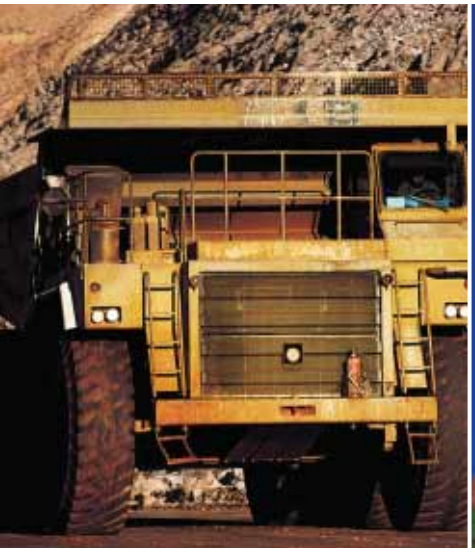
TIMKEN

Where You Turn



Industrial Products and Services

Where you turn for Friction Management Solutions[SM]

Torrington®

Fafnir®


TIMKEN.
Where you turn.

All around the world, customers turn to Timken for innovation that moves them ahead of the competition. Our contributions to advancing work and living standards – through innovations surrounding friction management and power transmission – are invaluable. We have played a role in virtually all major technologies that have shaped our age, from automobile travel to artificial hearts. You can find our products wherever you turn, on land, sea and in space – and in any industry where anything turns.

When our customers turn to us, they are turning to our worldwide team of 26,000 individuals dedicated to making their products perform better. Our ability to help them be more successful is why customers honor us with more than 300 awards each year.

Whether it is a wheel assembly for a family vehicle, bearings for a roller coaster, repair services for rail bearings or steel for an aircraft engine shaft, we supply the products and services that help keep the world turning.

About The Timken Company…

- *Timken is a global Fortune 500 company.*
- *The company has ranked among the 250 largest U.S. industrial corporations since the 1920s, and it has been listed on the New York Stock Exchange since 1922.*
- *Timken has 10 technical and engineering centers in North America, Europe and India.*
- *Timken has more than 66 plants and 105 sales offices, customer service centers and distribution centers in 27 countries on six continents.*
- *Timken maintains steel plants around the world.*

A TOTAL SYSTEM APPROACH

As customers' needs change and advanced motion control systems evolve, Timken is leveraging its knowledge to offer a broader array of bearings, related products and integrated services to the industrial marketplace. This approach provides customers with cost-effective solutions, while also helping them achieve specific friction management objectives.

Customers can benefit by having Timken, a trusted name for more than 100 years, evaluate entire systems, not just individual components. Timken integrates bearings, lubrication, seals, repair services, maintenance practices, gears, condition monitoring and material science to address a wide variety of customer needs. These value-added products, services and programs help keep overall systems running more efficiently so that performance and productivity gains can be achieved.

RESEARCH & DEVELOPMENT

The company's engineering expertise benefits customers through industry-leading products and innovative components to further enhance their competitive positions. Bearing and steel manufacturing is strongly backed by Timken's technology centers, where the scientific aspects of metallurgy, bearing operating characteristics, lubrication, torque, noise, heat treatment, advanced processing concepts and application development are translated into friction management solutions for customers.

BRANDS YOU CAN TRUST

Timken has built a strong tradition of quality, technology and innovation. A long list of customer certifications provides solid evidence that our products have earned customer trust. As our founder, Henry Timken, said, "Don't set your name to anything you will ever have cause to be ashamed of."

The Timken® brand also reflects the well-known quality of Torrington® and Fafnir® product lines. By leveraging the benefits of these brands – from design to distribution – Timken is giving customers expanded options along with the security of knowing that each box contains an industry-trusted product.

ABOUT THIS CATALOG

Timken offers an extensive range of bearings in both imperial and metric sizes. For your convenience, size ranges are indicated both in millimeters and inches. These bearings are sold under the Timken, Torrington and Fafnir brand names. The bearing designs chosen for this catalog represent some of the more common products found in industrial applications. Contact your Timken sales engineer to learn more about our complete line for the special needs of your application.

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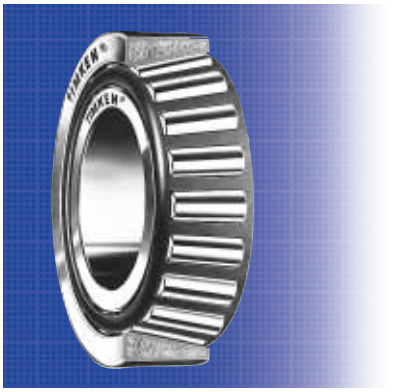
WARNING!

