	2.03	1.12	.28	.25	3.2	1560
SPB-32-OPN	1.9994/1.9987	3.250	3.250	5.250	1.00	.63	2.50	1.44	.41	.38	6.0	2350

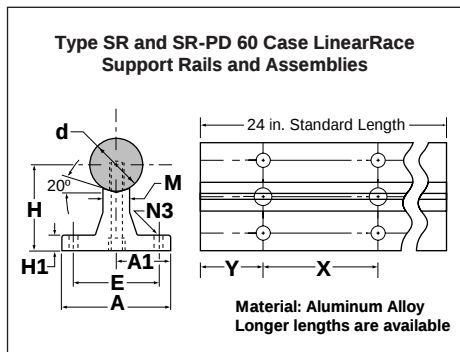
Load/Life Graph (Lines indicate limiting load for given Ball Bushing Pillow Block)



60 Case LinearRace Support Rails and Assemblies for Continuously Supported Applications



Type LSR and LSR-PD 60 Case* LinearRace*Support Rails (Dimensions in inches)											
LSR Standard Without Holes	LSR-PD Standard w/PreDrilled Holes	Nominal LinearRace Diameter d	H ±.002	H1	A	M	Mounting Holes		X	Y	LSR Mass lb/ft
							N2 Hole	N1 Bolt			
LSR-8	LSR-8-PD	.500	.562	.34	.37	.25	.17	#6-32	4	2	.32
LSR-10	LSR-10-PD	.625	.687	.41	.45	.31	.19	#8-32	4	2	.49
LSR-12	LSR-12-PD	.750	.750	.42	.51	.38	.22	#10-32	6	3	.59
LSR-16	LSR-16-PD	1.000	1.000	.56	.69	.50	.28	¼-20	6	3	1.01
LSR-20	LSR-20-PD	1.250	1.187	.63	.78	.56	.34	⅝-18	6	3	1.27
LSR-24	LSR-24-PD	1.500	1.375	.70	.93	.69	.41	¾-16	8	4	1.68
LSR-32	LSR-32-PD	2.000	1.750	.85	1.18	.88	.53	1½-13	8	4	2.59



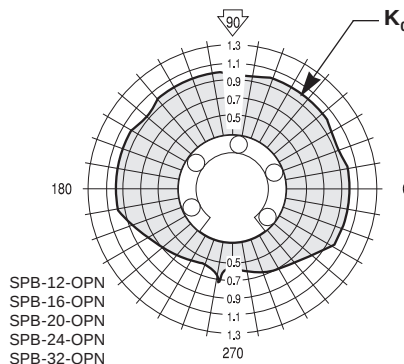
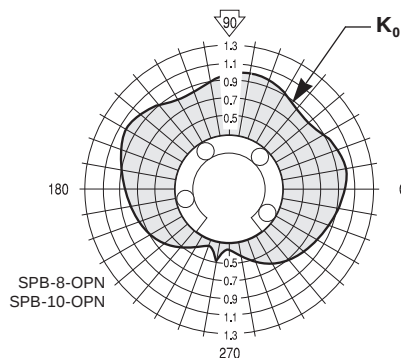
Type SR/ SR-PD LinearRace Support Rails and Assemblies													(Dimensions in inches)			
SR Without Holes	SR-PD With PreDrilled Holes	Assy. W/Solid LinearRace	Nom. LinearRace Dia. d	H ±.002	H1	A	A1 ±.002	E	M	N3		LinearRace Mounting Bolt N1	X	Y	SR Mass lb/ft	
										Hole	Bolt					
SR-8	SR-8-PD	SRA-8	.500	1.125	.19	1.50	.750	1.00	.25	.17	#6	#6-32 x .88	4	2	.60	
SR-10	SR-10-PD	SRA-10	.625	1.125	.25	1.63	.813	1.13	.31	.19	#8	#8-32 x .88	4	2	.80	
SR-12	SR-12-PD	SRA-12	.750	1.500	.25	1.75	.875	1.25	.38	.22	#10	10-32 x 1.25	6	3	1.00	
SR-16	SR-16-PD	SRA-16	1.000	1.750	.25	2.13	1.063	1.50	.50	.28	¼	¼-20 x 1.50	6	3	1.40	
SR-20	SR-20-PD	SRA-20	1.250	2.125	.31	2.50	1.250	1.88	.56	.34	5/16	5/16-18 x 1.75	6	3	2.10	
SR-24	SR-24-PD	SRA-24	1.500	2.500	.38	3.00	1.500	2.25	.69	.34	5/16	5/8-16 x 2.00	8	4	2.60	
SR-32	SR-32-PD	SRA-32	2.000	3.250	.50	3.75	1.875	2.75	.88	.41	¾	½-13 x 2.50	8	4	4.20	

- ⁽¹⁾ 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 polar graphs below.
- ⁽²⁾ For the maximum length of all 60 Case LinearRace Support Rail Assemblies without 60 Case LinearRace Joints see maximum length table on page 57. 60 Case LinearRace Support Rail Assemblies are available with 60 Case LinearRace joints for unlimited travel lengths.
- ⁽³⁾ For part number description and specifications see page 56 and 57.
- Note: For additional technical data, see **Engineering Support Appendix**.

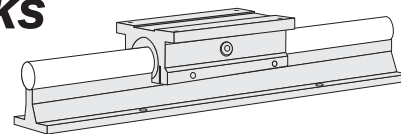
Standard Without Holes	Standard With PreDrilled Holes	Assembly With Solid 60 Case LinearRace	Standard Single Piece Length ⁽²⁾ in	Maximum Single Piece Length ⁽²⁾ in
LSR	LSR-PD	—	48	96
SR	SR-PD	SRA	24	72

Polar Graphs

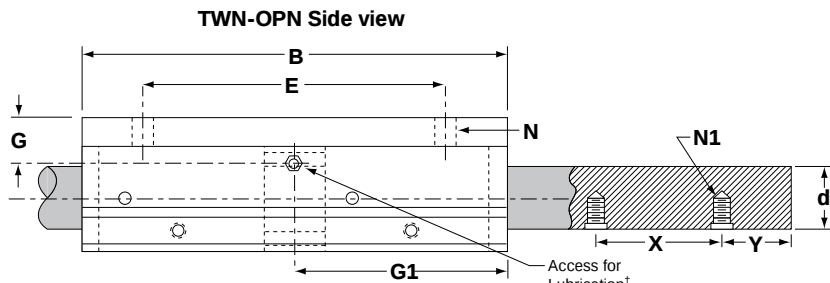
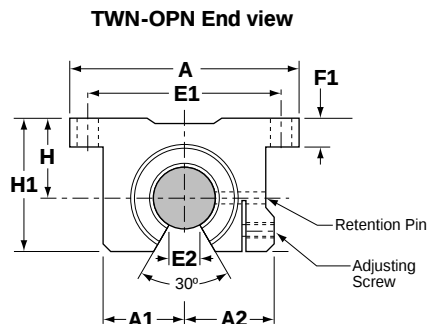
The actual Dynamic Load Capacity of a Ball Bushing bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor K_0 is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the 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.



Super Ball Bushing Twin Pillow Blocks (Open Type) for Continuously Supported Applications



† Size .500 has oil lubricant fitting.
Sizes .625 and above have ¼-28
access for lubrication.

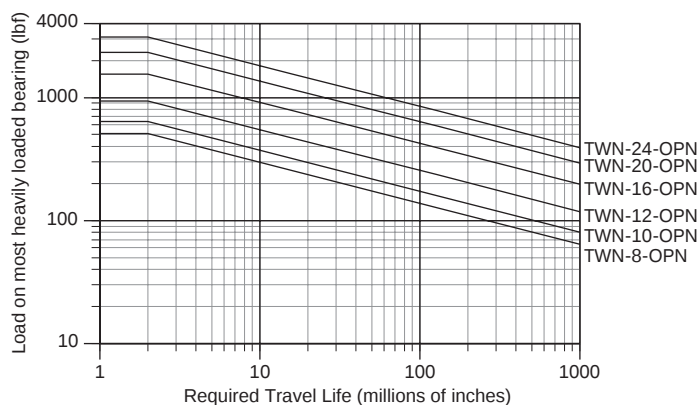


Super Ball Bushing* Twin Pillow Blocks (Open Type, seal at both ends) and 60 Case* LinearRace* (Dimensions in inches)

Part Number ⁽³⁾										60 Case LinearRace Minimum Depth of Hardness	60 Case Solid LinearRace Mass lb/in	60 Case LinearRace		
Super Ball Bushing Twin Pillow Block	60 Case LinearRace	Nominal Diameter	H ±.003	H1	A	A1	A2	B	Mounting Holes					
												X	Y	N1
TWN-8-OPN	LRL-8-PD	.500	.687	1.13	2.00	.69	.75	3.50	.06	.06	4	2	#6-32	
TWN-10-OPN	LRL-10-PD	.625	.875	1.44	2.50	.88	.94	4.00	.06	.09	4	2	#8-32	
TWN-12-OPN	LRL-12-PD	.750	.937	1.56	2.75	.94	1.00	4.50	.06	.13	6	3	#10-32	
TWN-16-OPN	LRL-16-PD	1.000	1.187	2.00	3.25	1.19	1.25	6.00	.08	.22	6	3	¼-20	
TWN-20-OPN	LRL-20-PD	1.250	1.500	2.56	4.00	1.50	1.63	7.50	.08	.35	6	3	5/16-18	
TWN-24-OPN	LRL-24-PD	1.500	1.750	2.94	4.75	1.75	1.88	9.00	.08	.50	8	4	¾-16	

Part Number ⁽³⁾	60 Case LinearRace Diameter Tolerance d	E ±.010	E1 ±.01	E2 Min.	F1	G	G1	N		Pillow Block Mass lb	Dynamic ⁽¹⁾ Load Capacity lb _f
								Hole	Bolt		
TWN-8-OPN	.4995/.4990	2.500	1.688	.31	.25	.56	1.75	.16	#6	.4	460
TWN-10-OPN	.6245/.6240	3.000	2.125	.37	.28	.67	2.00	.19	#8	.8	640
TWN-12-OPN	.7495/.7490	3.500	2.375	.43	.31	.94	2.25	.19	#8	1.0	940
TWN-16-OPN	.9995/.9990	4.500	2.875	.56	.38	1.20	3.00	.22	#10	2.0	1560
TWN-20-OPN	1.2495/1.2490	5.500	3.500	.62	.44	1.50	3.75	.22	#10	4.2	2340
TWN-24-OPN	1.4994/1.4989	6.500	4.125	.75	.50	1.75	4.50	.28	.25	6.7	3120

Load/Life Graph (Lines indicate limiting load for given Ball Bushing Pillow Block)



Determining Ball Bushing Bearing Size

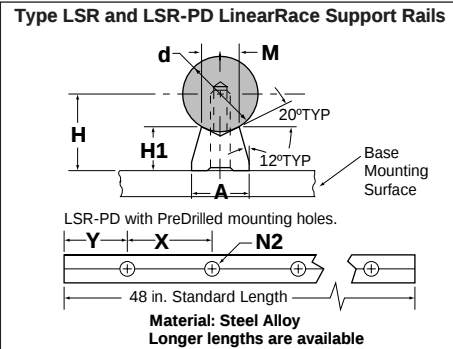
To determine the proper Ball Bushing bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing bearing sizes that pass through or above and to the right of this point may be suitable for this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

Note: For the purpose of using this chart.

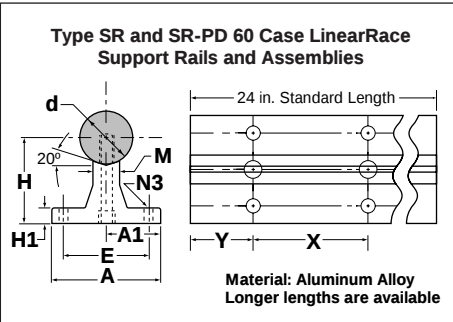
Load on most heavily loaded bearing = maximum applied load/K_o

Where K_o can be determined from the Polar Graph to the right.

60 Case LinearRace Support Rails and Assemblies for Continuously Supported Applications



Type LSR and LSR-PD 60 Case* LinearRace* Support Rails (Dimensions in inches)											
LSR Standard Without Holes	LSR-PD Standard w/PreDrilled Holes	Nominal LinearRace Diameter d	H ±.002	H1	A	M	Mounting Holes		X	Y	LSR Mass lb/ft
							N2 Hole	N1 Bolt			
LSR-8	LSR-8-PD	.500	.562	.34	.37	.25	.17	#6-32	4	2	.32
LSR-10	LSR-10-PD	.625	.687	.41	.45	.31	.19	#8-32	4	2	.49
LSR-12	LSR-12-PD	.750	.750	.42	.51	.38	.22	#10-32	6	3	.59
LSR-16	LSR-16-PD	1.000	1.000	.56	.69	.50	.28	¼-20	6	3	1.01
LSR-20	LSR-20-PD	1.250	1.187	.63	.78	.56	.34	⅝-18	6	3	1.27
LSR-24	LSR-24-PD	1.500	1.375	.70	.93	.69	.41	⅜-16	8	4	1.68

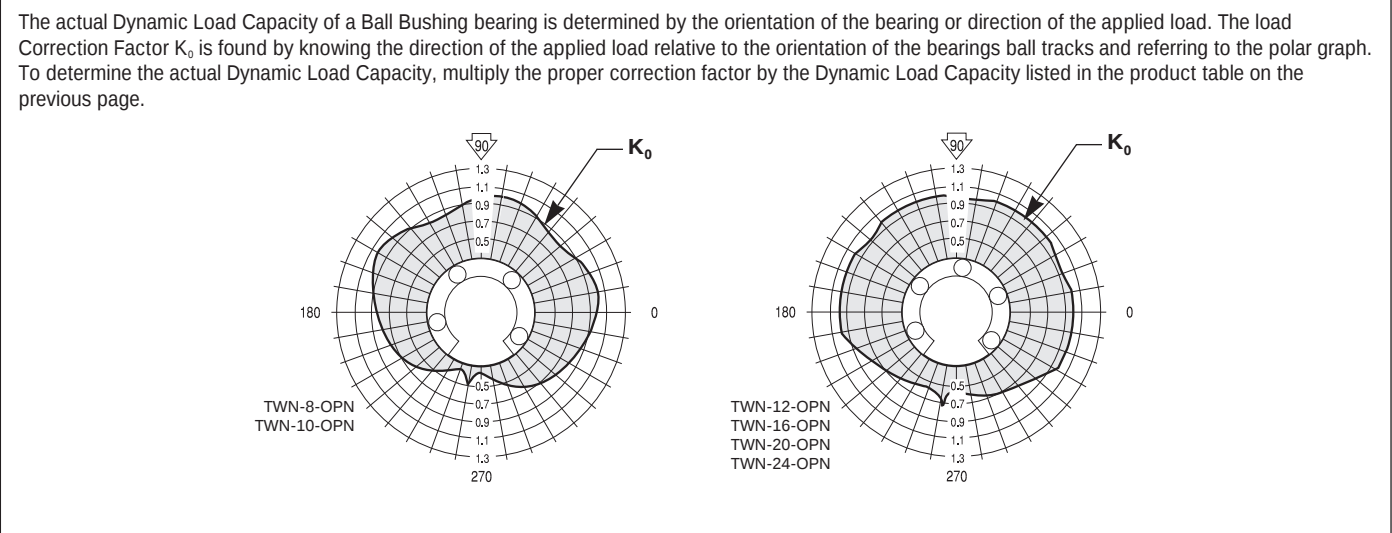


Type SR/ SR-PD LinearRace Support Rails and Assemblies														(Dimensions in inches)		
SR Without Holes	SR-PD With PreDrilled Holes	Assy. W/Solid LinearRace	Nom. LinearRace Dia. d	H ±.002	H1	A	A1 ±.002	E	M	N3		LinearRace Mounting Bolt N1	X	Y	SR Mass lb/ft	
										Hole	Bolt					
SR-8	SR-8-PD	SRA-8	.500	1.125	.19	1.50	.750	1.00	.25	.17	#6	#6-32 x .88	4	2	.60	
SR-10	SR-10-PD	SRA-10	.625	1.125	.25	1.63	.813	1.13	.31	.19	#8	#8-32 x .88	4	2	.80	
SR-12	SR-12-PD	SRA-12	.750	1.500	.25	1.75	.875	1.25	.38	.22	#10	#10-32 x 1.25	6	3	1.00	
SR-16	SR-16-PD	SRA-16	1.000	1.750	.25	2.13	1.063	1.50	.50	.28	¼	¼-20 x 1.50	6	3	1.40	
SR-20	SR-20-PD	SRA-20	1.250	2.125	.31	2.50	1.250	1.88	.56	.34	⅝ ₁₆	⅝ ₁₆ -18 x 1.75	6	3	2.10	
SR-24	SR-24-PD	SRA-24	1.500	2.500	.38	3.00	1.500	2.25	.69	.34	⅝ ₁₆	⅝ ₁₆ -16 x 2.00	8	4	2.60	

- ⁽¹⁾ 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 polar graphs below.
- ⁽²⁾ For the maximum length of all 60 Case LinearRace Support Rail Assemblies without 60 Case LinearRace Joints see maximum length table on page 57. 60 Case LinearRace Support Rail Assemblies are available with 60 Case LinearRace joints for unlimited travel lengths.
- ⁽³⁾ For part number description and specifications see page 56 and 57.
- Note: For additional technical data, see **Engineering Support Appendix**.

Standard Without Holes	Standard With PreDrilled Holes	Assembly With Solid 60 Case LinearRace	Standard Single Piece Length ⁽²⁾ in	Maximum Single Piece Length ⁽²⁾ in
LSR	LSR-PD	—	48	96
SR	SR-PD	SRA	24	72

Polar Graphs



Cam-Actuated Part Transfer Mechanism for Multiple-Transfer Press

Objective

Improve production rate and increase the service life of a transfer table mechanism.

Solution

Replace the conventional linear bearings with Adjustable Super Ball Bushing* Twin Pillow Blocks. Bearing service life increased to 5 years.

Products Specified

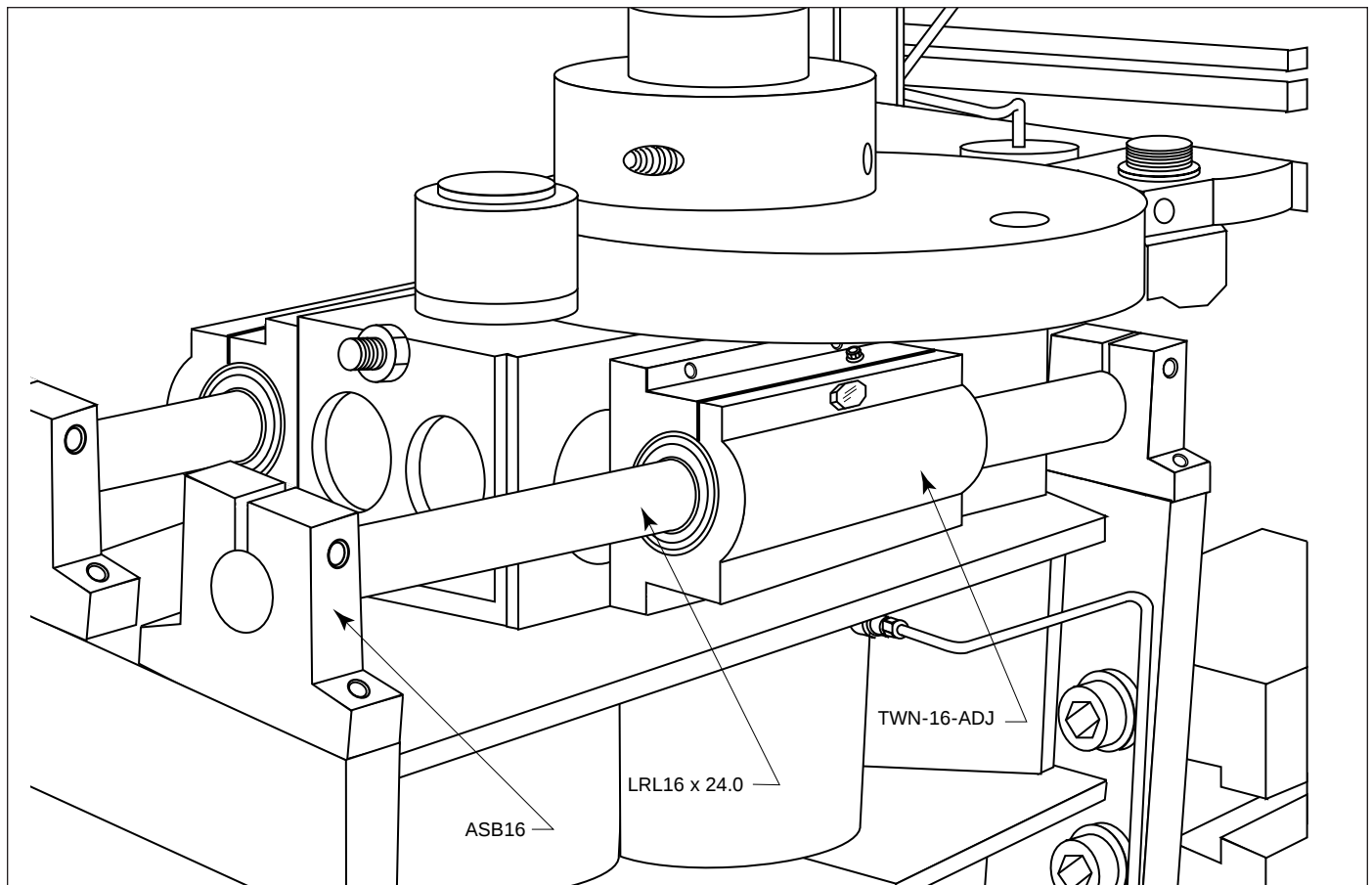
2 – TWN16-ADJ (Super Ball Bushing Twin Pillow Blocks)

4 – ASB16 (60 Case* LinearRace* End Support Blocks)

2 – LRL16 x 24.00 in (60 Case LinearRace)

Benefits

The table achieved maximum cycle efficiency by reducing costly downtime and improving service life.



Precision Steel Ball Bushing Bearing Products



Thomson Precision Steel Ball Bushing* Bearing Products offer:

- a coefficient of friction as low as .001. When replacing high friction plain bearings, Precision Steel Ball Bushing bearings dramatically improve machine productivity and efficiency.
- all-steel construction, for maximum system rigidity.
- two accuracy classes allowing for immediate improvements in system positioning and repeatability.
- availability in fourteen bore sizes and nine configurations.
- the RoundRail* Advantage which minimizes installation time and cost.
- steady state travel speeds up to 10 ft/s and accelerations to 450 ft/s² without the use of derating factors.
- an operating temperature up to 600° F.
- availability in a self-aligning pillow block housing for ease of installation and use.
- worldwide availability from over 1800 authorized distributors.

Precision Steel Ball Bushing Bearings

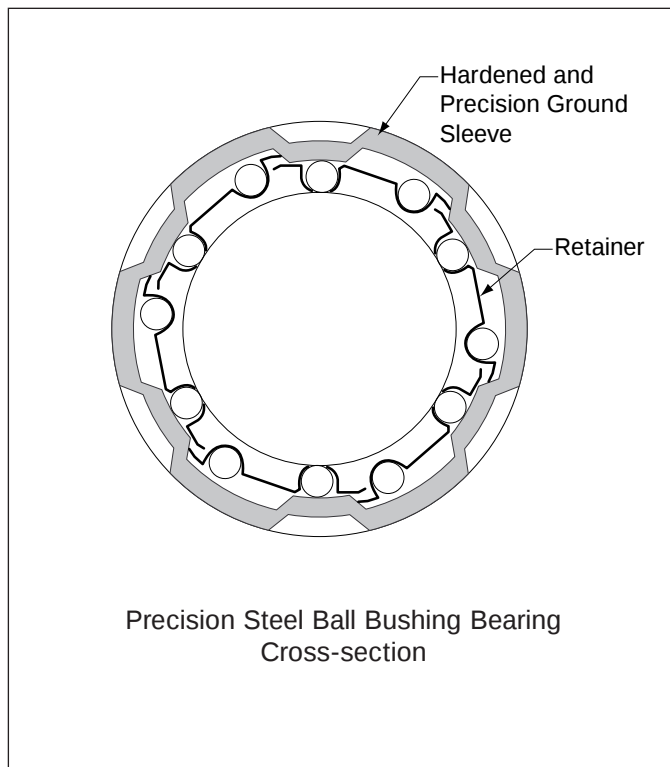
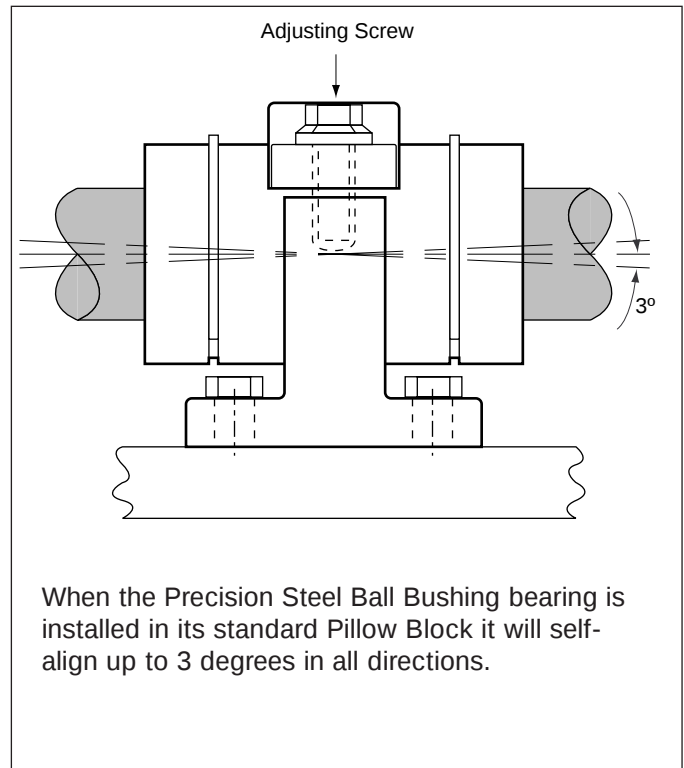
The basis for the performance of all Precision Steel Ball Bushing* bearings is a simple but ingenious system of ball recirculation that permits almost frictionless, unlimited travel.

Replace High Friction Plain Bearings

Plain bearings cause friction, stick-slip, binding and chatter. The Precision Steel Ball Bushing bearing's patented ball recirculation virtually eliminates wear and provides a constant coefficient of friction as low as .001. This dramatic reduction in friction allows the designer to use smaller less expensive drive motors, ball screws, belts, linkages and gears.

Lasting Precision Alignment

High friction plain bearings cause wear resulting in a loss in system alignment and repeatability. Each Precision Steel Ball Bushing bearing is manufactured with high quality bearing steel that is hardened and precision ground. The rolling elements of each Ball Bushing bearing are precision ground bearing balls that recirculate freely into and out of the load zone. The balls are guided through their recirculation path by a steel retainer and hardened sleeve. The inherent non-wear characteristics of each Precision Steel Ball Bushing bearing assures maximum system accuracy and repeatability.



High Travel Speeds

Precision Steel Ball Bushing can operate at travel rates as high as 10 ft/s and accelerations as high as 450 ft/s². When replacing inefficient v-way or flat-way systems, this travel rate capability provides immediate improvements in machine efficiency and productivity.

Ease of Installation

The Precision Steel Ball Bushing bearing can be retained in a housing, internally or externally. The retaining ring groove on the outside diameter allows the bearing to be captured and retained by an external retaining ring. If internal retention is required, the Ball Bushing bearing can be installed in a housing and held in place with an internal retaining ring.

Protection from Contamination

Precision Steel Ball Bushing bearings most popular sizes are available with double acting integral wipers that keep out contamination, retain lubrication and maximize travel life.

Precision Steel Ball Bushing Bearing Products

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Precision Steel Ball Bushing bearing closed type products have been designed for use in end supported applications, where spanning or bridging a gap is required. End supported products are available in a variety of configurations and sizes. For a complete overview of each Precision Steel Ball Bushing bearing end supported product, simply turn to page A4. For complete product specifications see the pages referenced below.

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Precision Steel Ball Bushing Bearing Products
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Precision Steel Ball Bushing bearing open type products are specifically designed for use in continuously supported applications where rigidity and stiffness are required. Continuously supported products are available in a variety of configurations and sizes. For a complete overview of all Precision Steel Ball Bushing bearing continuously supported products turn to page A20. For complete product specifications see the pages referenced below.

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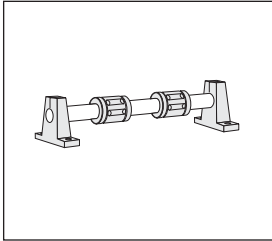
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Continuously Supported Product Specifications

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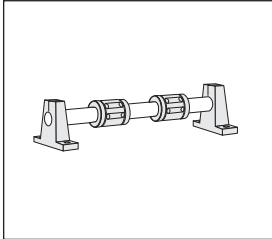
Precision Steel Ball Bushing Bearings and Pillow Blocks for End Supported Applications



Precision Steel Ball Bushing Bearings (Closed type)

Features:

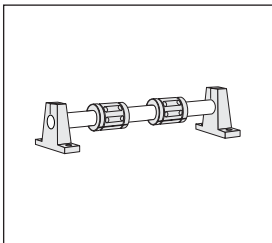
- Coefficient of friction as low as .001.
- Load capacity range from 19 to 5,000 lbf.
- High operating temperature capability.
- Available in sizes 1/4 to 4 inch bore diameter.
- Can be mounted in a custom housing.
- Travel speeds up to 10 ft/s.
- Available in corrosion resistant stainless steel for diameters up to 1 inch.
- All steel construction for increased rigidity.
- Sizes 1/2, 3/4 and 1 inch available with integral, double acting wipers.



Extra Precision Steel Ball Bushing Bearings (Closed type)

Features:

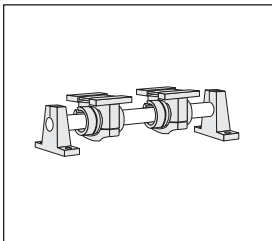
- Increased precision for high accuracy positioning and repeatability
- Coefficient of friction as low as .001.
- Load capacity range from 19 to 5,000 lbf.
- High operating temperature capability.
- Available in sizes 1/4 to 4 inch bore diameter.
- Can be mounted in a custom housing.
- Travel speeds up to 10 ft/s.
- Available in corrosion resistant stainless steel for diameters up to 1 inch.
- All steel construction for increased rigidity.
- Sizes 1/2, 3/4 and 1 inch available with integral, double acting wipers.



Adjustable Precision Steel Ball Bushing Bearings (Closed Type)

Features:

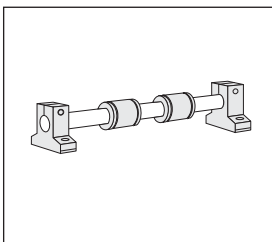
- Adjustment capability provides minimum 60 Case* LinearRace* shaft and bearing clearance for improvements in positioning accuracy and repeatability.
- Coefficient of friction as low as .001.
- Load capacity range from 85 to 5,000 lbf.
- High operating temperature capability.
- Available in sizes 1/2 to 4 inch bore diameter.
- Can be mounted in a custom housing.
- Travel speeds up to 10 ft/s.
- All steel construction for increased rigidity.
- Available in corrosion resistant stainless steel for diameters up to 1 inch.



Precision Steel Ball Bushing Pillow Blocks (Closed and Adjustable Type)

Features:

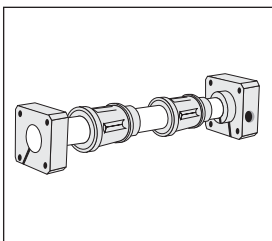
- Coefficient of friction as low as .001.
- Load capacity range from 85 to 1,100 lbf.
- High operating temperature capability.
- Available in sizes 1/2 to 2 inch bore diameter.
- Self-aligning for easy installation.
- Travel speeds up to 10 ft/s.
- Pillow Blocks are available with corrosion resistant stainless steel Ball Bushing bearings up to 1 inch.
- Easily mounted and secured with four mounting bolts.
- All metal construction for increased rigidity.
- Available with integral, double acting seals.
- Adjustment capability provides minimum 60 Case LinearRace and bearing clearance for improvements in positioning accuracy and repeatability.



Miniature Instrument Ball Bushing Bearings

Features:

- Available in sizes 1/8, 3/16 and 1/4 inch bore diameter.
- Available with a matched 60 Case LinearRace
- Coefficient of friction as low as .001.
- Compact size for low inertia and weight.
- Precision bearing balls, sleeve and 60 Case LinearRace manufactured of corrosion resistant stainless steel.
- Load Capacity range between 7 and 19 lbf.

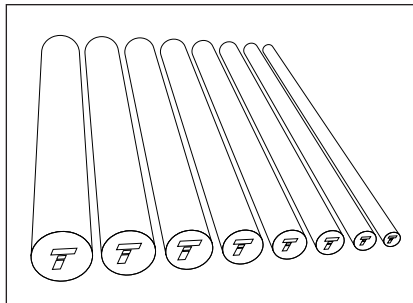


Die Set Ball Bushing Bearings

Features:

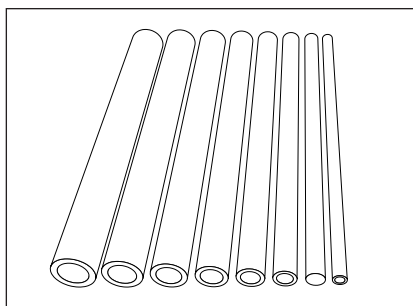
- Available in sizes 1, 1 1/4, 1 1/2 and 2 inch bore diameter.
- Load Capacity range between 350 and 1,100 lbf.
- All steel construction for maximum rigidity.
- Travel speeds up to 10 ft/s.
- Easily mounted by simply bolting toe clamps in place.
- Can be mounted perpendicular to mounting surface.
- High operating temperature capability.
- Coefficient of friction as low as .001.

60 Case LinearRace Shafting for End Supported Applications



Solid 60 Case* LinearRace* Shafting Features:

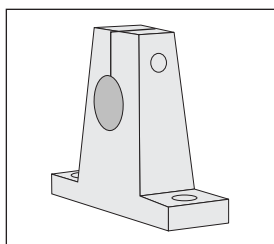
- Diameter range between 3/16 and 4 inch.
- Roundness 80 millionths of an inch.
- Case hardness 60-65 HRC.
- Surface finish 12 Ra microinch.
- Available in corrosion resistant 440C stainless steel (50-55 HRC).
- Available with PrePlate* chrome option.
- Standard straightness is .001 inch per foot cumulative (.002 TIR) with special straightness at .0005 inch per foot cumulative (.001 TIR) available.



60 Case Tubular Lite* LinearRace Shafting Features:

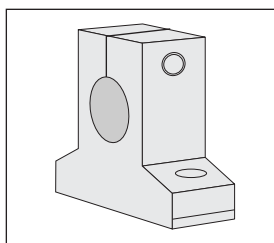
- Hollow inner diameter reduces weight and inertia.
- Diameter range between 3/4 and 4 inch.
- Roundness 80 millionths of an inch.
- Case hardness 58-63 HRC.
- Surface finish 12 Ra microinch.
- Available with Preplate chrome option.
- Standard straightness is .001 inch per foot cumulative (.002 TIR) with special straightness at .0005 inch per foot cumulative (.001 TIR) available.

60 Case LinearRace Supports For End Supported Applications



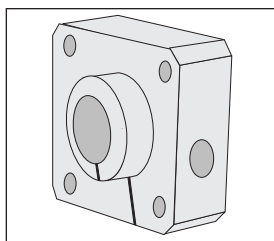
SB 60 Case LinearRace End Support Block Features:

- Size range between 1/4 and 2 inch.
- Easily secured with two mounting bolts.
- Malleable iron alloy for sizes 1/2 to 2 inch diameter.
- Protected by corrosion resistant coating.
- Light weight, high strength aluminum alloy construction for sizes 1/4 and 3/8 inch.



ASB Low Profile 60 Case LinearRace End Support Block Features:

- Size range between 1/4 and 1 1/2 inch.
- Low profile design.
- Easily secured with two mounting bolts.
- Protected by corrosion resistant anodized coating.
- Light weight, high strength aluminum alloy construction.



FSB Flanged 60 Case LinearRace End Support Block Features:

- Available in 1/2, 3/4, 1 and 1 1/4 inch diameters.
- Flanged mounting surface for easy assembly.
- Easily secured with four mounting bolts.
- Designed specifically for use with Super Smart Flanged Pillow Blocks
- Protected by corrosion resistant coating.
- Light weight, high strength aluminum alloy construction.

Part Number Description and Specification:

Precision Steel Ball Bushing* Bearings (Closed Type) for End Supported Applications

A - 162536 - DD				
Type	Description	Size	Nominal Diameter	Option Description
A	Precision Steel Ball Bushing bearings	4812	.250	– Standard
XA	Extra Precision Ball Bushing bearings	61014	.375	DD With Integral Wipers ($1\frac{1}{2}$ thru $1\frac{1}{2}$)
ADJ	Adjustable Precision Steel Ball Bushing bearings	81420	.500	NB Nylon Balls
		101824	.625	DP Dry Packed
		122026	.750	SS Stainless Steel (up to 1" only)
		162536	1.000	
		203242	1.250	
		243848	1.500	
		324864	2.000	
		406080	2.500	
		487296	3.000	
		649612	4.000	

Precision Steel Ball Bushing Pillow Blocks (Closed Type) for End Supported Applications

PB - 8 - A - SS				
Type	Description	Size	Nominal Diameter	Option Description
PB	Precision Steel Ball Bushing Pillow Blocks	8	.500	– Standard
		10	.625	SS Stainless Steel
		12	.750	
		16	1.000	
		20	1.250	
		24	1.500	
		32	2.000	
				Option Description
				A Standard
				ADJ Adjustable Type

Part Number Description and Specification:

60 Case LinearRace for End Supported Applications

LRS-16-SS

Type	Description									Option	Description
LR	60 Case LinearRace					Nom. Size	Nom. Dia.	Nom. Size	Nom. Dia.	–	Carbon Steel
S	For use with A type Ball Bushing bearings					4	.250	16	1.000	SS	440C Stainless Steel
L	For use with XA, Open and Adjustable Ball Bushing bearings and Pillow Blocks For					6	.375	20	1.250	TU	Tubular Lite
D	use with Die Set Ball Bushing bearings					8	.500	24	1.500	CP	Preplate Chrome
						10	.625	32	2.000		
						12	.750				

60 Case* LinearRace* Class L

Part Number	60 Case LinearRace Diameter Class L	Max. Length in.	Part Number	Stainless Steel 60 case LinearRace	Max. Length in.	Part Number	Chrome Plated 60 Case LinearRace	Max. Length in.	Part Number	60 Case Tubular Lite 60 Case LinearRace	Max. Length in.	Part Number	Chrome Plated Tubular Lite 60 Case LinearRace	Max. Length in.
LRL-4	.2495/.2490	96	LRL-4-SS	60		LRL-4-CP	92							
LRL-6	.3745/.3740	180	LRL-6-SS	180		LRL-6-CP	166							
LRL-8	.4995/.4990	180	LRL-8-SS	180		LRL-8-CP	168							
LRL-10	.6245/.6240	180	LRL-10-SS	180		LRL-10-CP	178							
LRL-12	.7495/.7490	204	LRL-12-SS	180		LRL-12-CP	178		LRL-12-TU	180		LRL-12-TU-CP	178	
LRL-16	.9995/.9990	204	LRL-16-SS	180		LRL-16-CP	178		LRL-16-TU	180		LRL-16-TU-CP	178	
LRL-20	1.2495/1.2490	204	LRL-20-SS	180		LRL-20-CP	178							
LRL-24	1.4994/1.4989	204	LRL-24-SS	180		LRL-24-CP	178		LRL-24-TU	180		LRL-24-TU-CP	178	
LRL-32	1.9994/1.9987	204	LRL-32-SS	180		LRL-32-CP	178		LRL-32-TU	180		LRL-32-TU-CP	178	
LRL-40	2.4993/2.4985	204	LRL-40-SS	180		LRL-40-CP	178		LRL-40-TU	180		LRL-40-TU-CP	178	
LRL-48	2.9992/2.9983	204	LRL-48-SS	–		LRL-48-CP	178		LRL-48-TU	180		LRL-48-TU-CP	178	
LRL-64	3.9988/3.9976	216	LRL-64-SS	–		LRL-64-CP	178		LRL-64-TU	180		LRL-64-TU-CP	178	

60 Case LinearRace Class S

Part Number	60 Case LinearRace Diameter Class S	Max. Length in.	Part Number	Stainless Steel LinearRace	Max. Length in.
LRS-4	.2490/.2485	96	LRS-4-SS	168	
LRS-6	.3740/.3735	168	LRS-6-SS	168	
LRS-8	.4990/.4985	168	LRS-8-SS	168	
LRS-10	.6240/.6235	180	LRS-10-SS	168	
LRS-12	.7490/.7485	180	LRS-12-SS	168	
LRS-16	.9990/.9985	180	LRS-16-SS	168	

60 Case LinearRace Class S

Part Number	60 Case LinearRace Diameter Class S	Max. Length in.	Part Number	Stainless Steel LinearRace	Max. Length in.
LRS-20	1.2490/1.2485	180	LRS-20-SS	168	
LRS-24	1.4989/1.4984	180	LRS-24-SS	168	
LRS-32	1.9987/1.9980	180	LRS-32-SS	168	
LRS-40	2.4985/2.4977	180	LRS-40-SS	168	
LRS-48	2.9983/2.9974	168	LRS-48-SS	–	
LRS-64	3.9976/3.9964	180	LRS-64-SS	–	

60 Case LinearRace Class D

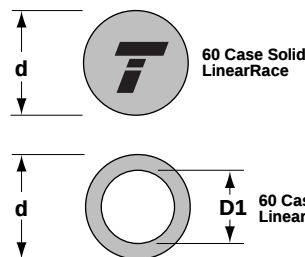
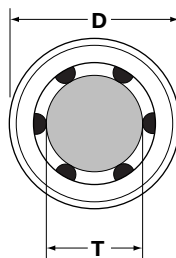
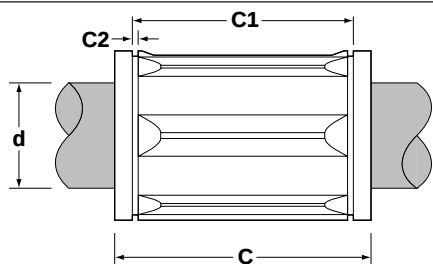
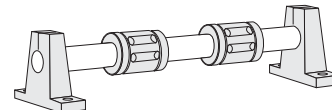
Part Number	60 Case LinearRace Diameter Class D	Max. Length in.
LRD-16	1.0003/1.0000	180
LRD-20	1.2503/1.2500	180
LRD-24	1.5003/1.5000	180
LRD-32	2.0003/2.0000	180

60 Case LinearRace Support Blocks for End Supported Applications

ASB-16

Type	Description	Nom. Size	Nom. Dia.	Nom. Size	Nom. Dia.	Nom. Size	Nom. Dia.
ASB	Low Profile 60 Case LinearRace End Support Block	4	.250	10	.625	20	1.250
SB	Standard 60 Case LinearRace End Support Block	6	.375	12	.750	24	1.500
FSB	Flanged 60 Case LinearRace End Support Block	8	.500	16	1.000	32	2.000

Precision Steel Ball Bushing Bearings (Closed Type) for End Supported Applications



Sizes .250 thru 1.00 available in Corrosion Resistant Stainless Steel

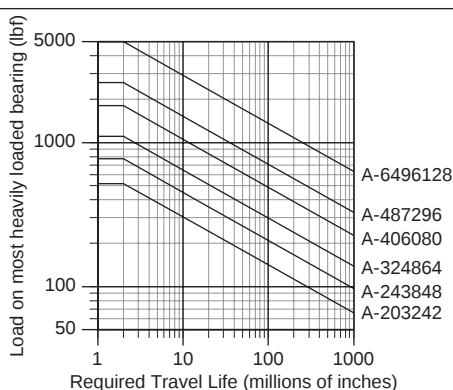
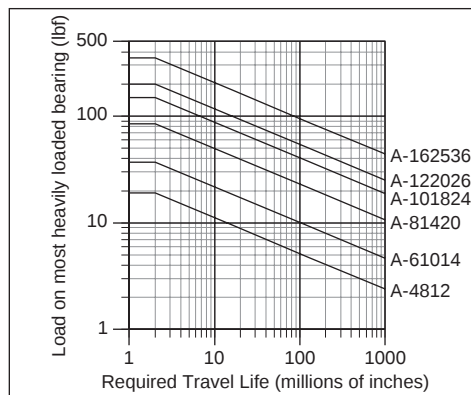
Precision Steel Ball Bushing* Bearings (Closed Type) and 60 Case* LinearRace* (Dimensions in inches)

Part Number ⁽²⁾		60 Case LinearRace	Nom. Dia.	Length C	Distance Between Retaining Grooves C1	Ret. Ring Groove min. C2	No. of Ball Circ.	D	60 Case Solid LinearRace Mass lb/in	60 Case Tubular Lite LinearRace Mass lb/in	60 Case Tubular Lite LinearRace ID D1
Precision Steel Ball Bushing Bearing											
w/o Seals	With Seals										
A-4812	A-4812-DD	LRS-4	.250	.750/.735	.515/.499	.039	3	.5000/.4996	.01	—	—
A-61014	A-61014-DD	LRS-6	.375	.875/.860	.640/.624	.039	4	.6250/.6246	.03	—	—
A-81420	A-81420-DD	LRS-8	.500	1.250/1.235	.967/.951	.046	4	.8750/.8746	.06	—	—
A-101824	—	LRS-10	.625	1.500/1.485	1.108/1.092	.056	4	1.1250/1.1246	.09	—	—
A-122026	A-122026-DD	LRS-12	.750	1.625/1.610	1.170/1.154	.056	5	1.2500/1.2496	.13	.08	.46/.41
A-162536	A-162536-DD	LRS-16	1.000	2.250/2.235	1.759/1.741	.068	5	1.5625/1.5621	.22	.16	.62/.56
A-203242	A-203242-DD	LRS-20	1.250	2.625/2.605	2.009/1.991	.068	6	2.0000/1.9995	.35	—	—
A-243848	A-243848DD	LRS-24	1.500	3.000/2.980	2.415/2.397	.086	6	2.3750/2.3745	.50	.33	.93/.84
A-324864	—	LRS-32	2.000	4.000/3.980	3.195/3.177	.103	6	3.0000/2.9994	.89	.54	1.31/1.18
A-406080	—	LRS-40	2.500	5.000/4.975	3.978/3.958	.120	6	3.7500/3.7492	1.39	.75	1.84/1.66
A-487296	—	LRS-48	3.000	6.000/5.970	4.728/4.708	.120	6	4.5000/4.4990	2.00	1.11	2.20/1.80
A-6496128	—	LRS-64	4.000	8.000/7.960	6.265/6.235	.139	6	6.0000/5.9988	3.56	1.56	3.30/2.70

Part Number ⁽²⁾		Working Bore Diameter T	Recommended Housing Bore		60 Case LinearRace Diameter d	Precision Steel Ball Bushing Bearing/ LinearRace Fit Up [†]	Precision Steel Ball Bushing Bearing Mass lb	Dynamic ⁽¹⁾ Load Capacity lb _f
Precision Steel Ball Bushing Bearing			Normal Fit	Press Fit				
w/o Seals	With Seals							
A-4812	A-4812-DD	.2500/.2495	.5005/.5000	.4995/.4990	.2490/.2485	.0015C/.0005C	.02	19
A-61014	A-61014-DD	.3750/.3745	.6255/.6250	.6245/.6240	.3740/.3735	.0015C/.0005C	.06	37
A-81420	A-81420-DD	.5000/.4995	.8755/.8750	.8745/.8740	.4990/.4985	.0015C/.0005C	.08	85
A-101824	—	.6250/.6245	1.1255/1.1250	1.1245/1.1240	.6240/.6235	.0015C/.0005C	.16	150
A-122026	A-122026-DD	.7500/.7495	1.2505/1.2500	1.2495/1.2490	.7490/.7485	.0015C/.0005C	.21	200
A-162536	A-162536-DD	1.0000/.9995	1.5630/1.5625	1.5620/1.5615	.9990/.9985	.0015C/.0005C	.38	350
A-203242	A-203242DD	1.2500/1.2494	2.0010/2.0000	1.9993/1.9983	1.2490/1.2485	.0015C/.0004C	1.10	520
A-243848	A-243848-DD	1.5000/1.4994	2.3760/2.3750	2.3743/2.3733	1.4989/1.4984	.0016C/.0005C	1.43	770
A-324864	—	2.0000/1.9992	3.0010/3.0000	2.9992/2.9982	1.9987/1.9980	.0020C/.0005C	2.75	1100
A-406080	—	2.5000/2.4990	3.7510/3.7500	Not Normally Recommended	2.4985/2.4977	.0023C/.0005C	5.50	1800
A-487296	—	3.0000/2.9988	4.5010/4.5000		2.9983/2.9974	.0026C/.0005C	9.50	2600
A-6496128	—	4.0000/3.9980	6.0010/6.0000		3.9976/3.9964	.0036C/.0004C	20.20	5000

Load/Life Graph (Lines indicate limiting load for given Ball Bushing bearing)

[†] P=Preload, C=Clearance



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.