- **Never spin a bearing with compressed air. The rollers may be forcefully expelled, creating a risk of serious bodily harm.**
- **Proper maintenance and handling practices are critical. Failure to follow installation instructions and to maintain proper lubrication can result in equipment failure, creating a risk of serious bodily harm.**

TIMKEN® TAPERED ROLLER BEARINGS

Timken offers the most extensive line of tapered roller bearings in the world. Tapered bearings are uniquely designed to manage both thrust and radial loads on rotating shafts and in housings. We manufacture nearly 26,000 bearing combinations – in single, double and four-row configurations. Sizes range from an 8 mm (0.31496") bore to a 2,222.5 mm (87.5") outside diameter (OD). Customized geometries and engineered surfaces can be applied to these bearings to further enhance performance in demanding applications.



Type TS

Size range:
7.937 mm – 1,701.8 mm bore
(0.3125" – 67")

Type TSL

Size range:
19.505 mm – 68.262 mm bore
(0.76791" – 2.6875")

Single-Row Bearings

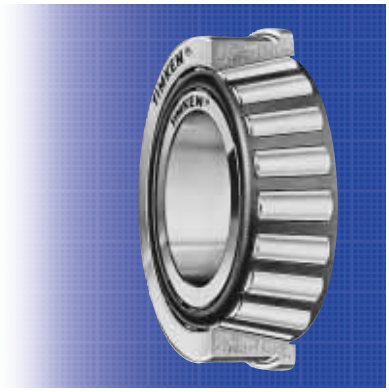
Single-row tapered roller bearings consist of four independent components: the cone (inner ring), the cup (outer ring), the tapered rollers and the cage. The tapered angles allow the bearings to handle a combination of radial and thrust loads.

Timken® single-row tapered bearings are commonly applied in wheels, transmissions, gear reduction units and a wide array of rotating industrial equipment.

Single-row tapered roller bearings have positive roller alignment that ensures true rolling motion and generates a "seating force" that pushes the roller against the cone large rib. This seating force prevents the rollers from skewing off apex, thereby keeping them positively aligned and located against the cone large rib. During assembly, tapered bearings can be preset to required clearance (end play) or preload conditions for optimum performance.

TS bearings are the most widely used design. TSF bearings are single-row tapered bearings that have flanged cups to facilitate axial location and accurately align seats in through-bored housings.

TSL bearings are similar to TS varieties but feature DUO-FACE® PLUS seals pressed onto the outside diameters of the cone ribs. TSU bearings are self-contained, unitized assemblies that carry heavy radial loads and can manage thrust loads in either direction.

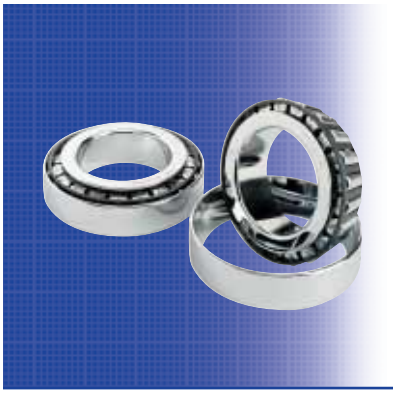


Type TSF

Size range:
7.937 mm – 1,270 mm bore
(0.3125" – 50")

Type TSU

Size range:
30 mm – 45 mm bore
(1.1811" – 1.7717")

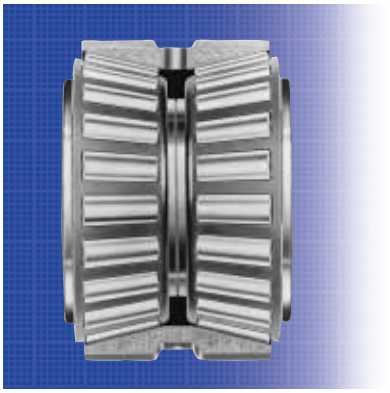


IsoClass™ Metric Bearings

Size range:
40 mm – 480 mm bore

Timken offers more than 170 part numbers in the 30000 ISO series that cover 95 percent of the total market for metric bearings.

Timken engineers and other experts readily collaborate with customers to identify custom solutions that may include special materials, geometries or surface finishes.



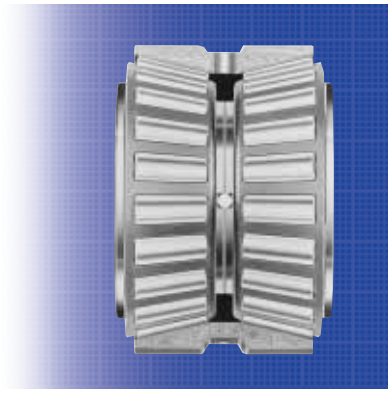
Type TNA

Size range:
19.05 mm – 406.4 mm bore
(0.75" – 16")

Two-Row Bearings

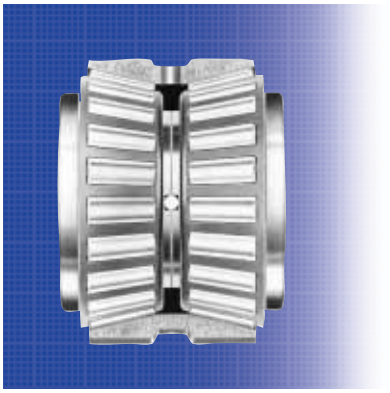
Timken tapered roller bearings are available in two-row designs. Two-row bearings are typically used in applications such as heavy-duty gear drives, wheel hubs of heavy vehicles, coil conveyors, cranes and calender rolls.

TNA bearings consist of double outer races and two single inner races. Internal bearing clearance is controlled by extending the front faces of the inner races so that they make contact. These bearings are pre-set during manufacturing and can be used at fixed or floating positions. Variations of the TNA bearing feature: chamfers, slots to provide lubrication through the shaft (Type TNASW), extended large ribs on the inner races (Type TNASWE), and seal or stamped closures and/or flanged double outer races (Type TNASWH).



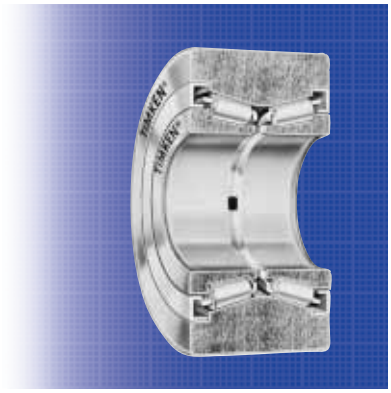
Type TNASW

Size range:
19.05 mm – 406.4 mm bore
(0.75" – 16")



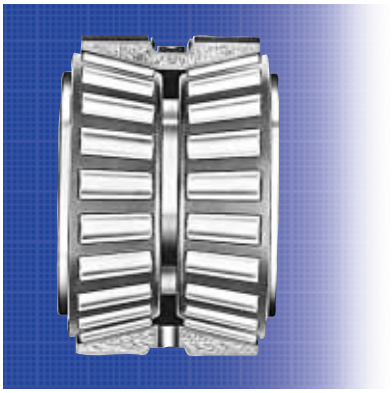
Type TNASWE

Size range:
19.05 mm – 406.4 mm bore
(0.75" – 16")



Type TNASWH

Size range:
7.938 mm – 127 mm bore
(0.3125" – 5")

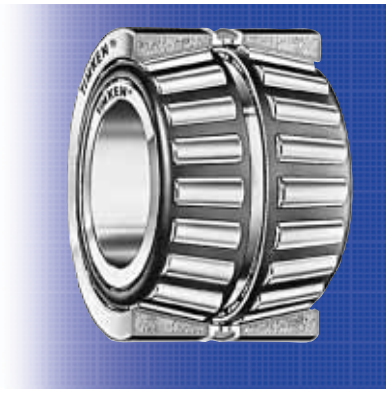


Type TDO

Size range:
9.525 mm – 2,085 mm bore
(0.375" – 82.0866")

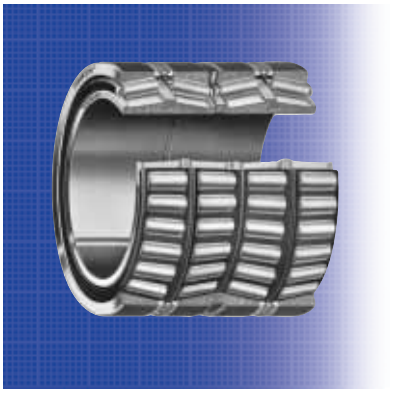
TDO bearings have a one-piece double outer ring and two single inner rings, and are used in either fixed or floating positions. They are typically supplied with inner-ring spacers as pre-set assemblies. TDO bearings are frequently chosen for applications where overturning moments are a significant load component.

TDI bearings consist of a one-piece double inner ring and two single outer rings. They typically are supplied complete with outer-race spacers in pre-set assemblies. A variation, the TDIT bearing, is available with a tapered inner ring bore.