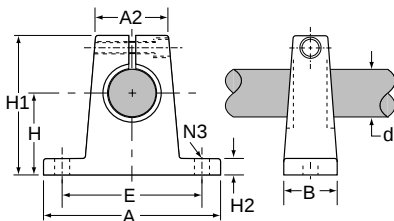
Note: For the purpose of using this chart.

Load on most heavily loaded bearing = maximum applied load/K₀

Where K₀ can be determined from the Polar Graph to the right.

60 Case LinearRace Support Blocks for End Supported Applications

Type SB LinearRace Support Block

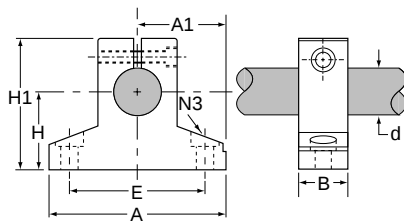


Material: Malleable Iron for sizes .5 to 2 in.
Aluminum Alloy for sizes .25 and .375 in.

Type SB 60 Case* LinearRace* End Support Blocks (Dimensions in inches)

Part ⁽²⁾ No.	Nominal LinearRace Diameter d	H ±.002	H1	H2	A	A2	B	E ±.010	N3		Wt. lb
									Hole	Bolt	
SB-4	.250	.687	1.06	.25	1.50	.63	.50	1.125	.16	#6	.03
SB-6	.375	.750	1.19	.25	1.63	.69	.56	1.250	.16	#6	.05
SB-8	.500	1.000	1.63	.25	2.00	.75	.63	1.500	.19	#8	.30
SB-10	.625	1.000	1.75	.31	2.50	.88	.69	1.880	.22	#10	.40
SB-12	.750	1.250	2.13	.31	2.75	1.00	.75	2.000	.22	#10	.50
SB-16	1.000	1.500	2.56	.38	3.25	1.38	1.00	2.500	.28	.25	1.00
SB-20	1.250	1.750	3.00	.44	4.00	1.75	1.13	3.000	.34	.31	2.00
SB-24	1.500	2.000	3.50	.50	4.75	2.00	1.25	3.500	.34	.31	2.60
SB-32	2.000	2.500	4.50	.63	6.00	2.63	1.50	4.500	.41	.38	4.80

Type ASB LinearRace Support Block

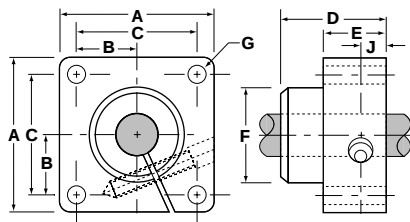


Material: Aluminum Alloy

Type ASB 60 Case LinearRace End Support Blocks (Dimensions in inches)

Part ⁽²⁾ No.	Nominal LinearRace Diameter d	H ±.001	H1	A	A1 ±.001	B	E	N3		Wt. lb
								Hole	Bolt	
ASB-4	.250	.500	.88	1.50	.750	.50	1.12	.16	#6	.06
ASB-6	.375	.562	1.00	1.62	.813	.56	1.25	.16	#6	.08
ASB-8	.500	.875	1.48	2.00	1.000	.63	1.50	.19	#8	.11
ASB-12	.750	1.125	1.95	2.50	1.250	.75	2.00	.22	#10	.22
ASB-16	1.000	1.375	2.48	3.25	1.625	1.00	2.50	.28	.25	.44
ASB-24	1.500	2.000	3.50	4.75	2.375	1.25	3.50	.34	.31	1.16

Type FSB Flanged LinearRace Support Block



Material: Aluminum Alloy

Type FSB Flanged 60 Case LinearRace End Support Blocks (Dimensions in inches)

Part No.	Nominal LinearRace Diameter d	A	B	C ±.010	D	E	F	G		J	Mass lb
								Hole	Bolt		
FSB-8	.500	1.63	.81	1.250	.88	.50	1.00	.18	#8	.25	.3
FSB-12	.750	2.38	1.19	1.750	1.00	.63	1.25	.21	#10	.31	.6
FSB-16	1.000	2.75	1.38	2.125	1.25	.63	1.50	.27	1/4	.31	.8
FSB-20	1.250	3.13	1.56	2.375	1.38	.75	1.75	.27	1/4	.38	.9

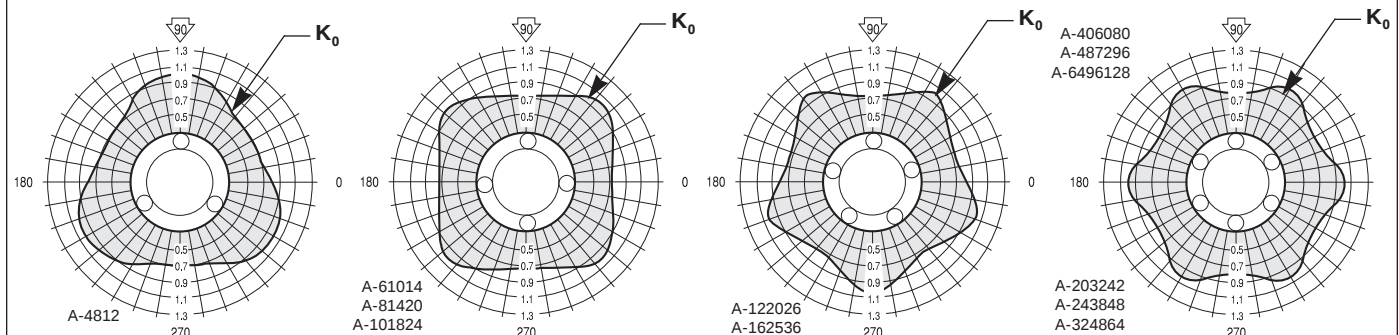
⁽¹⁾ The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.

⁽²⁾ For part number description and specifications see page 72 and 73.

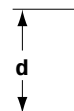
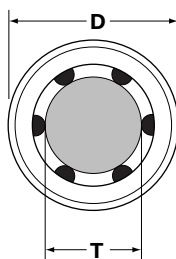
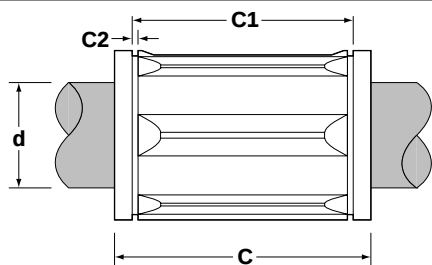
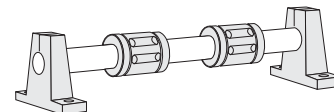
Note: Precision Steel Ball Bushing bearings are available in corrosion resistant stainless steel in diameters up to 1 inch. Dynamic load ratings are reduced by 30% when using stainless steel Ball Bushing bearings. See Engineering Support Appendix page 136. For additional technical data, see Engineering Support Appendix.

Polar Graphs

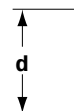
The actual Dynamic Load Capacity of a Ball Bushing bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor K_0 is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the 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.



Extra Precision Steel Ball Bushing Bearings (Closed Type) for End Supported Applications



60 Case Solid
LinearRace



60 Case Tubular Lite
LinearRace

Sizes .250 thru 1.00 available in Corrosion Resistant Stainless Steel

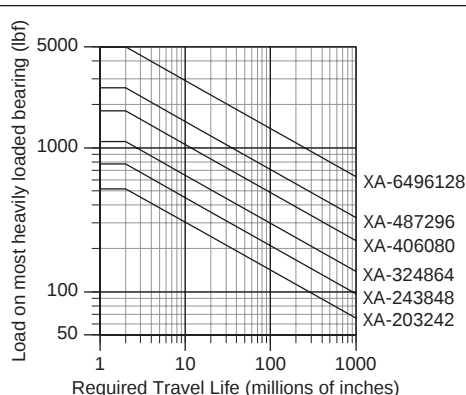
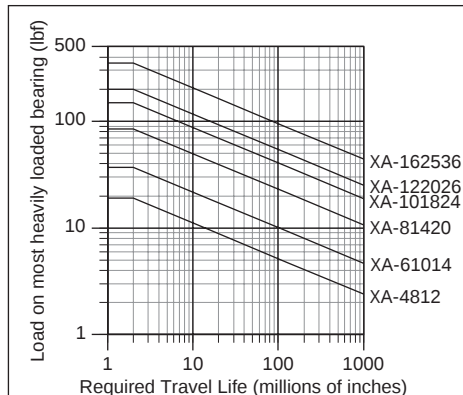
Extra Precision Steel Ball Bushing Bearings (Closed Type) and 60 Case* LinearRace* (Dimensions in inches)

Part Number ⁽²⁾		60 Case LinearRace	Nom. Dia.	Length C	Distance Between Retaining Grooves C1	Ret. Ring Groove min. C2	No. of Ball Circ.	D	60 Case Solid LinearRace Mass lb/in	60 Case Tubular Lite LinearRace Mass lb/in	60 Case Tubular Lite LinearRace ID D1
Extra Precision Steel Ball Bushing Bearing											
w/o Wipers	With Wipers										
XA-4812	—	LRL-4	.250	.750/.735	.515/.499	.039	3	.5000/.4996	.01	—	—
XA-61014	—	LRL-6	.375	.875/.860	.640/.624	.039	4	.6250/.6246	.03	—	—
XA-81420	XA-81420-DD	LRL-8	.500	1.250/1.235	.967/.951	.046	4	.8750/.8746	.06	—	—
XA-101824	—	LRL-10	.625	1.500/1.485	1.108/1.092	.056	4	1.1250/1.1246	.09	—	—
XA-122026	XA-122026-DD	LRL-12	.750	1.625/1.610	1.170/1.154	.056	5	1.2500/1.2496	.13	.08	.46/.41
XA-162536	XA-162536-DD	LRL-16	1.000	2.250/2.235	1.759/1.741	.068	5	1.5625/1.5621	.22	.16	.62/.56
XA-203242	—	LRL-20	1.250	2.625/2.605	2.009/1.991	.068	6	2.0000/1.9995	.35	—	—
XA-243848	—	LRL-24	1.500	3.000/2.980	2.415/2.397	.086	6	2.3750/2.3745	.50	.33	.93/.84
XA-324864	—	LRL-32	2.000	4.000/3.980	3.195/3.177	.103	6	3.0000/2.9994	.89	.54	1.31/1.18
XA-406080	—	LRL-40	2.500	5.000/4.975	3.978/3.958	.120	6	3.7500/3.7492	1.39	.75	1.84/1.66
XA-487296	—	LRL-48	3.000	6.000/5.970	4.728/4.708	.120	6	4.5000/4.4990	2.00	1.11	2.20/1.80
XA-6496128	—	LRL-64	4.000	8.000/7.960	6.265/6.235	.139	6	6.0000/5.9988	3.56	1.56	3.30/2.70

Part Number ⁽²⁾		Working Bore Diameter T	Recommended Housing Bore		60 Case LinearRace Diameter d	Precision Steel Ball Bushing Bearing/ LinearRace Fit Up [†]	Precision Steel Ball Bushing Bearing Mass lb	Dynamic ⁽¹⁾ Load Capacity lb _f
Extra Precision Steel Ball Bushing Bearing			Normal Fit	Press Fit				
w/o Seals	With Seals							
XA-4812	—	.2500/.2497	.5005/.5000	Not Normally Recommended	.2495/.2490	.0010C/.0002C	.02	19
XA-61014	—	.3750/.3747	.6255/.6250		.3745/.3740	.0010C/.0002C	.06	37
XA-81420	XA-81420-DD	.5000/.4997	.8755/.8750		.4995/.4990	.0010C/.0002C	.08	85
XA-101824	—	.6250/.6247	1.1255/1.1250		.6245/.6240	.0010C/.0002C	.16	150
XA-122026	XA-122026-DD	.7500/.7497	1.2505/1.2500		.7495/.7490	.0010C/.0002C	.21	200
XA-162536	XA-162536-DD	1.0000/.9997	1.5630/1.5625		.9995/.9990	.0010C/.0002C	.38	350
XA-203242	—	1.2500/1.2496	2.0010/2.0000		1.2495/1.2490	.0010C/.0001C	1.10	520
XA-243848	—	1.5000/1.4996	2.3760/2.3750		1.4994/1.4989	.0011C/.0002C	1.43	770
XA-324864	—	2.0000/1.9996	3.0010/3.0000		1.9994/1.9987	.0013C/.0002C	2.75	1100
XA-406080	—	2.5000/2.4995	3.7510/3.7500		2.4993/2.4985	.0015C/.0002C	5.50	1800
XA-487296	—	3.0000/2.9994	4.5010/4.5000		2.9992/2.9983	.0017C/.0002C	9.50	2600
XA-6496128	—	4.0000/3.9990	6.0010/6.0000		3.9988/3.9976	.0024C/.0002C	20.20	5000

Load/Life Graph (Lines indicate limiting load for given Ball Bushing bearing)

[†] P=Preload, C=Clearance



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.

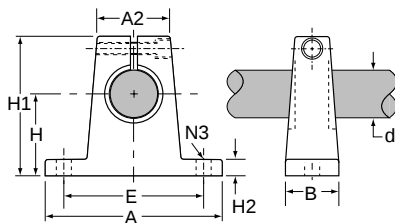
Note: For the purpose of using this chart.

Load on most heavily loaded bearing = maximum applied load/K_p.

Where K_p can be determined from the Polar Graph to the right.

60 Case LinearRace Support Blocks for End Supported Applications

Type SB LinearRace Support Block

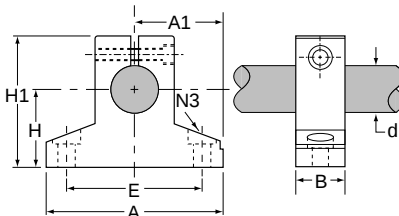


Material: Malleable Iron for sizes .5 to 2 in.
Aluminum Alloy for sizes .25 and .375 in.

Type SB 60 Case* LinearRace* End Support Blocks (Dimensions in inches)

Part ⁽²⁾ No.	Nominal LinearRace Diameter d	H ±.002	H1	H2	A	A2	B	E ±.010	N3		Mass lb
									Hole	Bolt	
SB-4	.250	.687	1.06	.25	1.50	.63	.50	1.125	.16	#6	.03
SB-6	.375	.750	1.19	.25	1.63	.69	.56	1.250	.16	#6	.05
SB-8	.500	1.000	1.63	.25	2.00	.75	.63	1.500	.19	#8	.30
SB-10	.625	1.000	1.75	.31	2.50	.88	.69	1.875	.22	#10	.40
SB-12	.750	1.250	2.13	.31	2.75	1.00	.75	2.000	.22	#10	.50
SB-16	1.000	1.500	2.56	.38	3.25	1.38	1.00	2.500	.28	.25	1.00
SB-20	1.250	1.750	3.00	.44	4.00	1.75	1.13	3.000	.34	.31	2.00
SB-24	1.500	2.000	3.50	.50	4.75	2.00	1.25	3.500	.34	.31	2.60
SB-32	2.000	2.500	4.50	.63	6.00	2.63	1.50	4.500	.41	.38	4.80

Type ASB LinearRace Support Block

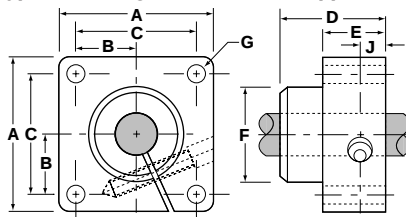


Material: Aluminum Alloy

Type ASB 60 Case LinearRace End Support Blocks (Dimensions in inches)

Part ⁽²⁾ No.	Nominal LinearRace Diameter d	H ±.001	H1	A	A1 ±.001	B	E	N3		Mass lb
								Hole	Bolt	
ASB-4	.250	.500	.88	1.50	.750	.50	1.12	.16	#6	.06
ASB-6	.375	.562	1.00	1.62	.813	.56	1.25	.16	#6	.08
ASB-8	.500	.875	1.48	2.00	1.000	.63	1.50	.19	#8	.11
ASB-12	.750	1.125	1.95	2.50	1.250	.75	2.00	.22	#10	.22
ASB-16	1.000	1.375	2.48	3.25	1.625	1.00	2.50	.28	.25	.44
ASB-24	1.500	2.000	3.50	4.75	2.375	1.25	3.50	.34	.31	1.16

Type FSB Flanged LinearRace Support Block



Material: Aluminum Alloy

Type FSB Flanged 60 Case LinearRace End Support Blocks (Dimensions in inches)

Part No.	Nominal LinearRace Diameter d	A	B	C ±.010	D	E	F	G		J	Mass lb
								Hole	Bolt		
FSB-8	.500	1.63	.81	1.250	.88	.50	1.00	.18	#8	.25	.3
FSB-12	.750	2.38	1.19	1.750	1.00	.63	1.25	.21	#10	.31	.6
FSB-16	1.000	2.75	1.38	2.125	1.25	.63	1.50	.27	1/4	.31	.8
FSB-20	1.250	3.13	1.56	2.375	1.38	.75	1.75	.27	1/4	.38	.9

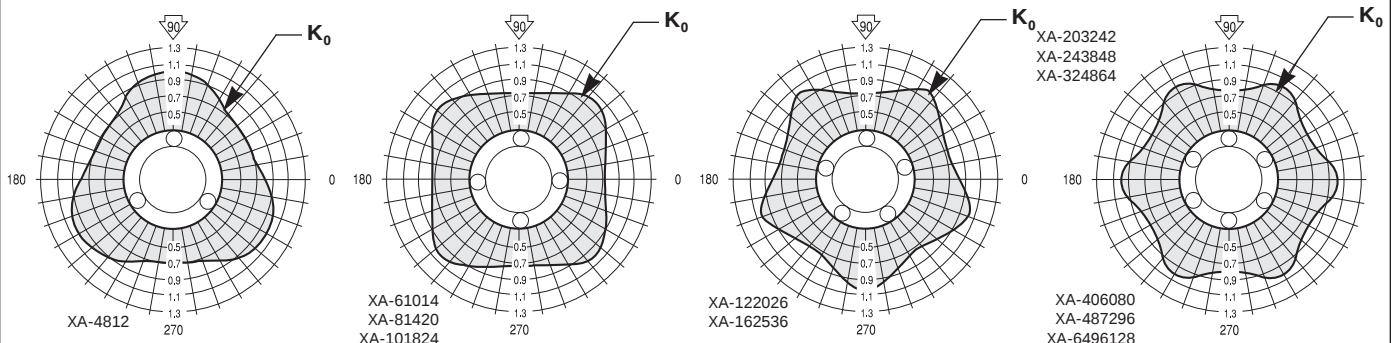
⁽¹⁾ The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.

⁽²⁾ For part number description and specifications see page 72 and 73.

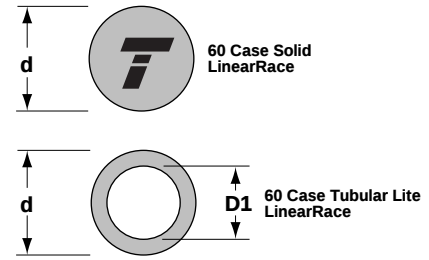
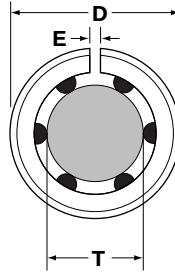
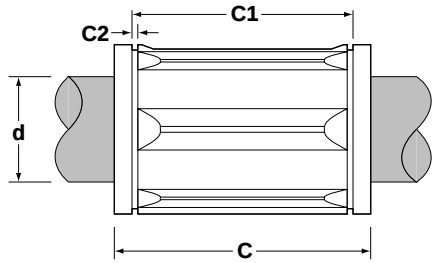
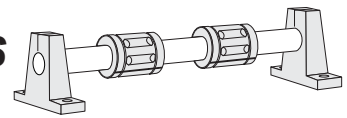
Note: Precision Steel Ball Bushing bearings are available in corrosion resistant stainless steel in diameters up to 1 inch. Dynamic load ratings are reduced by 30% when using stainless steel Ball Bushing bearings. See Engineering Support Appendix page 136. For additional technical data, see Engineering Support Appendix.

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.



Adjustable Precision Steel Ball Bushing Bearings for End Supported Applications



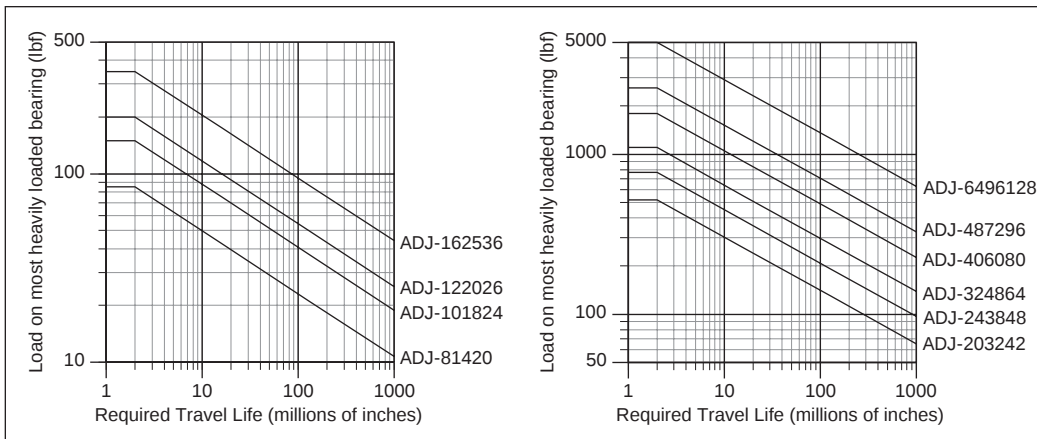
Sizes .250 thru 1.00 available in Corrosion Resistant Stainless Steel

Adjustable Precision Steel Ball Bushing Bearings and 60 Case* LinearRace* (Dimensions in inches)

Part Number ⁽²⁾		Nom. Dia.	Length C	Distance Between Retaining Grooves C1	Ret. Ring Groove min. C2	Min. Slot Width E	No. of Ball Circ.	60 Case LinearRace Minimum Depth of Hardness	60 Case Solid LinearRace Mass lb/in	60 Case Tubular Lite LinearRace Mass lb/in	60 Case Tubular Lite LinearRace ID D1
Precision Steel Ball Bushing Bearing	60 Case LinearRace										
ADJ-81420	LRL-8	.500	1.250/1.235	.967/.951	.046	.06	4	.04	.06	—	—
ADJ-101824	LRL-10	.625	1.500/1.485	1.108/1.092	.056	.09	4	.04	.09	—	—
ADJ-122026	LRL-12	.750	1.625/1.610	1.170/1.154	.056	.09	5	.06	.13	.08	.46/.41
ADJ-162536	LRL-16	1.000	2.250/2.235	1.759/1.741	.068	.09	5	.08	.22	.16	.62/.56
ADJ-203242	LRL-20	1.250	2.625/2.605	2.009/1.991	.068	.09	6	.08	.35	—	—
ADJ-243848	LRL-24	1.500	3.000/2.980	2.415/2.397	.086	.13	6	.08	.50	.33	.93/.84
ADJ-324864	LRL-32	2.000	4.000/3.980	3.195/3.177	.103	.13	6	.10	.89	.54	1.31/1.18
ADJ-406080	LRL-40	2.500	5.000/4.975	3.978/3.958	.120	.13	6	.10	1.39	.75	1.84/1.66
ADJ-487296	LRL-48	3.000	6.000/5.970	4.728/4.708	.120	.13	6	.10	2.00	1.11	2.20/1.80
ADJ-6496128	LRL-64	4.000	8.000/7.960	6.265/6.235	.139	.13	6	.10	3.56	1.56	3.30/2.70

Part Number ⁽²⁾	Working Bore Diameter T	Recommended Housing Bore Diameter D	60 Case LinearRace Diameter d	Precision Steel Ball Bushing Bearing Mass lb	Dynamic ⁽¹⁾ Load Capacity lb _f
Precision Steel Ball Bushing Bearing		Normal Fit			
ADJ-81420	.5000/.4995	.8755/.8750	.4995/.4990	.08	85
ADJ-101824	.6250/.6245	1.1255/1.1250	.6245/.6240	.16	150
ADJ-122026	.7500/.7495	1.2505/1.2500	.7495/.7490	.21	200
ADJ-162536	1.0000/.9995	1.5630/1.5625	.9995/.9990	.38	350
ADJ-203242	1.2500/1.2494	2.0010/2.0000	1.2495/1.2490	1.10	520
ADJ-243848	1.5000/1.4994	2.3760/2.3750	1.4994/1.4989	1.43	770
ADJ-324864	2.0000/1.9992	3.0010/3.0000	1.9994/1.9987	2.75	1100
ADJ-406080	2.5000/2.4990	3.7510/3.7500	2.4993/2.4985	5.50	1800
ADJ-487296	3.0000/2.9988	4.5010/4.5000	2.9992/2.9983	9.50	2600
ADJ-6496128	4.0000/3.9980	6.0010/6.0000	3.9988/3.9976	20.20	5000

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.

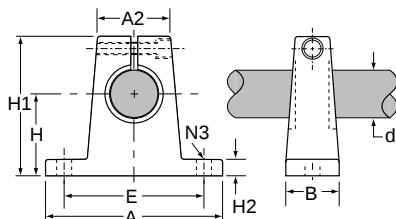
Note: For the purpose of using this chart.

Load on most heavily loaded bearing = maximum applied load/K_s

Where K_s can be determined from the Polar Graph to the right.

60 Case LinearRace Support Blocks for End Supported Applications

Type SB LinearRace Support Block



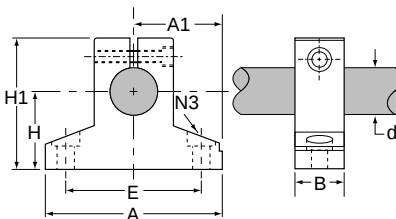
Material: Malleable Iron for sizes .5 to 2 in.
Aluminum Alloy for sizes .25 and .375 in.

Type SB 60 Case* LinearRace* End Support Blocks

(Dimensions in inches)

Part ⁽²⁾ No.	Nominal LinearRace Diameter d	H ±.002	H1	H2	A	A2	B	E ±.010	N3		Wt. lb
									Hole	Bolt	
SB-8	.500	1.000	1.63	.25	2.00	.75	.63	1.500	.19	#8	.30
SB-10	.625	1.000	1.75	.31	2.50	.88	.69	1.875	.22	#10	.40
SB-12	.750	1.250	2.13	.31	2.75	1.00	.75	2.000	.22	#10	.50
SB-16	1.000	1.500	2.56	.38	3.25	1.38	1.00	2.500	.28	.25	1.00
SB-20	1.250	1.750	3.00	.44	4.00	1.75	1.13	3.000	.34	.31	2.00
SB-24	1.500	2.000	3.50	.50	4.75	2.00	1.25	3.500	.34	.31	2.60
SB-32	2.000	2.500	4.50	.63	6.00	2.63	1.50	4.500	.41	.38	4.80

Type ASB LinearRace Support Block



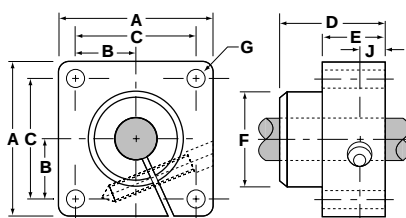
Material: Aluminum Alloy

Type ASB 60 Case LinearRace End Support Blocks

(Dimensions in inches)

Part ⁽²⁾ No.	Nominal LinearRace Diameter d	H ±.001	H1	A	A1 ±.001	B	E	N3		Wt. lb
								Hole	Bolt	
ASB-8	.500	.875	1.48	2.00	1.000	.63	1.50	.19	#8	.11
ASB-12	.750	1.125	1.95	2.50	1.250	.75	2.00	.22	#10	.22
ASB-16	1.000	1.375	2.48	3.25	1.625	1.00	2.50	.28	.25	.44
ASB-24	1.500	2.000	3.50	4.75	2.375	1.25	3.50	.34	.31	1.16

Type FSB Flanged LinearRace Support Block



Material: Aluminum Alloy

Type FSB Flanged 60 Case LinearRace End Support Blocks

(Dimensions in inches)

Part ⁽²⁾ No.	Nominal LinearRace Diameter d	A	B	C ±.010	D	E	F	G		J	Mass lb
								Hole	Bolt		
FSB-8	.500	1.63	.81	1.250	.88	.50	1.00	.18	#8	.25	.3
FSB-12	.750	2.38	1.19	1.750	1.00	.63	1.25	.21	#10	.31	.6
FSB-16	1.000	2.75	1.38	2.125	1.25	.63	1.50	.27	1/4	.31	.8
FSB-20	1.250	3.13	1.56	2.375	1.38	.75	1.75	.27	1/4	.38	.9

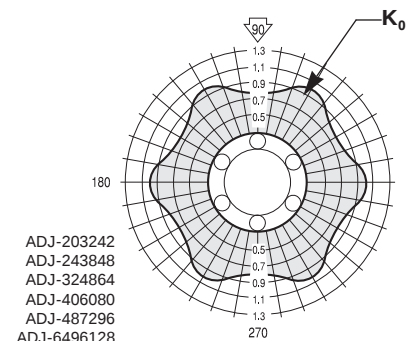
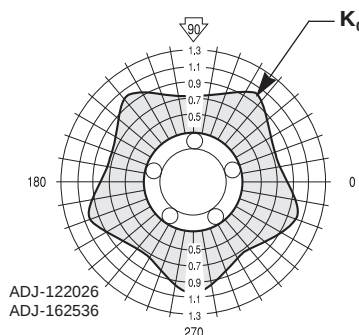
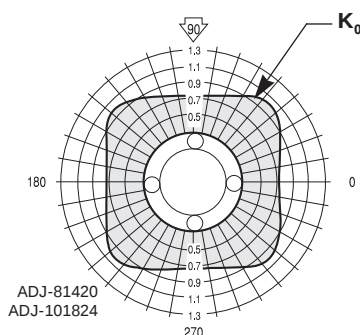
⁽¹⁾ The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.

⁽²⁾ For part number description and specifications see page 72 and 73.

Note: Precision Steel Ball Bushing bearings are available in corrosion resistant stainless steel in diameters up to 1 inch. Dynamic load ratings are reduced by 30% when using stainless steel Ball Bushing bearings. See Engineering Support Appendix page 136. For additional technical data, see Engineering Support Appendix.

Polar Graphs

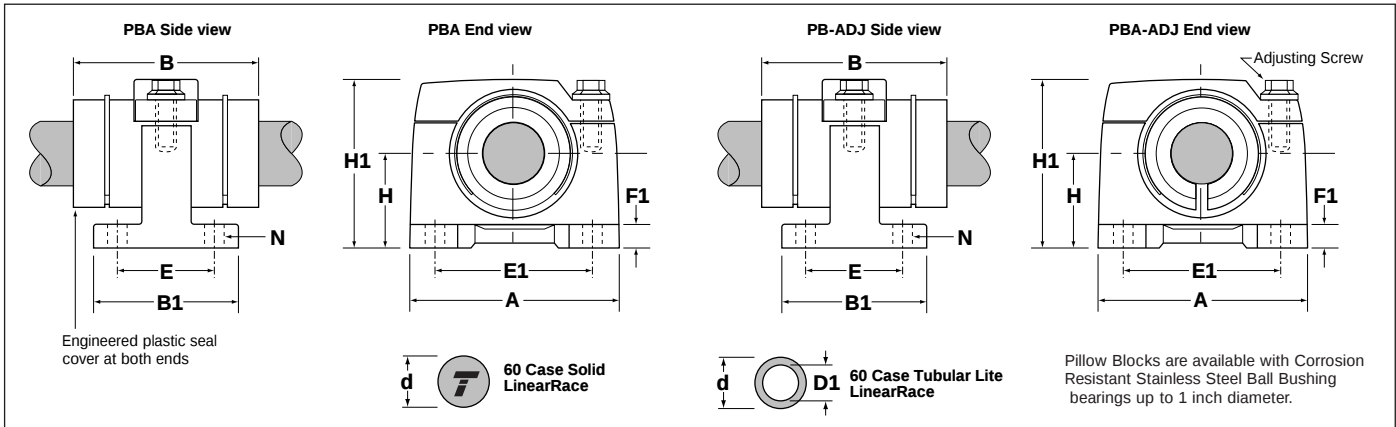
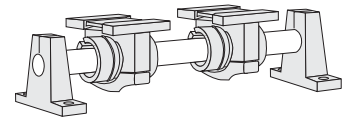
The actual Dynamic Load Capacity of a Ball Bushing bearing is determined by the orientation of the bearing or direction of the applied load. The load Correction Factor K_0 is found by knowing the direction of the applied load relative to the orientation of the bearings ball tracks and referring to the 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.



Precision Steel Ball Bushing Pillow Blocks

(Closed and Adjustable Type)

for End Supported Applications

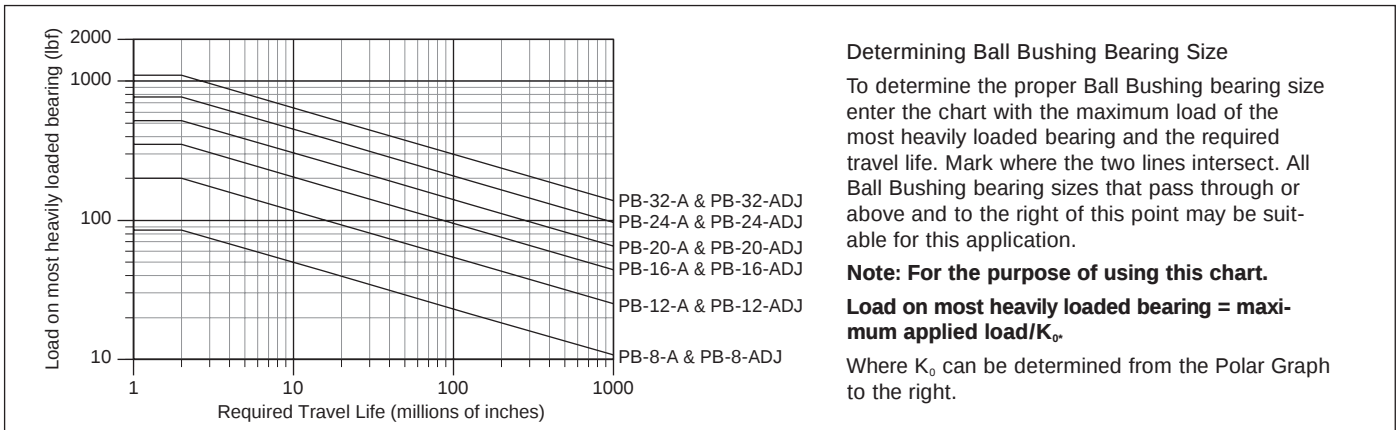


Precision Steel Ball Bushing Pillow Blocks (Closed and Adjustable Type, seal at both ends) (Dimensions in inches)

Part Number ⁽²⁾				Nom. Dia.	H ±.005	H1	Class S 60 Case LinearRace Diameter d	Class L 60 Case LinearRace Diameter d	60 Case LinearRace Minimum Depth of Hardness	60 Case Solid LinearRace Mass lb/in	60 Case Tubular Lite LinearRace Mass lb/in	60 Case Tubular Lite LinearRace ID D1
Precision Steel Ball Bushing Pillow Block	60 Case* LinearRace* Class S	Precision Steel Ball Bushing Pillow Block	60 Case LinearRace Class L									
Closed		Adjustable										
PB-8-A	LRS-8	PB-8-ADJ	LRL-8	.500	.875	1.63	.4990/.4985	.4995/.4990	.04	.06	—	—
PB-12-A	LRS-12	PB-12-ADJ	LRL-12	.750	1.125	2.13	.7490/.7485	.7495/.7490	.06	.13	.08	.46/.41
PB-16-A	LRS-16	PB-16-ADJ	LRL-20	1.000	1.375	2.56	.9990/.9985	.9995/.9990	.08	.22	.16	.62/.56
PB-20-A	LRS-20	PB-20-ADJ	LRL-16	1.250	1.750	3.25	1.2490/1.2485	1.2495/1.2490	.08	.35	—	—
PB-24-A	LRS-24	PB-24-ADJ	LRL-24	1.500	2.000	3.75	1.4989/1.4984	1.4994/1.4989	.08	.50	.33	.93/.84
PB-32-A	LRS-32	PB-32-ADJ	LRL-32	2.000	2.500	4.75	1.9987/1.9980	1.9994/1.9987	.10	.89	.54	1.31/1.18

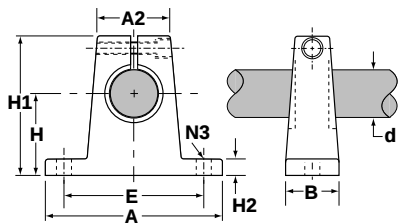
Part Number ⁽²⁾		A	B	B1	E	E1	F1	N		Pillow Block Mass lb	Dynamic ⁽¹⁾ Load Capacity lb _f
Precision Steel Ball Bushing Pillow Block								Hole	Bolt		
Closed	Adjustable										
PB-8-A	PB-8-ADJ	2.00	1.69	1.50	1.000	1.500	.25	.19	#8	.5	85
PB-12-A	PB-12-ADJ	2.75	2.06	2.00	1.375	2.000	.31	.22	#10	1.3	200
PB-16-A	PB-16-ADJ	3.25	2.88	2.25	1.500	2.500	.38	.28	¼	2.1	350
PB-20-A	PB-20-ADJ	4.00	3.63	2.75	1.875	3.000	.44	.34	⅝ ₁₆	4.4	520
PB-24-A	PB-24-ADJ	4.75	4.00	3.00	2.000	3.500	.50	.34	⅝ ₁₆	5.7	770
PB-32-A	PB-32-ADJ	6.00	5.00	3.50	2.500	4.500	.63	.41	¾	10.5	1100

Load/Life Graph (Lines indicate limiting load for given Ball Bushing bearing)



60 Case LinearRace Support Blocks for End Supported Applications

Type SB LinearRace Support Block

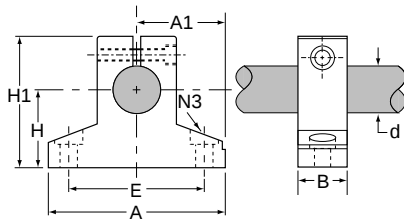


Material: Malleable Iron

Type SB 60 Case* LinearRace* End Support Blocks (Dimensions in inches)

Part ⁽²⁾ No.	Nominal LinearRace Diameter d	H ±.002	H1	H2	A	A2	B	E ±.010	N3		Wt. lb
									Hole	Bolt	
SB-8	.500	1.000	1.63	.25	2.00	.75	.63	1.500	.19	#8	.3
SB-12	.750	1.250	2.13	.31	2.75	1.00	.75	2.000	.22	#10	.5
SB-16	1.000	1.500	2.56	.38	3.25	1.38	1.00	2.500	.28	.25	1.0
SB-20	1.250	1.750	3.00	.44	4.00	1.75	1.13	3.000	.34	.31	2.0
SB-24	1.500	2.000	3.50	.50	4.75	2.00	1.25	3.500	.34	.31	2.6
SB-32	2.000	2.500	4.50	.63	6.00	2.63	1.50	4.500	.41	.38	4.8

Type ASB LinearRace Support Block

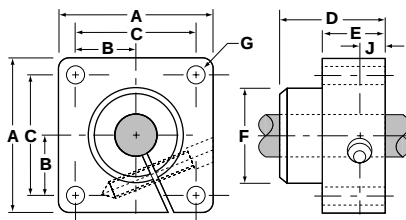


Material: Aluminum Alloy

Type ASB 60 Case LinearRace End Support Blocks (Dimensions in inches)

Part ⁽²⁾ No.	Nominal LinearRace Diameter d	H ±.001	H1	A	A1 ±.001	B	E	N3		Wt. lb
								Hole	Bolt	
ASB-8	.500	.875	1.48	2.00	1.000	.63	1.50	.19	#8	.11
ASB-12	.750	1.125	1.95	2.50	1.250	.75	2.00	.22	#10	.22
ASB-16	1.000	1.375	2.48	3.25	1.625	1.00	2.50	.28	.25	.44
ASB-24	1.500	2.000	3.50	4.75	2.375	1.25	3.50	.34	.31	1.16

Type FSB Flanged LinearRace Support Block



Material: Aluminum Alloy

Type FSB Flanged 60 Case LinearRace End Support Blocks (Dimensions in inches)

Part No.	Nominal LinearRace Diameter d	A	B	C ±.010	D	E	F	G		J	Mass lb
								Hole	Bolt		
FSB-8	.500	1.63	.81	1.250	.88	.50	1.00	.18	#8	.25	.3
FSB-12	.750	2.38	1.19	1.750	1.00	.63	1.25	.21	#10	.31	.6
FSB-16	1.000	2.75	1.38	2.125	1.25	.63	1.50	.27	1/4	.31	.8
FSB-20	1.250	3.13	1.56	2.375	1.38	.75	1.75	.27	1/4	.38	.9

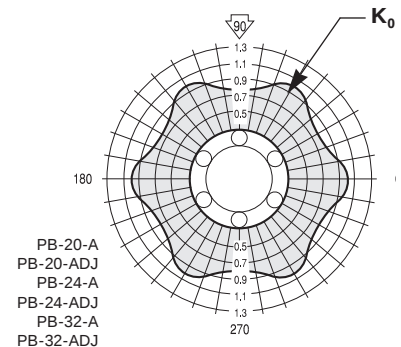
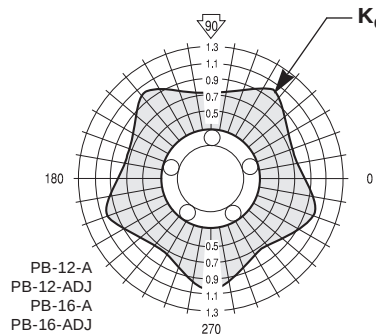
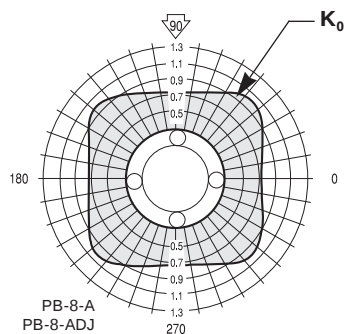
⁽¹⁾ The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs below.

⁽²⁾ For part number description and specifications see page 72 and 73.

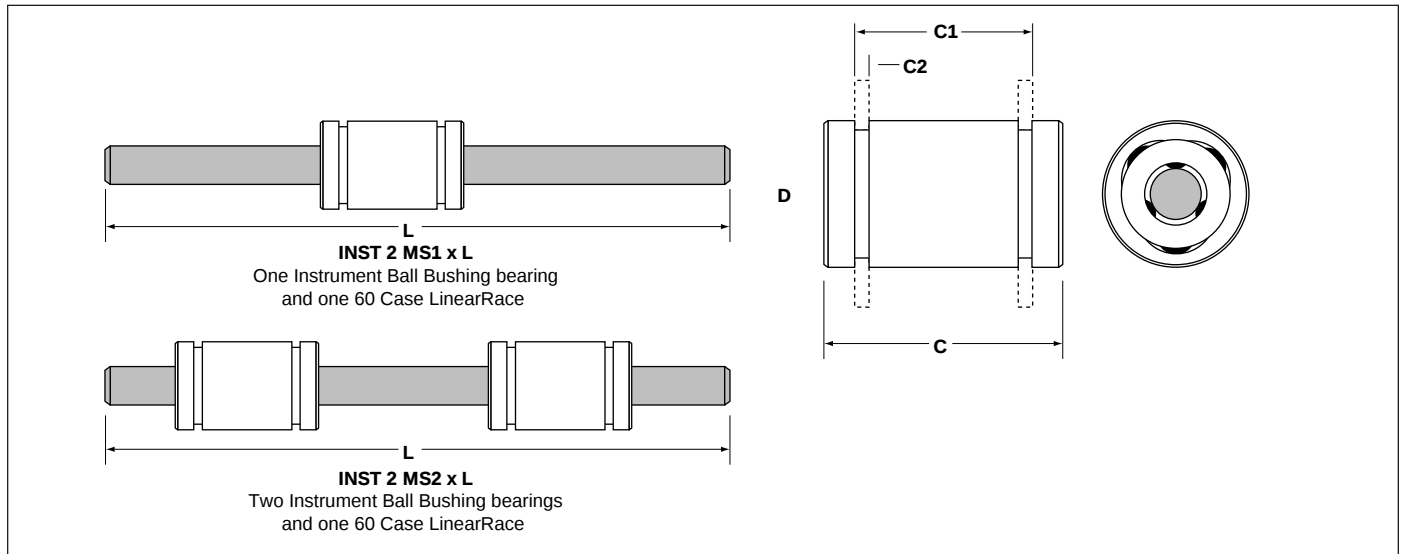
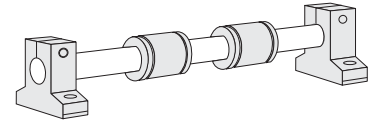
Note: Precision Steel Ball Bushing bearings are available in corrosion resistant stainless steel in diameters up to 1 inch. Dynamic load ratings are reduced by 30% when using stainless steel Ball Bushing bearings. See Engineering Support Appendix page 136. For additional technical data, see Engineering Support Appendix.

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.



Miniature Instrument Ball Bushing Bearing and 60 Case LinearRace Sets

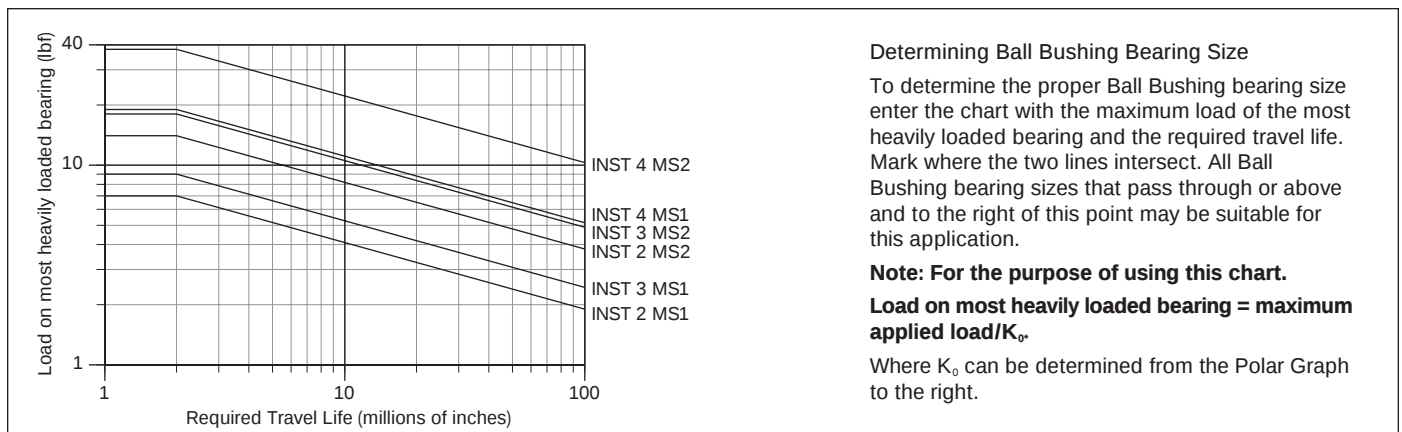


Miniature Instrument Ball Bushing* Bearing and 60 Case* LinearRace* Sets										(Dimensions in inches)
Part Number		Nominal Diameter	Outside Diameter D	Ball Bushing Bearing Length C	Distance Between Retaining Rings C1	Ret. Ring Groove min. C2	Recommended [†] Housing Bore	No. of Ball Circuits	Ball Bushing Bearing Mass lb	60 Case LinearRace Mass lb/in
One Bearing	Two Bearings									
INST 2 MS1	INST 2 MS2	.1250	.3125/.3121	.500/.485	.354	.028	.3130/.3124	3	.007	.004
INST 3 MS1	INST 3 MS2	.1875	.3750/.3746	.562/.547	.417	.028	.3755/.3749	3	.011	.008
INST 4 MS1	INST 4 MS2	.2500	.5000/.4996	.750/.735	.499	.039	.5005/.4999	3	.025	.014

Miniature Instrument Ball Bushing Bearing (Dimensions in inches)						
Part Number	Working Bore Diameter	60 Case LinearRace Part Number	LinearRace Maximum Length	60 Case LinearRace Diameter d	Instrument Ball Bushing bearing/ LinearRace Set Fit up	Dynamic ⁽¹⁾ Load Capacity lb _f
Miniature Instrument Ball Bushing Bearing						
INST 258-SS	.1250/.1247	LRI 2	12	.1248/.1245	.0003C/.0001C	7
INST 369-SS	.1875/.1872	LRI 3	12	.1873/.1870	.0003C/.0001C	9
INST 4812-SS	.2500/.2497	LRI 4	12	.2498/.2495	.0003C/.0001C	19

Load/Life Graph (Lines indicate limiting load for given Ball Bushing Bearing)

[†] Press fit not recommended



Miniature Instrument Ball Bushing Bearing and 60 Case LinearRace Sets

Type SB LinearRace Support Block

Material: Malleable Iron for sizes .5 to 2 in.
Aluminum Alloy for sizes .25 and .375 in.

Material: Aluminum Alloy

Type SB 60 Case* LinearRace* End Support Blocks										(Dimensions in inches)	
Part No.	Nominal LinearRace Diameter d	H ±.002	H1	H2	A	A2	B	E ±.010	N3		Mass lb
									Hole	Bolt	
SB-4	.250	.687	1.06	.25	1.50	.63	.50	1.125	.16	#6	.03

Type ASB LinearRace Support Block

Material: Aluminum Alloy

Type ASB 60 Case LinearRace End Support Blocks								(Dimensions in inches)		
Part No.	Nominal LinearRace Diameter d	H ±.001	H1	A	A1 ±.001	B	E	N3		Mass lb
								Hole	Bolt	
ASB-4	.250	.500	.88	1.50	.750	.50	1.12	.16	#6	.06

Part Number Description

INST

2

MS1

x

L3.0

Length of 60 Case LinearRace in inches (3.0 in.)

Type of matched set

• MS1 - one bearing and one 60 Case LinearRace

• MS2 - two bearings and one 60 Case LinearRace

Instrument Ball Bushing Product

60 Case LinearRace diameter 2=1/8 in., 3=3/16 in. or 4=1/4 in.

60 Case LinearRace Specifications

Material: 440C Stainless Steel

Hardness: 55-60 HRC

Surface Finish: 4 R_a microinch

Straightness: .0001 inch per inch

⁽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 polar graphs below. The dynamic load capacity for MS2 configurations are based on two bearings equally loaded. Note: For additional technical data, see Engineering Support Appendix.

Polar Graph

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 K₀ 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.

First in Linear Motion and Control Technology

The specifications and data in this publication are believed to be accurate and reliable. However, it is the responsibility of the product user to determine the suitability of Thomson products for a specific application. While defective products will be replaced without charge if promptly returned, no liability is assumed beyond such replacement.

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Die Set Ball Bushing Bearings

For End Supported Applications

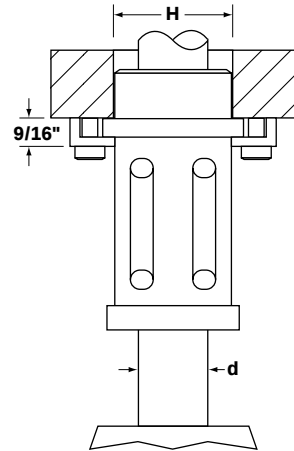
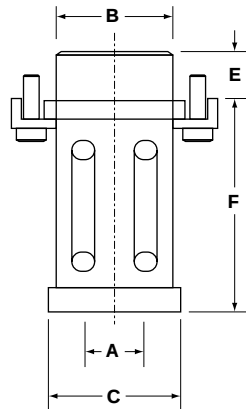
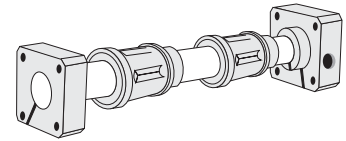
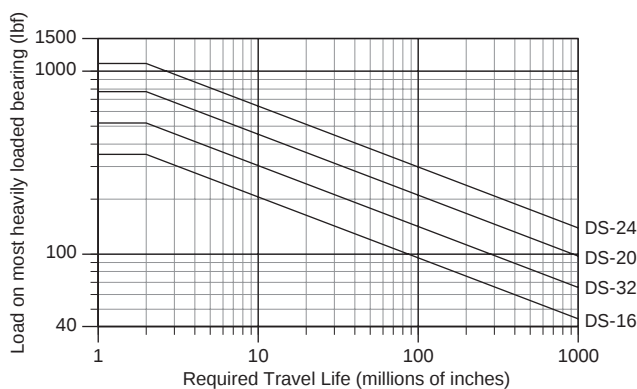


Table 1 — Precision Series Die Set Ball Bushing* Bearings and 60 Case* LinearRace* (Dimensions in inches)

Part Number		Nom. Dia.	60 Case LinearRace Diameter d	Working Bore Diameter A	Ball Bushing Pilot Diameter B	O.D. C	Ball Bushing Bearing Pilot Length E	F	Recommended Mounting Hole Diameter H	Concentricity of Pilot (B) to Bearing Bore (A) (TIR)	Dynamic ⁽¹⁾ Load Capacity lb _f
DS Ball Bushing Bearing	60 Case LinearRace										
DS-16	LRD-16	1.000	1.0003/1.0000	.9999/.9996	1.5007/1.5003	1.91	.94	3.17	1.5005/1.5000	.0007	350
DS-20	LRD-20	1.250	1.2503/1.2500	1.2498/1.2495	1.7507/1.7503	2.31	1.19	3.67	1.7505/1.7500	.0007	520
DS-24	LRD-24	1.500	1.5003/1.5000	1.4997/1.4994	2.0007/2.0003	2.72	1.44	4.17	2.0005/2.0000	.0007	770
DS-32	LRD-32	2.000	2.0003/2.0000	1.9995/1.9992	2.5007/2.5003	3.53	1.94	4.42	2.5005/2.5000	.0007	1100

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.

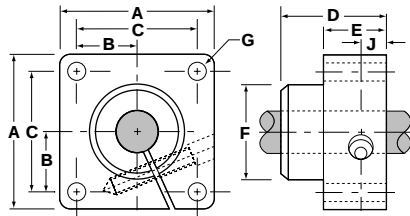
Note: For the purpose of using this chart.

Load on most heavily loaded bearing = maximum applied load/ K_o .

Where K_o can be determined from the Polar Graph to the right.

60 Case LinearRace Support Blocks for End Supported Applications

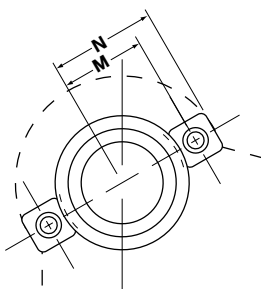
Type FSB Flanged LinearRace Support Block



Material: Aluminum Alloy

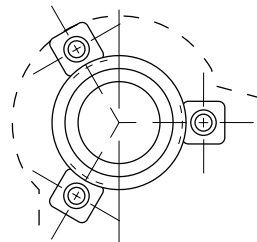
Type FSB Flanged 60 Case* LinearRace* End Support Blocks (Dimensions in inches)

Part No.	Nominal LinearRace Diameter d	A	B	C ±.010	D	E	F	G		J	Mass lb
								Hole	Bolt		
FSB-16	1.000	2.75	1.38	2.125	1.25	.63	1.50	.27	1/4	.31	.80
FSB-20	1.250	3.13	1.56	2.375	1.38	.75	1.75	.27	1/4	.38	.90



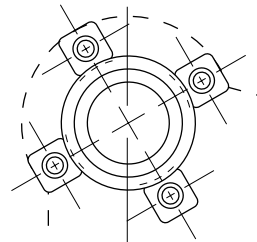
DS-16

furnished with 2 clamps
#CL-1 and 2 socket
head screws 1/4-20 x 1



DS-20

furnished with 3 clamps
#CL-1 and 3 socket
head screws 1/4-20 x 1



DS-32

furnished with 4 clamps
#CL-2 and 4 socket
head screws 5/16-18 x 1

DS-24

furnished with 3 clamps
#CL-2 and 3 socket
head screws 5/16-18 x 1

Die Set DS (Dimensions in inches)

Part Number		M	N
DS Ball Bushing Bearing	DS-B Ball Bushing Bearing		
DS-16	DS-16B	1.06	1.41
DS-20	DS-20B	1.27	1.61
DS-24	DS-24B	1.56	2.00
DS-32	DS-32B	1.94	2.38

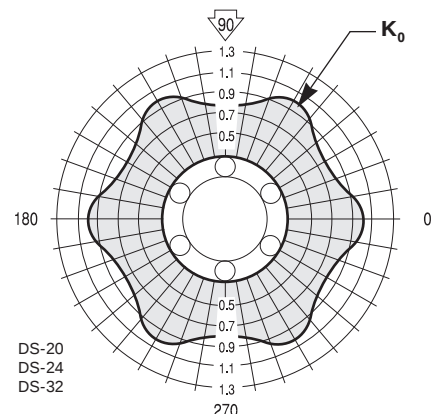
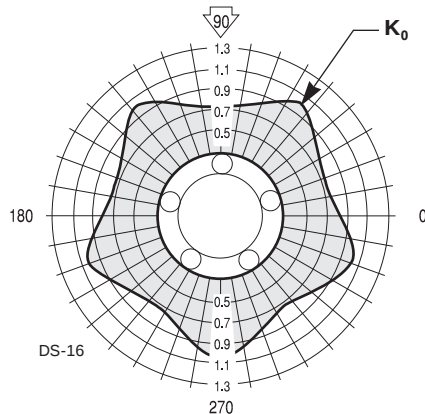
⁽¹⁾ The Dynamic Load Capacity is based on a rated travel life of 2 million inches.

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 polar graphs below.

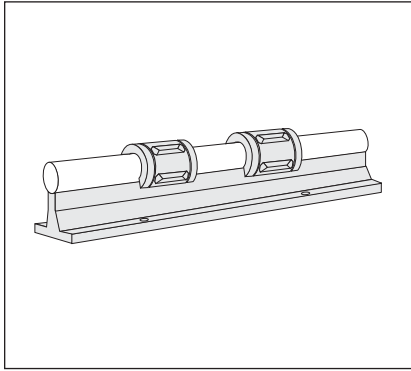
Note: For additional technical data, see Engineering Support Appendix.

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.



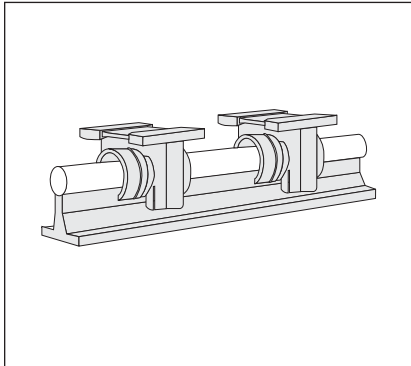
Precision Steel Ball Bushing Bearings and Pillow Blocks (Open Type) for Continuously Supported Applications



Precision Steel Ball Bushing Bearings (Open type)

Features:

- Coefficient of friction as low as .001.
- Load Capacity range from 60 to 3,800 lb_f.
- Can be mounted in a custom housing.
- Available in sizes ½ to 4 inch diameter.
- All steel construction for maximum rigidity.
- Can be adjusted to remove clearance between the Ball Bushing bearing and 60 Case* LinearRace*.
- Available in corrosion resistant stainless steel in sizes up to 1 inch diameter.
- Travel speeds up to 10 ft/s.

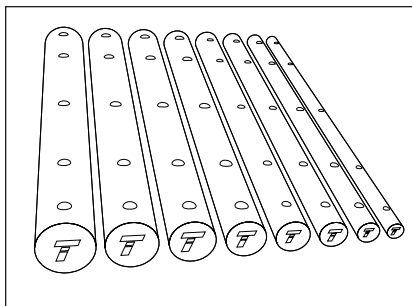


Precision Steel Ball Bushing Pillow Blocks (Open Type)

Features:

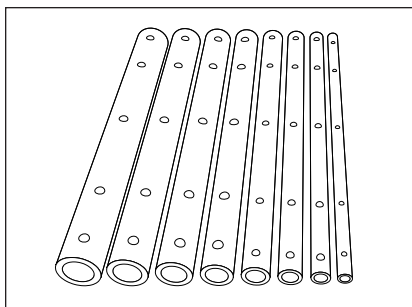
- Self-aligning for easy installation.
- Easily secured to table surface with four mounting bolts.
- Coefficient of friction as low as .001.
- Load capacity range from 60 to 860 lb_f.
- Available in sizes ½ to 2 inch diameter.
- Available with seals at both ends.
- All steel construction for maximum rigidity.
- Can be adjusted to remove clearance between the Ball Bushing bearing and 60 Case LinearRace.
- Available with corrosion resistant stainless steel Ball Bushing bearing in sizes up to 1 inch diameter.
- Travel speeds up to 10 ft/s.

60 Case LinearRace (PreDrilled) for Continuously Supported Applications



60 Case* Solid LinearRace* with Mounting Holes Features:

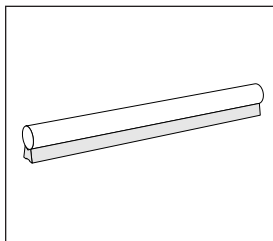
- Radial drilled and tapped holes ready for immediate use with standard hole spacing to match standard 60 Case LinearRace support rails.
- Diameter range between ½ and 4 inch.
- Surface finish 12 R_a microinch.
- Hardness 60-65 HRC.
- Roundness 80 millionths of an inch.
- Available in corrosion resistant 440C stainless steel (50-55 HRC).
- Available with Preplate chrome option.
- Standard straightness .001 inch per foot cumulative (.002 TIR) with special straightness at .0005 inch per foot cumulative (.001 TIR) available.



60 Case Tubular Lite LinearRace with Mounting Holes Features:

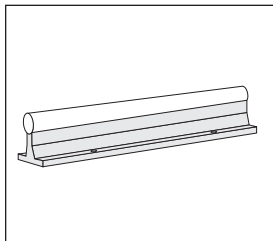
- Hollow design reduces weight and inertia.
- Radial drilled and tapped holes ready for immediate use.
- Standard hole spacing to match standard 60 Case LinearRace support rails.
- Diameter range between 1½ and 4 inch.
- Roundness 80 millionths of an inch.
- Case hardness 58-63 HRC.
- Surface finish 12 R_a microinch.
- Available with Preplate chrome option.
- Standard straightness .001 inch per foot cumulative (.002 TIR) with special straightness at .0005 inch per foot cumulative (.001 TIR) available.

60 Case LinearRace Support Rails and Assemblies for Continuously Supported Applications



LSR Low Profile 60 Case LinearRace Support Rail Features:

- Diameter range between ½ and 4 inch.
- Available with standard mounting holes for immediate use.
- Available without mounting holes for custom hole spacing.
- Low Profile design.
- Unlimited travel lengths.



SR 60 Case LinearRace Support Rail SRA 60 Case LinearRace Support Rail Assembly Features:

- Diameter range between ½ and 2 inch.
- Available with standard mounting holes for immediate use.
- Available without mounting holes for customized hole spacing.
- Available as a pre-engineered, ready to install assembly.
- Light weight, high strength aluminum alloy rail.
- Unlimited travel lengths.

Part Number Description and Specification:

Precision Steel Ball Bushing Bearings (Open Type) for Continuously Supported Applications

OPN-162536-DD				
Type	Description	Size	Nominal Diameter	Option Description
OPN	Precision Steel Ball Bushing bearings (Open Type)	81420	.500	– Standard
		101824	.625	SP Stainless Steel Balls, Black
		122026	.750	NB Oxide Sleeve and Retainer
		162536	1.000	DP Nylon Balls
		203242	1.250	SS Dry Packed
		243848	1.500	DD Stainless Steel With Integral Wipers
		324864	2.000	
		406080	2.500	
		487296	3.000	
		6496128	4.000	

Precision Steel Ball Bushing Pillow Blocks (Open Type) for Continuously Supported Applications

PBO-8-OPN-SS				
Type	Description	Size	Nominal Diameter	Option Description
PBO	Precision Steel Ball Bushing Pillow Blocks (Open Type)	8	.500	SS Stainless Steel
		10	.625	
		12	.750	
		16	1.000	
		20	1.250	
		24	1.500	
		32	2.000	
OPN	Open Type			

Part Number Description and Specification:

60 Case* LinearRace* (PreDrilled) for Continuously Supported Applications

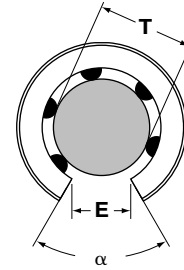
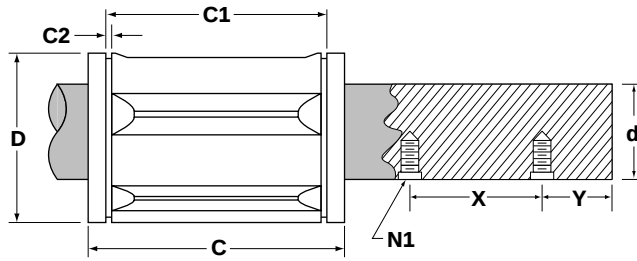
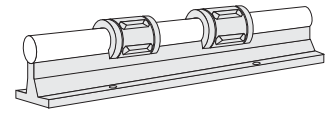
LRL-16-SS-PD						
Type	Description	Class	Size	Nominal Diameter	Type	Description
LR	60 Case LinearRace	L	8	.500	PD	PreDrilled
			10	.625		
			12	.750		
			16	1.000		
			20	1.250		
			24	1.500		
			32	2.000		
Option	Description					
—	Standard Carbon Steel					
SS	440 C Stainless Steel					
TU	Tubular Lite					
CP	Preplate Chrome					

60 Case LinearRace						
Part Number			Part Number		Part Number	
60 Case Solid LinearRace	60 Case LinearRace Diameter Class L	Max. Length in.	Stainless Steel 60 Case LinearRace	Max. Length in.	Chrome Plated 60 Case LinearRace	Max. Length in.
LRL-8-PD	.4995/.4990	168	—	—	LRL-8-CP-PD	168
LRL-10-PD	.6245/.6240	178	LRL-10-SS-PD	178	LRL-10-CP-PD	178
LRL-12-PD	.7495/.7490	178	LRL-12-SS-PD	178	LRL-12-CP-PD	178
LRL-16-PD	.9995/.9990	178	LRL-16-SS-PD	178	LRL-16-CP-PD	178
LRL-20-PD	1.2495/1.2490	178	LRL-20-SS-PD	178	LRL-20-CP-PD	178
LRL-24-PD	1.4994/1.4989	178	LRL-24-SS-PD	178	LRL-24-CP-PD	178
LRL-32-PD	1.9994/1.9987	178	LRL-32-SS-PD	178	LRL-32-CP-PD	178
LRL-40-PD	2.4993/2.4985	178	LRL-40-SS-PD	178	LRL-40-CP-PD	178
LRL-48-PD	2.9992/2.9983	178	LRL-48-SS-PD	178	LRL-48-CP-PD	178
LRL-64-PD	3.9988/3.9976	178	LRL-64-SS-PD	178	LRL-64-CP-PD	178

60 Case LinearRace Support Rails and Assemblies for Continuously Supported Applications

Type	Description	SR-16-PD x Length				Type	Description
LSR	Low Profile 60 Case LinearRace Support Rail					-	w/o PreDrilled holes
SR	60 Case LinearRace Support Rail					PD	with PreDrilled holes
SRA-16-SS x Length							
Type	Description	Size	Nom. Dia.	Size	Nom. Dia.	Type	Description
SRA	60 Case LinearRace Support Rail Assembly	8	.500	20	1.250	-	Standard Assembly
		10	.625	24	1.500	SS	With stainless steel 60 Case LinearRace
		12	.750	32	2.000	TU	With Tubular Lite 60 Case LinearRace
		16	1.000			CP	PrePlate Chrome

Precision Steel Ball Bushing Bearings (Open Type) For Continuously Supported Applications



Sizes .500 thru 1.00 available in Corrosion Resistant Stainless

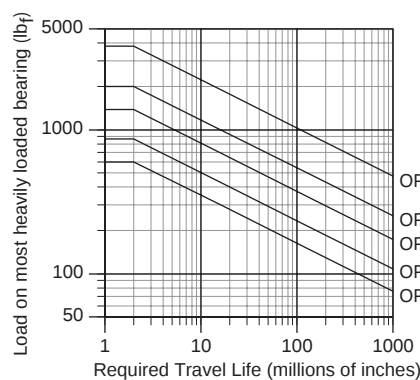
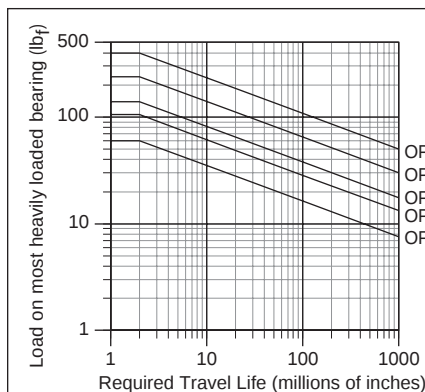
Precision Steel Ball Bushing Bearings (Open Type) and 60 Case* LinearRace* (Dimensions in inches)

Part Number ⁽³⁾		Nominal Diameter	Length C	Distance Between Retaining Rings C1	Ret. Ring Groove min. C2	60 Case LinearRace Minimum Depth of Hardness	60 Case Solid LinearRace Mass lb/in	60 Case LinearRace		
Precision Steel Ball Bushing Bearing	60 Case LinearRace							Mounting Holes		
								X	Y	N1
OPN-81420	LRL-8-PD	.500	1.250/1.235	.967/.951	.046	.04	.06	4	2	#6-32
OPN-101824	LRL-10-PD	.625	1.500/1.485	1.108/1.092	.056	.04	.09	4	2	#8-32
OPN-122026	LRL-12-PD	.750	1.625/1.610	1.170/1.154	.056	.06	.13	6	3	#10-32
OPN-162536	LRL-16-PD	1.000	2.250/2.235	1.759/1.741	.068	.08	.22	6	3	¼-20
OPN-203242	LRL-20-PD	1.250	2.625/2.605	2.009/1.991	.068	.08	.35	6	3	⅝-18
OPN-243848	LRL-24-PD	1.500	3.000/2.980	2.415/2.397	.086	.08	.50	8	4	⅜-16
OPN-324864	LRL-32-PD	2.000	4.000/3.980	3.195/3.177	.103	.10	.89	8	4	½-13
OPN-406080	LRL-40-PD [†]	2.500	5.000/4.975	3.978/3.958	.120	.10	1.39	8	4	⅝-11
OPN-487296	LRL-48-PD [†]	3.000	6.000/5.970	4.728/4.708	.120	.10	2.00	8	4	¾-10
OPN-6496128	LRL-64-PD [†]	4.000	8.000/7.960	6.265/6.235	.139	.10	3.56	8	4	#1-8

Part Number ⁽³⁾	Working Bore Diameter T	Recommended Housing Bore Before Adjustment D	60 Case LinearRace Diameter d	Minimum Slot Width E	Angle deg alpha	Number of Ball Circuits	Ball Bushing Bearing Mass lb	Dynamic ⁽⁴⁾ Load Capacity lb _f
OPN-81420	.5005/.4995	.8760/.8740	.4995/.4990	.31	50	3	.07	60
OPN-101824	.6255/.6245	1.1260/1.1240	.6245/.6240	.38	60	3	.11	105
OPN-122026	.7505/.7495	1.2510/1.2490	.7495/.7490	.44	60	4	.17	140
OPN-162536	1.0005/.9995	1.5635/1.5615	.9995/.9990	.56	60	4	.32	240
OPN-203242	1.2506/1.2494	2.0010/1.9990	1.2495/1.2490	.63	50	5	.90	400
OPN-243848	1.5006/1.4994	2.3760/2.3740	1.4994/1.4989	.75	50	5	1.12	600
OPN-324864	2.0008/1.9992	3.0010/2.9990	1.9994/1.9987	1.00	50	5	2.16	860
OPN-406080	2.5010/2.4990	3.7515/3.7485	2.4993/2.4985	1.25	50	5	4.24	1380
OPN-487296	3.0012/2.9988	4.5015/4.4985	2.9992/2.9983	1.50	50	5	7.33	2000
OPN-6496128	4.0020/3.9980	6.0020/5.9980	3.9988/3.9976	2.00	50	5	17.25	3800

[†] Contact factory for availability

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.

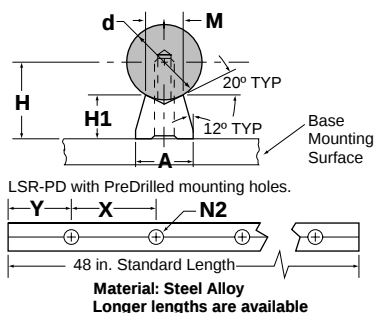
Note: For the purpose of using this chart.

Load on most heavily loaded bearing = maximum applied load/K_o

Where K_o can be determined from the

60 Case LinearRace Support Rails and Assemblies for Continuously Supported Applications

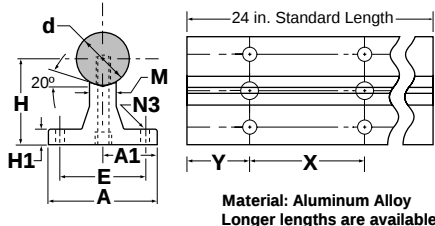
Type LSR and LSR-PD LinearRace Support Rails



Type LSR and LSR-PD 60 Case* LinearRace* Support Rails (Dimensions in inches)

LSR Standard Without Holes	LSR-PD Standard w/PreDrilled Holes	Nominal LinearRace Diameter d	H ±.002	H1	A	M	Mounting Holes		X	Y	LSR Mass lb/ft
							N2 Hole	N1 Bolt			
LSR-8	LSR-8-PD	.500	.562	.34	.37	.25	.17	#6-32	4	2	.32
LSR-10	LSR-10-PD	.625	.687	.41	.45	.31	.19	#8-32	4	2	.49
LSR-12	LSR-12-PD	.750	.750	.42	.51	.38	.22	#10-32	6	3	.59
LSR-16	LSR-16-PD	1.000	1.000	.56	.69	.50	.28	1/4-20	6	3	1.01
LSR-20	LSR-20-PD	1.250	1.187	.63	.78	.56	.34	5/16-18	6	3	1.27
LSR-24	LSR-24-PD	1.500	1.375	.70	.93	.69	.41	3/8-16	8	4	1.68
LSR-32	LSR-32-PD	2.000	1.750	.85	1.18	.88	.53	1/2-13	8	4	2.59
LSR-40	LSR-40-PD	2.500	2.250	1.13	1.50	1.13	.69	5/8-11	8	4	4.48
LSR-48	LSR-48-PD	3.000	2.750	1.40	1.88	1.38	.81	3/4-10	8	4	6.98
LSR-64	LSR-64-PD	4.000	3.500	1.75	2.50	1.88	1.06	#1-8	8	4	11.80

Type SR and SR-PD 60 Case LinearRace
Support Rails and Assemblies



Type SR/ SR-PD LinearRace Support Rails and Assemblies (Dimensions in inches)

SR Without Holes	SR-PD With PreDrilled Holes	Assy. With Solid LinearRace	Nom. LinearRace Dia. d	H ±.002	H1	A	A1 ±.002	E	M	N3		LinearRace Mounting Bolt N1	X	Y	SR Mass lb/ft
										Hole	Bolt				
SR-8	SR-8-PD	SRA-8	.500	1.125	.19	1.50	.750	1.00	.25	.17	#6	#6-32 x .88	4	2	.60
SR-10	SR-10-PD	SRA-10	.625	1.125	.25	1.63	.813	1.13	.31	.19	#8	#8-32 x .88	4	2	.80
SR-12	SR-12-PD	SRA-12	.750	1.500	.25	1.75	.875	1.25	.38	.22	#10	#10-32 x 1.25	6	3	1.00
SR-16	SR-16-PD	SRA-16	1.000	1.750	.25	2.13	1.063	1.50	.50	.28	1/4	1/4-20 x 1.50	6	3	1.40
SR-20	SR-20-PD	SRA-20	1.250	2.125	.31	2.50	1.250	1.88	.56	.34	5/16	5/16-18 x 1.75	6	3	2.10
SR-24	SR-24-PD	SRA-24	1.500	2.500	.38	3.00	1.500	2.25	.69	.34	5/16	3/8-16 x 2.00	8	4	2.60
SR-32	SR-32-PD	SRA-32	2.000	3.250	.50	3.75	1.875	2.75	.88	.41	3/8	1/2-13 x 2.50	8	4	4.20

⁽¹⁾ 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 polar graphs below. See page 136 for Stainless Steel bearing derating.

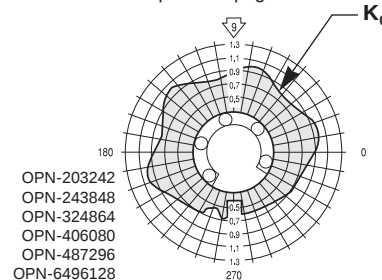
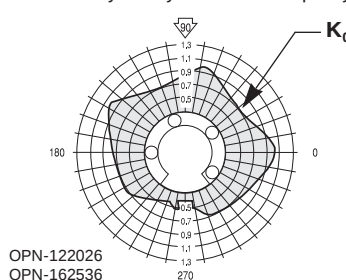
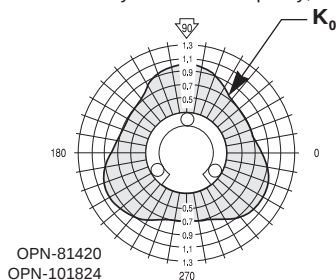
⁽²⁾ For the maximum length of all 60 Case LinearRace Support Rail Assemblies without 60 Case LinearRace Joints see maximum length table on page 89. 60 Case LinearRace Support Rail Assemblies are available with 60 Case LinearRace joints for unlimited travel lengths.

⁽³⁾ For part number description and specifications see page 88 and 89.

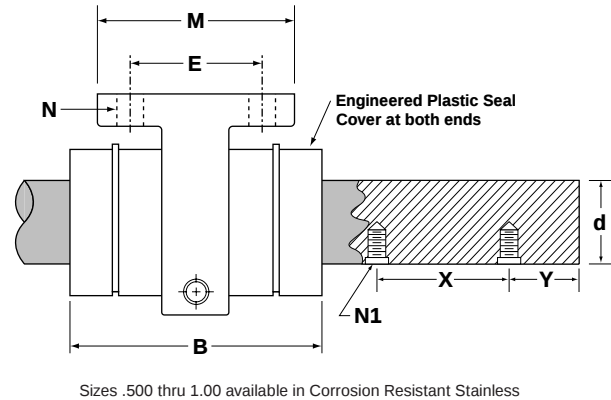
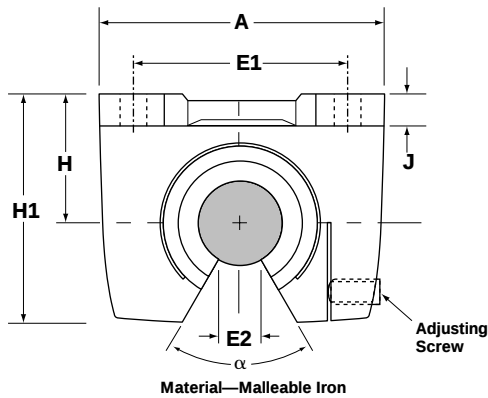
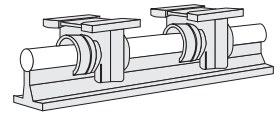
Standard Without Holes	Standard With PreDrilled Holes	Assembly With Solid 60 Case LinearRace	Standard Single Piece Length ⁽²⁾ in	Maximum Single Piece Length ⁽²⁾ in
LSR	LSR-PD	—	48	96
SR	SR-PD	SRA	24	72

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.



Precision Steel Ball Bushing Bearing Pillow Block (Open Type) For Continuously Supported Applications

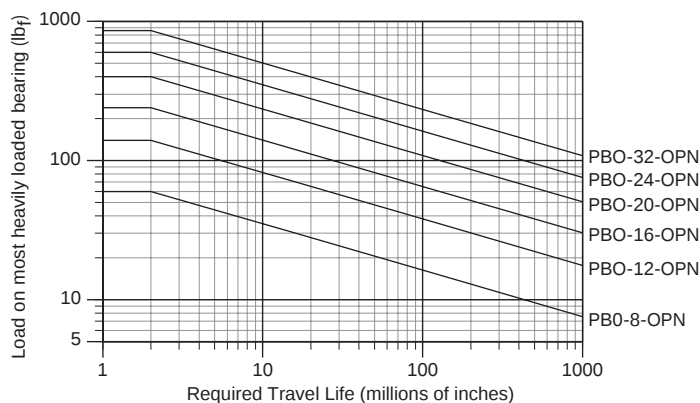


Precision Steel Ball Bushing* Bearing Pillow Blocks (Open Type, seal at both ends) and 60 Case* LinearRace* (Dimensions in inches)

Part Number ⁽³⁾		Nominal Diameter	H ±.005	H1	60 Case LinearRace Minimum Depth of Hardness	60 Case Solid LinearRace Mass lb/in	60 Case LinearRace		
Precision Steel Ball Bushing Pillow Block	60 Case LinearRace						Mounting Holes		
							X	Y	N1
PBO-8-OPN	LRL-8	.500	.875	1.50	.04	.06	4	2	#6-32
PBO-12-OPN	LRL-12	.750	1.125	2.00	.06	.13	6	3	#10-32
PBO-16-OPN	LRL-16	1.000	1.375	2.38	.08	.22	6	3	¼-20
PBO-20-OPN	LRL-20	1.250	1.750	3.06	.08	.35	6	3	5/16-18
PBO-24-OPN	LRL-24	1.500	2.000	3.50	.08	.50	8	4	⅜-16
PBO-32-OPN	LRL-32	2.000	2.500	4.50	.10	.89	8	4	½-13

Part Number ⁽³⁾	60 Case LinearRace Diameter d	A	B	E ±.010	E1 ±.010	E2 min.	J	α deg	M	N		Pillow Block Weight lb	Dynamic ⁽¹⁾ Load Capacity lb _f
Precision Steel Ball Bushing Pillow Block										Hole	Bolt		
PBO-8-OPN	.4995/.4990	2.00	1.69	1.000	1.500	.37	.25	50	1.50	.19	#8	.4	60
PBO-12-OPN	.7495/.7490	2.75	2.06	1.375	2.000	.43	.31	60	2.00	.22	#10	1.0	140
PBO-16-OPN	.9995/.9990	3.25	2.88	1.500	2.500	.56	.38	60	2.25	.28	¼	1.8	240
PBO-20-OPN	1.2495/1.2490	4.00	3.63	1.875	3.000	.67	.44	50	2.75	.34	5/16	3.8	400
PBO-24-OPN	1.4994/1.4989	4.75	4.00	2.000	3.500	.81	.50	50	3.00	.34	5/16	4.8	600
PBO-32-OPN	1.9994/1.9987	6.00	5.00	2.500	4.500	1.00	.63	50	3.50	.41	¾	8.5	860

Load/Life Graph (Lines indicate limiting load for given Ball Bushing bearing pillow block)



Determining Ball Bushing Bearing Size

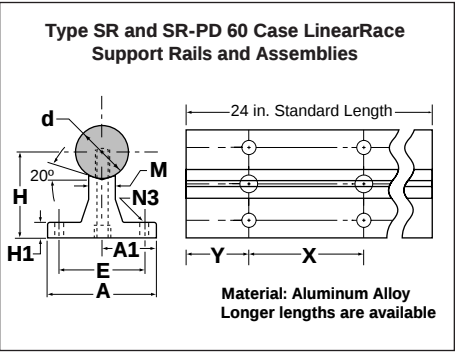
To determine the proper Ball Bushing bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing bearing sizes that pass through or above and to the right of this point may be suitable for this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

Note: For the purpose of using this chart.

Load on most heavily loaded bearing = maximum applied load/ K_o .

Where K_o can be determined from the Polar Graph to the right.