Type TDI

Size range:
19.05 mm – 1,905 mm bore
(0.75" – 75")

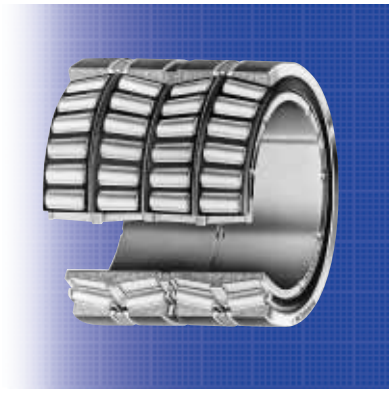


Type TQO

Size range:
25.4 mm – 1,500 mm bore
(1" – 59.0551")

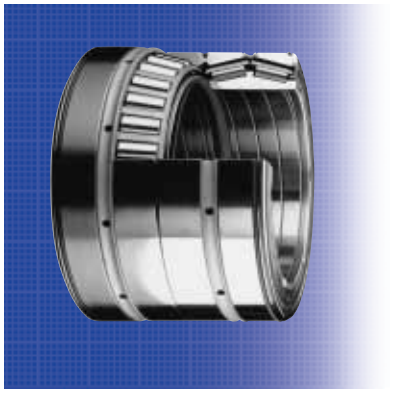
Four-Row Bearings

Type TQO four-row tapered bearings consist of two pairs of directly mounted bearings, comprised of two double inner races, two single and one double outer race with one inner ring spacer and two outer ring spacers. These types are used on low- and medium-speed rolling mills and are applied to the roll necks with a loose fit. When the fillet and/or filler rings do not already have lubrication slots, they are provided in the faces of the bearing inner rings (type TQOW). The cone spacers of these bearings are hardened to minimize face wear.



Type TQOW

Size range:
50.8 mm – 1,219.2 mm bore
(2" – 48")

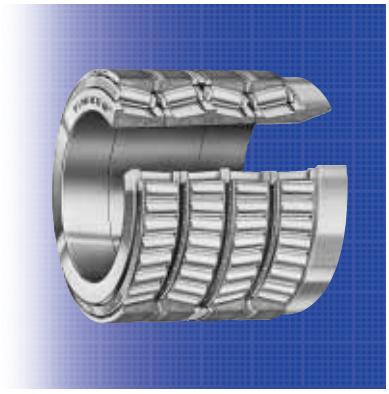


Sealed Roll Neck Bearings

Size range:
190.5 mm – 711.2 mm bore
(7.5" – 28")

Sealed roll neck bearings have specially designed sealing arrangements. This allows the bearings to endure harsh environments by helping to eliminate contamination from the bearing envelope, thereby extending bearing life. All Timken sealed roll neck bearings have spiral bore grooves with blended radii to eliminate roll neck damage.

Types TQITS and TQITSE consist of two pairs of indirectly mounted bearings, two single and one double cone, four single cups and three cup spacers. Type TQITSE has an extension to the large bore cone adjacent to the roll body. This not only provides a hardened, concentric and smooth surface for radial lip seals, but also improves roll neck rigidity by eliminating a fillet ring. This feature allows the centerline of the bearing to move closer to the roll body, and it also permits shorter and less costly rolls. The indirect mounting of both the TQITS and the TQITSE increases the overall effective spread of the bearing to deliver optimum stability and roll rigidity.

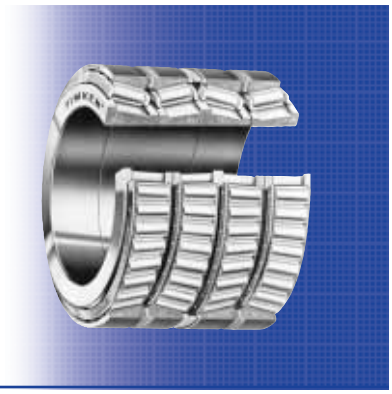


Type TQITSE

Size range:
50.8 mm – 1,219.2 mm bore
(2" – 48")

Type TQITS

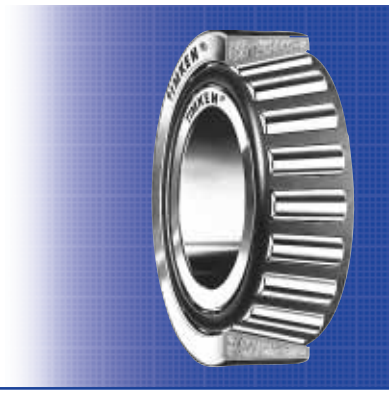
Size range:
50.8 mm – 1,219.2 mm bore
(2" – 48")