60 Case LinearRace Support Rails and Assemblies for Continuously Supported Applications

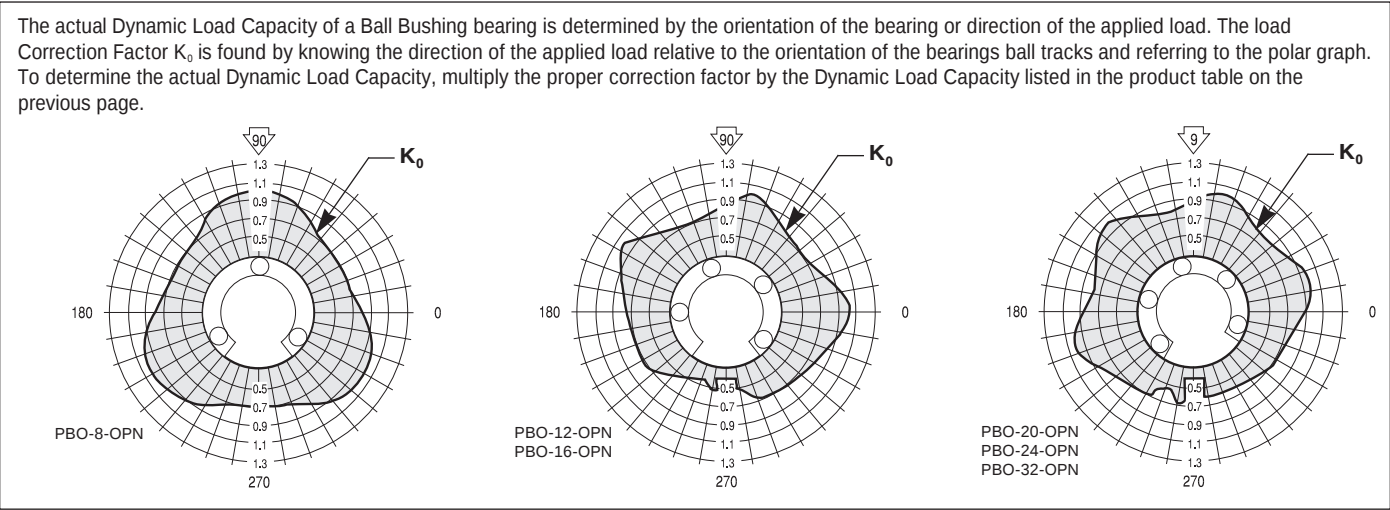


Type SR/ SR-PD LinearRace Support Rails and Assemblies													(Dimensions in inches)			
SR Without Holes	SR-PD With Predrilled Holes	Assy. With Solid LinearRace	Nom. LinearRace Dia. d	H ±.002	H1	A	A1 ±.002	E	M	N3		LinearRace Mounting Bolt N1	X	Y	SR Mass lb/ft	
										Hole	Bolt					
SR-8	SR-8-PD	SRA-8	.500	1.125	.19	1.50	.750	1.00	.25	.17	#6	#6-32 x .88	4	2	.60	
SR-12	SR-12-PD	SRA-12	.750	1.500	.25	1.75	.875	1.25	.38	.22	#10	10-32 x 1.25	6	3	1.00	
SR-16	SR-16-PD	SRA-16	1.000	1.750	.25	2.13	1.063	1.50	.50	.28	¼	¼-20 x 1.50	6	3	1.40	
SR-20	SR-20-PD	SRA-20	1.250	2.125	.31	2.50	1.250	1.88	.56	.34	⅝ ₁₆	⅝ ₁₆ -18 x 1.75	6	3	2.10	
SR-24	SR-24-PD	SRA-24	1.500	2.500	.38	3.00	1.500	2.25	.69	.34	⅝ ₁₆	⅝ ₁₆ -16 x 2.00	8	4	2.60	
SR-32	SR-32-PD	SRA-32	2.000	3.250	.50	3.75	1.875	2.75	.88	.41	⅜	½-13 x 2.50	8	4	4.20	

- ⁽¹⁾ 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 polar graphs below.
- ⁽²⁾ For the maximum length of all 60 Case* LinearRace* Support Rail Assemblies without 60 Case LinearRace Joints see maximum length table on page 89. 60 Case LinearRace Support Rail Assemblies are available with 60 Case LinearRace joints for unlimited travel lengths.
- ⁽³⁾ For part number description and specifications see page 88 and 89.
- Note: Precision Steel Ball Bushing* bearings are available in corrosion resistant stainless steel in diameters up to 1 inch. Dynamic load ratings are reduced by 30% when using stainless steel Ball Bushing bearings. See Engineering Support Appendix page 136. For additional technical data, see Engineering Support Appendix.

Standard Without Holes	Standard With Predrilled Holes	Assembly With Solid 60 case LinearRace	Standard Single Piece Length ⁽²⁾ in	Maximum Single Piece Length ⁽²⁾ in
SR	SR-PD	SRA	24	72

Polar Graphs



Wire Straightening/Feeding Mechanism

Objective

Redesign a wire straightening/feeding mechanism for a wire drawing machine that improves cycle time and minimizes downtime.

Solution

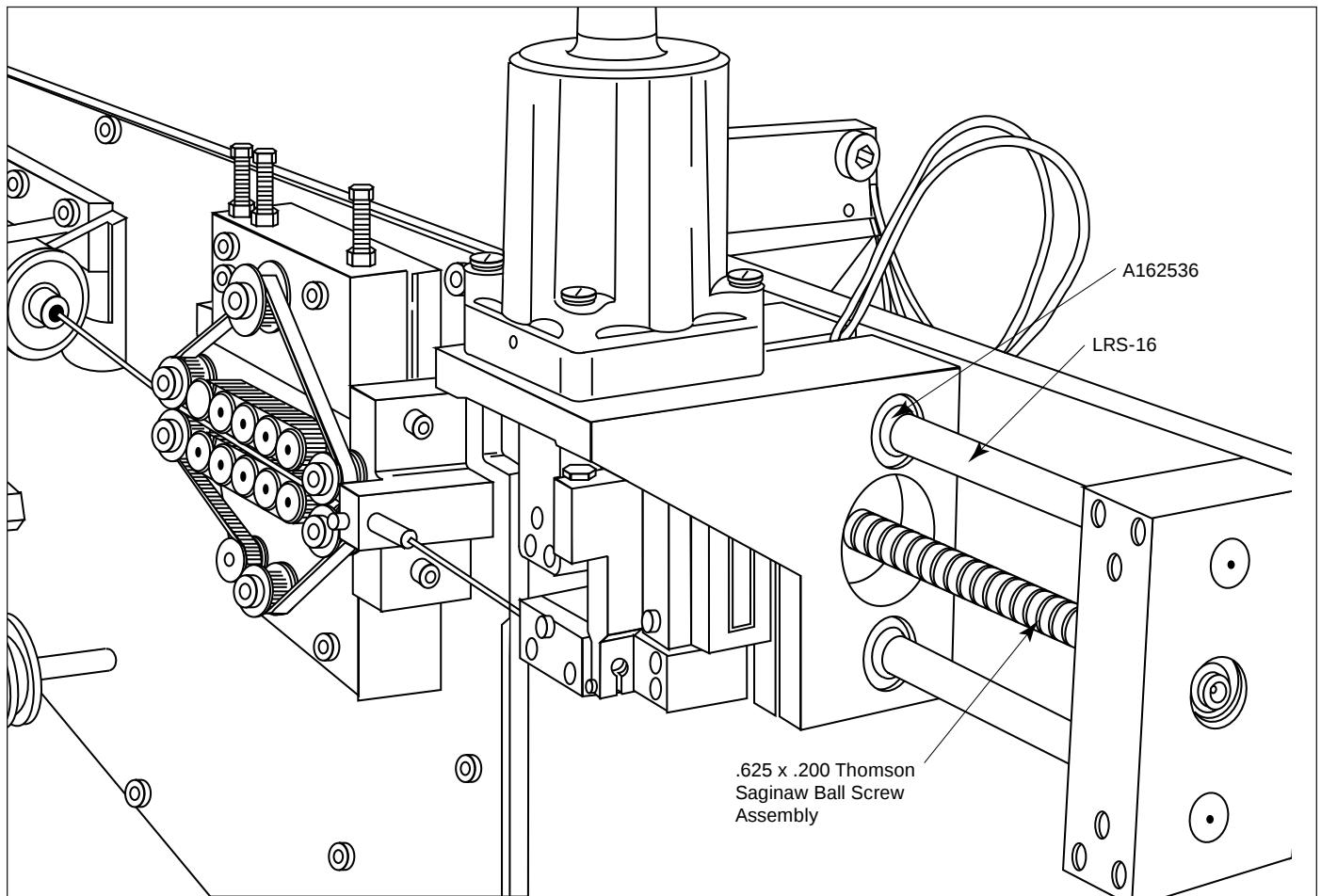
Combine the performance advantages of the Precision Steel Ball Bushing* bearing with the operating efficiency of Thomson Saginaw ball screws.

Products Specified

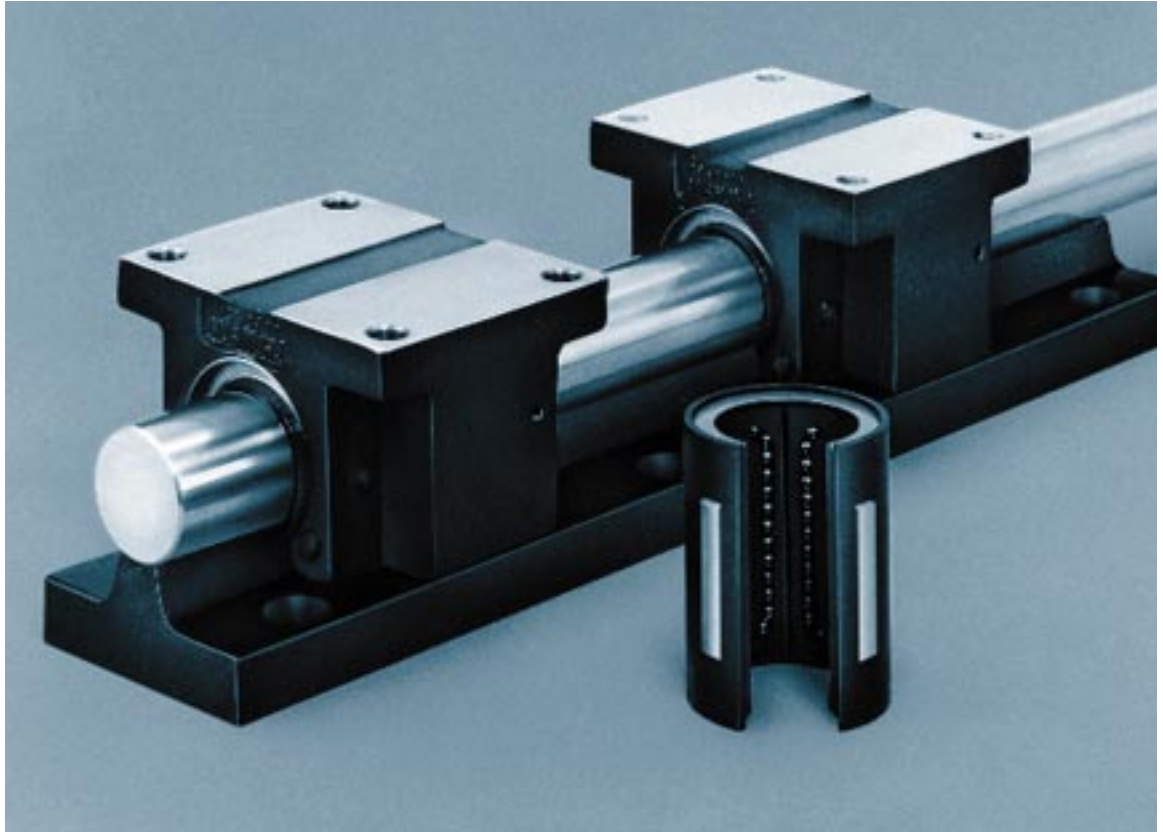
- 4 – A162536 (Precision Steel Ball Bushing bearings)
- 2 – LRS-16 (60 Case* LinearRace*)
- 1 – .625 x .200 (Thomson Saginaw ball screw assembly)

Benefits

By replacing high friction plain bearings with Precision Steel Ball Bushing bearings, service life increased from six months to four years. This significantly reduced downtime and maintenance requirements and provided increased productivity with substantial cost savings.



XR Ball Bushing Bearing Products



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.
- available in three sizes from over 1,800 authorized distributors worldwide.

XR Ball Bushing Bearing Products

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.

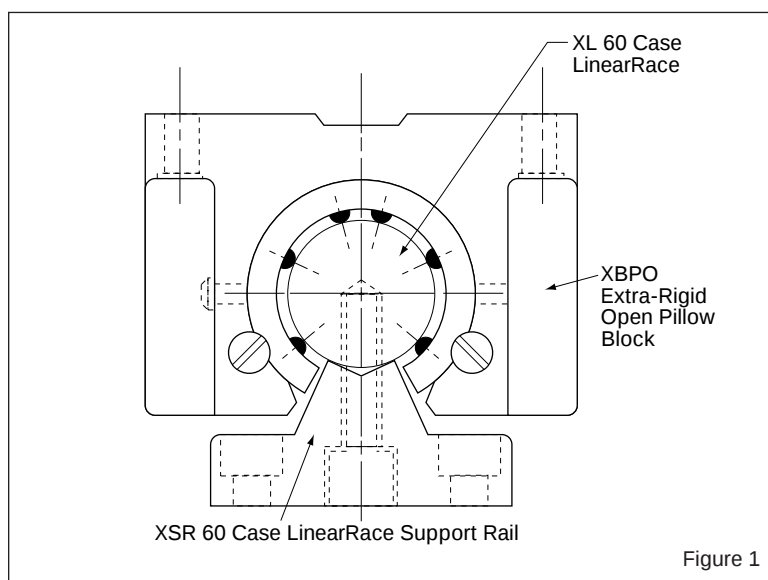


Figure 1

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 R_a microinch and is straight to .001 inch per foot cumulative. Roundness of each 60 Case LinearRace is controlled through proprietary techniques that results 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.

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.

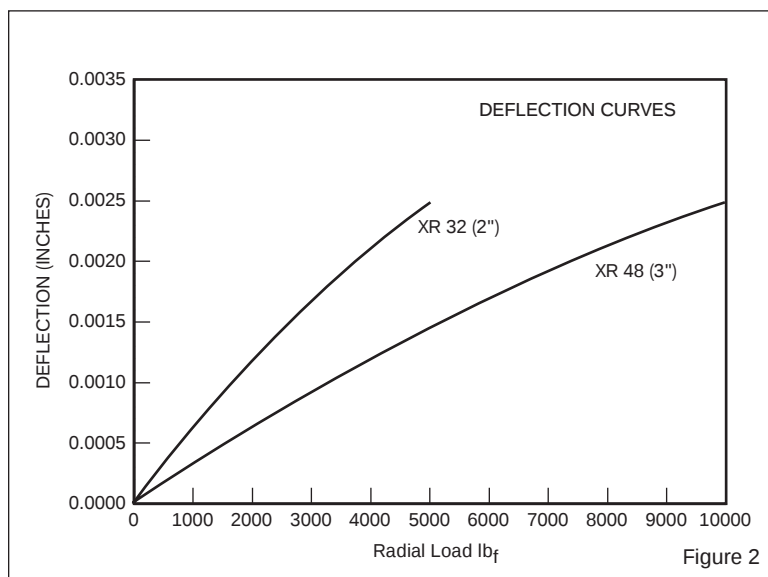
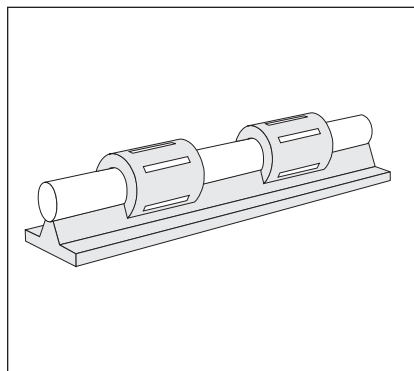


Figure 2

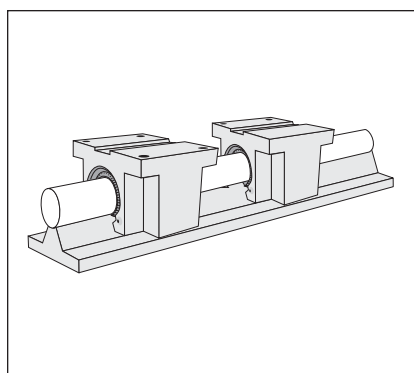
XR Ball Bushing Bearing Products for Continuously Supported Applications



XR Ball Bushing* Bearings

Features:

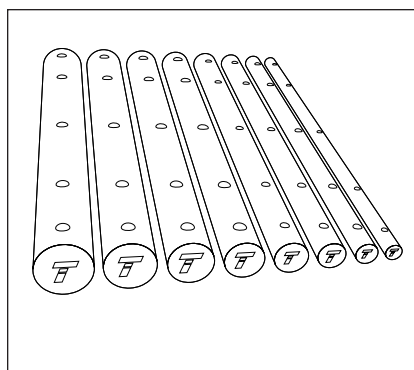
- Available in sizes 2 and 3 inch bore diameter.
- Load capacity range from 4,500 to 10,000 lb_f.
- Pull of load capacity range between 2,100 to 8,000 lb_f.
- Can be mounted in a custom housing.
- Travel speeds up to 5 ft/s.
- System accelerations up to 160 ft/s².



XPBO Ball Bushing Pillow Blocks

Features:

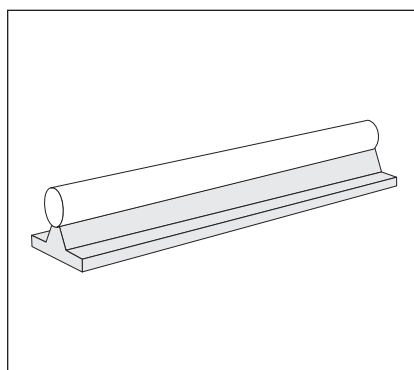
- Available in 2 and 3 inch diameter sizes.
- Load capacity range from 4,500 to 10,000 lb_f.
- Pull of load capacity range between 2,100 to 4,500 lb_f.
- Easily secured to table or carriage surface with four mounting bolts.
- Travel speeds up to 5 ft/s.
- System accelerations up to 160 ft/s².
- When used with XL 60 Case* LinearRace* internal clearance is minimized.
- Integral double acting seals at both ends.



XL 60 Case LinearRace

Features:

- Case hardness to 60-65 HRC.
- Surface finish is 8 R_a microinch for 2 and 3 inch diameter and 10 R_a microinch for 4 inch diameter.
- Roundness 80 millionths of an inch.
- Straightness of .0005 inch per foot (.001 TIR) cumulative.
- Available with standard radial drilled and tapped holes.
- Minimum depth of hardness is .100 inch.



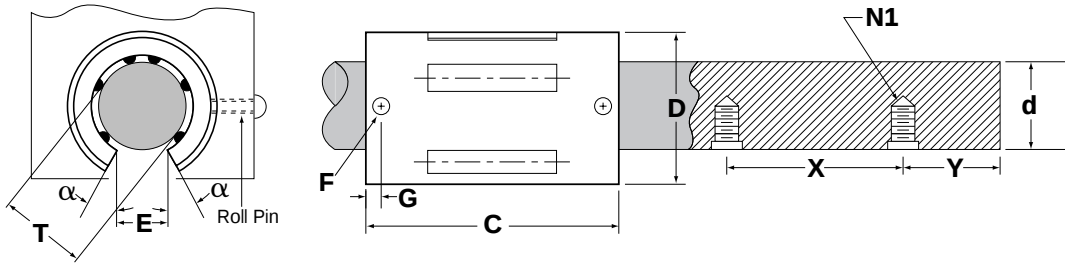
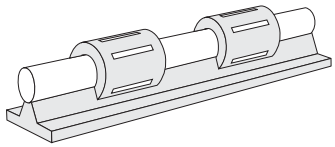
XSR 60 Case LinearRace Support Rails

Features:

- All ductile iron, heavy duty design and construction.
- Available in 2 and 3 inch diameter sizes.
- Equipped with drilled thru and counterbored base mounting holes.
- Can be pre-assembled with a 60 Case LinearRace for quick and easy installation.
- Precision ground surfaces for 60 Case LinearRace and base mounting.
- Reference edge for ease of installation.

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	60 Case LinearRace Minimum Depth of Hardness	60 Case Solid LinearRace Mass lb/in	60 Case Solid LinearRace Maximum Length	60 Case LinearRace		
XR Ball Bushing Bearing	60 Case LinearRace							Mounting Holes		
								X	Y	N1
XR-32-OPN	LRXL-32-PD ⁽⁴⁾	2	4.000/3.970	1.9994/1.9991	.100	.89	168	4	2	½-13
XR-48-OPN	LRXL-48-PD ⁽⁴⁾	3	6.000/5.940	2.9992/2.9989	.100	2.00	168	6	3	¾-10

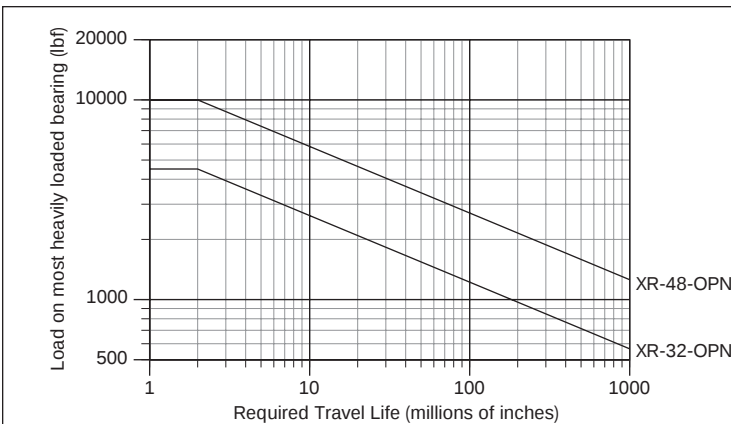
Part Number	Working ⁽¹⁾ Bore Diameter T	Recommended Housing Bore Diameter D	Min. Slot Width E	Retention Hole ⁽²⁾		Angle deg α	Number of Ball Circuits	Ball Dia.	Bearing Mass lb	Dynamic ⁽³⁾ Load Capacity lb _f
				Dia. F	Loc. G					
XR-32-OPN	2.0000/1.9992	3.0000	1.00	.27	.31	27	6	.25	1.3	4500
XR-48-OPN	3.0000/2.9988	4.5000	1.50	.27	.42	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 XR-32-OPN and 4.4975 for XR-48-OPN.

⁽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 polar graphs opposite.

⁽⁴⁾ Contact factory for availability.



Determining Ball Bushing Bearing Size

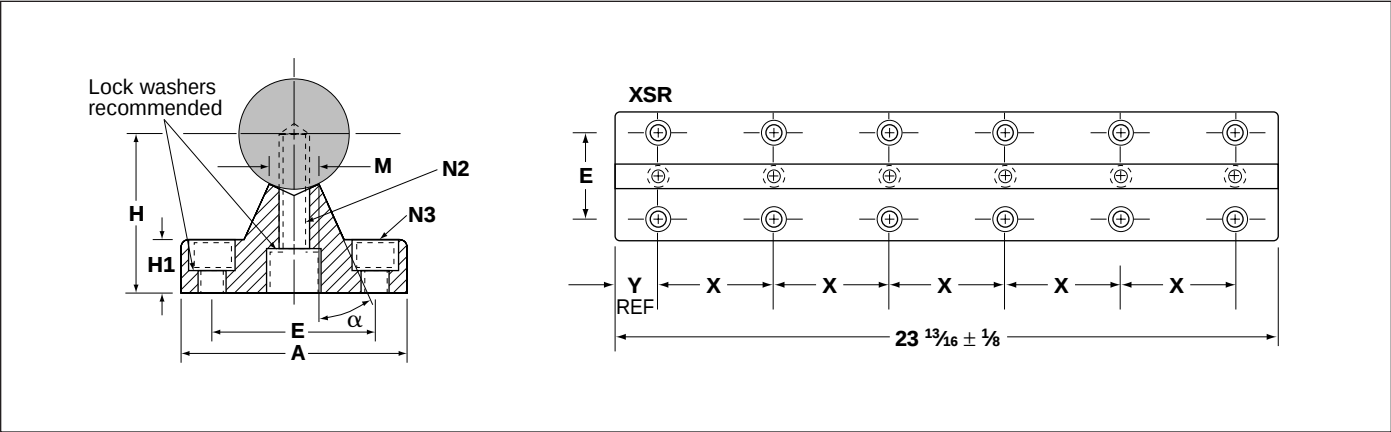
To determine the proper Ball Bushing bearing size enter the chart with the maximum load of the most heavily loaded bearing and the required travel life. Mark where the two lines intersect. All Ball Bushing bearing sizes that pass through or above and to the right of this point may be suitable for this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

Note: For the purpose of using this chart.

Load on most heavily loaded bearing = maximum applied load/ K_o .

Where K_o can be determined from the Polar Graph to the right.

XSR 60 Case LinearRace Support Rails and Assemblies for Continuously Supported Applications

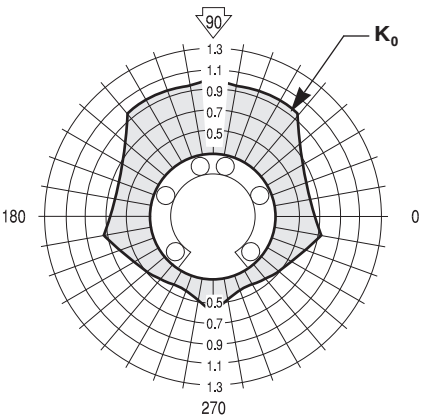


Type XSR/XSRA 60 Case* LinearRace* Support Rails and Assemblies													(Dimensions in inches)				
XSR With Mounting Holes	Assembly With Solid LinearRace	Nominal LinearRace Diameter	H +.000 -.001	H1	A	E	M	N2			N2		N3	α Deg	X	Y	XSR Mass lb/ft
								Hole	Bolt	Counterbore	Hole	Bolt					
XSR-32	XSRA-32	2	2.750	1.00	4.50	3.13	.88	.56	½-13 x 2	1 x .75 DP	.56	.50	1 x .63 DP	15	4	1.97	16
XSR-48	XSRA-48	3	4.000	1.31	6.00	4.25	1.25	.81	¾-10 x 2.75	1.44 x 1.13 DP	.69	.63	1.25 x .75 DP	25	6	2.97	31

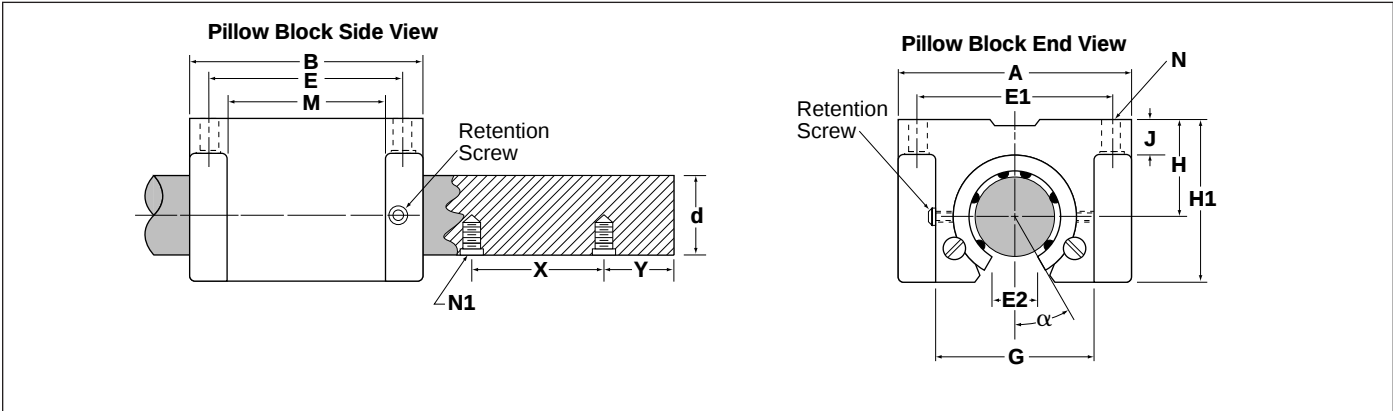
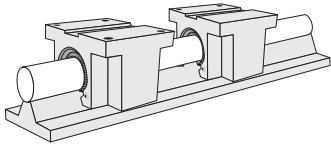
Centerline of 60 Case LinearRace will be parallel to base within .0005 in.
 Mounting hole locations are within ±.015, non-cumulative.

Polar Graph

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.



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 +.000 -.001	H1	60 Case LinearRace Minimum Depth of Hardness	60 Case Solid LinearRace Mass lb/in	60 Case LinearRace Mounting Holes		
Extra Rigid Ball Bushing Pillow Block	60 Case LinearRace						X	Y	N1
XPBO-32-OPN	LRXL-32-PD ⁽³⁾						4	2	1/2-13
XPBO-48-OPN	LRXL-48-PD ⁽³⁾	3	3.500	5.875	.10	2.00	6	3	3/4-10

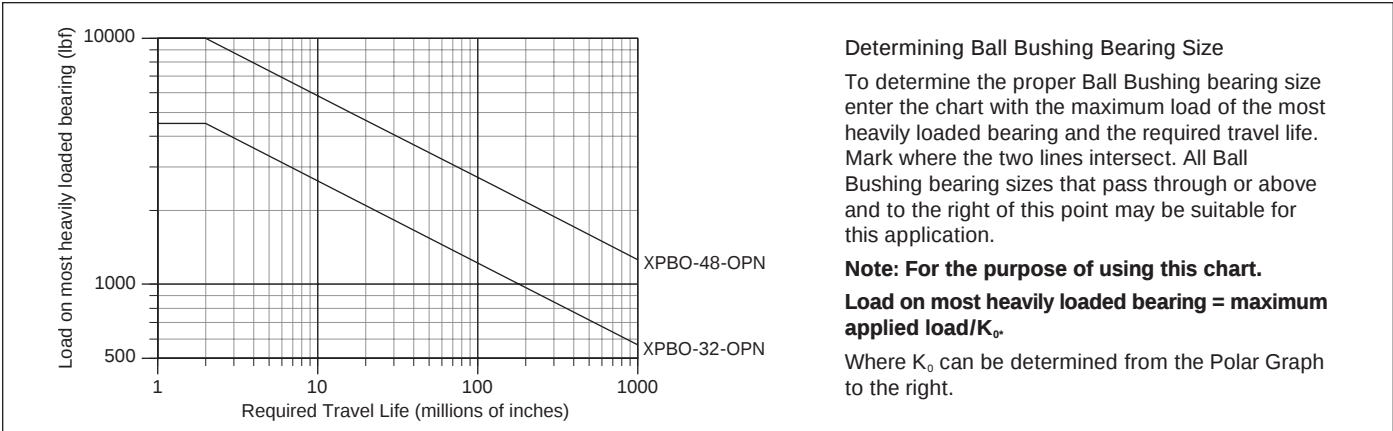
Part Number	Working Bore Diameter T	60 Case LinearRace Diameter d	Ball Bushing ⁽¹⁾ Bearing/ LinearRace Fit Up	A	B	E ±.010	E1 ±.010	E2 min.	G	J	α Deg	M	N		Pillow Block Mass lb	Dynamic ⁽²⁾ Load Capacity lbf
Extra Rigid Ball Bushing Pillow Block													Hole	Bolt		
XPBO-32-OPN	1.9985/1.9972	1.9994/1.9991	.0022P/.006P	6.00	4.88	3.750	5.000	1.00	3.75	.88	27	2.63	.53	1/2	18	4500
XPBO-48-OPN	2.9980/2.9963	2.9992/2.9989	.0029P/.0009P	8.38	7.25	5.875	7.000	1.50	5.50	1.25	30	4.13	.66	5/8	55	10000

⁽¹⁾ XPBO 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.

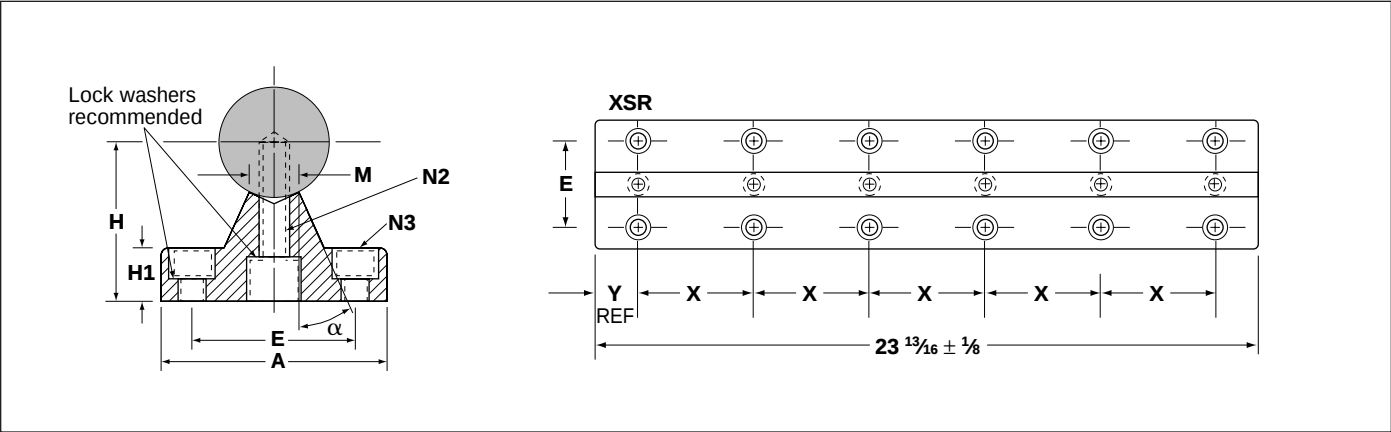
⁽²⁾ The Dynamic Load Capacity is based on a rated travel life of 2 million inches. The actual Dynamic Load Capacity can be affected by the orientation of the bearing or the direction of the applied load. For dynamic load correction factors see polar graphs opposite.

⁽³⁾ Contact factory for availability.

Load/Life Graph (Lines indicate limiting load for given Ball Bushing bearing)



XSR 60 Case LinearRace Support Rails and Assemblies for Continuously Supported Applications

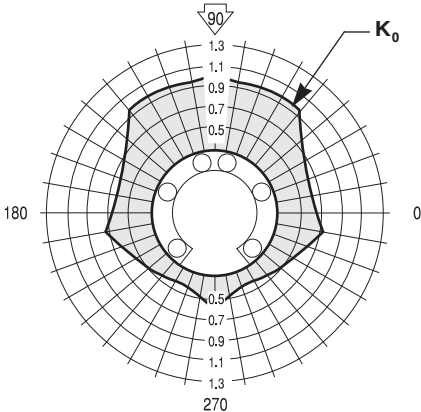


Type XSR/XSRA 60 Case* LinearRace* Support Rails and Assemblies													(Dimensions in inches)				
XSR With Mounting Holes	Assembly With Solid LinearRace	Nominal LinearRace Diameter	H +.000 -.001	H1	A	E	M	N2			N3			α Deg	X	Y	XSR Mass lb/ft
								Hole	Bolt	Counterbore	Hole	Bolt	Counterbore				
XSR-32	XSRA-32	2	2.750	1.00	4.50	3.13	.88	.56	½-13 x 2	1 x .75 DP	.56	.50	1 x .63 DP	15	4	1.97	16
XSR-48	XSRA-48	3	4.000	1.31	6.00	4.25	1.25	.81	¾-10 x 2.75	1.44 x 1.13 DP	.69	.63	1.25 x .75 DP	25	6	2.97	31

Centerline of 60 Case LinearRace will be parallel to base within .0005 in.
 XBPO Material: Ductile Iron.

Polar Graph

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 – XR-32-OPN (XR Ball Bushing bearing)
2 – XSRA-32 x 108 in (60 Case* LinearRace* Support Rail Assembly)

Y-axis

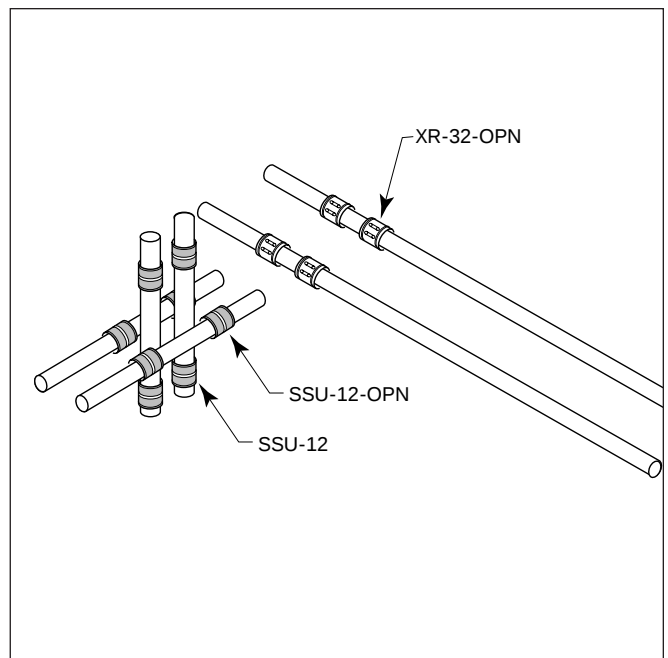
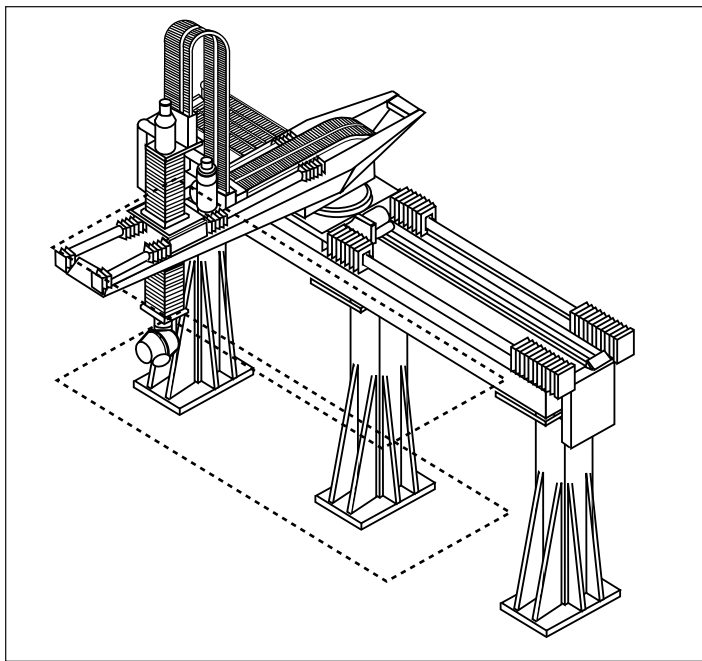
4 – SSU-12-OPN (Super Smart Ball Bushing bearing [Open Type])
2 – LSR-12-PD x 48 in (Low Profile 60 Case LinearRace Support Rail)
2 – LRL-12-PD x 48 in (60 Case LinearRace)

Z-axis

4 – SSU-12 (Super Smart Ball Bushing bearing)
2 – LRL-12 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 ± 0.005 in.



RoundWay Linear Roller Bearings

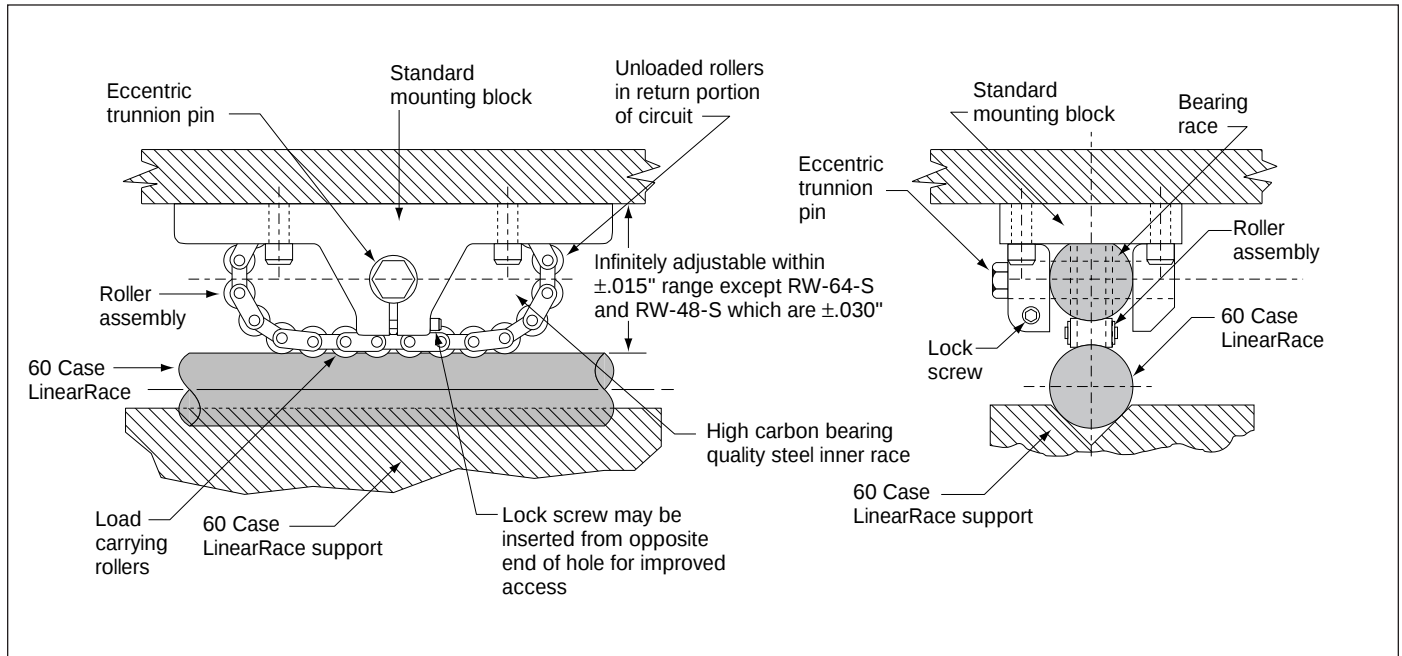


Thomson RoundWay* Linear Roller Bearings offer:

- up to twenty times the load capacity of conventional linear ball bearings. This dramatic increase allows for more compact machine designs with a reduction in hardware costs.
- a rigid design that provides high accuracy while tolerating the high shock loads common to machine tool applications.
- a coefficient of friction as low as .005. When replacing v-ways or flat-ways, RoundWay linear roller bearings allow for the use of smaller less expensive drives, motors, belts, gears and ball screws.
- a self-aligning capability that reduces installation time and cost.
- an eccentric trunnion pin that adjusts bearing height to compensate for minor inaccuracies in mounting base flatness or machining accuracy. Installation is quicker and easier than old style, conventional way systems.
- availability of an integral wiper that protects against contamination while retaining lubrication.
- interchangeable components for quick, cost-effective machine maintenance. There is no need to scrap the entire way system, a problem with some linear guide products.
- the RoundRail* Advantage combined with the self aligning feature, eliminates the need for derating factors commonly seen with linear guides.
- availability from over 1800 distributors worldwide.

RoundWay Linear Roller Bearings

RoundWay Operating Principle



Thomson invented the RoundWay* Linear roller bearing for use in high load, heavy duty applications. Each RoundWay bearing combines the high load capacity of hardened and ground steel recirculating rollers with a rigid malleable iron pillow block providing extremely high load capacity with smooth linear travel. The RoundWay linear roller bearing comes in both a single and dual version. A single RoundWay linear roller bearing does not resist side loads and is therefore always used in conjunction with a dual version, unless used in a configuration as shown in Figures 2, 3 and 4 on page RW4.

Each RoundWay linear roller bearing is designed for use on 60 Case LinearRace. The 60 Case* LinearRace* shaft can be continuously supported using type LSR, SR, FLSS or XSR 60 Case LinearRace support rails or intermittently supported using the adjustable Waymount* LinearRace supports type WM.

The RoundWay linear roller bearing consists of four basic parts: the bearing race, the roller assembly, the eccentric trunnion pin and the mounting block. The rolling elements of a RoundWay linear roller bearing are a series of concave rollers interconnected and linked by a chain assembly. As load is applied to the mount-

ing block it is transferred through the bearing race and roller assembly to the supported 60 Case LinearRace. Connecting the mounting block to the RoundWay bearing and roller assembly is an eccentric trunnion pin that allows the height of the RoundWay linear roller bearing to be adjusted to compensate for variations in the mounting surfaces or the build-up of tolerances between component elements. The eccentric trunnion pin can also be used to preload the RoundWay bearing by eliminating internal bearing clearance. After the eccentric trunnion pin has been adjusted it can be held in place by simply tightening the lock screw.

Self-Aligning

The RoundWay single and dual bearings are designed with a built-in self-aligning capability that absorbs misalignment caused by inaccuracies in carriage or base machining. The RoundWay single bearing has an additional built-in self-aligning capability that allows it to absorb misalignment caused by two slightly out of parallel 60 Case LinearRace ways. This feature is realized when two RoundWay single bearings are mounted on one 60 Case LinearRace and two dual RoundWay bearings are on a parallel 60 Case LinearRace (Figure 1 on page 106).

RoundWay Linear Roller Bearing Mounting Configurations

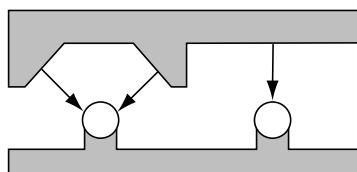


Fig. 1

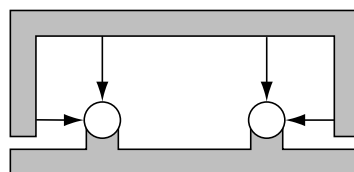


Fig. 2

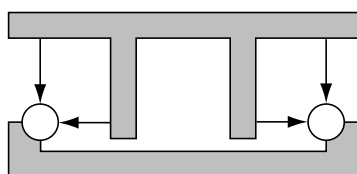


Fig. 3

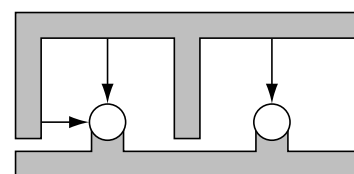


Fig. 4

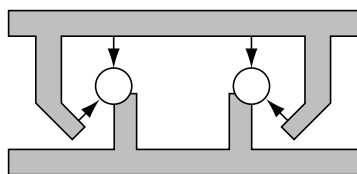


Fig. 5

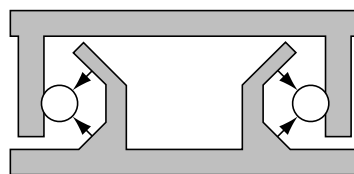


Fig. 6

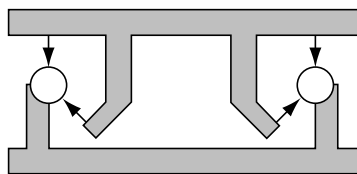


Fig. 7

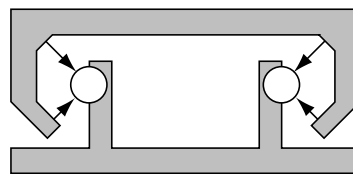


Fig. 8

IMPORTANT!

A single RoundWay bearing does not resist side loads. Therefore, dual RoundWay bearings or the equivalent are always used in combination with single units.

RoundWay* Bearing Mounting Arrangements

RoundWay bearings are available in single mounting blocks or dual V-blocks. The basic race and roller assembly can be purchased separately, along with the suitable type of trunnion pin for mounting directly in the carriage or other machine elements (see page 110). When using either type of cantilever mounting trunnion pin, deflection may be experienced under heavy loads.

The above illustrations are a few schematic suggestions for arrangements of RoundWay bearings and 60 Case* LinearRace* ways. The load directions of the bearings are indicated by arrows.

The first group (Figs. 1 through 4) depends on gravity to hold the carriage on the ways.

The second group shows arrangements which will carry loads in any direction. The first two figures (Figs. 5 and 6) are similar to the second two figures (Figs. 7 and 8), except for reverse orientation of horizontal load-carrying bearings.

All schematics on this page can be pre-loaded except Fig. 1. In the Fig. 1 arrangement, the maximum side load permitted is 50% of the applied vertical load on the Dual RoundWay bearing.

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NOTES

[illegible]

RoundWay Linear Roller Bearings

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RoundWay* Linear Roller Bearings.....108



RoundWay Linear Roller bearings have been designed to **carry heavy loads** in either a continuous or intermittent supported application, where rigidity and stiffness is required. RoundWay Linear Roller bearings are also the proper choice for **high speed** applications or **highly contaminated environments**. RoundWay Linear Roller Bearings are available in a variety of configurations and sizes. For a complete overview of each RoundWay type, simply turn to page RW6. For specifications see the corresponding pages referenced below.

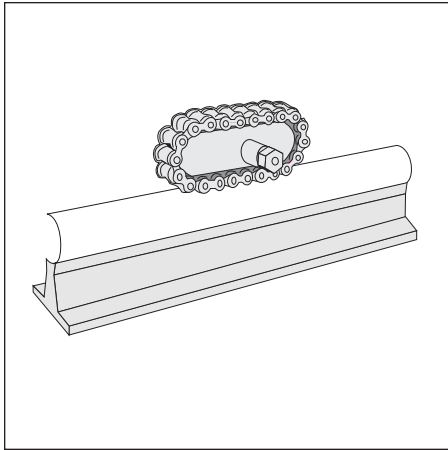
Product Overview.....108

Specifications

RoundWay Linear Roller bearing Type A,B,C110
RoundWay Linear Roller bearing Single Type112
RoundWay Linear Roller bearing Dual Type114

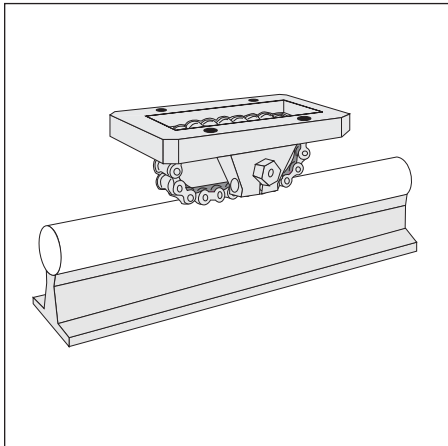
RoundWay Linear Roller Bearings

for Continuously Supported Applications



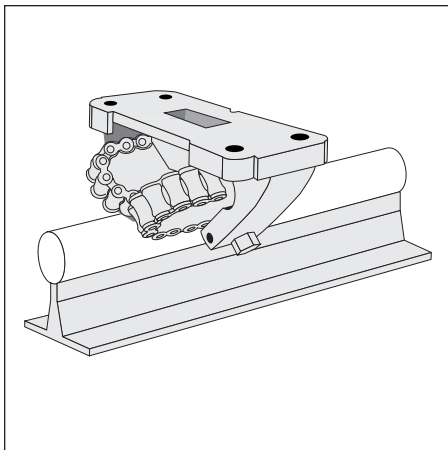
RoundWay* Linear Roller Bearing Type (Type A,B,C)

- Available in ½ through 4 inch diameters.
- Load capacity range between 970 and 24,000 lb_f.
- Travel speeds up to 100 ft/s.
- Accelerations up to 450 ft/s².
- Can be adjusted to compensate for variations in the mounting surface.
- Self-aligning in all directions.
- Designed to compensate for two 60 Case LinearRace ways that are slightly out of parallel
- Can be mounted in a custom housing.
- Available with a two piece seal that retains lubrication while protecting the bearing from the ingress of dirt or contaminants.



RoundWay Linear Roller Bearing (Single Type)

- Available in ½ through 4 inch diameters.
- Load capacity range between 970 and 24,000 lb_f.
- Travel speeds up to 100 ft/s.
- Accelerations up to 450 ft/s².
- Can be adjusted to compensate for variations in the mounting surface.
- Self-aligning in all directions.
- Designed to compensate for two 60 Case LinearRace ways that are slightly out of parallel
- Should always be used in conjunction with RoundWay Dual version.
- Can be mounted in a custom housing.
- Available with a two piece seal that retains lubrication while protecting the bearing from the ingress of dirt or contaminants.
- Easily mounted to carriage with four mounting bolts.

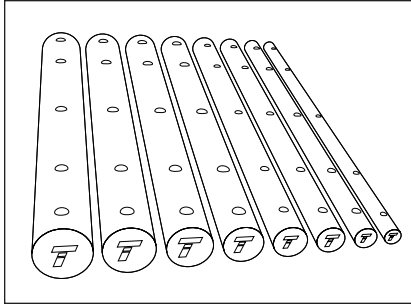


RoundWay Linear Roller Bearing (Dual Type)

- Available in ½ through 4 inch diameters.
- Load capacity range between 1370 and 35,000 lb_f.
- Travel speeds up to 100 ft/s.
- Accelerations up to 450 ft/s².
- Can be adjusted to compensate for variations in the mounting surface.
- Self-aligning in all directions.
- Available with a two piece seal that retains lubrication while protecting the bearing from the ingress of dirt or contaminants.
- Easily mounted to carriage with four mounting bolts.

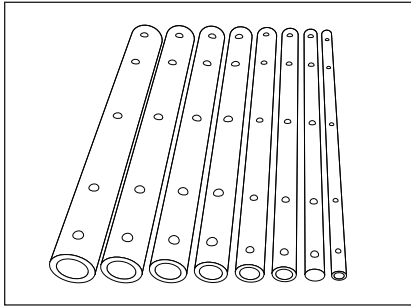
60 Case LinearRace (PreDrilled)

for Continuously Supported Applications



60 Case* Solid LinearRace* with Mounting Holes Features:

- Radial drilled and tapped holes ready for immediate use with standard hole spacing to match standard 60 Case LinearRace support rails.
- Diameter range between ½ and 4 inch.
- Surface finish 12 R_a microinch.
- Hardness 60-65 HRC.
- Roundness 80 millionths of an inch.
- Available in corrosion resistant 440C stainless steel (50-55 HRC).
- Available with Preplate* chrome option.
- Standard straightness .001 inch per foot cumulative (.002 TIR) with special straightness at .0005 inch per foot cumulative (.001 TIR) available.

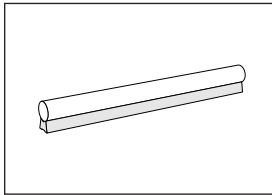


60 Case Tubular Lite* LinearRace with Mounting Holes Features:

- Hollow design reduces weight and inertia.
- Radial drilled and tapped holes ready for immediate use.
- Standard hole spacing to match standard 60 Case LinearRace support rails.
- Diameter range between 1½ and 4 inch.
- Roundness 80 millionths of an inch.
- Case hardness 58-63 HRC.
- Surface finish 12 R_a microinch.
- Available with Preplate chrome option.
- Standard straightness .001 inch per foot cumulative (.002 TIR) with special straightness at .0005 inch per foot cumulative (.001 TIR) available.

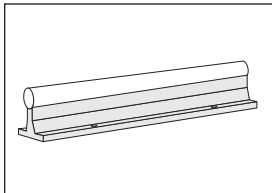
60 Case LinearRace Support Rails and Assemblies

for Continuously Supported Applications



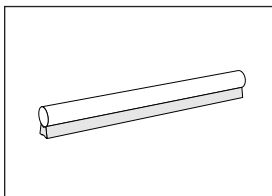
LSR Low Profile 60 Case LinearRace Support Rail Features:

- Diameter range between ½ and 4 inch.
- Available with standard mounting holes for immediate use.
- Available without mounting holes for custom hole spacing.
- Low Profile design.
- Unlimited travel lengths.



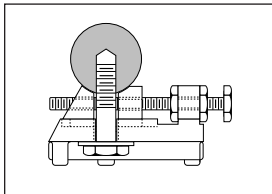
SR/SRA 60 Case LinearRace Support Rail Assembly Features:

- Diameter range between ½ and 2 inch.
- Available with standard mounting holes for immediate use.
- Available without mounting holes for customized hole spacings.
- Available as a pre-engineered, ready to install assembly.
- Light weight, high strength aluminum alloy rail.
- Unlimited travel lengths.



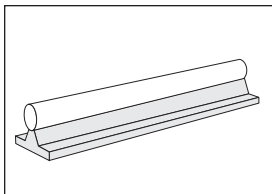
LSRA SmartRail* Assembly Features:

- Diameter range between 5/8 and 1½ inch.
- Bolt-down-from-the-top mounting.
- Two mounting hole patterns.
- Single piece lengths up to 15 feet long.
- Low profile design.



Waymount* 60 Case LinearRace Support Block Features:

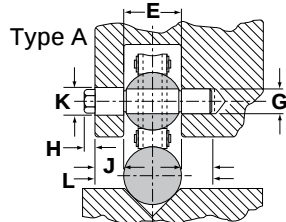
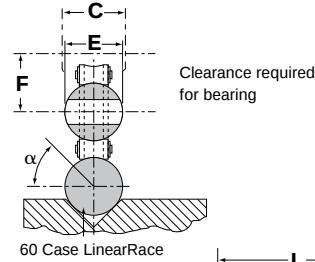
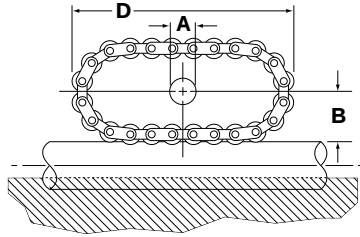
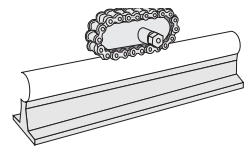
- Available for 60 Case LinearRace diameters ½ through 4 inch.
- Can easily adjust vertical or horizontal position of 60 Case LinearRace.
- Easily secured to base surface.
- Protected with a corrosion resistant coating.
- Designed specifically for use with RoundWay Linear Roller bearings.
- Installation time and cost is minimized.



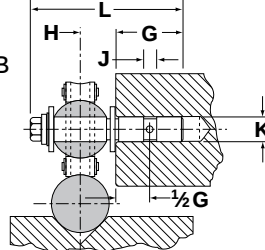
XSR/XSRA 60 Case LinearRace Support Rail and Assembly Features:

- All ductile iron, heavy duty design and construction.
- Equipped with drill thru and counterbored base mounting holes.
- Reference edge for ease of installation.
- Can be pre-assembled with 60 Case LinearRace for quick and easy installation.
- Precision ground surfaces for 60 Case LinearRace and base mounting.
- Available in 2 and 3 inch diameter.

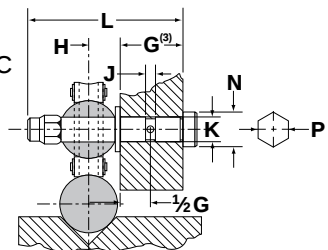
RoundWay Linear Roller Bearing Type A, B and C



Type B



Type C



RoundWay* Linear Roller Bearing (Type A, B and C) and 60 Case* LinearRace*

(Dimensions in inches)

Part Number				Nom. Dia.	A	B	C	D	E	F	α	60 Case LinearRace Diameter d	60 Case LinearRace Maximum Length	60 Case Solid LinearRace Mass lb/in	Dynamic ⁽¹⁾ Load Cap. lb _f
Bearing Type A	Bearing Type B	Bearing Type C	60 Case LinearRace		+ .0005 - .0000				± .001		Deg				
RW-8-A	RW-8-B	RW-8-C	LRL-8-PD	.500	.2500	.45	.63	2.38	.502	.56	50	.4995/.4990	168	.06	970
RW-16-A	RW-16-B	RW-16-C	LRL-16-PD	1.000	.4688	.80	1.00	3.75	1.002	.94	50	.9995/.9990	180	.22	3020
RW-24-A	RW-24-B	RW-24-C	LRL-24-PD	1.500	.7188	1.15	1.50	5.38	1.502	1.38	55	1.4994/1.4989	204	.50	6020
RW-32-A	RW-32-B	RW-32-C	LRL-32-PD	2.000	.9688	1.50	2.00	7.38	2.002	1.75	55	1.9994/1.9987	204	.89	12360
RW-48-A	RW-48-B	RW-48-C	LRL-48-PD ⁽²⁾	3.000	1.5626	2.30	3.00	11.00	3.002	2.75	50	2.9992/2.9983	204	2.00	24000

Trunnion Type A

RoundWay Bearing Part Number	G	H	J	K	L	Bearing Mass lb
	+ .0000 - .0005			+ .0000 - .0005		
RW-8-A	.2187	.19	.31	.2812	1.13	.30
RW-16-A	.4375	.25	.50	.5000	2.00	1.10
RW-24-A	.6875	.31	.63	.7500	2.75	3.10
RW-32-A	.9375	.38	.75	1.0000	3.50	7.3
RW-48-A	1.5000	.59	1.25	1.6250	5.53	24.0

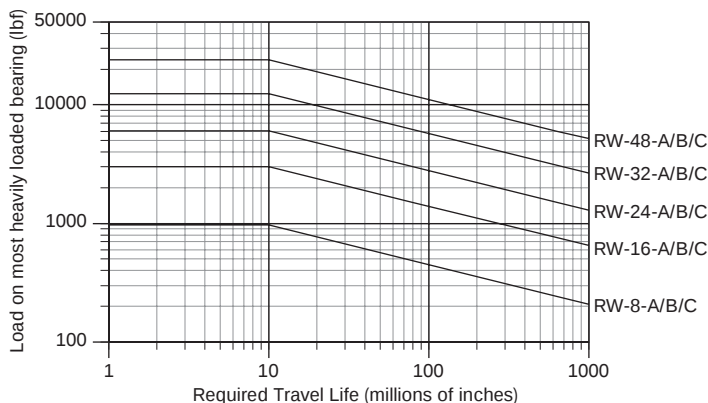
Trunnion Type B

RoundWay Bearing Part Number	G	H	J	K	L	Bearing Mass lb
				+ .000 - .001		
RW-8-B	.75	.31	.13	.3105	1.63	.30
RW-16-B	1.25	.59	.19	.498	2.78	1.10
RW-24-B	1.75	.88	.25	.748	3.94	3.10
RW-32-B	2.25	1.13	.31	.998	5.06	7.70
RW-48-B	3.50	1.75	.50	1.623	8.00	24.80

Trunnion Type C

RoundWay Bearing Part Number	G ⁽³⁾	H	J	K	L	M	N	P Std. Hex across Flats	Bearing Mass lb
	+ .060 - .000			+ .000 - .001					
RW-8-C	.719	.31	.13	.311	1.69	.22	.44	-	.30
RW-16-C	1.188	.59	.19	.498	2.88	.31	.75	-	1.10
RW-24-C	1.656	.88	.25	.748	4.13	.50	1.00	-	3.20
RW-32-C	2.094	1.13	.31	.998	5.25	.63	1.31	-	7.90
RW-48-C	3.063	1.75	.50	1.623	7.25	1.00	-	2.25	25.60

Load/Life Graph (Lines indicate limiting load for given RoundWay bearing)



⁽¹⁾ Dynamic Load Capacity is based on 10 million inches of travel.

⁽²⁾ Contact factory for availability.

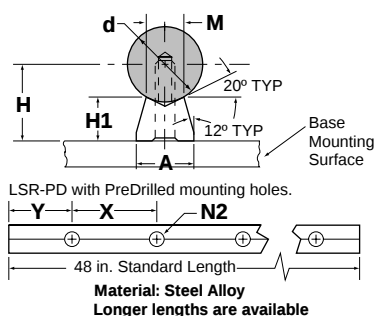
⁽³⁾ Thickness of mounting member.

Determining RoundWay Bearing Size

The primary factors that influence the choice of bearing size are maximum load on a single RoundWay bearing and the required travel life. To determine the proper RoundWay 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 RoundWay bearing sizes that pass through or above and to the right of this point may be suitable for this application.

60 Case LinearRace Support Rails and Assemblies for Continuously Supported Applications

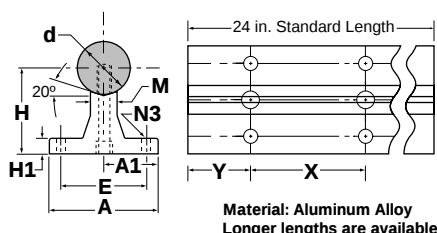
Type LSR and LSR-PD LinearRace Support Rails



Type LSR and LSR-PD 60 Case* LinearRace* Support Rails (Dimensions in inches)

LSR Standard Without Holes	LSR-PD Standard w/PreDrilled Holes	Nominal LinearRace Diameter d	H ±.002	H1	A	M	N2		X	Y	LSR Mass lb/ft
							Hole	Bolt			
LSR-8	LSR-8-PD	.500	.562	.34	.37	.25	.17	#6-32	4	2	.32
LSR-16	LSR-16-PD	1.000	1.000	.56	.69	.50	.28	¼-20	6	3	1.01
LSR-24	LSR-24-PD	1.500	1.375	.70	.93	.69	.41	⅜-16	8	4	1.68
LSR-32	LSR-32-PD	2.000	1.750	.85	1.18	.88	.53	½-13	8	4	2.59
LSR-48	LSR-48-PD	3.000	2.750	1.40	1.88	1.38	.81	¾-10	8	4	6.98

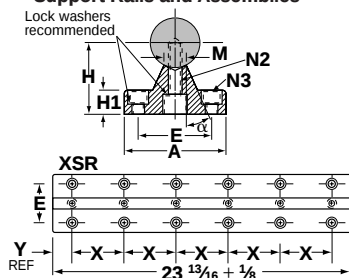
Type SR and SR-PD 60 Case LinearRace
Support Rails and Assemblies



Type SR/ SR-PD LinearRace Support Rails and Assemblies (Dimensions in inches)

SR Without Holes	SR-PD With PreDrilled Holes	Assy. With Solid LinearRace	Nom. LinearRace Dia. d	H ±.002	H1	A	A1 ±.002	E	M	N3		LinearRace Mounting Bolt N1	X	Y	SR Mass lb/ft
										Hole	Bolt				
SR-8	SR-8-PD	SRA-8	.500	1.125	.19	1.50	.750	1.00	.25	.17	#6	#6-32 x .88	4	2	.60
SR-16	SR-16-PD	SRA-16	1.000	1.750	.25	2.13	1.063	1.50	.50	.28	¼	¼-20 x 1.50	6	3	1.40
SR-24	SR-24-PD	SRA-24	1.500	2.500	.38	3.00	1.500	2.25	.69	.34	⅜	⅜-16 x 2.00	8	4	2.60
SR-32	SR-32-PD	SRA-32	2.000	3.250	.50	3.75	1.875	2.75	.88	.41	⅝	½-13 x 2.50	8	4	4.20

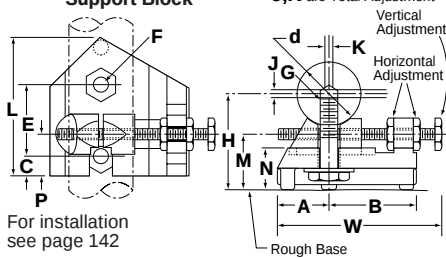
Type XSR/XSRA 60 Case LinearRace
Support Rails and Assemblies



Type XSR/XSRA LinearRace Support Rails and Assemblies (Dimensions in inches)

XSR With Mounting Holes	Assy. With Solid LinearRace	Nominal LinearRace Diameter	H ±.001 +.000	H1	A	E	M	N2			N3			α deg	X	Y	XSR Mass lb/ft
								Hole	Bolt	Counterbore	Hole	Bolt	Counterbore				
XSR-32	XSRA-32	2.000	2.750	1.00	4.50	3.13	.88	.56	½-13 x 2	1 x .75 DP	.56	.50	1 x .63 DP	15	4	1.97	16
XSR-48	XSRA-48	3.000	4.000	1.31	6.00	4.25	1.25	.81	¾-10 x 2.75	1.44 x 1.13 DP	.69	.63	1.25 x .75 DP	25	6	2.97	31

Waymount LinearRace
Support Block

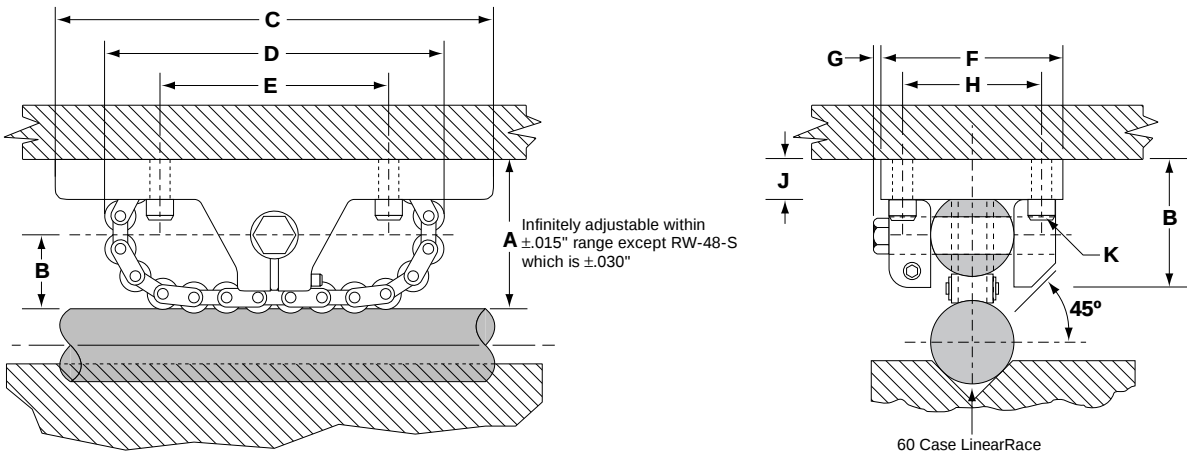
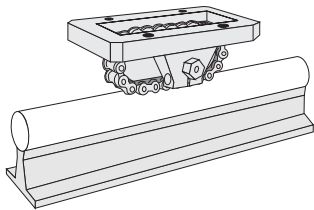


Waymount LinearRace Support Block (Dimensions in inches)

Waymount Part Number	Nominal LinearRace Diameter d	L	H	W	A	B	C	E	F	G ⁽⁴⁾	J	K	M	N	P	Mass lb
WM-8	.500	1.50	1.06	1.75	.50	.88	.25	.75	.22	#8-32	.05	.09	.69	.50	.44	.20
WM-16	1.000	2.00	1.50	2.50	.75	1.25	.31	1.06	.28	¼-28	.06	.13	.81	.69	.69	.50
WM-24	1.500	2.50	2.00	3.50	1.19	1.63	.44	1.19	.34	⅜-24	.13	.13	1.00	.75	.75	1.10
WM-32	2.000	3.00	2.50	4.00	1.44	1.88	.50	1.38	.41	½-24	.13	.13	1.25	.94	1.00	1.80
WM-48	3.000	5.00	4.31	6.75	2.38	3.38	.75	2.63	.66	⅝-18	.13	.13	2.25	1.63	1.50	10.20

⁽⁴⁾ Supplied with Waymount LinearRace support block

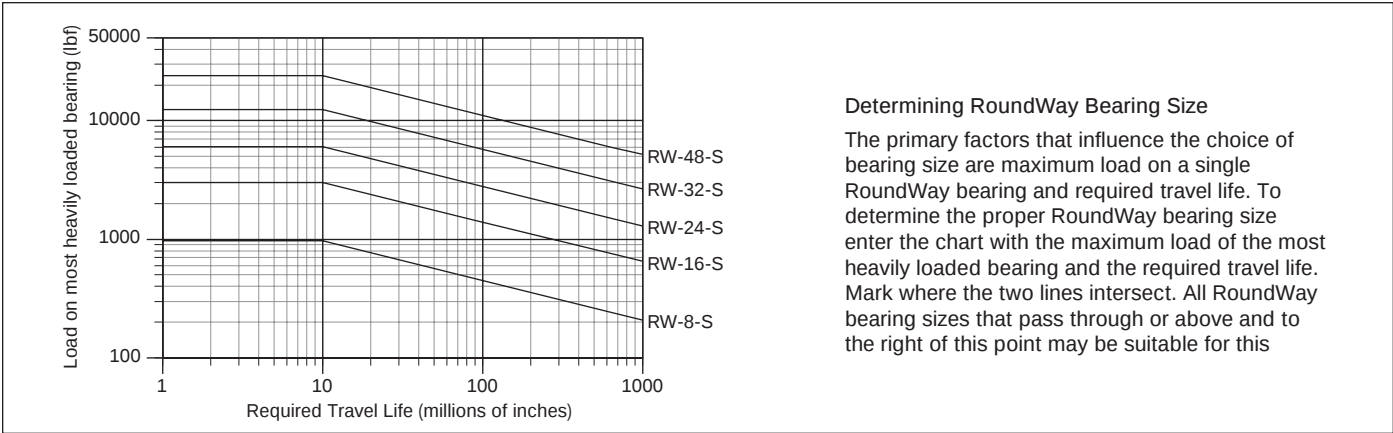
RoundWay Linear Roller Bearing (Single Type)



RoundWay* Linear Roller Bearing (Single Type) and 60 Case* LinearRace* (Dimensions in inches)																			
Part Number		Nom. Dia.	A	B	C	D	E	F	G	H	J	K		L	60 Case LinearRace Diameter d	60 Case LinearRace Maximum Length	60 Case Solid LinearRace Mass lb/in	Bearing Mass lb	Dynamic ⁽¹⁾ Load Capacity lbf
RoundWay Bearing	60 Case LinearRace											Bolt	Hole						
RW-8-S	LRL-8-PD	.500	1.00	.45	3.0	2.38	1.50	1.25	.19	.94	.31	#6	.16	.88	.4995/.4990	168	.06	.50	970
RW-16-S	LRL-16-PD	1.000	1.75	.80	5.0	3.75	2.50	2.13	.25	1.63	.50	#10	.25	1.50	.9995/.9990	180	.22	2.20	3020
RW-24-S	LRL-24-PD	1.500	2.50	1.15	6.5	5.38	3.50	2.88	.31	2.13	.63	.31	.38	2.13	1.4994/1.4989	204	.50	5.60	6020
RW-32-S	LRL-32-PD	2.000	3.25	1.50	8.5	7.38	4.50	3.63	.38	2.75	.75	.38	.44	2.88	1.9994/1.9987	204	.89	12.40	12360
RW-48-S	LRL-48-PD ⁽²⁾	3.000	5.00	2.30	13.0	11.00	7.00	6.00	.50	4.25	1.25	.63	.69	4.25	2.9992/2.9983	204	2.00	48.00	24000

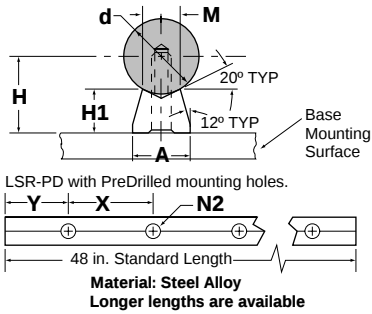
⁽¹⁾ Dynamic Load Capacity is based on 10 million inches of travel.
⁽²⁾ Contact factory for availability

Load/Life Graph (Lines indicate limiting load for given RoundWay bearing)



60 Case* LinearRace* Support Rails and Assemblies for Continuously Supported Applications

Type LSR and LSR-PD LinearRace Support Rails

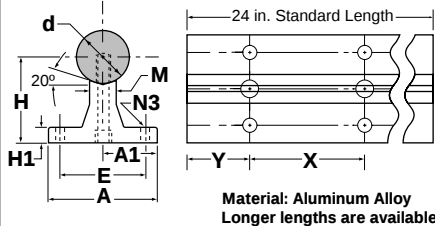


Type LSR and LSR-PD LinearRace Support Rails

(Dimensions in inches)

LSR Standard Without Holes	LSR-PD Standard w/PreDrilled Holes	Nominal LinearRace Diameter d	H	H1	A	M	N2		X	Y	LSR Mass lb/ft
							Hole	Bolt			
LSR-8	LSR-8-PD	.500	.562	.34	.37	.25	.17	#6-32	4	2	.32
LSR-16	LSR-16-PD	1.000	1.000	.56	.69	.50	.28	1/4-20	6	3	1.01
LSR-24	LSR-24-PD	1.500	1.375	.70	.93	.69	.41	3/8-16	8	4	1.68
LSR-32	LSR-32-PD	2.000	1.750	.85	1.18	.88	.53	1/2-13	8	4	2.59
LSR-48	LSR-48-PD	3.000	2.750	1.40	1.88	1.38	.81	3/4-10	8	4	6.98

Type SR and SR-PD 60 Case LinearRace Support Rails and Assemblies

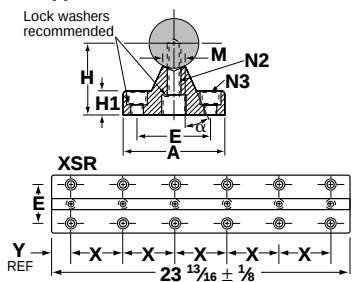


Type SR/ SR-PD LinearRace Support Rails and Assemblies

(Dimensions in inches)

SR Without Holes	SR-PD With PreDrilled Holes	Assy. With Solid LinearRace	Nom. LinearRace Dia. d	H	H1	A	A1	E	M	N3		LinearRace Mounting Bolt N1	X	Y	SR Mass lb/ft
										Hole	Bolt				
SR-8	SR-8-PD	SRA-8	.500	1.125	.19	1.50	.750	1.00	.25	.17	#6	#6-32 x .88	4	2	.60
SR-16	SR-16-PD	SRA-16	1.000	1.750	.25	2.13	1.063	1.50	.50	.28	1/4	1/4-20 x 1.50	6	3	1.40
SR-24	SR-24-PD	SRA-24	1.500	2.500	.38	3.00	1.500	2.25	.69	.34	5/16	3/8-16 x 2.50	8	4	2.60
SR-32	SR-32-PD	SRA-32	2.000	3.250	.50	3.75	1.875	2.75	.88	.41	3/8	1/2-13 x 2.50	8	4	4.20

Type XSR/XSRA 60 Case LinearRace Support Rails and Assemblies

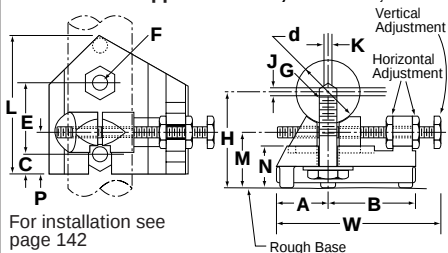


Type XSR/XSRA LinearRace Support Rails and Assemblies

(Dimensions in inches)

XSR With Mounting Holes	Assy. With Solid LinearRace	Nominal LinearRace Diameter	H	H1	A	E	M	N2			N3			α deg	X	Y	XSR Mass lb/ft
								Hole	Bolt	Counterbore	Hole	Bolt	Counterbore				
XSR-32	XSRA-32	2.000	2.750	1.00	4.50	3.13	.88	.56	1/2-13 x 2	1 x .75 DP	.56	.50	1 x .63 DP	15	4	1.97	16
XSR-48	XSRA-48	3.000	4.000	1.31	6.00	4.25	1.25	.81	3/4-10 x 2.75	1.44 x 1.13 DP	.69	.63	1.25 x .75 DP	25	6	2.97	31

Waymount 60 Case LinearRace Support Block J,K are Total Adjustment



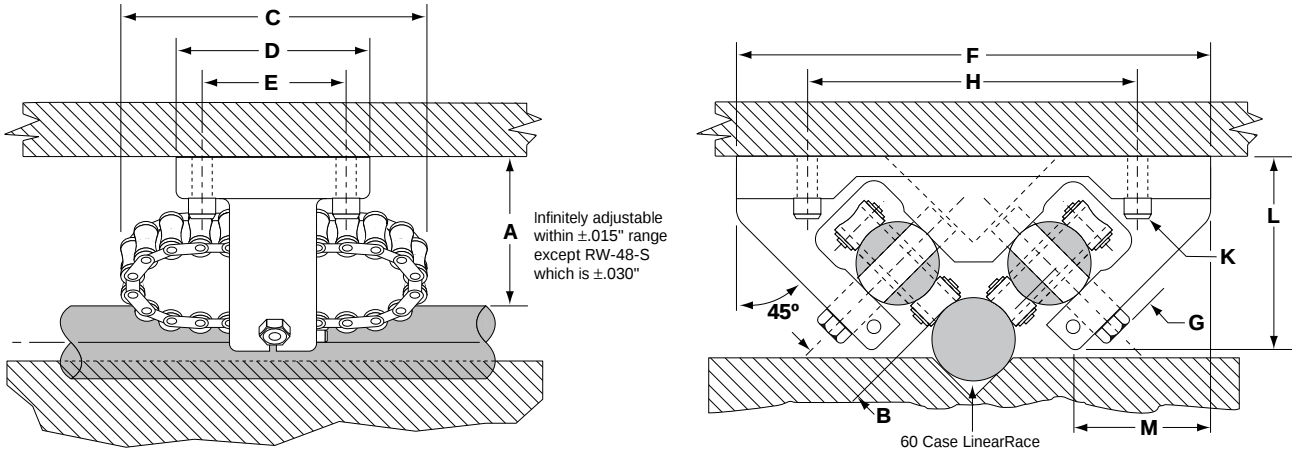
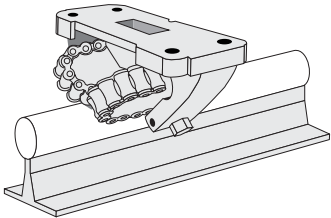
Waymount LinearRace Support Block

(Dimensions in inches)

Waymount Part Number	Nominal LinearRace Diameter d	L	H	W	A	B	C	E	F	G ⁽⁴⁾	J	K	M	N	P	Mass lb
WM-8	.500	1.50	1.06	1.75	.50	.88	.25	.75	.22	#8-32	.05	.09	.69	.50	.44	.20
WM-16	1.000	2.00	1.50	2.50	.75	1.25	.31	1.06	.28	1/4-28	.06	.13	.81	.69	.69	.50
WM-24	1.500	2.50	2.00	3.50	1.19	1.63	.44	1.19	.34	5/16-24	.13	.13	1.00	.75	.75	1.10
WM-32	2.000	3.00	2.50	4.00	1.44	1.88	.50	1.38	.41	3/8-24	.13	.13	1.25	.94	1.00	1.80
WM-48	3.000	5.00	4.31	6.75	2.38	3.38	.75	2.63	.66	5/8-18	.13	.13	2.25	1.63	1.50	10.20

⁽⁴⁾ Supplied with Waymount LinearRace support block

RoundWay Linear Roller Bearing (Dual Type)

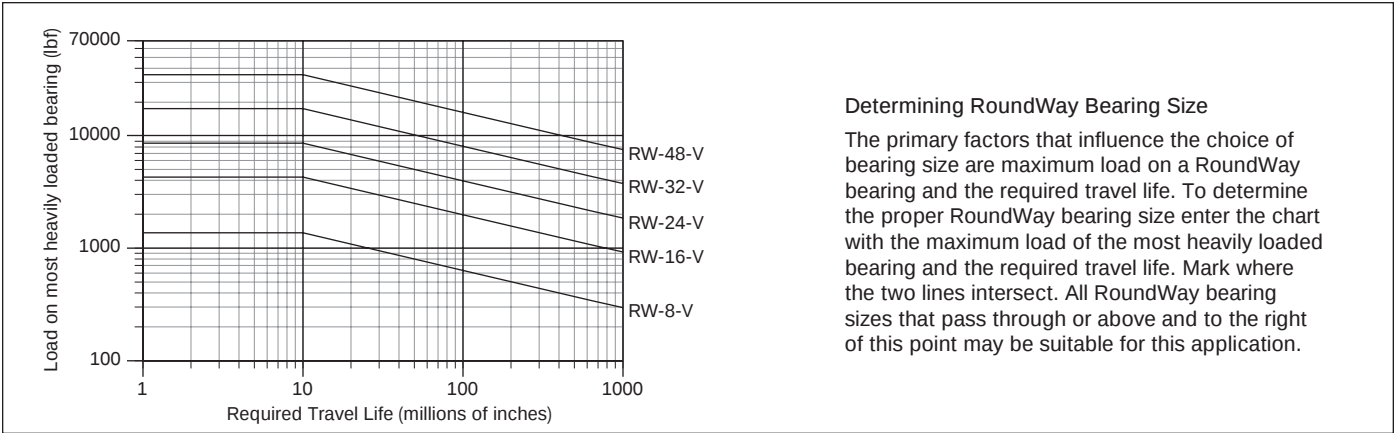


RoundWay* Linear Roller Bearings (Dual Type) and 60 Case* LinearRace* (Dimensions in inches)																				
Part Number		Nom. Dia.	A	B	C	D	E	F	G	H	J	K		L	M	60 Case LinearRace Diameter d	60 Case LinearRace Maximum Length	60 Case Solid LinearRace Mass lb/in	Bearing Mass lb	Dyn. Load Cap. lb _f
RoundWay Bearing	60 Case LinearRace											Bolt	Hole							
RW-8-V	LRL-8-PD	.500	1.00	.45	2.38	1.38	1.00	3.00	.19	2.25	.31	#8	.19	1.38	.69	.4995/.4990	168	.06	1.10	1370
RW-16-V	LRL-16-PD	1.000	1.75	.80	3.75	2.25	1.63	5.75	.25	4.0	.50	#10	.25	2.38	1.56	.9995/.9990	180	.22	4.90	4300
RW-24-V	LRL-24-PD	1.500	2.50	1.15	5.38	2.75	2.00	7.88	.31	6.0	.63	.31	.38	3.38	2.13	1.4994/1.4989	204	.50	11.70	8600
RW-32-V	LRL-32-PD	2.000	3.25	1.50	7.38	3.50	2.50	9.75	.38	7.5	.75	.38	.44	4.38	2.50	1.9994/1.9987	204	.89	25.20	17500
RW-48-V	LRL-48-PD	3.000	5.00	2.30	11.00	5.50	4.00	15.50	.63	12.0	1.25	.63	.69	7.00	4.25	2.9992/2.9983	204	2.00	90	35000

⁽¹⁾ Dynamic Load Capacity is based on 10 million inches of travel.

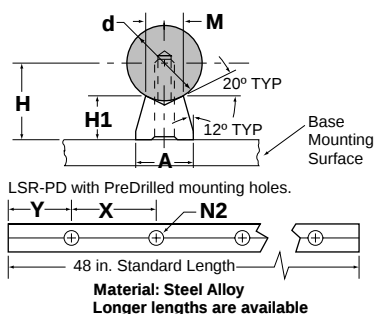
⁽²⁾ Contact factory for availability.

Load/Life Graph (Lines indicate limiting load for given RoundWay bearing)



60 Case* LinearRace* Support Rails and Assemblies for Continuously Supported Applications

Type LSR and LSR-PD LinearRace Support Rails

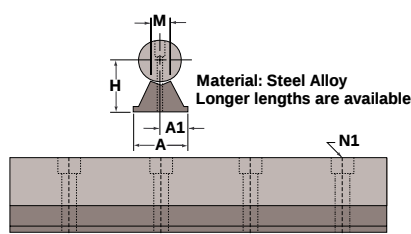


Type LSR and LSR-PD LinearRace Support Rails

(Dimensions in inches)

LSR Standard Without Holes	LSR-PD Standard w/PreDrilled Holes	Nominal LinearRace Diameter d	H	H1	A	M	N2		X	Y	LSR Mass lb/ft
							Hole	Bolt			
LSR-8	LSR-8-PD	.500	.562	.34	.37	.25	.17	#6-32	4	2	.32
LSR-16	LSR-16-PD	1.000	1.000	.56	.69	.50	.28	1/4-20	6	3	1.01
LSR-24	LSR-24-PD	1.500	1.375	.70	.93	.69	.41	3/8-16	8	4	1.68
LSR-32	LSR-32-PD	2.000	1.750	.85	1.18	.88	.53	1/2-13	8	4	2.59
LSR-48	LSR-48-PD	3.000	2.750	1.40	1.88	1.38	.81	3/4-10	8	4	6.98

Type LSRA 60 Case Smart Rail Assemblies



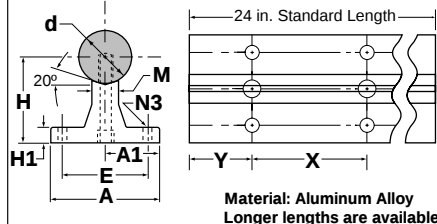
Type LSRA Smart Rail* Assemblies

(Dimensions in inches)

Part Number ⁽³⁾		LinearRace Diameter	H	A	A1	Y	Mounting Holes		
Smart Rail Assembly ⁽¹⁾	Smart Rail Assembly ⁽²⁾						Std.	X1	X2 ⁽⁴⁾
LSRA10	LSRA10 CR	0.625	0.687	0.45	0.225	1.0	2	3	#5
LSRA12	LSRA12 CR	0.750	0.750	0.51	0.255	1.5	3	4	#6
LSRA16	LSRA16 CR	1.000	1.000	0.69	0.345	1.5	3	4	#10
LSRA20	LSRA20 CR	1.250	1.187	0.78	0.390	1.5	3	6	5/16
LSRA24	LSRA24 CR	1.500	1.375	0.93	0.465	2.0	4	8	3/8

(1) = Consists of steel rail and high carbon steel LinearRace (HRC 60-65). (2) = Consists of zinc plated steel rail and 440C St. S'l. LinearRace (HRC 50-55). (3) = Specify length of assembly and mounting hole spacing (X1 or X2) when ordering. For example, LSRA12 CR X1 x 24.00 inches. (4) = Made to order.

Type SR and SR-PD 60 Case LinearRace Support Rails and Assemblies

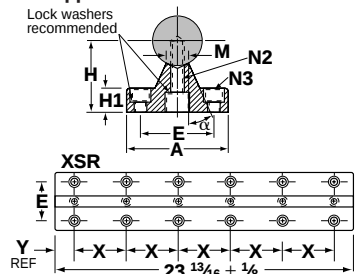


Type SR/ SR-PD LinearRace Support Rails and Assemblies

(Dimensions in inches)

SR Without Holes	SR-PD With PreDrilled Holes	Assy. With Solid LinearRace	Nom. LinearRace Dia. d	H	H1	A	A1	E	M	N3		LinearRace Mounting Bolt N1	X	Y	SR Mass lb/ft
										Hole	Bolt				
SR-8	SR-8-PD	SRA-8	.500	1.125	.19	1.50	.750	1.00	.25	.17	#6	#6-32 x .88	4	2	.60
SR-16	SR-16-PD	SRA-16	1.000	1.750	.25	2.13	1.063	1.50	.50	.28	1/4	1/4-20 x 1.50	6	3	1.40
SR-24	SR-24-PD	SRA-24	1.500	2.500	.38	3.00	1.500	2.25	.69	.34	5/16	3/8-16 x 2.00	8	4	2.60
SR-32	SR-32-PD	SRA-32	2.000	3.250	.50	3.75	1.875	2.75	.88	.41	3/8	1/2-13 x 2.50	8	4	4.20

Type XSR/XSRA 60 Case LinearRace Support Rails and Assemblies

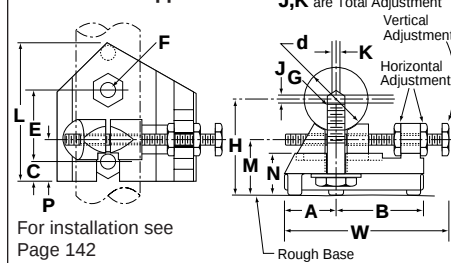


Type XSR/XSRA LinearRace Support Rails and Assemblies

(Dimensions in inches)

XSR With Mounting Holes	Assy. With Solid Linear/Race	Nominal Linear/Race Diameter	H - .001 + .000	H1	A	E	M	N2			N3			α deg	X	Y	XSR Mass lb/ft
								Hole	Bolt	Counterbore	Hole	Bolt	Counterbore				
XSR-32	XSRA-32	2.000	2.750	1.00	4.50	3.13	.88	.56	½-13 x 2	1 x .75 DP	.56	.50	1 x .63 DP	15	4	1.97	16
XSR-48	XSRA-48	3.000	4.000	1.31	6.00	4.25	1.25	.81	¾-10 x 2.75	1.44 x 1.13 DP	.69	.63	1.25 x .75 DP	25	6	2.97	31

Waymount 60 Case LinearRace Support Block



Waymount LinearRace Support Block

(Dimensions in inches)

Waymount Part Number	Nominal LinearRace Diameter d	L	H	W	A	B	C	E	F	G ⁽⁴⁾	J	K	M	N	P	Mass lb
WM-8	.500	1.50	1.06	1.75	.50	.88	.25	.75	.22	8-32	.05	.09	.69	.50	.44	.20
WM-16	1.000	2.00	1.50	2.50	.75	1.25	.31	1.06	.28	1/4-28	.06	.13	.81	.69	.69	.50
WM-24	1.500	2.50	2.00	3.50	1.19	1.63	.44	1.19	.34	3/8-24	.13	.13	1.00	.75	.75	1.10
WM-32	2.000	3.00	2.50	4.00	1.44	1.88	.50	1.38	.41	1/2-24	.13	.13	1.25	.94	1.00	1.80
WM-48	3.000	5.00	4.31	6.75	2.38	3.38	.75	2.63	.66	3/4-18	.13	.13	2.25	1.63	1.50	10.20

⁽⁴⁾ Supplied with Waymount LinearRace support block

Overhead Carriage for Log-Processing Machine

Objective

Design overhead carriage system using RoundWay linear roller bearings mounted on 60 Case LinearRace ways.