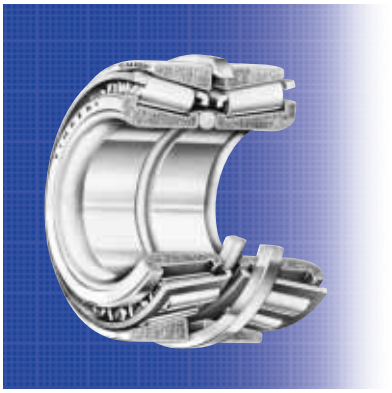


Precision Tapered Roller Bearings

Size range:
7.937 mm – 315 mm bore
(0.3125" – 12.4016")

Some applications require a level of precision that cannot be achieved with a standard tapered roller bearing. Timken precision tapered roller bearings promote and maintain the operating accuracy required of today's machine tool industry and various related specialized markets. Precision class tapered roller bearings offer machine tool builders an economical design solution that exceeds most application needs for rotational accuracy and rigidity. Precision classes range from Class 3 (C) to Class 000 (AA).





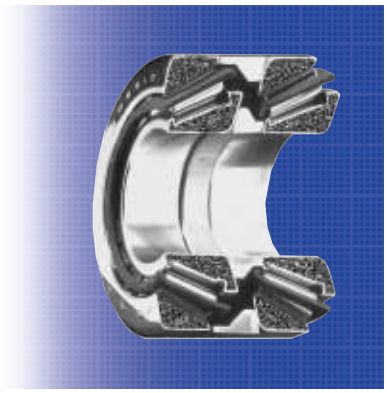
Type 2S

Size range:
17.462 mm – 83.345 mm bore
(0.6875" – 3.2813")

Spacer Bearing Assemblies

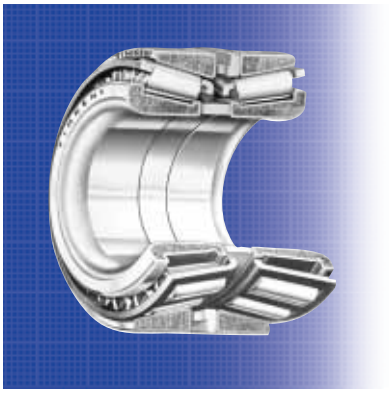
Spacer bearing assemblies speed bearing installation time by eliminating the need for bearing adjustment. They can be used with two-row and four-row Timken tapered roller bearings to pre-set the bench lateral clearance (bench end play).

With the addition of spacers, machined to predetermined dimensions and tolerances, many single-row bearings (type TS) can be supplied as a two-row, pre-set, ready-to-fit assembly. This principle is adopted in two standard ranges of spacer assemblies: types 2S and SR. The concept also can be applied to produce custom-made two-row bearings to suit specific applications, for example, 2TS-TM and 2TS-DM.



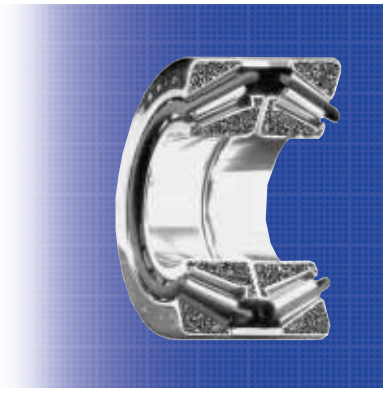
Type 2TS-TM

- **Size depends on precision required; contact your Timken sales engineer for more information.**



Type SR

Size range:
50 mm – 200 mm bore
(1.9685" – 7.874")



Type 2TS-DM

Size range:
7.937 mm – 1,701.8 mm bore
(0.3125" – 67")

Crossed Roller Bearings Type TXR

Size range:
203.2 mm – 1,879.6 mm bore
(8" – 74")

A crossed roller bearing is comprised of two sets of bearing races and rollers brought together at right angles – with alternate rollers facing in opposite directions – and within a section height not much greater than that of a single bearing. The crossed roller design is ideal for machine tool applications such as vertical boring mills, vertical grinding machines and other equipment.

TIMKEN® TORRINGTON® SPHERICAL ROLLER BEARINGS

Timken® Torrington® spherical roller bearings feature all of the characteristics that have made Timken renowned – superior design, reliable performance and comprehensive technical support. Our spherical bearings are designed to manage high radial loads and perform consistently, even when misalignment, marginal lubrication, contamination, extreme speeds and critical application stresses are present.