Solution

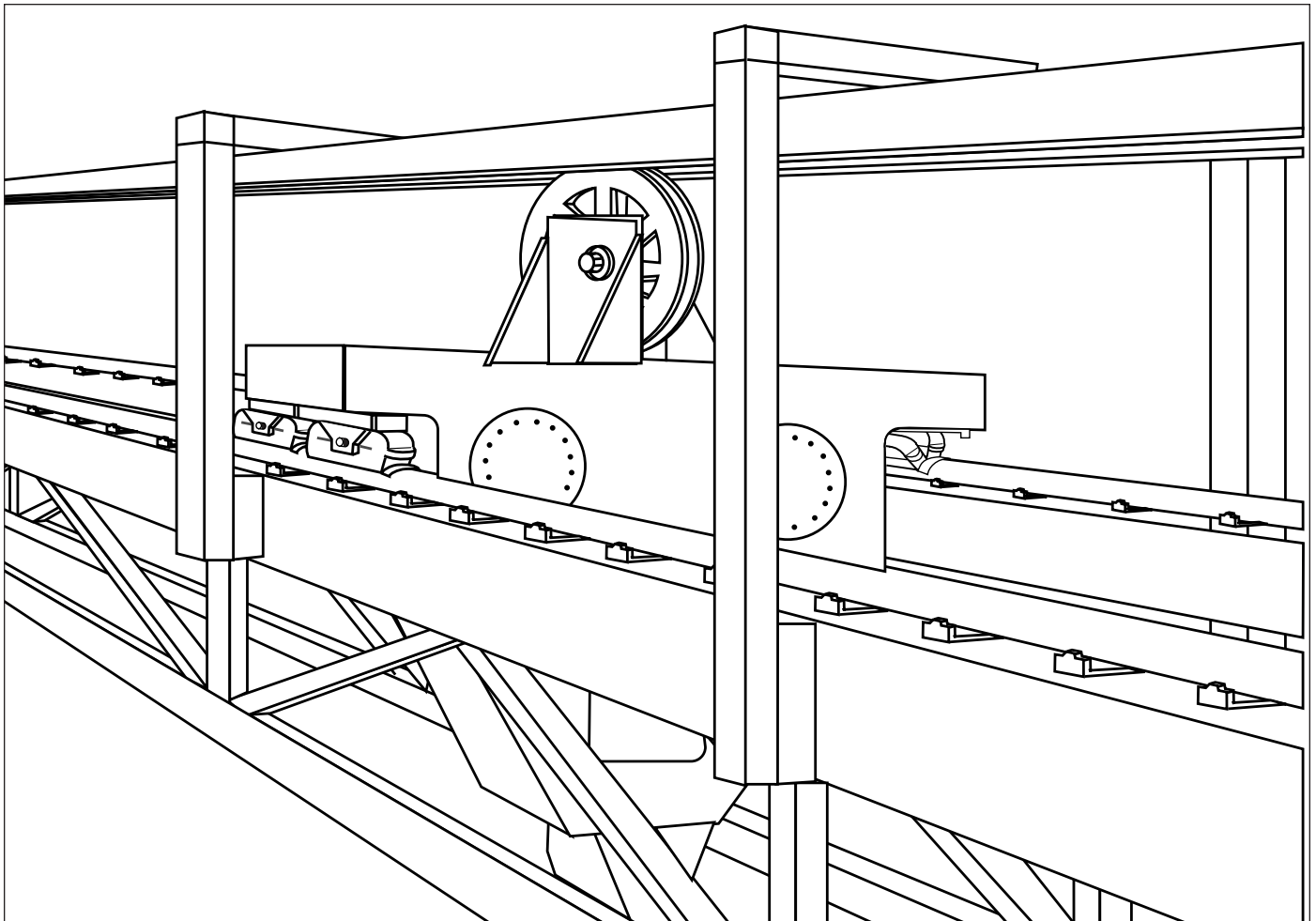
RoundWay linear roller bearings' high load capacity will be used to move heavy logs into and out of the band saws. The carriages shuttle back and forth on 100 foot long 60 Case LinearRace ways until the final cut is made.

Products specified

2 – RW-32-V (RoundWay Linear Roller bearing Dual Type)
2 – RW-32-S (RoundWay Linear Roller bearing Single Type)
2 – LRL-32-PD x 100 ft (60 Case LinearRace)

Benefits

RoundWay linear roller bearings provide operating speeds up to 100 ft/s, optimizing productivity and minimizing cost. The RoundWay bearings' low coefficient of friction allows the use of smaller, less expensive drive motors, belts, linkages and gears. The seal keeps out wood chips and other contaminants and maximizes bearing life.



FluoroNyliner Bushing Bearing

NEW



Thomson FluoroNyliner* Bushing Bearing Offers:

- High performance in contaminated, washdown, or submerged environments
- Proprietary, self-lubricating, composite bearing liner TEP 950
- Low friction, ideally suited for linear and rotary motion
- Precision machined aluminum sleeve
- Excellent performance in high vibration and mechanical shock applications
- Corrosion resistance
- Product availability in industry standard sizes from 0.25" to 2.00"
- Closed, Open, and Self-Aligning configurations
- Load capacities up to 14,000 lbf
- Integral seals
- Closed, Open, and Flanged Pillow Blocks available in single or twin versions
- Available from over 1800 distributors worldwide

FluoroNyliner* Bushing Bearing

Eight Bearing Configurations

Closed Bearing



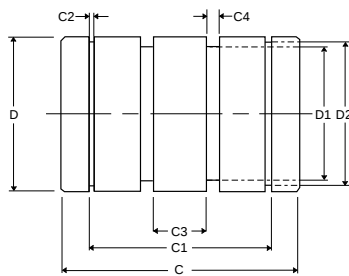
COMMON SPECIFICATIONS

Nominal Bearing Diameter (in.)	60 Case* LinearRace* Shafting		Recommended Shaft Diameter (in.)		Weight lbs.	Effective Surface Area (in²)	Max Static Load ² lbf
	Carbon Steel	316 Stainless Steel	Min	Max			
0.250	LRL-4	LRL-4-SS-316	0.2490	0.2495	0.008	0.19	300
0.375	LRL-6	LRL-6-SS-316	0.3740	0.3745	0.013	0.33	500
0.500	LRL-8	LRL-8-SS-316	0.4990	0.4995	0.030	0.63	970
0.625	LRL-10	LRL-10-SS-316	0.6240	0.6245	0.072	0.94	1450
0.750	LRL-12	LRL-12-SS-316	0.7490	0.7495	0.090	1.22	1900
1.000	LRL-16	LRL-16-SS-316	0.9990	0.9995	0.190	2.25	3500
1.250	LRL-20	LRL-20-SS-316	1.2490	1.2495	0.380	3.28	5100
1.500	LRL-24	LRL-24-SS-316	1.4989	1.4994	0.610	4.51	7000
2.000	LRL-32	LRL-32-SS-316	1.9987	1.9994	1.230	8.01	12500

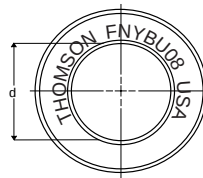
Self-Aligning Bearing



CLOSED BEARING

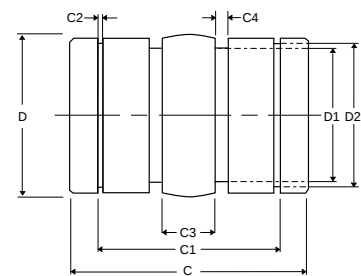


SIDE VIEW



FRONT VIEW

SELF-ALIGNING BEARING



SIDE VIEW

STANDARD BEARINGS

Precision I.D.			Compensated I.D. (1)			Closed Bearing Dimensions (in.)										
Part Number	d (in.)		Part Number	d (in.)		Nominal Bearing Diameter	D		D1	D2	C		C1 Min	C2 Min	C3	C4
	Min	Max		Min	Max		Min	Max			Min	Max				
FNYBU-04	0.2510	0.2520	FNYBU-04-L	0.2530	0.2540	0.250	0.4990	0.5000	0.399	0.467	0.735	0.750	0.519	0.041	0.125	0.080
FNYBU-06	0.3760	0.3770	FNYBU-06-L	0.3780	0.3790	0.375	0.6240	0.6250	0.524	0.596	0.860	0.875	0.634	0.041	0.187	0.080
FNYBU-08	0.5010	0.5020	FNYBU-08-L	0.5030	0.5040	0.500	0.8740	0.8750	0.712	0.833	1.235	1.250	0.956	0.046	0.250	0.125
FNYBU-10	0.6260	0.6270	FNYBU-10-L	0.6280	0.6290	0.625	1.1240	1.1250	0.962	1.070	1.485	1.500	1.101	0.056	0.312	0.125
FNYBU-12	0.7510	0.7520	FNYBU-12-L	0.7540	0.7550	1.750	1.2490	1.2500	1.087	1.195	1.610	1.625	1.163	0.056	0.312	0.125
FNYBU-16	1.0010	1.0020	FNYBU-16-L	1.0040	1.0050	1.000	1.5614	1.5625	1.402	1.490	2.235	2.250	1.745	0.068	0.500	0.125
FNYBU-20	1.2510	1.2520	FNYBU-20-L	1.2550	1.2560	1.250	1.9990	2.0000	1.837	1.889	2.605	2.625	2.015	0.070	0.625	0.125
FNYBU-24	1.5010	1.5022	FNYBU-24-L	1.5050	1.5062	1.500	2.3740	2.3750	2.152	2.265	2.985	3.000	2.402	0.086	0.750	0.165
FNYBU-32	2.0010	2.0024	FNYBU-32-L	2.0060	2.0074	2.000	2.9990	3.0000	2.775	2.860	3.985	4.000	3.180	0.103	1.000	0.188

STANDARD SELF-ALIGNING BEARINGS

Precision I.D.			Compensated I.D. (1)			Closed Bearing Dimensions (in.)										
Part Number	d (in.)		Part Number	d (in.)		Nominal Bearing Diameter	D		D1	D2	C		C1 Min	C2 Min	C3	C4
	Min	Max		Min	Max		Min	Max			Min	Max				
FNYBU-04-A	0.2510	0.2520	FNYBU-04-AL	0.2530	0.2540	0.250	0.4990	0.5000	0.399	0.467	0.735	0.750	0.519	0.041	0.125	0.080
FNYBU-06-A	0.3760	0.3770	FNYBU-06-AL	0.3780	0.3790	0.375	0.6240	0.6250	0.524	0.596	0.860	0.875	0.634	0.041	0.187	0.080
FNYBU-08-A	0.5010	0.5020	FNYBU-08-AL	0.5030	0.5040	0.500	0.8740	0.8750	0.712	0.833	1.235	1.250	0.956	0.046	0.250	0.125
FNYBU-10-A	0.6260	0.6270	FNYBU-10-AL	0.6280	0.6290	0.625	1.1240	1.1250	0.962	1.070	1.485	1.500	1.101	0.056	0.312	0.125
FNYBU-12-A	0.7510	0.7520	FNYBU-12-AL	0.7540	0.7550	1.750	1.2490	1.2500	1.087	1.195	1.610	1.625	1.163	0.056	0.312	0.125
FNYBU-16-A	1.0010	1.0020	FNYBU-16-AL	1.0040	1.0050	1.000	1.5614	1.5625	1.402	1.490	2.235	2.250	1.745	0.068	0.500	0.125
FNYBU-20-A	1.2510	1.2520	FNYBU-20-AL	1.2550	1.2560	1.250	1.9990	2.0000	1.837	1.889	2.605	2.625	2.015	0.070	0.625	0.125
FNYBU-24-A	1.5010	1.5022	FNYBU-24-AL	1.5050	1.5062	1.500	2.3740	2.3750	2.152	2.265	2.985	3.000	2.402	0.086	0.750	0.165
FNYBU-32-A	2.0010	2.0024	FNYBU-32-AL	2.0060	2.0074	2.000	2.9990	3.0000	2.775	2.860	3.985	4.000	3.180	0.103	1.000	0.188

(1) Compensated I.D. bearings have additional running clearance, ideally suited for high speed and non-parallel shaft applications.

(2) Open bearings operating in shear should be derated by 40%. Open bearings operating in tension should be derated by 70%.

FluoroNyliner* Bushing Bearing

Open Bearing



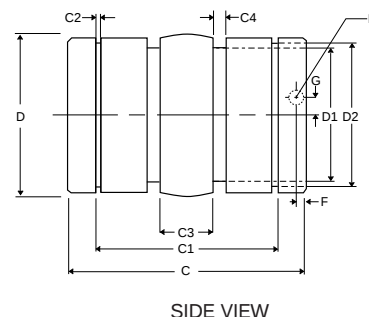
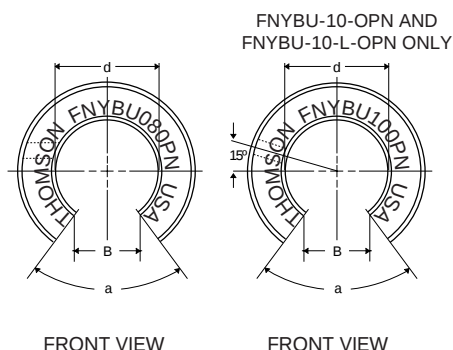
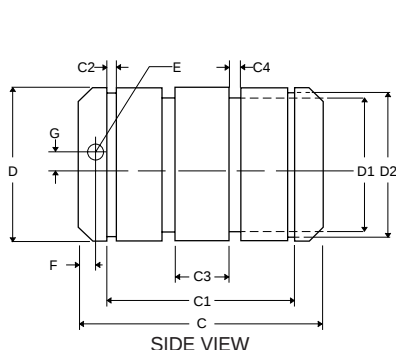
Common Open Bearing Dimensions (in.)					
Nominal Bearing Diameter	E	F	G	B	a (°)
0.250	0.094	0.375	0.000	0.188	60
0.375	0.094	0.438	0.000	0.250	60
0.500	0.136	0.625	0.125	0.313	66
0.625	0.104	0.125	-	0.375	60
0.750	0.136	0.125	0.000	0.438	66
1.000	0.136	0.125	0.000	0.563	64
1.250	0.201	0.197	0.000	0.625	60
1.500	0.201	0.193	0.000	0.750	60
2.000	0.265	0.292	0.000	1.000	60

Self-Aligning Open Bearing



OPEN BEARING

SELF-ALIGNING OPEN BEARING



STANDARD OPEN BEARINGS

Precision I.D.			Compensated I.D. (1)			Open Bearing Dimensions (in.)										
Part Number	d (in.)		Part Number	d (in.)		Nominal Bearing Diameter	D		D1	D2	C		C1 Min	C2 Min	C3	C4
	Min	Max		Min	Max		Min	Max			Min	Max				
FNYBU-04-OPN	0.2510	0.2520	FNYBU-04-L-OPN	0.2530	0.2540	0.250	0.4990	0.5000	0.399	0.467	0.735	0.750	0.519	0.041	0.125	0.080
FNYBU-06-OPN	0.3760	0.3770	FNYBU-06-L-OPN	0.3780	0.3790	0.375	0.6240	0.6250	0.524	0.596	0.860	0.875	0.634	0.041	0.187	0.080
FNYBU-08-OPN	0.5010	0.5020	FNYBU-08-L-OPN	0.5030	0.5040	0.500	0.8740	0.8750	0.712	0.833	1.235	1.250	0.956	0.046	0.250	0.125
FNYBU-10-OPN	0.6260	0.6270	FNYBU-10-L-OPN	0.6280	0.6290	0.625	1.1240	1.1250	0.962	1.070	1.485	1.500	1.101	0.056	0.312	0.125
FNYBU-12-OPN	0.7510	0.7520	FNYBU-12-L-OPN	0.7540	0.7550	0.750	1.2490	1.2500	1.087	1.195	1.610	1.625	1.163	0.056	0.312	0.125
FNYBU-16-OPN	1.0010	1.0020	FNYBU-16-L-OPN	1.0040	1.0050	1.000	1.5614	1.5625	1.402	1.490	2.235	2.250	1.745	0.068	0.500	0.125
FNYBU-20-OPN	1.2510	1.2520	FNYBU-20-L-OPN	1.2550	1.2560	1.250	1.9990	2.0000	1.837	1.889	2.605	2.625	2.015	0.070	0.625	0.125
FNYBU-24-OPN	1.5010	1.5022	FNYBU-24-L-OPN	1.5050	1.5062	1.500	2.3740	2.3750	2.152	2.265	2.985	3.000	2.402	0.086	0.750	0.165
FNYBU-32-OPN	2.0010	2.0024	FNYBU-32-L-OPN	2.0060	2.0074	2.000	2.9990	3.0000	2.775	2.860	3.985	4.000	3.180	0.103	1.000	0.188

STANDARD SELF-ALIGNING OPEN BEARINGS

Precision I.D.			Compensated I.D. (1)			Self-Aligning Bearing Dimensions (in.)										
Part Number	d (in.)		Part Number	d (in.)		Nominal Bearing Diameter	D		D1	D2	C		C1 Min	C2 Min	C3	C4
	Min	Max		Min	Max		Min	Max			Min	Max				
FNYBU-04-A-OPN	0.2510	0.2520	FNYBU-04-AL-OPN	0.2530	0.2540	0.250	0.4990	0.5000	0.399	0.467	0.735	0.750	0.519	0.041	0.125	0.080
FNYBU-06-A-OPN	0.3760	0.3770	FNYBU-06-AL-OPN	0.3780	0.3790	0.375	0.6240	0.6250	0.524	0.596	0.860	0.875	0.634	0.041	0.187	0.080
FNYBU-08-A-OPN	0.5010	0.5020	FNYBU-08-AL-OPN	0.5030	0.5040	0.500	0.8740	0.8750	0.712	0.833	1.235	1.250	0.956	0.046	0.250	0.125
FNYBU-10-A-OPN	0.6260	0.6270	FNYBU-10-AL-OPN	0.6280	0.6290	0.625	1.1240	1.1250	0.962	1.070	1.485	1.500	1.101	0.056	0.312	0.125
FNYBU-12-A-OPN	0.7510	0.7520	FNYBU-12-AL-OPN	0.7540	0.7550	0.750	1.2490	1.2500	1.087	1.195	1.610	1.625	1.163	0.056	0.312	0.125
FNYBU-16-A-OPN	1.0010	1.0020	FNYBU-16-AL-OPN	1.0040	1.0050	1.000	1.5614	1.5625	1.402	1.490	2.235	2.250	1.745	0.068	0.500	0.125
FNYBU-20-A-OPN	1.2510	1.2520	FNYBU-20-AL-OPN	1.2550	1.2560	1.250	1.9990	2.000	1.837	1.889	2.605	2.625	2.015	0.070	0.625	0.125
FNYBU-24-A-OPN	1.5010	1.5022	FNYBU-24-AL-OPN	1.5050	1.5062	1.500	2.3740	2.3750	2.152	2.265	2.985	3.000	2.402	0.086	0.750	0.165
FNYBU-32-A-OPN	2.0010	2.0024	FNYBU-32-AL-OPN	2.0060	2.0074	2.000	2.9990	3.000	2.775	2.860	3.985	4.000	3.180	0.103	1.000	0.188

(1) Compensated I.D. bearings have additional running clearance, ideally suited for high speed and non-parallel shaft applications.

NOTE: Max static load for open bearings operating in shear should be derated by 40%.

Open bearings operating in tension should be derated by 70%.

FluoroNyliner* Bushing Bearing Pillow Blocks



For easiest
installation, order
Pillow Blocks
with factory
installed
FluoroNyliner*
Bushing
bearings.

THREE PILLOW BLOCK CONFIGURATIONS

CLOSED



CLOSED BEARING PILLOW BLOCKS

- For end supported applications
- Choose twin pillow blocks for twice the load capacity
- Order with seals for heavily contaminated environments
- Available as single or twin pillow blocks

OPEN



OPEN BEARING PILLOW BLOCKS

- For continuously supported applications
- Choose compensated I.D. bearings for non-parallel shafting
- Order with seals for heavily contaminated environments
- Available as single or twin pillow blocks

FLANGED

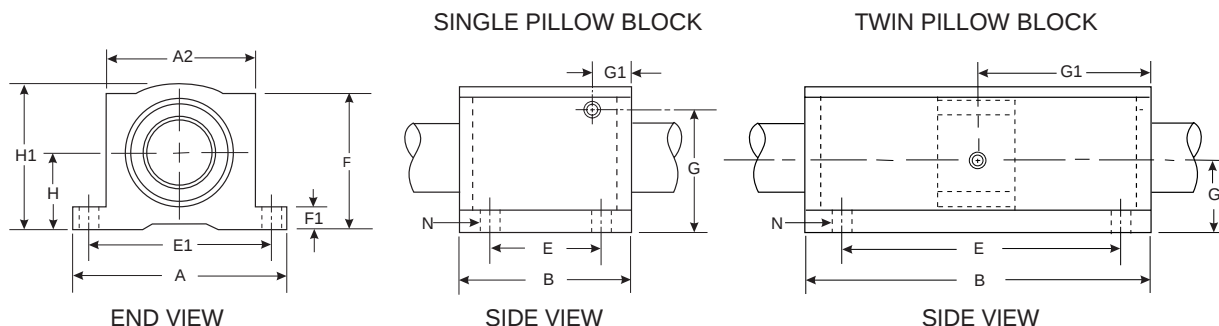


FLANGED PILLOW BLOCKS WITH CLOSED BEARINGS

- For low profile applications such as packaging equipment
- Choose precision I.D. bearings for precision fit-up
- Available with self-aligning or compensated I.D. bearings
- Available as single or twin pillow blocks

FluoroNyliner* Bushing Bearing Pillow Blocks

CLOSED PILLOW BLOCKS WITH SELF-ALIGNING BEARINGS



CLOSED SINGLE PILLOW BLOCKS WITH SELF-ALIGNING BEARINGS

Precision I.D	Compensated I.D.(1)	Single Pillow Block Dimensions (2)														
Part Number	Part Number	H	H1	A	A2	B	E	E1	F	F1	G	G1	N		Pillow Block Mass (lb)	Max Static Load (lbf)
		±0.003					±0.010	±0.010					Hole / Bolt			
FNYBU-PB-04-A-LS	FNYBU-PB-04-AL-LS	.437	.81	1.63	1.00	1.19	.750	1.313	.75	.19	.61	.22	.16	#6	.10	300
FNYBU-PB-06-A-LS	FNYBU-PB-06-AL-LS	.500	.94	1.75	1.13	1.31	.875	1.438	.88	.19	.72	.22	.16	#6	.13	500
FNYBU-PB-08-A-LS	FNYBU-PB-08-AL-LS	.687	1.25	2.00	1.38	1.69	1.000	1.688	1.13	.25	.69	.84	.16	#6	.20	970
FNYBU-PB-10-A-LS	FNYBU-PB-10-AL-LS	.875	1.63	2.50	1.75	1.94	1.125	2.125	1.44	.28	.70	.68	.19	#8	.50	1450
FNYBU-PB-12-A-LS	FNYBU-PB-12-AL-LS	.937	1.75	2.75	1.88	2.06	1.250	2.375	1.56	.31	.94	.72	.19	#8	.60	1900
FNYBU-PB-16-A-LS	FNYBU-PB-16-AL-LS	1.187	2.19	3.25	2.38	2.81	1.750	2.875	1.94	.38	1.20	.86	.22	#10	1.20	3500
FNYBU-PB-20-A-LS	FNYBU-PB-20-AL-LS	1.500	2.81	4.00	3.00	3.63	2.000	3.500	2.50	.44	1.50	1.20	.22	#10	2.50	5100
FNYBU-PB-24-A-LS	FNYBU-PB-24-AL-LS	1.750	3.25	4.75	3.50	4.00	2.500	4.125	2.88	.50	1.75	1.25	.28	1/4	3.80	7000
FNYBU-PB-32-A-LS	FNYBU-PB-32-AL-LS	2.125	4.06	6.00	4.50	5.00	3.250	5.250	3.63	.63	2.12	1.58	.41	3/8	7.00	12,500

CLOSED TWIN BEARING PILLOW BLOCKS WITH SELF-ALIGNING BEARINGS

Precision I.D	Compensated I.D (1)	Twin Pillow Block Dimensions (2)														
Part Number	Part Number	H	H1	A	A2	B	E	E1	F	F1	G	G1	N		Pillow Block Mass (lb)	Max Static Load (lbf)
		±0.003					±0.010	±0.010					Hole / Bolt			
FNYBU-TWN-04-A-LS	FNYBU-TWN-04-AL-LS	.437	.81	1.63	1.00	2.50	2.000	1.313	.75	.19	.44	1.25	.16	#6	.19	600
FNYBU-TWN-06-A-LS	FNYBU-TWN-06-AL-LS	.500	.94	1.75	1.13	2.75	2.250	1.438	.88	.19	.50	1.37	.16	#6	.25	1000
FNYBU-TWN-08-A-LS	FNYBU-TWN-08-AL-LS	.687	1.25	2.00	1.38	3.50	2.000	1.688	1.13	.25	.59	1.75	.16	#6	.40	1940
FNYBU-TWN-10-A-LS	FNYBU-TWN-10-AL-LS	.875	1.63	2.50	1.75	4.00	3.000	2.125	1.44	.28	.85	2.00	.19	#8	1.00	2900
FNYBU-TWN-12-A-LS	FNYBU-TWN-12-AL-LS	.937	1.75	2.75	1.88	4.50	3.500	2.375	1.56	.31	.94	2.25	.19	#8	1.20	3800
FNYBU-TWN-16-A-LS	FNYBU-TWN-16-AL-LS	1.187	2.19	3.25	2.38	6.00	4.500	2.875	1.94	.38	1.19	3.00	.22	#10	2.40	7000
FNYBU-TWN-20-A-LS	FNYBU-TWN-20-AL-LS	1.500	2.81	4.00	3.00	7.50	5.500	3.500	2.50	.44	1.50	3.75	.22	#10	5.00	10,200
FNYBU-TWN-24-A-LS	FNYBU-TWN-24-AL-LS	1.750	3.25	4.75	3.50	9.00	6.500	4.125	2.88	.50	1.75	4.50	.28	1/4	7.80	14,000

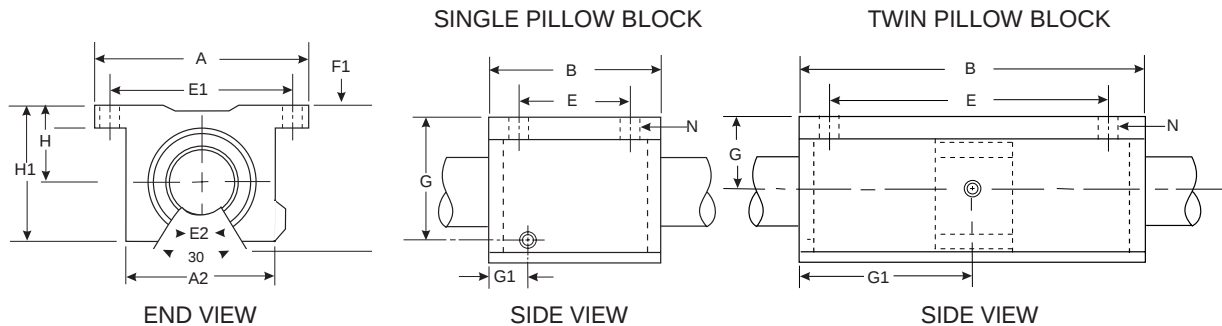
(1) Compensated I.D. bearings have additional running clearance, ideally suited for high speed and non-parallel shaft applications.

(2) All dimensions in inches unless otherwise noted.

Note : For Pillow Block Seals or non-self-aligning bearings see Part Number Matrix on Page 123.

FluoroNyliner* Bushing Bearing Pillow Blocks

OPEN PILLOW BLOCKS WITH SELF-ALIGNING BEARINGS



OPEN SINGLE PILLOW BLOCKS WITH SELF-ALIGNING BEARINGS

Precision I.D.	Compensated I.D. (1)	Single Pillow Block Dimensions (2)												
Part Number	Part Number	H	H1	A	A2	B	E	E1	F1	G	G1	N	Pillow Block Mass (lb)	Max Static Load ⁽³⁾ (lbf)
		±0.003					±0.010	±0.010				Hole / Bolt		
FNYBU-PBO-08-A-LS	FNYBU-PBO-08-AL-LS	.687	1.25	2.00	1.38	1.69	1.000	1.688	.25	.69	.84	.16 #6	.20	970
FNYBU-PBO-10-A-LS	FNYBU-PBO-10-AL-LS	.875	1.63	2.50	1.75	1.94	1.125	2.125	.28	.70	.68	.19 #8	.50	1450
FNYBU-PBO-12-A-LS	FNYBU-PBO-12-AL-LS	.937	1.75	2.75	1.88	2.06	1.250	2.375	.31	.94	.72	.19 #8	.60	1900
FNYBU-PBO-16-A-LS	FNYBU-PBO-16-AL-LS	1.187	2.19	3.25	2.38	2.81	1.750	2.875	.38	1.20	.86	.22 #10	1.20	3500
FNYBU-PBO-20-A-LS	FNYBU-PBO-20-AL-LS	1.500	2.81	4.00	3.00	3.63	2.000	3.500	.44	1.50	1.20	.22 #10	2.50	5100
FNYBU-PBO-24-A-LS	FNYBU-PBO-24-AL-LS	1.750	3.25	4.75	3.50	4.00	2.500	4.125	.50	1.75	1.25	.28 1/4	3.80	7000
FNYBU-PBO-32-A-LS	FNYBU-PBO-32-AL-LS	2.125	4.06	6.00	4.50	5.00	3.250	5.250	.63	2.12	1.58	.41 3/8	7.00	12500

OPEN TWIN PILLOW BLOCKS WITH SELF-ALIGNING BEARINGS

Precision I.D.	Compensated I.D. (1)	Twin Pillow Block Dimensions (2)													
Part Number	Part Number	H	H1	A	A2	B	E	E1	F1	G	G1	N		Pillow Block Mass (lb)	Max Static Load ⁽³⁾ (lbf)
		±0.003					±0.010	±0.010					Hole / Bolt		
FNYBU-TWNO-08-A-LS	FNYBU-TWNO-08-AL-LS	.687	1.25	2.00	1.38	3.50	2.000	1.688	.25	.59	1.75	.16	#6	.40	1940
FNYBU-TWNO-10-A-LS	FNYBU-TWNO-10-AL-LS	.875	1.63	2.50	1.75	4.00	3.000	2.125	.28	.85	2.00	.19	#8	1.00	2900
FNYBU-TWNO-12-A-LS	FNYBU-TWNO-12-AL-LS	.937	1.75	2.75	1.88	4.50	3.500	2.375	.31	.94	2.25	.19	#8	1.20	3800
FNYBU-TWNO-16-A-LS	FNYBU-TWNO-16-AL-LS	1.187	2.19	3.25	2.38	6.00	4.500	2.875	.38	1.19	3.00	.22	#10	2.40	7000
FNYBU-TWNO-20-A-LS	FNYBU-TWNO-20-AL-LS	1.500	2.81	4.00	3.00	7.50	5.500	3.500	.44	1.50	3.75	.22	#10	5.00	10,200
FNYBU-TWNO-24-A-LS	FNYBU-TWNO-24-AL-LS	1.750	3.25	4.75	3.50	9.00	6.500	4.125	.50	1.75	4.50	.28	1/4	7.80	14,000

(1) Compensated I.D. bearings have additional running clearance, ideally suited for high speed and non-parallel shaft applications.

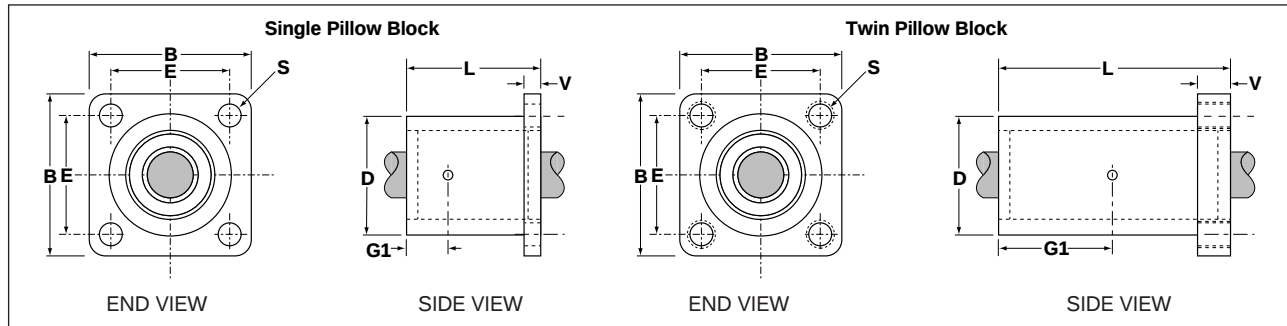
(2) All dimensions in inches unless otherwise noted.

(3) Open bearings operating in shear should be derated by 40%. Open bearings operating in tension should be derated by 70%.

Note : For Pillow Block Seals or non-self-aligning bearings see Part Number Matrix on Page123.

Flanged Pillow Blocks with Self-Aligning Bearings

FLANGED PILLOW BLOCKS WITH SELF-ALIGNING BEARINGS



FLANGED SINGLE PILLOW BLOCKS WITH SELF-ALIGNING BEARINGS

Precision I.D.	Compensated I.D. (1)	Single Pillow Block Dimensions (2)									
Part Number	Part Number	Nominal Bearing Diameter	B	E +0.010	L	D	V	G1 +0.010	S Shaft Hole Diameter	60 Case* LinearRace* Shaft Diameter	
										Min	Max
FNYBU-FB-08-A-LS	FNYBU-FB-08-AL-LS	.500	1.63	1.250	1.69	1.25	.25	.72	.19	.4990	.4995
FNYBU-FB-12-A-LS	FNYBU-FB-12-AL-LS	.750	2.38	1.750	2.06	1.75	.38	.89	.22	.7490	.7495
FNYBU-FB-16-A-LS	FNYBU-FB-16-AL-LS	1.00	2.75	2.125	2.81	2.25	.50	1.27	.28	.9990	.9995
FNYBU-FB-20-A-LS	FNYBU-FB-20-AL-LS	1.25	3.50	2.750	3.63	3.00	.63	1.67	.35	1.2490	1.2495
FNYBU-FB-24-A-LS	FNYBU-FB-24-AL-LS	1.50	4.00	3.125	4.00	3.62	.75	1.86	.41	1.4989	1.4994

FLANGED TWIN PILLOW BLOCKS WITH SELF-ALIGNING BEARINGS

Precision I.D.	Compensated I.D. (1)	Twin Pillow Block Dimensions (2)									
Part Number	Part Number	Nominal Bearing Diameter	B	E +0.010	L	D	V	G1 +0.010	S Thread	60 Case LinearRace Shaft Diameter	
										Min	Max
FNYBU-TFB-08-A-LS	FNYBU-TFB-08-AL-LS	.500	1.63	1.250	3.20	1.25	.90	1.48	1/4 -20	.4990	.4995
FNYBU-TFB-12-A-LS	FNYBU-TFB-12-AL-LS	.750	2.38	1.750	3.95	1.75	.90	1.98	1/4 -20	.7490	.7495
FNYBU-TFB-16-A-LS	FNYBU-TFB-16-AL-LS	1.00	2.75	2.125	5.33	2.25	.90	2.67	1/4 -18	.9990	.9995
FNYBU-TFB-20-A-LS	FNYBU-TFB-20-AL-LS	1.25	3.50	2.750	6.70	3.00	.90	3.35	5/16 -18	1.2490	1.2495
FNYBU-TFB-24-A-LS	FNYBU-TFB-24-AL-LS	1.50	4.00	3.125	7.50	3.62	.100	3.75	5/16 -16	1.4989	1.4994

(1) Compensated I.D. bearings have additional running clearance ideally suited for high speed and non-parallel shaft applications.

(2) All dimensions in inches unless otherwise noted.

Note : For Pillow Block Seals, or Non-Self-Aligning Bearings see Part Number Matrix at bottom of this page.

FNYB [U] [-PB] [-M] XX [-L] [-OPN] [-RP] [-LS]

FNYB - FluoroNyliner Bushing Bearing

U - USA Inch
E - European Metric
J - Japanese Metric

No Entry - Inch
M - Metric

Bearing ID

Large Quantity Roll Packing

Less Seals (For Pillow Blocks Only)

No Entry - Std. Plain Bearing
PB - Closed Pillow Block
PBO - Open Pillow Block
FB - Flanged Pillow Block
TFB - Twin Flanged Pillow Block
TWN - Twin Pillow Block
TWN0 - Open Twin Pillow Block

No Entry - Std.
L - Compensated I.D.
A - Aligning (Crowned O.D.)
AL - Compensated I.D. & Aligning

No Entry - Closed
OPN - Open (unmounted bearings only)

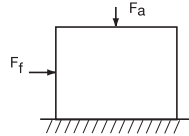
[] = Part Number Specific Feature

Attention: Thomson FluoroNyliner* Bushing bearings are precision components. For best results and to preserve the bearing's warranty you must use the specified Thomson 60 Case* LinearRace* shafting.

Frictional Characteristics:

- I) Static: Tests performed on dry FNYBU-16 bearings indicate that the force required to initiate motion is dependent upon the applied load according to the following equation:

$$F_f = 1.3 + 0.18 F_a$$



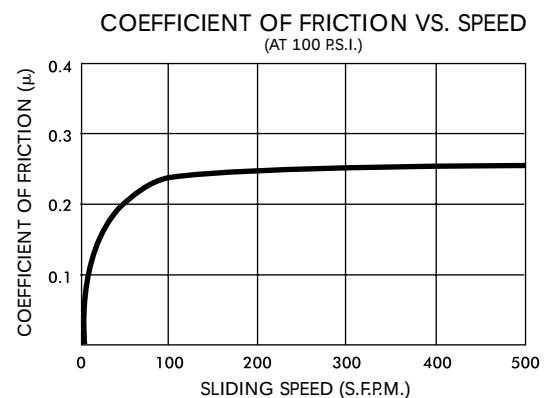
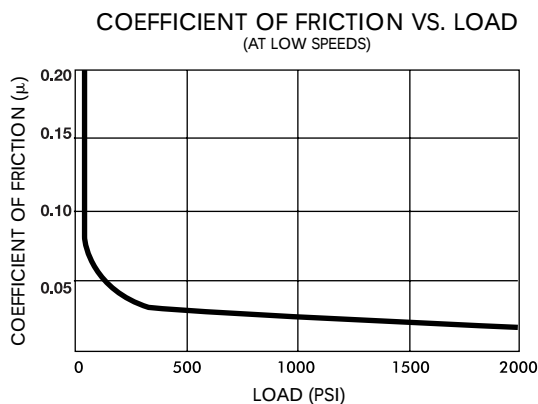
Where:

F_f = Friction force, static (lbf)

F_a = Applied force (lbf)

Characteristic	Limit
Liner Temperature Range	-400° F to 550° F (-240° C to 288° C)
Velocity, dry	140 ft/min. Continuous
Velocity, dry	400 ft/min. Intermittent
Velocity, lubricated	400 ft/min. Continuous
Pressure	1500 psi
PV	10,000 psi ft/min

- II) Dynamic: The coefficient of friction is dependent upon both the pressure and the velocity.
 Pressure: Coefficient of friction decreases rapidly with increase in pressure.
 Velocity: Coefficient of friction increases with an increase in velocity, and quickly stabilizes.
 For example, at 100 psi, the coefficient of friction is approximately 0.25 for velocities of 100ft/min and higher.



Wear Rates and Life Expectancy:

- I) Wear rates: The wear rates of a plain bearing are dependent upon a number of variables, including characteristics of the counter-face, velocity, lubrication, load and contamination. Tests conducted on FNYBU-16 bearings operating in the linear mode at approximately 70 ft/min, and at a pressure of approximately 33 psi, demonstrated an average radial wear change of 0.0011 inches, after 80 million inches of travel. This yields the following formula:

$$W_R = 14 \times (10^{-6}) \times T$$

Where:

W_R = Radial Wear (micro-inches)

T = Travel (inches)

- II) Life expectancy: The life expectancy may be calculated from the wear rate. This is normally associated with the allowable radial clearance for a given application. The absolute wear limit is the bearing material thickness, which is 0.028 inches.

FLUORONYLINER* BUSHING BEARING CHEMICAL RESISTANCE CHART

CHEMICAL	Rating **			CHEMICAL	Rating **		
	Liner	Standard Aluminum	Optional Hardcoat Anodized Aluminum		Liner	Standard Aluminum	Optional Hardcoat Anodized Aluminum
2 - butanone	A			Hydrochloric Acid, 20% or 35%	A	D	D
Acetic acid, 20%	A	C	C	Hydrocyanic Acid	A	D	D
Acetone	A	B	B	Hydrocyanic Acid, 10%		C	C
Acetylene	A			Hydrofluoric Acid	E	D	D
Alkalines	E			Hydrofluosilicic Acid	E		
Ammonia	E			Hydrogen Fluoride, Dry > 250°F	E		
Ammonia Anhydrous		B	B	Hydrogen Peroxide - dilute	A	B	B
Ammonium Chloride, 10%		D	D	Hydrogen Sulfide, Dry	A	C	B
Ammonium Hydroxide, 10%		D	D	Hydrogen Sulfide, Moist	A		
Amyl Chloride	A			Hydroxides	E		
Aniline	A			Kerosene		C	C
Barium Hydroxide		D	D	Lactic Acid, 10%	A	C	C
Beer	A	B	B	Magnesium Chloride, 50%	A	D	D
Benzaldehyde or Benzointrile	A			Mercury or Silver Salts	A	D	D
Benzenesulfonic Acid	A	A	A	Methyl Alcohol		C	C
Boric Acid solutions	A	B	B	Methylene Chloride	A	B	B
Bromine	A			Methylethyl Ketone	A	C	C
Butane		C	C	Mineral Oil	A	C	C
Calcium Chloride, 20%	A	C	C	Molten Alkali Metals	E		
Calcium Hydroxide, 10%	E	C	C	Molten Anhydrous Bases	E		
Calcium Hypochlorite	A	C	C	Naptha	A	C	C
Camphor Oil or Carbon Sulfide	A			Nitric Acid, 70%	E	D	D
Carbon Dioxide	A			Nitro Benzene	A		
Carbon Monoxide	A	B	B	Oleum	A		
Carbon Tetrachloride	A	B	B	Phosphoric Acid, 10%	A	D	D
Chloral Hydrate or Chloroacetic Acid	A			Potassium Chlorate	E		
Chlorine gas, dry	A	C	C	Potassium or Sodium Cyanide	A		
Chlorine gas, wet	A	D	D	Potassium Dichromate or Nitrate	A		
Chloroform or Chlorosulfonic Acid	A			Potassium Hydroxide	E		
Chromic Acid, 10%	A	C	B	Sea Water	A	C	B
Citric Acid, 5%	A	B	B	Sodium Chlorate	A		
Concentrated Oxidizing Acids	A			Sodium Chloride	A		
Creosote or Cresol	A			Sodium Hydroxide, 20%	C	D	D
Decalin or Dichlorobenzene	A			Sodium Hypochlorite, 20%	A	C	C
Diethyl Ether or Dimethylamine	A			Sodium Peroxide, 10%		C	C
Dimethyl Sulfoxide	A			Stannous Chloride	A		
Ethyl Acetate	A			Sulfur Dioxide, dry	A	C	C
Ethyl Alcohol	A	B	B	Sulfur Dioxide, 5% +H ₂ O	A	D	D
Ethylene Glycol	A	B	B	Sulfuric Acid, 50%	A	D	D
Ferric Chloride, 50%	A	D	D	Trichlorethylene	A		
Ferric Nitrate	A			Toluene (122°F/50°C)	A	B	B
Ferric Sulfate	A			Trifluoroacetic Acid	A		
Ferrous Sulfate	A			Turpentine	A	C	B
Fluoboric Acid	E			Water, demineralized	A	C	B
Fluorinating Agents, Strong	E			Water, distilled	A	D	C
Fluorine > 140°F & Dry Gas > 250°F	E			Water, Sewage		D	C
Fluosilicic Acid	E			Xylene	A	C	C
Gasoline	A	C	C	Zinc Chloride solutions	A	D	D
Hydrobromic Acid	A						

**Rating Key

A = No Attack B = Minimal Material Loss C = Moderate Material Loss D = Significant Material Loss E = Not Recommended
Chemical effects are at room temperature unless otherwise noted.

All information contained herein is believed to be correct but is presented without any guaranty, warranty or representation of any kind, express or implied. Changes in temperature, concentration and/or combinations of chemicals may cause different results. Prior to use, it is recommended that the material be tested to determine its compatibility with a specific application. Contact Thomson applications engineers for more detailed information at 1-800-554-THOMSON.

Accessories Appendix

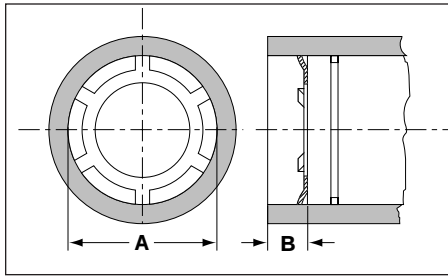


The Accessories Appendix contains the retaining rings, seals and combination bearings used with the products in this catalog.

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Retaining Rings

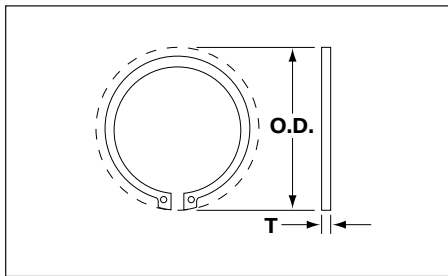


Internal Retaining Rings (Type PR)

Push-in retaining rings, as shown, are for use with Super Smart, Super and Precision Steel Ball Bushing* closed type bearings. Each retaining ring is installed inside the housing bore at each end of the Ball Bushing bearing.

Internal Retaining Rings (Type PR)			(Dimensions in inches)
Part Number	Use with Ball Bushing Bearing Part Number	Nominal Housing Bore A	Minimum End Space Required B
PR-250	SUPER-4 or 4812 ⁽¹⁾	.500	.060
PR-375	SUPER-6 or 61014 ⁽¹⁾	.625	.060
PR-500	SUPER-8 or 81420 ⁽¹⁾	.875	.080
PR-625	SSU-10 or SUPER-10 or 101824 ⁽¹⁾	1.125	.080
PR-750	SSU-12 or SUPER-12 or 122026 ⁽¹⁾	1.250	.080
PR-1000	SSU-16 or SUPER-16 or 162536 ⁽¹⁾	1.563	.080
PR-1250	SSU-20 or SUPER-20 or 203242 ⁽¹⁾	2.000	.080
PR-1500	SSU-24 or SUPER-24 or 243848 ⁽¹⁾	2.375	.100
PR-2000	SUPER-32 or 324864 ⁽¹⁾	3.000	.100

⁽¹⁾ Applies to A and XA Type Precision Steel Ball Bushing bearings

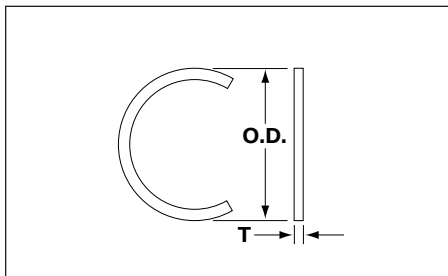


External Retaining Rings (Type W)

External retaining rings fit into the retaining ring grooves on the outside diameter of Super Smart, Super and Precision Steel Ball Bushing bearings to provide external mounting retention. Available in standard and stainless steel versions.

External Retaining Rings (Types C and W)			(Dimensions in inches)	
Standard Steel Part Number	Stainless Steel Part Number	Use with Ball Bushing Bearing Part Number	T	O.D.
—	W-125-SS	INST-258-SS ⁽²⁾	.025	.520
—	W-187-SS	INST-369-SS ⁽²⁾	.025	.560
W-250	W-250-SS	SUPER-4 or 4812 ⁽²⁾	.035	.720
C-250	C-250-SS		.035	.550
W-375	W-375-SS	SUPER-6 or 61014 ⁽²⁾	.035	.850
C-375	C-375-SS		.035	.673
W-500	W-500-SS	SUPER-8 or 81420 ⁽²⁾	.042	1.150
C-500	C-500-SS		.042	.923
W-625	W-625-SS	SSU-10 or SUPER-10 or 101824 ⁽²⁾	.050	1.510
C-625	C-625-SS		.050	1.180
W-750	W-750-SS	SSU-12 or SUPER-12 or 122026 ⁽²⁾	.050	1.620
C-750	C-750-SS		.050	1.301
W-1000	W-1000-SS	SSU-16 or SUPER-16 or 162536 ⁽²⁾	.062	2.040
C-1000	C-1000-SS		.062	1.620
W-1250	—	SSU-20 or SUPER-20 or 203242 ⁽²⁾	.062	2.500
C-1250	—		.062	2.040
W-1500	—	SSU-24 or SUPER-24 or 243848 ⁽²⁾	.078	2.910
C-1500	—		.078	2.429
W-2000	—	SUPER-32 or 324864 ⁽²⁾	.093	3.600
W-2500	—	406080 ⁽²⁾	.109	4.420
W-3000	—	487296 ⁽²⁾	.109	5.310
W-4000	—	6496128 ⁽²⁾	.125	7.100

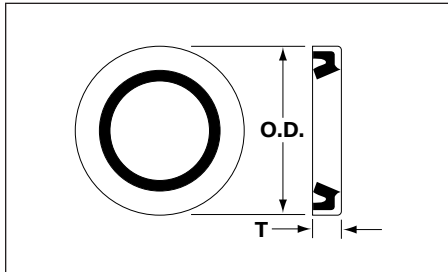
⁽²⁾ Applies to A, XA and OPN Type Precision Steel Ball Bushing bearings



External Retaining Rings (Type C)

External retaining rings fit into the retaining ring grooves on the outside diameter of Super Smart, Super and Precision Steel Ball Bushing bearings (Open and Closed Type) to provide external mounting retention. Available in standard and stainless steel versions.

External Seals

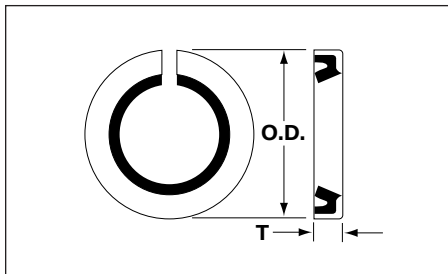


Seals for Fixed Diameter Housings

Double acting seals for Super Smart, Super and Precision Steel closed type Ball Bushing bearings. Standard and stainless versions. Sizes 1½ inch and above use spring fingers to reinforce sealing capability which could add to seal drag.

External Seals for Fixed Diameter Housings				(Dimensions in inches)	
Standard Steel Seal Part Number	Stainless Steel Seal Part Number	Use with Ball Bushing Bearing Part Number	Nominal Linear Race Diameter	T	O.D.
S-250	S-250-SS	SUPER-4 or 4812 ⁽¹⁾	.250	.125	.504
S-375	S-375-SS	SUPER-6 or 61014 ⁽¹⁾	.375	.125	.629
S-500	S-500-SS	SUPER-8 or 81420 ⁽¹⁾	.500	.125	.879
S-625	S-625-SS	SSU-10 or SUPER-10 or 101824 ⁽¹⁾	.625	.125	1.129
S-750	S-750-SS	SSU-12 or SUPER-12 or 122026 ⁽¹⁾	.750	.125	1.254
S-1000	S-1000-SS	SSU-16 or SUPER-16 or 162536 ⁽¹⁾	1.000	.187	1.567
S-1250	—	SSU-20 or SUPER-20 or 203242 ⁽¹⁾	1.250	.375	2.004
S-1500	—	SSU-24 or SUPER-24 or 243848 ⁽¹⁾	1.500	.375	2.379
S-2000	—	SUPER-32 or 324864 ⁽¹⁾	2.000	.375	3.004
S-2500	—	406080 ⁽¹⁾	2.500	.375	3.756
S-3000	—	487296 ⁽¹⁾	3.000	.500	4.506
S-4000	—	6496128 ⁽¹⁾	4.000	.500	6.006

⁽¹⁾ Applies to A and XA Precision Steel Ball Bushing bearings

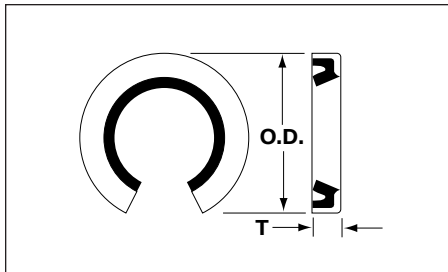


Seals for Adjustable Housings

Double acting seals for Super Smart, Super and Precision Steel Ball Bushing bearings. Seals have a radial slot through the circumferences to facilitate diameter adjustment. Standard and stainless steel versions.

Seals for Adjustable Housings				(Dimensions in inches)	
Standard Steel Seal Part Number	Stainless Steel Seal Part Number	Use with Adjustable Type Ball Bushing Bearing Part Number	Nominal Linear Race Diameter	T	O.D.
ADJ-S-500	ADJ-S-500-SS	SUPER-8 or 81420 ⁽²⁾	.500	.125	.879
ADJ-S-625	ADJ-S-625-SS	SSU-10 or SUPER-10 or 101824 ⁽²⁾	.625	.125	1.129
ADJ-S-750	ADJ-S-750-SS	SSU-12 or SUPER-12 or 122026 ⁽²⁾	.750	.125	1.254
ADJ-S-1000	ADJ-S-1000-SS	SSU-16 or SUPER-16 or 162536 ⁽²⁾	1.000	.187	1.567
ADJ-S-1250	—	SSU-20 or SUPER-20 or 203242 ⁽²⁾	1.250	.375	2.004
ADJ-S-1500	—	SSU-24 or SUPER-24 or 243848 ⁽²⁾	1.500	.375	2.379
ADJ-S-2000	—	SUPER-32 or 324864 ⁽²⁾	2.000	.375	3.004
ADJ-S-2500	—	406080 ⁽²⁾	2.500	.375	3.756
ADJ-S-3000	—	487296 ⁽²⁾	3.000	.500	4.506
ADJ-S-4000	—	6496128 ⁽²⁾	4.000	.500	6.006

⁽²⁾ Applies to ADJ Type Precision Steel Ball Bushing bearings



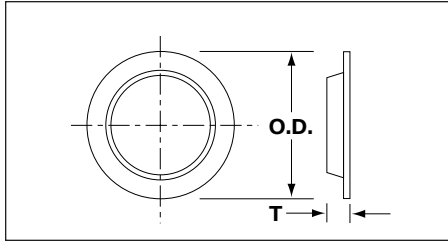
Seals for Open Type Housings

Double acting seals for Super Smart, Super and Precision Steel Ball Bushing Open Type bearings. Standard and stainless steel versions.

Seals for Open Type Housings				(Dimensions in inches)	
Standard Steel Seal Part Number	Stainless Steel Seal Part Number	Use with Open Type Ball Bushing Bearing Part Number	Nominal Linear Race Diameter	T	O.D.
OPN-S-500	OPN-S-500-SS	SUPER-8 or 81420 ⁽³⁾	.500	.125	.879
OPN-S-625	OPN-S-625-SS	SSU-10 or SUPER-10 or 101824	.625	.125	1.129
OPN-S-750	OPN-S-750-SS	SSU-12 or SUPER-12 or 122026	.750	.125	1.254
OPN-S-1000	OPN-S-1000-SS	SSU-16 or SUPER-16 or 162536	1.000	.187	1.567
OPN-S-1250	—	SSU-20 or SUPER-20 or 203242	1.250	.375	2.004
OPN-S-1500	—	SSU-24 or SUPER-24 or 243848	1.500	.375	2.379
OPN-S-2000	—	SUPER-32 or 324864 ⁽³⁾	2.000	.375	3.004
OPN-S-2500	—	406080 ⁽³⁾	2.500	.375	3.756
OPN-S-3000	—	487296 ⁽³⁾	3.000	.500	4.506
OPN-S-4000	—	6496128 ⁽³⁾	4.000	.500	6.006

⁽³⁾ Applies to OPN Type Precision Steel Ball Bushing bearings

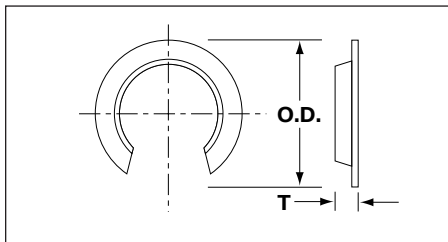
Integral Seals



Seals for Sealed Super Ball Bushing Bearings (Closed Type)			(Dimensions in inches)	
Part Number	Use with Super Ball Bushing Bearing Number	Nominal LinearRace Diameter	T	O.D.
S-500-DD	SUPER-8-DD	.500	.120	.770
S-625-DD	SUPER-10-DD	.625	.120	1.010
S-750-DD	SUPER-12-DD	.750	.120	1.110
S-1000-DD	SUPER-16-DD	1.000	.180	1.390

Seals for Sealed Super Ball Bushing Bearings (Closed Type)

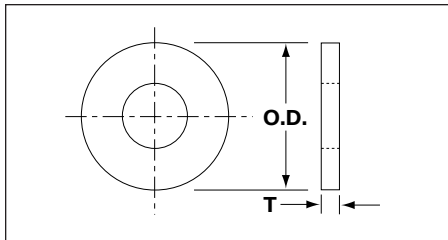
Double acting replacement seals for the Sealed Super Ball Bushing* bearing.



Seals for Sealed Super Ball Bushing Bearings (Open Type)			(Dimensions in inches)	
Part Number	Use with Super Ball Bushing Bearing Number	Nominal LinearRace Diameter	T	O.D.
S-500-OPN-DD	SUPER-8-DD-OPN	.500	.120	.770
S-625-OPN-DD	SUPER-10-DD-OPN	.625	.120	1.010
S-750-OPN-DD	SUPER-12-DD-OPN	.750	.120	1.110
S-1000-OPN-DD	SUPER-16-DD-OPN	1.000	.180	1.390

Seals for Sealed Super Ball Bushing Bearings (Open Type)

Double acting replacement seals for the Sealed Super Ball Bushing bearing.

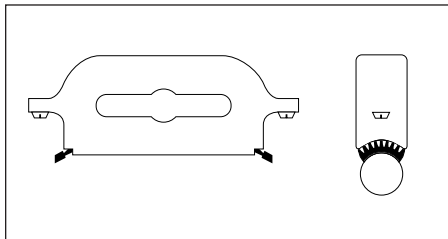


Felt Seals for Closed Type Ball Bushing bearings

Felt seals for Super Smart, Super and Precision Steel closed type Ball Bushing bearings. Felt seals reduce drag for applications where reduced friction is critical. Felt seals provide minimal protection from the ingress of contamination. Use PR type external retaining rings for retention.

Felt Seals for Closed Type Diameter Housings			(Dimensions in inches)	
Standard Felt Seal Part Number	Use with Ball Bushing Bearing Part Number	Nominal LinearRace Diameter	T	O.D.
FS-250	SUPER-4 or 4812 ⁽¹⁾	.250	.125	.500
FS-375	SUPER-6 or 61014 ⁽¹⁾	.375	.125	.625
FS-500	SUPER-8 or 81420 ⁽¹⁾	.500	.125	.875
FS-625	SSU-10 or SUPER-10 or 101824 ⁽¹⁾	.625	.125	1.125
FS-750	SSU-12 or SUPER-12 or 122026 ⁽¹⁾	.750	.125	1.250
FS-1000	SSU-16 or SUPER-16 or 162536 ⁽¹⁾	1.000	.125	1.563
FS-1250	SSU-20 or SUPER-20 or 203242 ⁽¹⁾	1.250	.188	2.000
FS-1500	SSU-24 or SUPER-24 or 243848 ⁽¹⁾	1.500	.188	2.375
FS-2000	SUPER-32 or 324864 ⁽¹⁾	2.000	.188	3.000

⁽¹⁾ Applies to A, XA and ADJ Type Precision Steel Ball Bushing bearings



Seals for RoundWay Linear Roller Bearings			(Dimensions in inches)	
Seal Number	Nominal LinearRace Diameter	Overall Length L	Overall Width W	Overall Height from Centerline of LinearRace H
RS-16	1.000	5.00	1.00	2.25
RS-24	1.500	6.50	1.38	3.25
RS-32	2.000	8.50	1.88	4.25
RS-48	3.000	13.00	2.63	6.50
RS-64	4.000	17.00	3.38	8.50

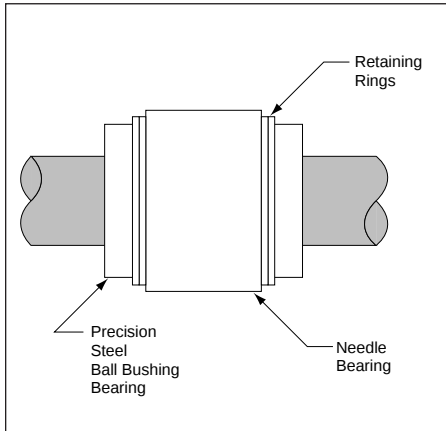
Seals for RoundWay Linear Roller Bearings

Standard seals for both single and dual types.

Combination Bearings and Resilient Mounts

Combination Bearings for Linear and Rotary Motion

For Precision Steel Ball Bushing* bearings Type A, XA and INST. The Combination bearing can handle both rotary and linear motion without causing wear and deformation to the ball retainers. The Combination bearing consists of a standard needle bearing that rotates on the hardened and precision ground outside diameter of the Ball Bushing bearing allowing for both rotary and linear motion. Each set consists of 2 retaining rings, 2 spacer rings and 1 anti-friction radial bearing. The Ball Bushing bearing must be purchased separately. Caution should be given when combining high rotational speeds or accelerations with heavy Ball Bushing bearing loads. Maximum rotational speed for needle bearings is 50 rpm. For applications that require higher speeds contact application engineering.

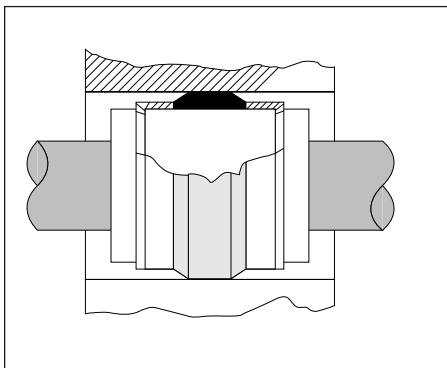


Combination Bearings for Linear and Rotary Motions				(Dimensions in inches)
Combination Bearing Part Number	Use with Ball Bushing Bearing Number	Nominal LinearRace Diameter	Recommended Housing Bore for Press Fit of Radial Bearing Tol. +.001 –.000	Length of Radial Bearing
CMB-125	INST-258-SS ⁽¹⁾	.125	.500	.31
CMB-187	INST-369-SS	.188	.562	.31
CMB-250	INST-481-SS	.250	.687	.38
CMB-250	A or XA-4812	.250	.687	.38
CMB-375	A or XA-61014	.375	.812	.50
CMB-500	A or XA-81420	.500	1.125	.75
CMB-625	A or XA-101824	.625	1.375	.75
CMB-750	A or XA-122026	.750	1.500	1.00
CMB-1000	A or XA-162536	1.000	2.123	1.25
CMB-1250	A or XA-203242	1.250	2.375	1.75
CMB-1500	A or XA-243848	1.500	3.748	1.75
CMB-2000	A or XA-324864	2.000	3.748	1.75
CMB-2500	A or XA-406080	2.500	4.748	2.00
CMB-3000	A or XA-487296	3.000	5.998	2.25
CMB-4000	A or XA-6496128	4.000	7.498	3.00

⁽¹⁾ No spacer rings required for INST-258-SS only.

Resilient Ball Bushing Bearing Mounts for Ease of Installation

Used with Precision Steel Ball Bushing bearings Type A and XA. Resilient Ball Bushing bearing mounts are sometimes used when absolute rigidity is not essential and where a slightly larger housing bore can be accommodated. The self-aligning feature of these mounts guarantee uniform load distribution over the entire length of the load carrying balls and compensates for slight errors in housing bores and parallel 60 Case* LinearRace* alignment. The mount consists of a band of resilient material that can be easily mounted to the outside diameter of the Ball Bushing bearing. After it is installed in the housing bore it provides permanent resilient, self-aligning support for the bearing. Resilient mounts consist of one rubber ring, 2 spacers and 2 retaining rings. Ball Bushing bearings must be purchased separately.



Resilient Ball Bushing Bearing Mounts				(Dimensions in inches)
Resilient Mount Assembly Part Number	Use with Ball Bushing Bearing Number	Nominal LinearRace Diameter	Recommended Housing Bore ±.005	
RSL-250	A or XA-4812	.250	.625	
RSL-375	A or XA-61014	.375	.750	
RSL-500	A or XA-81420	.500	1.000	
RSL-625	A or XA-101824	.625	1.313	
RSL-750	A or XA-122026	.750	1.438	
RSL-1000	A or XA-162536	1.000	1.813	
RSL-1250	A or XA-203242	1.250	2.313	
RSL-1500	A or XA-243848	1.500	2.750	

Engineering Support Appendix



The Engineering Support Appendix contains valuable information on the application and use of Thomson Ball Bushing* bearings, pillow blocks, 60 Case* LinearRace* shafts, 60 Case LinearRace supports and accessories.

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Performance Criteria

The following performance criteria relates to the use, installation and specification of Thomson Ball Bushing* bearings. Each performance criteria plays an important role in maximizing system effectiveness and life.

Dynamic Load Capacity

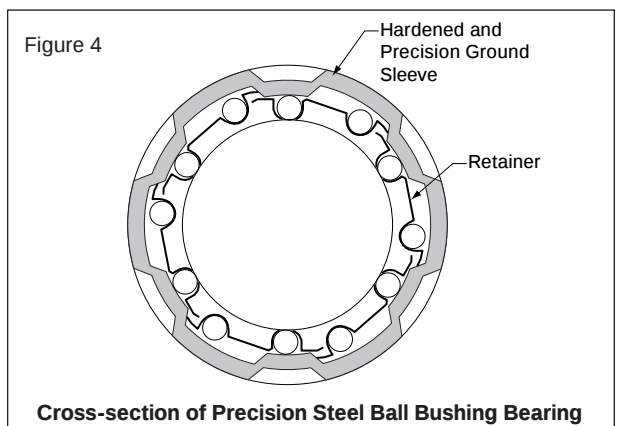
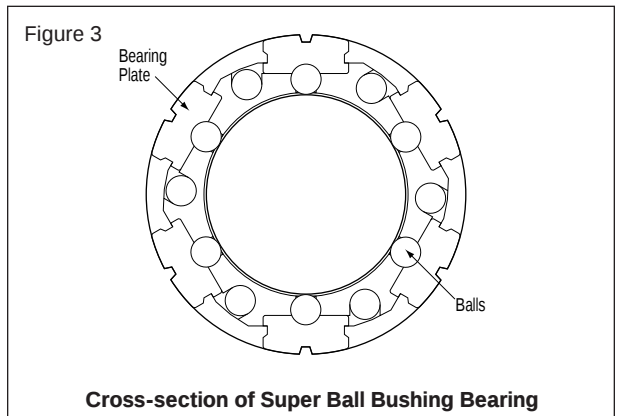
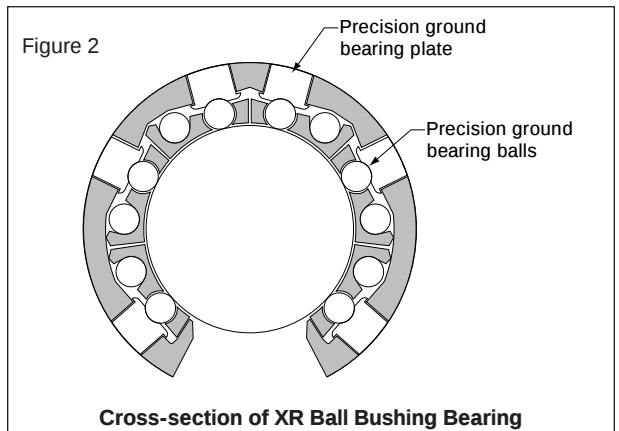
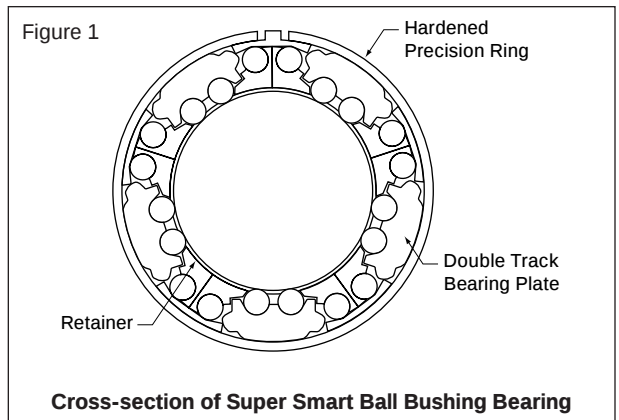
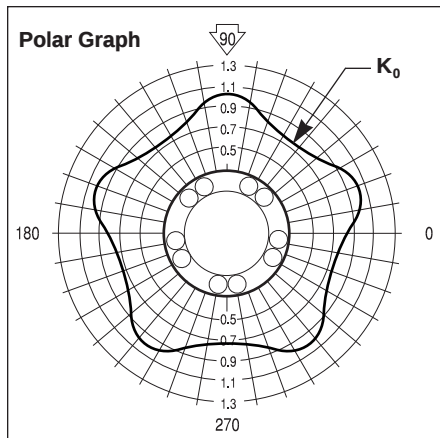
The Dynamic load capacity of a Ball Bushing bearing is determined by the reaction between the rolling elements and the inner and outer race. The rolling elements in a Ball Bushing bearing are a series of hardened and precision ground bearing balls manufactured by Thomson Precision Ball Company, Bristol, Connecticut. The inner race is a hardened and precision ground 60 Case LinearRace manufactured by Thomson Corporation, Lancaster, Pennsylvania.

The outer race can be a hardened and precision ground, ball conforming, steel bearing plate or a hardened and precision ground steel bearing sleeve. The dynamic load capacity is also affected by the orientation of the ball tracks, the size of the balls, the shape of the ball conforming groove, the number of balls that are in load contact and more.

Since the introduction of the Ball Bushing bearing in 1945, Thomson Industries, Inc. has designed and developed Ball Bushing bearing products that have continuously achieved dramatic increases in dynamic load capacity and life. Thomson's most recent innovation is the Super Smart Ball Bushing bearing which has six times the dynamic load capacity or 216 times greater life than the traditional Ball Bushing bearing.

This increase in load capacity was achieved by maximizing the load reaction between the inner and outer races. This break-through in load capacity rivals that of linear guides while still retaining the added benefits of the RoundRail* Advantage.

The dynamic load capacity of all Thomson Ball Bushing bearings is based on a L_{10} life of two million inches of travel. The dynamic load capacity can be affected by the orientation of the bearing with respect to the load or the direction of the applied load. A polar graph is included with each product specification to assist you in maximizing the dynamic load capacity as well as the performance of the Ball Bushing bearing. To determine the actual dynamic load capacity enter the polar graph with the applied load direction until it intersects the polar curve. Next, multiply the proper correction factor by the dynamic load capacity listed in each product specification table.



Coefficient of Friction

The coefficient of friction of Thomson Ball Bushing* bearings ranges from 0.001 to 0.004. There are two components of the coefficient of friction, the rolling or operating friction and the static or breakaway friction.

Coefficient of Rolling Friction

The rolling coefficient of friction is measured by the force required to operate the Ball Bushing at a constant rate of travel. The formula for determining frictional resistance during operation is as follows:

$$P_f = P \times f_r$$

Where,

P_f = Frictional resistance (lb_f)

P = Resultant of externally applied loads (lb_f)

f_r = Coefficient of rolling friction

The following table describes the coefficient of rolling friction of Ball Bushing bearings operating on Thomson 60 Case* LinearRace*. These values are grouped according to the number of ball circuits in each bearing. Friction coefficients are constant among bearings having three and four ball circuits, but slightly less for bearings with five or six ball circuits. A dry Ball Bushing bearing has the lowest coefficient of friction due to the complete absence of lubricant surface tension effects. Values for grease lubrication ranges from 100% greater in the smaller sizes to 20% to 50% greater in the larger sizes. Oil lubrication (medium/heavy, viscosity 64 cs @ 100°F) achieves frictional values slightly higher than those for grease lubrication.

Ball Bushing bearing coefficients of rolling friction (f _r)							
Bearing I.D.	Number of Ball Circuits	Condition of Lubrication	Load in % of Rolling Load Rating (for 2,000,000 inches of travel)				
			125%	100%	75%	50%	25%
1/4, 3/8, 1/2, 5/8	3 & 4	No Lube	.0011	.0011	.0012	.0016	.0025
		Grease Lube	.0019	.0021	.0024	.0029	.0044
		Oil Lube	.0022	.0023	.0027	.0032	.0045
3/4, 1	5	No Lube	.0011	.0011	.0012	.0015	.0022
		Grease Lube	.0018	.0019	.0021	.0024	.0033
		Oil Lube	.0020	.0021	.0023	.0027	.0036
1 1/4 thru 4	6	No Lube	.0011	.0011	.0012	.0014	.0019
		Grease Lube	.0016	.0016	.0017	.0018	.0022
		Oil Lube	.0018	.0018	.0019	.0021	.0027
5/8 thru 1 1/2	10	No Lube	.0011	.0011	.0012	.0013	.0018
		Grease Lube	.0014	.0014	.0015	.0016	.0019
		Oil Lube	.0016	.0016	.0017	.0019	.0025

Coefficient of Static Friction

The coefficient of static or breakaway friction is measured by the force required to initiate Ball Bushing bearing movement. The formula used to determine static frictional resistance is:

$$P_f = P \times f_0$$

where f_0 = Coefficient of static friction

Ball Bushing bearing coefficients of static friction (f_0)				
Load in % of Rolling Load Rating				
125%	100%	75%	50%	25%
.0028	.0030	.0033	.0036	.0040

The values for the coefficient of static friction or breakaway friction are not measurably affected by the number of ball circuits in the bearing or by the lubrication condition.

Seal Drag

Another variable that affects the frictional resistance in a Ball Bushing bearing system is seal drag. When seals are used to retain lubricant or to prevent entry of foreign particles, frictional resistance must be taken into account for determining total frictional drag. In applications where contamination is minimal, the seals can be removed to reduce frictional drag. In highly contaminated applications, seals, wipers and or scrapers are used to minimize the ingress of contamination into the bearing. This protective measure adds to the frictional drag of the bearing system. There is a fine line between minimizing frictional drag and maximizing contaminant protection which is controlled by the addition or removal of seals, wipers or scrapers. In applications that require low frictional drag in highly contaminated environments, contact Thomson application engineering.

Lubrication

All Thomson Ball Bushing bearings require a small amount of grease or oil to operate. For most applications, lubricant is recommended to prevent wearing and rusting of the bearing surfaces. When linear speeds are high, a light oil should be used and the bearing should be prevented from running dry for a prolonged period of time. A medium to heavy oil or light grease has greater adhesion properties that afford longer bearing protection and minimize sealing problems. The numerous built-in pockets in the Ball Bushing bearing retainer allow grease to be stored for an extended period of time. Though not generally recommended, in some lightly loaded, low speed and highly contaminated applications, Ball Bushing bearings have been used without lubrication. For these types of applications contact Thomson application engineering.

All Thomson Ball Bushing bearings are shipped with a rust preventative oil. **It is recommended that you lubricate the Ball Bushing bearing prior to installation** and periodically during operation to assure that the Ball Bushing bearing does not run dry. For periodic relubrication, most Thomson Ball Bushing Pillow Blocks are equipped with an access for lubrication.

Thomson Industries can provide a specially formulated lubricant, specifically developed to meet a broad range of linear bearing applications. Thomson LinearLube* lubricant is a synthetic lubricant that utilizes suspended Teflon® in a specially formulated compound. LinearLube lubricant provides excellent performance characteristics in a wide range of applications. It is FDA listed, non-polluting and non-corrosive. LinearLube lubricant will not stain and adheres tightly to parts forming a virtually water resistant barrier.

- Maintains properties in operating temperatures from -65°F to 450°F
- USDA Rated HL (Non-Toxic)
- Will not oxidize in use
- 100% water resistant

Performance Criteria Continued

The RoundRail Advantage

The RoundRail® Advantage is the inherent ability of a Ball Bushing bearing to accommodate torsional misalignment (caused by inaccuracies in carriage or base machining or by machine deflection) with little increase in stress to bearing components (Figure 4). This important feature to all Thomson Ball Bushing* bearing systems reduces installation time and cost, while maximizing performance.

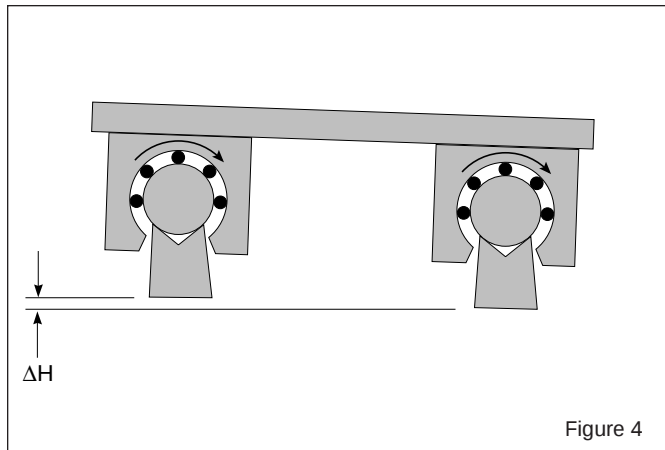


Figure 4

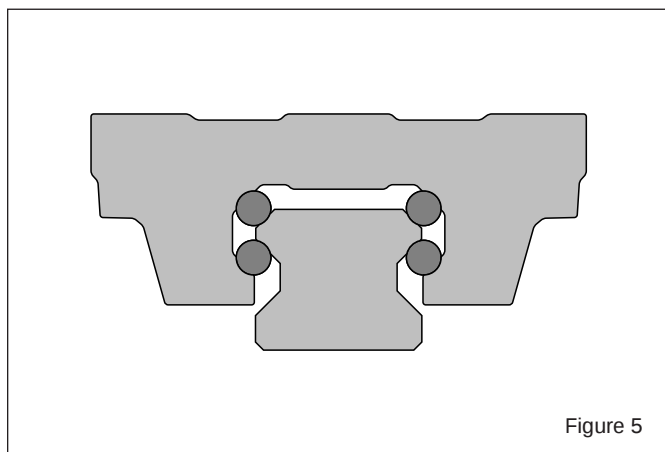


Figure 5

Ball Bushing Bearing vs. Linear Guide

The major difference between a Ball Bushing bearing and linear guide system is primarily in the design of the inner race. The linear guide inner race has two, four or six ground grooves that guides the carriage and the precision balls. Due to the ball conforming nature of the grooves, the carriage is prevented from accommodating torsional misalignment (Figure 5). If torsional misalignment is introduced to a linear guide system, the component stress increases, reducing life and performance. In a Ball Bushing bearing system the inner race is a hardened and ground 60 Case* LinearRace®. Due to the lack of ground grooves, the Ball Bushing bearing system can accommodate torsional misalignment and operate without added stress to bearing components.

60 Case LinearRace/Ball Bushing Bearing Fit-up

There are three basic fit-up conditions of a Ball Bushing bearing and 60 Case LinearRace, clearance, line-to-line and preload. In most product sections there are specification tables that detail the Ball Bushing bearing working bore diameter and 60 Case

LinearRace diameter tolerance as well as the fit-up between them. The clearance, line-to-line and preload conditions are shown by the abbreviation C for clearance, P for preload and .0000 for a line-to-line condition.

Clearance

The clearance between a Super Smart and Super Ball Bushing bearing and a 60 Case LinearRace is a function of the Ball Bushing bearing working bore diameter and the diameter tolerance of the 60 Case LinearRace. The working bore diameter of a Super Smart or Super Ball Bushing bearing is a function of the housing bore diameter tolerance. In applications where high accuracy and repeatability is not required, clearance is acceptable. Clearance can be achieved by following the recommended housing bore guidelines found in the product specification sections. To check for a clearance condition, simply rotate the 60 Case LinearRace inside the Super Smart or Super Ball Bushing bearing while installed in a housing bore. If you can freely rotate the 60 Case LinearRace then a clearance condition is present.

The clearance between the fixed diameter Precision Steel Ball Bushing bearing and the 60 Case LinearRace is a function of the Ball Bushing working bore and the 60 Case LinearRace diameter. When this Ball Bushing bearing is used with the recommended 60 Case LinearRace a clearance condition will always exist. For more details see the product specification sections.

Preload

In applications where accuracy and repeatability are critical, the Super Smart, Super and Precision Steel Ball Bushing bearings can be adjusted to a preload fit-up. The Super Smart and Super Ball Bushing bearings are inherently adjustable and when installed in an adjustable housing bore a preload condition can be achieved. In a nonadjustable housing a preload condition can be obtained by making the size of the housing bore smaller or by increasing the diameter of the 60 Case LinearRace. To test for a preload condition in an adjustable or nonadjustable housing, simply rotate the 60 Case LinearRace inside the Ball Bushing bearing while it is installed in the housing bore. If a slight drag is felt then a preload condition is present. When an adjustable housing is used the preload can be altered slightly. The Super Smart and Super Ball Bushing bearing are more tolerant to preload than the Precision Steel Ball Bushing bearing. Preload on a Super Smart and Super Ball Bushing bearing should be a maximum of .001 inch per inch of 60 Case LinearRace diameter. Preload on a Precision Steel Ball Bushing bearing should be a maximum of .0001 inch per inch of 60 Case LinearRace diameter. When all Ball Bushing bearings are preloaded, extra care must be taken in mounting the 60 Case LinearRace parallel.

Line-to-Line

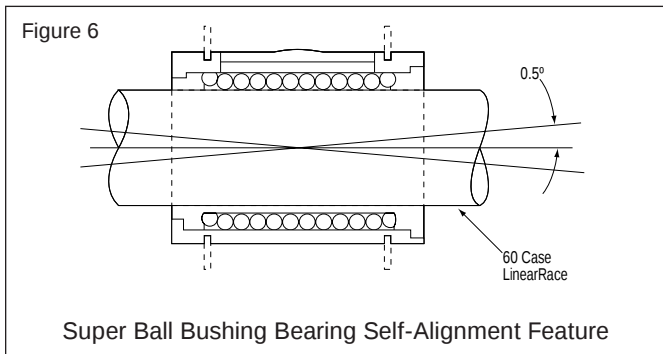
A line-to-line fit-up condition between a Ball Bushing bearing and 60 Case LinearRace is when no clearance or preload is present. A line-to-line fit-up can be achieved in an adjustable or fixed diameter housing. For more details see the product specification sections.

Examples of Ball Bushing bearing/60 Case LinearRace Fit-ups

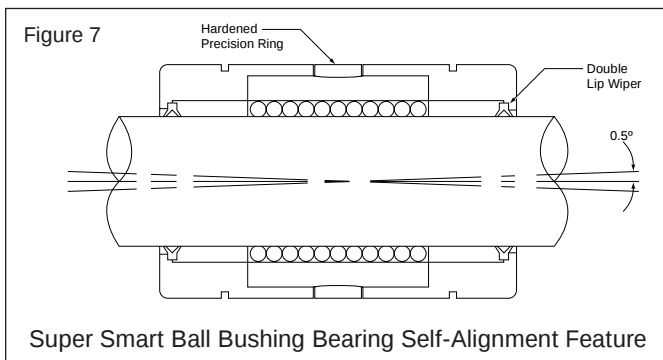
Ball Bushing Bearing Part Number	Working Bore Diameter	Recommended Housing Bore Diameter (Fixed)	Actual Working Bore Diameter	60 Case LinearRace Diameter	Ball Bushing Bearing/ 60 Case LinearRace Fit Up
SUPER 20	1.2500/1.2494	2.0008/2.0000	1.2508/1.2494	1.2495/1.2490	.0018C/.0001P
A-203242	1.2500/1.2494	-	1.2500/1.2494	1.2490/1.2485	.0015C/.0004C
XA-203242	1.2500/1.2496	-	1.2500/1.2496	1.2495/1.2490	.0010C/.0001C

Self-Alignment

The Super Smart and Super Ball Bushing bearings are equipped with a built-in self-alignment feature that allows the bearing to absorb misalignment up to 0.5° per inch (Figure 6 and 7). This self-aligning feature allows the Super Smart and Super Ball Bushing bearing to absorb misalignment caused by inaccuracies in housing bore alignment or 60 Case LinearRace deflection.



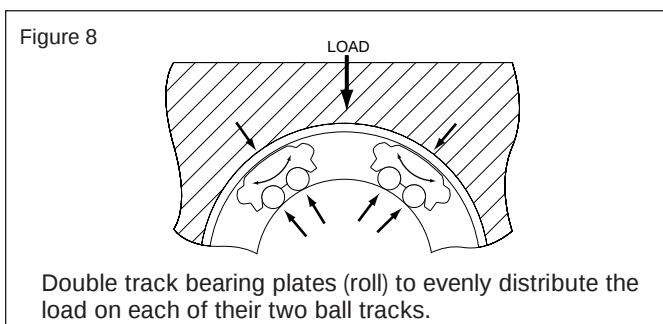
This rocking capability also provides smooth entry and exit of the precision balls into and out of the load zone assuring a constant low coefficient of friction. By compensating for misalignment, each bearing ball in the load carrying area is uniformly loaded providing maximum load capacity.



Besides this rocking capability, only the Super Smart Ball Bushing Bearing provides two additional self-alignment features. They are Roll and Yaw.

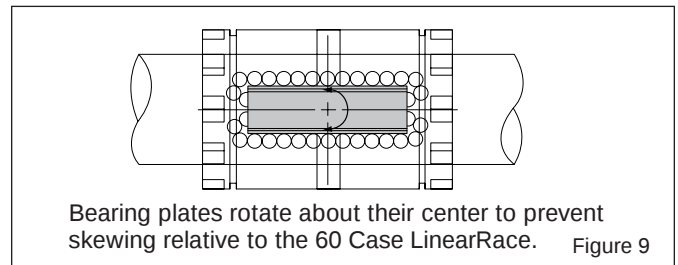
Roll

The Super Smart Ball Bushing bearing plate is designed with the radius of its outer surface smaller than the inside radius of the precision outer ring (Figure 8). This feature allows the bearing plate to compensate for torsional misalignment and evenly distribute the load on each of its two ball tracks. The roll component assures maximum load capacity and travel life.

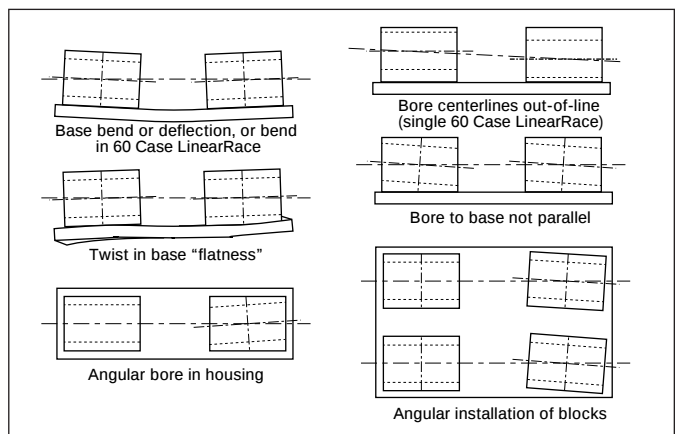


Yaw

The shape formed by the Rock and Roll features allows the Super Smart Ball Bushing bearing plate to rotate about its center (Figure 9). This allows the Super Smart Ball Bushing bearing to absorb skew caused by misalignment. The result is a constant low coefficient of friction and maximum bearing performance.



The diagrams below describe the conditions to which Super Smart and Super Ball Bushings automatically self-align. It is important to note that even though the Super Smart and Super Ball Bushing bearings self-align, they still cannot absorb an out-of-parallel 60 Case LinearRace condition. Tolerance to 60 Case LinearRace out-of-parallelism is a function of clearance between the bearing and its 60 Case LinearRace.