Spherical Roller Bearings

Size range:
25 mm – 1,500 mm bore
(0.9843" – 59.0551")

Spherical roller bearings have matching spherical surfaces on both rings and rollers that enable the bearings to compensate for modest misalignment between a rotating shaft and the bearing housing. Spherical bearings have high radial load capacity and accommodate some combination of radial and axial loads.

There are a number of spherical bearing cage designs available that are offered in different styles for varying combinations of loads and speeds. For example, one design provides an extra-close running accuracy for enhanced performance. Spherical roller bearings are used in applications for power generation, pulp and paper mills, oilfield, mining and aggregate processing, wind turbines, gear drives and rolling mills.

Spherical Roller Bearing Special Features

- **Carburized components to lengthen life in industrial machinery**
- **Engineered surfaces to extend life**
- **Special modification codes for specific applications**

Timken Torrington spherical bearings can be ordered with several enhancements to extend life and improve performance in specific applications. Carburized components offer higher compression stresses and resist shock loading. Large bearings often operate below the bearing's critical speed, causing the cage to push a non-rotating roller across the raceways. This sliding action breaks down lubrication film and can ultimately damage the bearing.

Timken engineered surfaces protect bearing components from skidding and sliding while withstanding small-particle contamination. In some cases, engineered surfaces can extend bearing life by up to five times standard designs. Bearings with engineered surfaces enhance life in paper and rolling mills and other demanding applications.

Special modification codes have been created for specific applications including W800 for vibrating mechanisms and W906A for large paper machinery.

Type CJ

Size range:
25 mm – 200 mm bore
(0.9843" – 7.874")

Spherical CJ bearings offer higher load ratings for longer life and incorporate a stamped steel window-type cage. Like all Timken Torrington spherical bearings, the CJ line compensates for misalignment and allows customers to use weldments for housing frames instead of complex castings.

Type YM and YMB

Size range:
40 mm – 1,500 mm bore
(1.5748" – 59.0551")

Type YM bearings feature precision-machined, roller-riding bronze cages and are designed for harsh industrial environments. These bearings offer higher load ratings for longer life.

Type YMB spherical bearings are designed with inner-ring, land-riding cages in larger bore sizes.

Spherical Roller Bearing Pillow Blocks

Size range:
35 mm – 300 mm shafts
(1.37795" – 11.811")

Special shaft sizes up to 1,000 mm (39.37") and beyond

Spherical roller bearing pillow blocks combine rugged cast-iron or steel housings with high-capacity spherical bearings to meet the toughest demands of industry. The convenient split-housing design simplifies assembly and service.

Each pillow block contains an advanced-design spherical roller bearing with improved geometry and raceway finish for maximum load capacity and service life. Integrated housing and bearing features enhance unit lubrication characteristics. Multiple sealing options protect against contamination. Typical applications include conveyors, mining, rolling mills and pulp and paper mills.

TIMKEN® TORRINGTON® SPHERICAL PLAIN BEARINGS

Spherical Plain Bearings

Size range:
12.7 mm – 600 mm bore
(0.5" – 23.622")

Spherical plain bearings consist of a spherically ground inner ring housed in a mating outer ring without any rolling elements. Spherical plain bearings are designed to carry radial and axial loads in a small envelope. They are ideal for static and oscillatory applications and can accommodate moderate misalignment. Available in a variety of styles, in imperial and metric sizes, radial spherical plain bearings are offered in standard or heavy-duty sealed versions and feature a single- or double-fractured outer race.

Thrust spherical plain bearings are designed for single direction thrust loading and also accommodate moderate misalignment. These bearings are commonly applied in construction and mining equipment such as dump trucks, excavators, track-type tractors and wheel loaders. They also are widely used in hydraulic and pneumatic actuator applications.

TIMKEN® TORRINGTON® CYLINDRICAL ROLLER BEARINGS

Timken® Torrington® cylindrical roller bearings are designed to manage heavy radial loads through expertly designed critical dimensions, including roller and raceway diameters and contact geometry. Our cylindrical bearings range from small to large bores – with up to four rows of rollers – for a wide range of industrial applications.

Cylindrical Roller Bearings

Size range:
15 mm – 1,600 mm bore
(0.59" – 62.99")

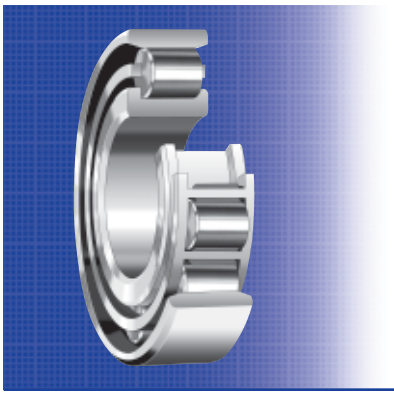
Cylindrical roller bearings consist of an inner and outer ring with a cage containing a complement of rollers. The selection of cylindrical roller bearing configurations depends on the application conditions, mounting and assembly requirements. Some configurations have flanges on the inner ring or outer ring as well as separable rings.

Timken offers single-row and multiple-row cylindrical roller bearing configurations. Two-row bearings have two complements of rolling elements for greater radial load capacity. Four-row bearings provide extremely high radial capacity for heavy-duty roll neck applications in metal rolling mills. These large-bore bearings are used in power generation operations, pulp and paper mills, oilfields, mining and aggregate processing plants, gear drives and rolling mills.

Type NU/RU/RIU

Size range:
15 mm – 1,600 mm bore
(0.59" – 62.99")

Type NU/RU/RIU cylindrical bearings carry radial loads only. The outer ring has two integral ribs, while the inner ring has a cylindrical OD. These bearings can accommodate axial expansion or contraction.



Type N/RN/RIN

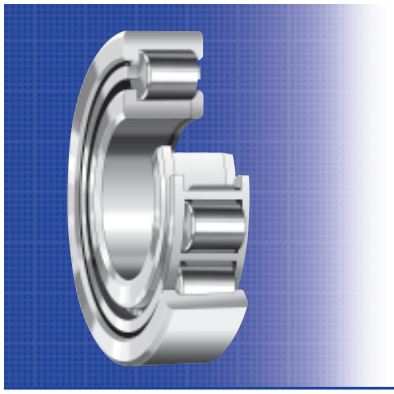
Size range:
15 mm – 1,600 mm bore
(0.59" – 62.99")

Type N/RN/RIN cylindrical bearings have an outer ring with a cylindrical bore and an inner ring with double integral ribs.

Type NJ/RJ/RIJ

Size range:
15 mm – 1,600 mm bore
(0.59" – 62.99")

Type NJ/RJ/RIJ cylindrical bearings have a double-ribbed outer ring and a single-ribbed inner ring to support heavy radial loads and light unidirectional thrust loads. Because these bearings can accommodate only a small percentage of thrust load, Timken sales engineers can provide suggestions for use in specific applications.



Type NUP/RP/RIP

Size range:
15 mm – 1,600 mm bore
(0.59" – 62.99")

Type NUP/RP/RIP cylindrical bearings have double integral ribs on the outer ring and an inner ring with one integral and one loose rib. These double ribs are used for locating purposes and can accept reversing axial loading.

Type NCF/NNCF

Size range:
200 mm – 1,300 mm bore
(7.87" – 51.18")

Type NCF/NNCF are single-row, full-complement cylindrical roller bearings. They feature integral flanges on the inner and outer rings. These bearings can manage axial loads in one direction and permit small axial displacements.

Type NN/NNU

Size range:
200 mm – 1,300 mm bore
(7.87" – 51.18")

Type NN/NNU double-row cylindrical bearings have a separable design that allows axial displacements between the shaft and housing to take place inside the bearing itself, within certain limits. Double-row cylindrical bearings can be supplied with either cylindrical bores or tapered bores. Type NN is supplied with a tapered bore. Type NN and NNU bearings differ primarily in the flange configuration and may also vary slightly in design for manufacturing, application or maintenance reasons.

Type RY

Size range:
160 mm – 1,200 mm bore
(6.2992" – 47.2441")

Type RYK

Size range:
195.5 mm – 999.9 mm bore
(7.6969" – 39.3661")

Type RX

Size range:
160 mm – 1,200 mm bore
(6.2992" – 47.2441")

Type RXK

Size range:
195.5 mm – 999.9 mm bore
(7.6969" – 39.3661")

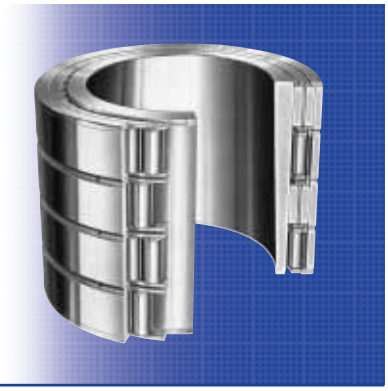
Four-Row Cylindrical Bearings

Timken four-row cylindrical bearings are designed for use in equipment that requires high capacity in a given cross-section. They are most often applied in rolling mill equipment or in mini-mills where equipment has been scaled down, yet loads remain high. Four-row cylindrical bearings can tolerate moderate to high shaft speeds, since the rollers and outer ring sections are carefully matched to ensure optimal load distribution.