Ball Bushing Bearing Life Expectancy and Load Capacity

There are many factors that affect Ball Bushing* bearing travel life such as 60 Case* LinearRace* hardness, the resultant load, the direction of the resultant load and Ball Bushing bearing orientation. The dynamic load capacities and travel life graphs given in the specification tables found in each product section are based on a load applied at 90° relative to the horizontal plane with the Ball Bushing bearing oriented as shown in each corresponding polar graph. The dynamic load capacity is also based on using only Thomson specified 60 Case LinearRace that is hardened to HRC 60-65. For considerations other than those described above, the following formula is used:

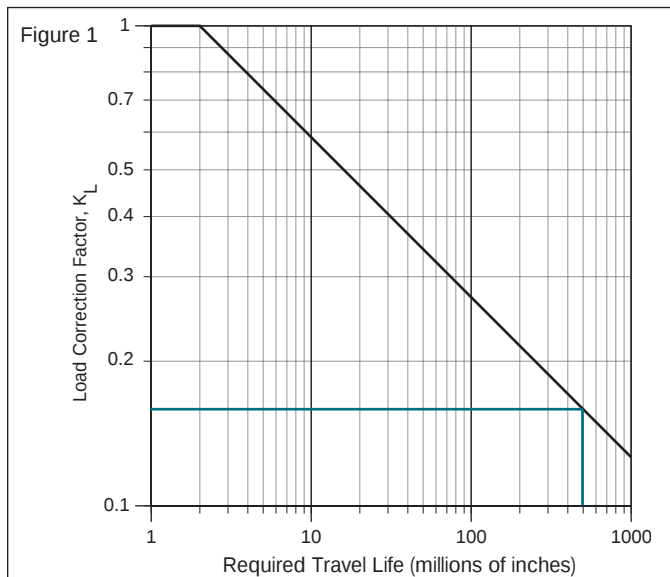
$$W_R = \frac{P}{K_O \cdot K_S \cdot K_L}$$

Where:

- W_R = required dynamic load capacity (lbf)
- P = resultant of externally applied loads (lbf)
- K_O = factor for direction of resultant load
- K_S = shaft hardness factor
(Equals 1.0 for 60 Case LinearRace)
- K_L = load correction factor

Travel Life

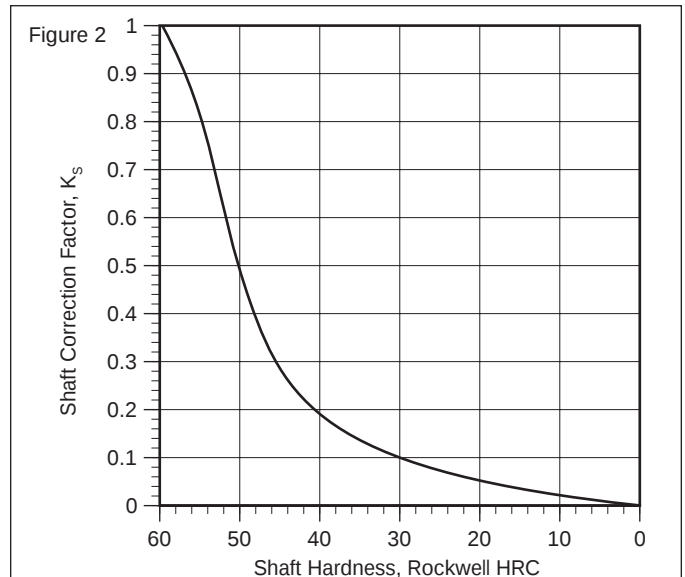
The load correction factor, K_L , can be found from Figure 1. To determine K_L , simply enter the chart with your required travel life and intersect the curve.



60 Case LinearRace Hardness

For shafts that do not meet 60 Case LinearRace hardness specifications, shaft hardness factor K_S must be applied. To determine K_S , simply enter Figure 2 with your shaft Rockwell hardness and intersect the curve.

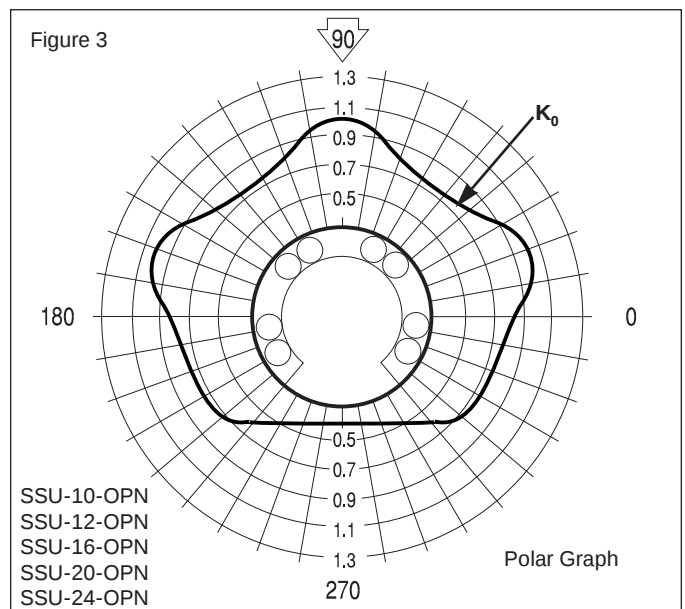
Note: Thomson Linear Ball Bushing bearings are precision components. To preserve bearing warranty you must use the specified Thomson 60 Case LinearRace.



Load Direction

In applications where the direction of the applied load is known, refer to the polar graphs on the product specification pages for the load correction factor, K_O . A polar graph is referenced in Figure 3 for example.

Once you have determined your required dynamic load capacity refer to the product specification table for the proper Ball Bushing bearing size.



Ball Bushing Bearing Size and Selection

The primary factors that influence the choice of bearing size are maximum load on a single Ball Bushing* bearing and required travel life. To determine the maximum load on a single Ball Bushing bearing refer to load considerations on page 138. To determine the required travel life refer to the following formula:

$$L_t = 2 \cdot s \cdot f \cdot L_h \cdot 60$$

Where:

L_t = required travel life in inches

s = stroke in inches

f = frequency in cycles per minute

L_h = service life in hours

Once you have determined the maximum load on a single Ball Bushing bearing and the required travel life, enter the chart (Figure 4) and mark where the two lines intersect. All Ball Bushing bearings with curves that pass through, or above and to the right of that point may be suitable for the application.

Sample Calculation 1:

Determining the correct Ball Bushing bearing for your application.

In this example, a Super Smart Ball Bushing bearing end supported system is subjected to a load of 500 lb_f. The load is distributed equally over four Super Smart Ball Bushing bearings. The carriage reciprocates over a 12 inch stroke at a frequency of 100 complete cycles per minute. The minimum service life required is 3500 hours.

The first step is to determine the average load on each Super Smart Ball Bushing bearing.

$$P = 500/4 = 125 \text{ lb}_f$$

Next, determine the equivalent travel life in inches.

L_t = required travel life in inches

$$L_t = 2 \cdot s \cdot f \cdot L_h \cdot 60$$

$$L_t = 2 \cdot 12 \cdot 100 \cdot 3500 \cdot 60$$

$$L_t = 5.04 \times 10^8 \text{ inches}$$

Enter Figure 4 with a maximum load capacity on a single bearing of 125 lb_f and a required travel life of 5.04×10^8 inches. All Super Smart Ball Bushing bearing curves that pass through or above and to the right of that point, may be suitable for the application. For this application we will choose the SSU-12.

Sample calculation 2:

Determining the correct Super Smart Ball Bushing bearing for your application.

In this example, an open type Super Smart Ball Bushing bearing continuously supported system is subjected to a load of 500 lb_f and is hung upside down from the ceiling. The load is distributed equally over four Super Smart Ball Bushing bearings and the factor for the direction of the resultant load is .45 (Figure 3, page 136).

The carriage reciprocates over a 12 inch stroke at a frequency of 100 complete cycles per minute. The minimum service life required is 3500 hours.

The first step is to determine the average load on each Super Smart Ball Bushing bearing.

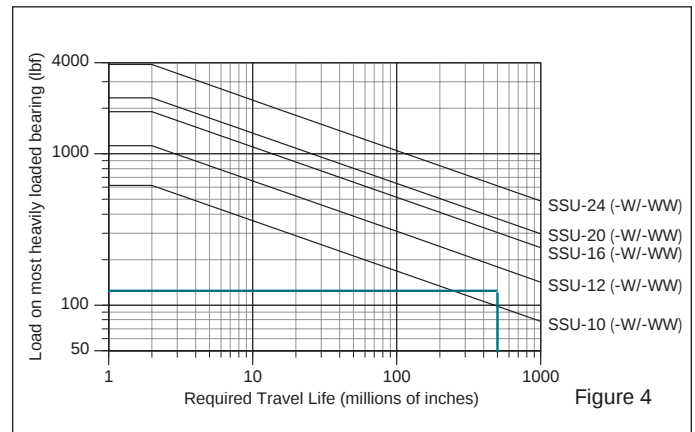
$$P = 500/4 = 125 \text{ lb}_f$$

Determine the equivalent travel life in inches.

$$L_t = 2 \cdot s \cdot f \cdot L_h \cdot 60$$

$$L_t = 2 \cdot 12 \cdot 100 \cdot 3500 \cdot 60$$

$$L_t = 5.04 \times 10^8 \text{ inches}$$



Enter Figure 1 and determine K_L

The next step is to determine the required dynamic load capacity.

$$W_R = \frac{P}{K_O \cdot K_S \cdot K_L}$$

$$W_R = \frac{125}{.45 \cdot 1 \cdot .17}$$

$$W_R = 1633 \text{ lb}_f$$

($K_S = 1$, since we are using a Thomson 60 Case LinearRace HRC 60-65.)

To determine the proper Super Smart Ball Bushing bearing size enter the specification table on page 28. Choose the Super Smart Ball Bushing bearing with a load capacity higher than 1633 lb_f. The SSU-12-OPN has a dynamic load capacity of 1130 lb_f and the SSU-16-OPN has a dynamic load capacity of 1900 lb_f. The SSU-16-OPN is therefore the proper choice.

Load Consideration

When designing a linear motion system it is necessary to consider how the variables of operation will affect performance.

The following examples demonstrate how the position of the load and the center of gravity can influence the product selection. When evaluating your application, review each of the forces acting on your system and determine the product best for your needs.

Terms:

d_0 = distance between centerlines of pillow blocks

d_1 = distance between centerlines of 60 Case LinearRace ways

d_2 = distance from centerline of carriage to load action point

d_3 = distance from centerline of carriage to load action point

W = Load (lb_f)

F_{NX} = Force in the X-axis direction (lb_f)

F_{NY} = Force in the Y-axis direction (lb_f)

F_{NZ} = Force in the Z-axis direction (lb_f)

$$F_{1Z} = \frac{W}{4} + \left(\frac{W}{2} \cdot \frac{d_2}{d_0} \right) - \left(\frac{W}{2} \cdot \frac{d_3}{d_1} \right)$$

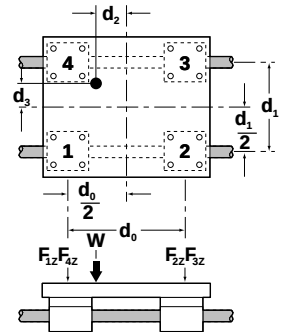
$$F_{2Z} = \frac{W}{4} - \left(\frac{W}{2} \cdot \frac{d_2}{d_0} \right) - \left(\frac{W}{2} \cdot \frac{d_3}{d_1} \right)$$

$$F_{3Z} = \frac{W}{4} - \left(\frac{W}{2} \cdot \frac{d_2}{d_0} \right) + \left(\frac{W}{2} \cdot \frac{d_3}{d_1} \right)$$

$$F_{4Z} = \frac{W}{4} + \left(\frac{W}{2} \cdot \frac{d_2}{d_0} \right) + \left(\frac{W}{2} \cdot \frac{d_3}{d_1} \right)$$

Horizontal Application I

At the time of movement with uniform velocity or at the time of stop.



$$F_{1Z} = \frac{W}{4} + \left(\frac{W}{2} \cdot \frac{d_2}{d_0} \right) - \left(\frac{W}{2} \cdot \frac{d_3}{d_1} \right)$$

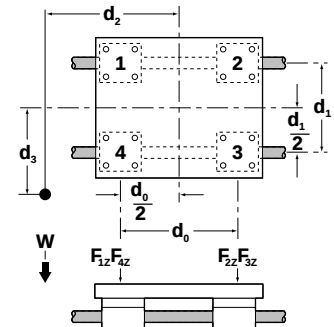
$$F_{2Z} = \frac{W}{4} - \left(\frac{W}{2} \cdot \frac{d_2}{d_0} \right) - \left(\frac{W}{2} \cdot \frac{d_3}{d_1} \right)$$

$$F_{3Z} = \frac{W}{4} - \left(\frac{W}{2} \cdot \frac{d_2}{d_0} \right) + \left(\frac{W}{2} \cdot \frac{d_3}{d_1} \right)$$

$$F_{4Z} = \frac{W}{4} + \left(\frac{W}{2} \cdot \frac{d_2}{d_0} \right) + \left(\frac{W}{2} \cdot \frac{d_3}{d_1} \right)$$

Horizontal Application II

At the time of movement with uniform velocity or at the time of stop.



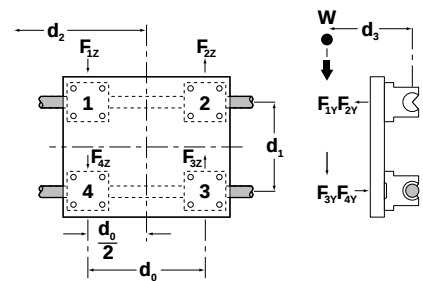
$$F_{1Y} \approx F_{4Y} = \left(\frac{W}{2} \cdot \frac{d_3}{d_1} \right)$$

$$F_{1Z} = F_{4Z} = \frac{W}{4} + \left(\frac{W}{2} \cdot \frac{d_2}{d_0} \right)$$

$$F_{2Z} = F_{3Z} = \frac{W}{4} - \left(\frac{W}{2} \cdot \frac{d_2}{d_0} \right)$$

Side Mounted Application

At the time of movement with uniform velocity or at the time of stop.



$$F_{1X} \approx F_{4X} = \frac{W}{2} \cdot \frac{d_2}{d_0}$$

$$F_{1Y} \approx F_{4Y} = \frac{W}{2} \cdot \frac{d_3}{d_0}$$

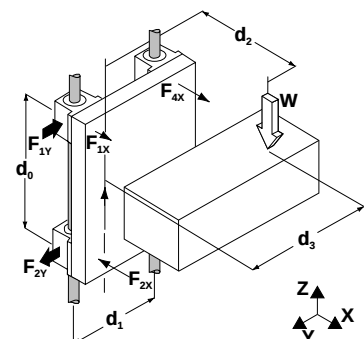
$$F_{1X} + F_{4X} \approx F_{2X} + F_{3X}$$

$$F_{1Y} + F_{4Y} \approx F_{2Y} + F_{3Y}$$

Vertical Application

At the time of movement with uniform velocity or at the time of stop.

At the time of start and stop, the load varies because of inertia.



60 Case LinearRace Deflection

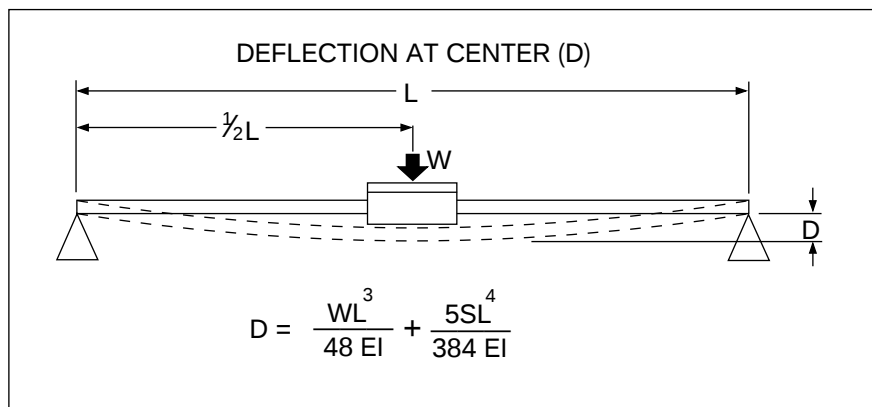
When Thomson 60 Case* LinearRace* is used in an end supported configuration it is important to ensure that 60 Case LinearRace deflections at the bearing locations are kept within performance limitations.

These equations give the deflection at the center of an end supported 60 Case LinearRace. Systems with continuous 60 Case LinearRace support are not subject to the same types of deflection.

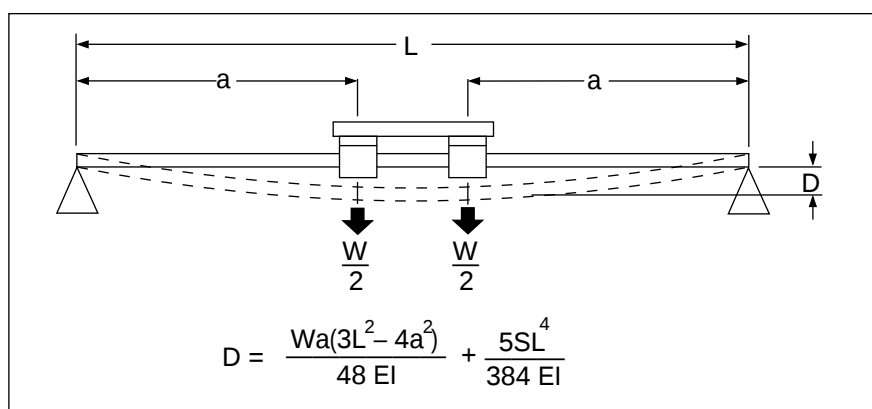
For more detailed information of the deflection characteristics of Thomson linear motion products contact application engineering.

Values for Thomson 60 Case LinearRace				
LinearRace Diameter (In)	Solid		Tubular	
	EI (lb _f •in ²)	S (lb _f /in)	EI (lb _f •in ²)	S (lb _f /in)
.187	1.8×10^3	.008	—	—
.250	5.8×10^3	.014	—	—
.375	2.9×10^4	.031	—	—
.500	9.2×10^4	.055	—	—
.625	2.3×10^5	.086	—	—
.750	4.7×10^5	.125	4.6×10^5	.075
1.000	1.5×10^6	.222	1.3×10^6	.158
1.250	3.6×10^6	.348	—	—
1.500	7.5×10^6	.500	6.3×10^6	.328
2.000	2.4×10^7	.890	1.9×10^7	.542
2.500	5.8×10^7	1.391	4.2×10^7	.749
3.000	1.2×10^8	2.003	9.3×10^7	1.112
4.000	3.8×10^8	3.560	2.5×10^8	1.558

Simply Supported 60 Case LinearRace with One Block



Simply Supported 60 Case LinearRace with Two Blocks



LEGEND:

- D = Deflection (in)
- W = Load (lb_f)
- L = Length of unsupported 60 Case LinearRace (in)
- a = Distance to first bearing with carriage at center position (in)
- S = Unit weight of LinearRace (lb_f/in)
- E = Modulus of Elasticity (lb_f•in²)
- I = Moment of inertia of area through diameter of LinearRace (in⁴)

Installation Guidelines

Thomson Ball Bushing bearings are manufactured to exceptionally close tolerances and offer smooth, virtually friction-free linear motion. The performance features of the bearings will only be realized, however, if care is taken during their installation.

Two areas of primary importance are the bearing alignment and the 60 Case* LinearRace* parallelism. Two bearings are normally used on each 60 Case LinearRace to assure smooth operation. The housing should be carefully aligned using the method given below. If a single twin-type housing is used, these procedures are not necessary.

It is also necessary to assure that the height from the housing mounting surface to the 60 Case LinearRace is consistent within .001 in. Shimming may be necessary depending on the accuracy of the mounting surfaces to which the housings are bolted.

The housing can be mounted to the plate using the following procedure:

- Prepare the carriage plate with one side having an abutting surface.
- Mount two housings with the reference edges located against the abutting surface and tighten the hold down bolts. Figure 1
- Mount the second pair of housings on the opposite side of the carriage and tighten the bolts finger tight.
- Insert a locating 60 Case LinearRace of correct diameter and tolerance through these two housings and reference the distance from the abutting surface in [b] above, to this locating 60 Case LinearRace. Figure 2
- After appropriate alignment of this pair of housings, tighten bolts to secure housings to carriage.

Figure 1

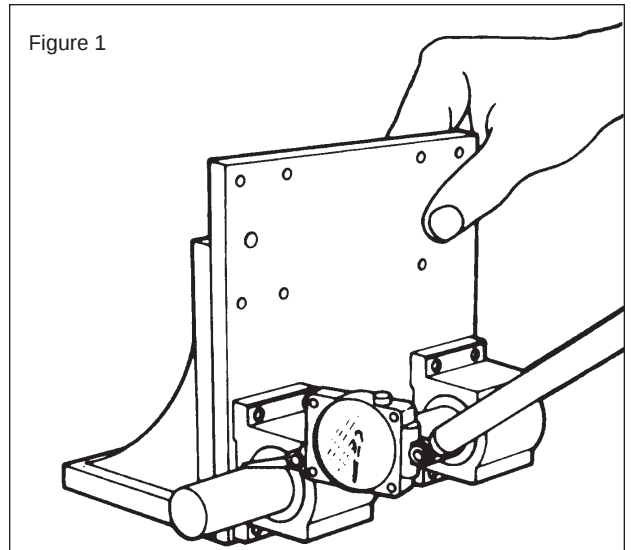


Figure 2

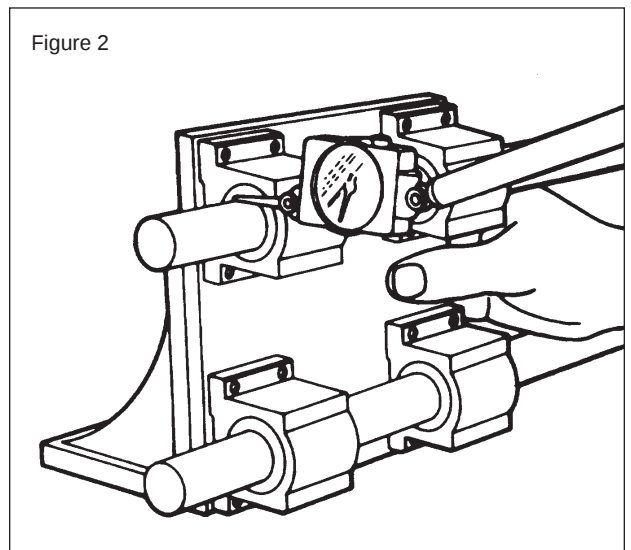
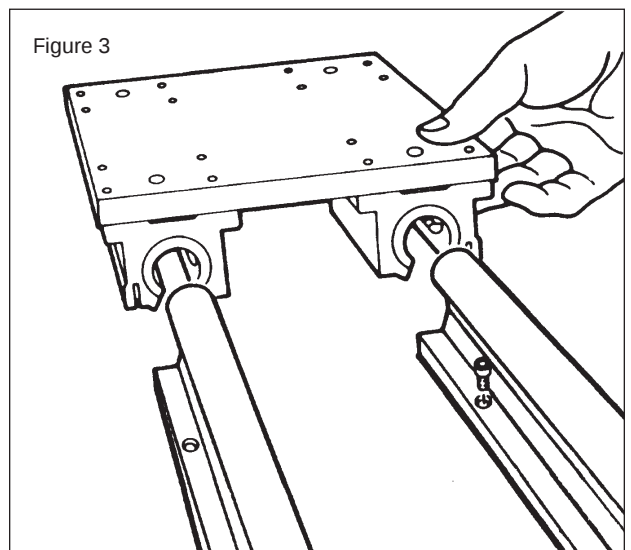


Figure 3



After the carriage is properly prepared, the 60 Case* LinearRace* must be mounted to the surface. To achieve smooth, accurate motion, the 60 Case LinearRace must be mounted parallel within .001 inch over the length of the stroke. This can be done by using the following procedure:

- a. Mount one 60 Case LinearRace (either end supported or continuously supported) to the surface with mounting bolts finger tight.
- b. Using an aligning device such as a laser, auto-collimator or other optics, sight the 60 Case LinearRace straight and secure to mounting surface.
- c. After this first 60 Case LinearRace is fixed, the second 60 Case LinearRace can be positioned and held down with bolts finger tight.
- d. The carriage is then mounted and its movement will pull this second 60 Case LinearRace parallel to the first. Figures 3, 4
- e. If the second 60 Case LinearRace is then secured into position, the procedure is complete. Note that for continuously supported systems, this securing should be done when the carriage is close to the bolts. For end supported systems, the securing should be done when the carriage is at the ends of the 60 Case LinearRace. Figure 5
- f. An additional check can be done at this time to assure that the carriage is tracking correctly (i.e., that the carriage edge is moving parallel to the 60 Case LinearRace). An indicator touching the carriage edge should not vary, as the carriage is moved along the 60 Case LinearRace. Figure 6

Figure 4

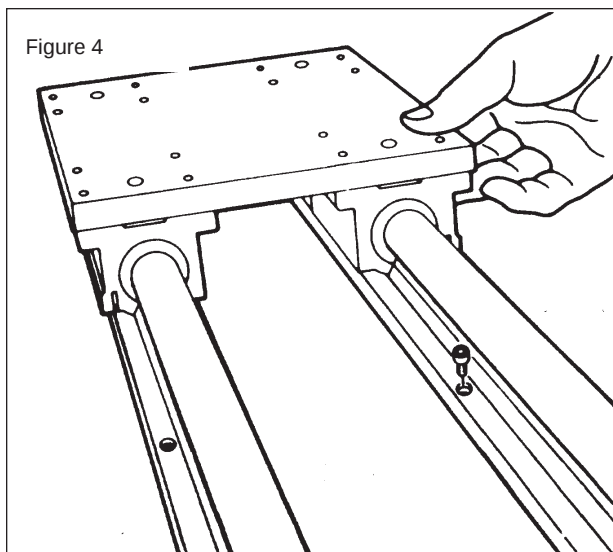


Figure 5

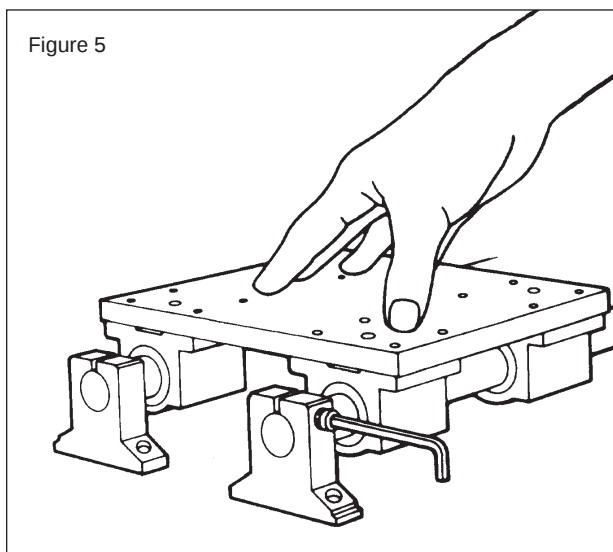
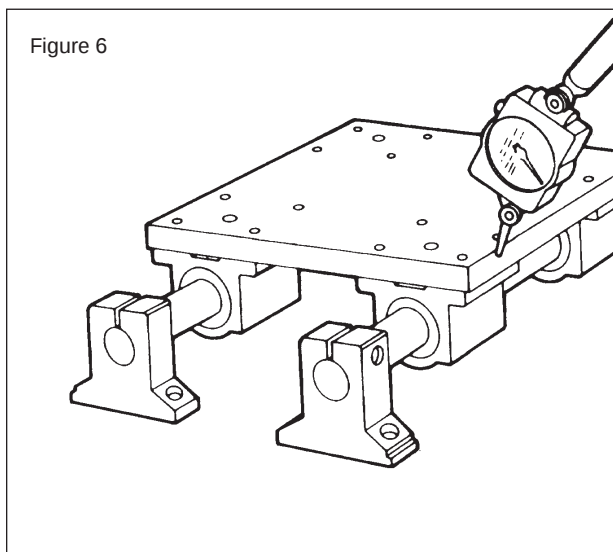


Figure 6



Application Tips

Two Ball Bushing* Bearings per 60 Case* LinearRace*

When using the Super Smart, Super or Precision Steel Ball Bushing bearing it is recommended that two Ball Bushings bearings be used on each 60 Case LinearRace. This will assure system stability as well optimum performance. If envelope constraints prohibit the use of two Ball Bushing bearings per 60 Case LinearRace contact application engineering.

Ball Bushing Bearing Spacing vs. 60 Case LinearRace Spacing

In parallel 60 Case LinearRace applications, the ratio of 60 Case LinearRace spacing to Ball Bushing bearing spacing should always be less than three to one. This will assure a constant breakaway and operating friction.

60 Case LinearRace Parallelism

In most applications the maximum acceptable out of parallelism condition is .001 inch over the entire full system length. In applications where preload is present (such as when using Die Set Ball Bushing bearings) a closer 60 Case LinearRace parallelism is recommended.

Three or More Parallel 60 Case LinearRace ways

When aligning two 60 Case LinearRace ways parallel great care is required to assure a parallelism within .001 inch over the entire length of travel. When aligning multiple 60 Case LinearRace ways, parallelism between each 60 Case LinearRace should be held within the .001 inch specification.

Measuring 60 Case LinearRace Alignment

Methods for establishing or checking 60 Case LinearRace straightness and parallelism depends on the accuracy required. Lasers, collimator or alignment telescopes can be used for very precise applications, while accurate levels, straight edges, micrometers and indicators will suffice for the majority of applications which have less stringent accuracy requirements.

Installation of Super and Precision Steel Adjustable Type Ball Bushing Bearings

When installing a Super Ball Bushing bearing into a slotted adjustable housing, the bearing plate should not align with the adjustment slot. When installing a Precision Steel Adjustable Type Ball Bushing bearing into a slotted adjustable housing, the bearing adjustment slot should be 90° to the pillow block adjustment slot. These important steps will assure accurate bearing adjustment.

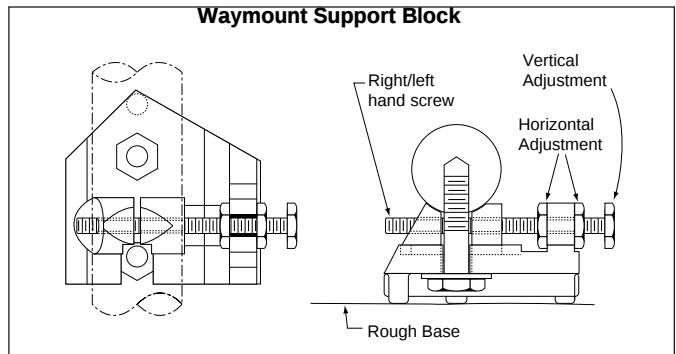
Access for Lubrication

Thomson Super Smart and Super Ball Bushing Pillow Blocks are equipped with either an oil lubrication fitting or a 1/4-28 access for lubrication. To use the oil fitting simply insert a lubrication device into the oil nipple by depressing the spring loaded ball. The 1/4-28 tapped hole is a standard size for most grease and lubrication fittings. Simply install the lubrication fitting of your choice and it is ready for immediate use. Super Ball Bushing Pillow blocks in sizes .250 through .500 inch diameter are equipped with oil lubrication fittings. Super Ball Bushing pillow blocks in sizes .625 inch and above and all Super Smart Ball Bushing Pillow Blocks are equipped with a 1/4-28 access for lubrication.

Waymount Support Block for Roundway Bearing Installation

Standard Waymount LinearRace Support Blocks provide 60 Case LinearRace adjustment in both the horizontal and vertical direction. This product reduces installation time dramatically, while assuring precise 60 Case LinearRace alignment. This versatile design allows the Waymount support to be mounted vertically or horizontally and in many different Roundway bearing applications. The number of Waymounts to be used is

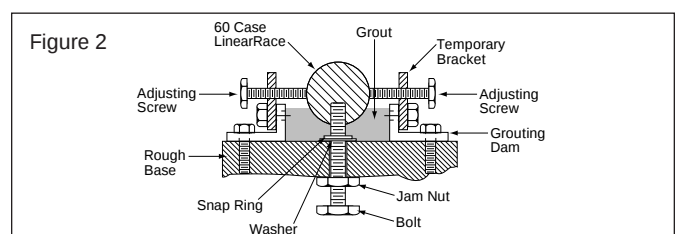
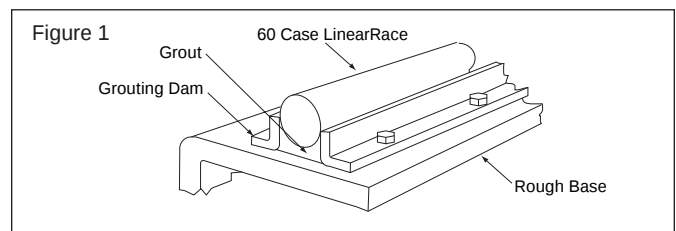
based on the maximum allowable 60 Case LinearRace deflection between supports and the accuracy required. Ordinarily indicators, sensitive levels and straight edges are adequate for most alignment conditions.



RoundWay* Bearing/60 Case LinearRace Installation Using Grout

Grouting is a very simple method of mounting a 60 Case LinearRace on almost any kind of surface, smooth or uneven. Grouting can also be used in conjunction with standard Waymount LinearRace support blocks or other 60 Case LinearRace supports to obtain maximum rigidity. Dams are fastened to the bed parallel to the 60 Case LinearRace which is then aligned with its mating 60 Case LinearRace (Figure 1). A compound, such as Thomson Waystone*, is then poured under and around the lower circumference of the 60 Case LinearRace. This dries quickly forming a solid support of high compressive strength (over 12,000 psi) without affecting the initial straightness of the LinearRace.

If the bearing arrangement permits the grout to flow substantially around the circumference of the 60 Case LinearRace and side loads are light, Waymount LinearRace supports or other hold down bolts along the length made be unnecessary (Figure 2). Just one support at each end of the 60 Case LinearRace will usually provide final alignment and hold the 60 Case LinearRace in position for grouting. If the length to diameter ratio is large, Waymount LinearRace supports should be equally spaced to minimize 60 Case LinearRace deflection. Grout should always be in direct contact with the surface of the bed or whatever base member provides primary rigidity and support.



60 Case LinearRace Shafting Specifications

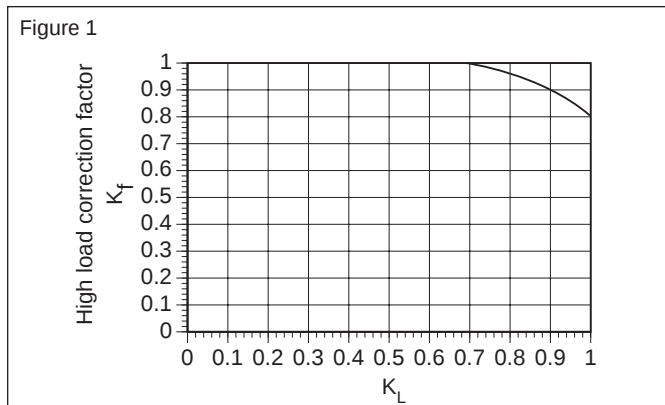
Thomson 60 Case* LinearRace* provides the inner race for Thomson Ball Bushing bearings. All 60 Case LinearRace is manufactured to extremely close tolerances for surface finish, roundness, hardness and straightness to provide long service life with reduced maintenance.

Specifications:

Hardness:	HRC 60-65
Surface Finish:	12 R_a microinch
Roundness:	80 millionths of an inch
Straightness:	Standard—.001 inch per foot cumulative (.002 TIR) Special—.0005 inch per foot cumulative (.001 TIR)
Length Tolerance:	Standard $\pm .030$ inch for diameters up to 2 inches and $\pm .060$ for diameters 2 inch and over. Special length tolerances available.
Chamfer:	Standard chamfer on diameters up to 1 inch is .030 x 45° and .060 x 45° for diameters larger than 1 inch.
Tensile Strength:	Case: 335,000 psi, Core: 100,000 psi
Yield Strength:	Case: 250,000 psi, Core: 75,000 psi

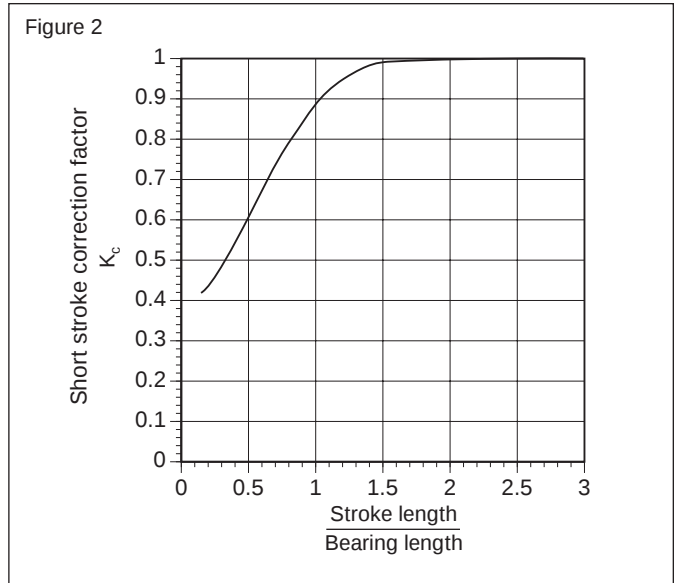
Load Factor

In applications where the applied load exceeds 70% of the maximum dynamic load capacity of Super Smart Ball Bushing bearings, a high load correction factor K_f must be applied to W_R when calculating travel life. (Figure 1)



Short Stroke Applications

In applications when the stroke length is short, the life of the shaft is shorter than that of the Ball Bushing bearing. In short stroke applications, the required dynamic load capacity must be multiplied by the factor K_c found on Figure 2.



Material engineering specifications

Ball Bushing* bearing materials.

The following is a tabulation of the materials used for the components of the various types of Ball Bushing bearings

Type	Outer Sleeve	Ball Retainers	Bearing Plates	Balls	End Rings
SSU, SUPER Ball Bushing Bearings	Delrin	Delrin	8620	Chrome Steel	None
Series A, B, XA, ADJ, OPN and DS	E52100	Steel	—	Chrome Steel	Steel
Stainless Steel (SS) to 1" I.D. Series A, XA, ADJ and OPN	440A	Type 30555	—	440C	Type 30555
Series INST-SS	440A	Brass	—	440C	None
Series XR	Reinforced Nylon	Reinforced Polyester	8620	Chrome Steel	Steel

Corrosion resistance

Super Ball Bushing bearings can be supplied corrosion resistant with hard chromeplated bearing plates and stainless steel balls. Load capacity will be 70% of regular Super Ball Bushing bearings. To order, add suffix CR to Super Ball Bushing bearing part number. Contact factory for price and delivery information.

For limited protection against atmospheric corrosion, large sizes (over 1" diameter) of series A, XA, ADJ, OPN and B, Ball Bushing bearings can be supplied with stainless steel balls and black oxide sleeve. Load capacity will be 70% of regular steel bearings. To order, add suffix SP to bearing part number. Contact factory for price and delivery.

Stainless steel Ball Bushing bearings

Available entirely of stainless steel. They are identified by the suffix "SS" following the part number (i.e. XA-81420-SS).

Sizes available:

Series A and XA to and including 1"
Series ADJ and OPN 1/2", 5/8", 3/4" and 1"

Ball Bushing bearings with nylon balls

For extremely quiet operation, Ball Bushing bearings fitted with Nylon balls can be supplied in sizes 1/2" and larger. For estimating purposes load ratings should be considered about 10% of those listed for Ball Bushing bearings with steel balls. Prices and other information available on request.

60 Case* shafts/RoundWays*—hardened and ground*

Material Type	AISI	Rockwell "C"
Solid 60 Case	Bearing-quality, high carbon alloy steel	60-65C
Tubular 60 Case	Bearing-quality, high carbon alloy steel	58-63C
Solid Stainless Steel	440C Stainless	50-55C

Maximum recommended operating temperatures for Ball Bushing bearings

The following are general recommendations. For additional information or more specific recommendations please contact factory with full application details.

Type of Ball Bushing bearings	Maximum Operating Temperature	Load Rating at Maximum Operating Temperature as % of Catalog Load Rating
SSU, Super & Series XR	185°F	100%
Series A, B XA, ADJ & OPN	500°F ¹	70%
Series A-SS, XA-SS, ADJ-SS, OPN-SS & INST-SS Stainless Steel (through 1" I.D.)	600°F ¹	60%

¹Maximum operating temperature for these two series for full catalog load rating is 300°F.
Note: Type PB-A, PB-ADJ, and PBO-OPN pillow blocks are assembled with Delrin plastic seal covers with a maximum operating temperature at 185°F.

Pillow blocks and shaft supports

Part Type	Material
Type SSUPB, SSUTWN, SPB & TWN pillow blocks	Type 6061-T6511 Aluminum
Type PB pillow blocks	Ductile Iron
Type PBO & XPBO Pillow blocks	Malleable/Ductile Iron
Type SR shaft support rails (std. lgth. 24")	Type 6061-T6511 Aluminum
Type LSR shaft support rails	1010 Steel
Type XSR shaft support rails (std. lgth. 24")	Ductile Iron
Type SB shaft support blocks	Malleable Iron ^{††}
Waymount shaft supports	Malleable Iron Base with steel adjustment elements

^{††}Type 6061-T6511 Aluminum for 1/4" and 3/8" sizes only

ENGINEERING CONVERSION FACTORS

QUANTITY	CONVENTIONAL		SI UNIT	CONVERSION FACTORS
	Inch Unit	Metric Unit (MKS)		
LENGTH	Inch in.	Meter m	Metre m	1 in. = 25.4 mm 1 mm = 0.03937 in. 1 m = 3.2808 ft. 1 ft. = 0.3048 m
AREA	Square Inch in.²	Square Meter m²	Square Metre m²	1 in. ² = 6.4516 cm ² 1 cm ² = 0.155 in. ² 1 m ² = 10.764 ft ² 1 ft. ² = 0.092903 m ²
MASS	Pound lb_m	Kilogram kg	Kilogram kg	1 lb _m = 0.45359237 kg 1 kg = 2.2046 lb
FORCE	Pound Force lb_f	Kilogram Force kg_f	Newton N	1 lb _f = 0.45359237 kg _f 1 lb _f = 4.44822 N 1 kg _f = 2.2046 lbf 1 kg _f = 9.80665 N 1 N = 0.1019716 kg _f 1 N = 0.224809 lb _f
STRESS or PRESSURE	Pounds per square inch lb_f/in.²	Kilograms per square meter kg_f/m²	Pascal Pa	1 MPa = 10 ⁶ N/m ² = N/mm ² 1 kPa = 10 ³ N/m ² 1 lb _f /inch ² = 0.070307 kg _f /cm ² 1 lb _f /inch ² = 7.0307 x 10 ⁻⁴ kg _f /mm ² 1 lb _f /inch ² = 6.8947 x 10 ⁻³ N/mm ² (MPa) 1 kg _f /cm ² = 14.2233 lb _f /in. ² 1 kg _f /cm ² = 9.80665 x 10 ⁻² N/mm ² (MPa)
TORQUE or WORK	Inch Pounds lb_f-in.	Kilogram Meters kg_f-m	Newton- Metres Nm	1 lbf-in. = 1.1521 kg _f -cm 1 kg _f -cm = 0.8679 lb _f -in. 1 lb _f -in. = 0.1129848 Nm 1 kg _f -m = 9.80665 Nm 1 kg _f -cm = 9.80665 x 10 ⁻² Nm 1 Nm = 8.85 lb _f -in. 1 Nm = 10.19716 kg _f -cm
POWER	Foot pound per minute lb_f-ft./min.	Force per second kg_f-m/s	Newton Metre per second Nm/s	1 kW = 1000Nm/s 1 kW = 60,000 Nm/s 1 kW = 44,220 lb _f -ft./min. 1 kW = 1.341 hp 1 hp = 75 kg _f -m/s 1 hp = 44,741 Nm/min. 1 hp = 33,000 lb _f -ft.min. 1 hp = 0.7457 kW
VELOCITY	Feet per second ft./s	Meters per second m/s	Meters per second m/s	1 ft./sec. = 0.3048 m/s 1 in./sec. = 2.54 cm/s 1 ft./sec. = 0.00508 m/s 1 mile/hr. = 0.44704 m/s 1 km/hr. = 0.27777 m/s 1 mile/hr = 1.609344 km/hr.
ACCELERATION	Feet per second squared ft./s²	Meters per second squared m/s²	Metres per second squared m/s²	1 ft./s ² = 0.3048 m/s ²

Advanced Linear Motion Products

The Thomson Industries Group of Companies specializes in the invention, design, development and manufacture of linear Ball Bushing* bearings; RoundWay* roller bearings; 60 Case* hardened-and-ground LinearRace* shafting; Thomson Saginaw* and IBL* ball screws and ball splines; pre-engineered, pre-assembled, ready-to-install RoundRail* linear guides; AccuGlide* linear ball bearing linear guides; AccuMax* linear roller bearing linear guides; Nyliner* engineered-polymer bearings; precision bearing balls; Thomson Micron precision planetary gearheads and feedback transducers; and related accessories. Thomson products are used worldwide in the automotive, aerospace, machine tool, machinery and equipment, process control, robotics, automated assembly, material handling, packaging, medical and recreational industries.



Linear Motion Systems



Linear Guides



Saginaw* and IBL* Ball Screws



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