Type RY and RYK bearings incorporate two outer races with triple flanges and a single piece inner ring, allowing easier handling. Lubrication is accomplished with slots in the faces of the outer ring. The cage is a single piece, fully machined, centrifugally cast bronze alloy design, with roller pockets staggered between the races.

RX bearings have two single-flanged outer races with two side plates for roller spacing, allowing for complete disassembly and inspection. RX bearings are designed with a balanced cross section, offering excellent load ratings for high-precision, moderate- and high-speed back-up roll applications.

RXK bearings have tapered bore inner ring options for fast hydraulic dismount. The outer assemblies of RXK bearings are completely separable and interchangeable with other inner races.



Timken® thrust bearings are designed specifically to manage thrust loads and provide high-shock-load resistance in industrial applications. These bearings provide high-speed performance and application flexibility. We manufacture thrust bearings in tapered, spherical, cylindrical, ball and needle configurations.

Type TTHD

Size range:
35 mm – 1,350 mm bore
(1.375" – 53.15")

Type TTHDFL/TTVF

Size range:
100 mm – 1,830 mm bore
(4" – 72")

Timken® Tapered Thrust Bearings

The TTHD bearing is designed for high thrust loads and heavy shock conditions. The bearing features an identical pair of hardened and ground steel washers with tapered raceways. The tapered rollers are equally spaced by a cage. TTHD bearings are used in slow to moderately high-speed applications, including oil well swivels, crane hooks, extruders and piercing mill thrust blocks.

Similar to the TTHD design, TTHDFL/TTVF and TTVS bearings combine the features of tapered thrust and cylindrical roller bearings to offer the highest possible capacity of any thrust bearing of its size. Both bearings employ a V-Flat design with the TTVS, providing self-aligning characteristics. In the V-Flat design, one washer is flat, while the second has a tapered raceway matching the rollers. Most TTHDFL/TTVF and TTVS V-Flat bearing sizes utilize cages with hardened pins through the center of the rollers. This allows for closer spacing of the rollers to maximize capacity.

The TTHDSV/TTSV and TTHDSX/TTSX tapered thrust bearings are both full-roller complement designs without conventional bores. They are provided with a center insert for attachment purposes as well as for lifting. They offer the highest capacity, but at a somewhat reduced speed

Type TTVS

Size range:
100 mm – 1,140 mm bore
(4" – 45")

Type TTHDSV/TTSV

Size range:
100 mm – 1,140 mm bore
(4" – 45")

continued from page 13

Type TTHDSX/TTSX

Size range:
100 mm – 1,140 mm bore
(4" – 45")

capability as compared with other V-Flat types. The TTHDSV/TTSV features a concave washer, the TTHDSX/TTSX a convex washer.

All four V-Flat designs are designed for semi-static (oscillating) duty in the automatic screw-down mechanisms of rolling mills, where sensitive screwdown response is required.

Timken® Torrington® Spherical Roller Thrust Bearings

Size range:
110 mm – 1,000 mm bore
(4.33" – 39.37")

Spherical roller thrust bearings incorporate spherically contoured rollers arranged in a steep angular position. These bearings accept heavy thrust loads in combination with moderate radial loading and can operate under conditions of dynamic misalignment.

Timken® Torrington® spherical roller bearings allow axial misalignment between the inner and outer ring of up to ± 2.5° when housing misalignment or shaft deflection is expected.

These thrust bearings are used in mining and aggregate equipment, rolling mills, pulp and paper mills, oilfield drilling equipment, power generation and rubber/plastics equipment.

Timken® Torrington® Spherical Roller Thrust Type TTC/TTSP

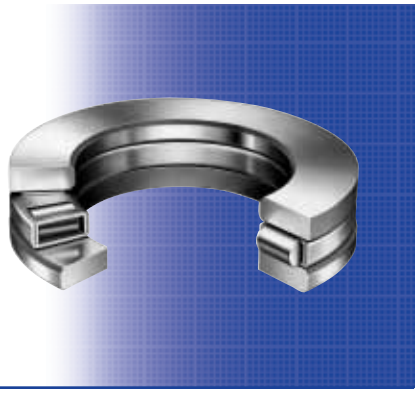
Size range:
16.129 mm – 147.637 mm bore
(0.635" – 5.8125")

Type TTC and TTSP thrust bearings are designed to be used in thrust-only load applications. There are two types of bearings for oscillating applications: TTC (without cage) and TTSP (with cage). The TTSP bearing is used in auto applications where full rotation is not required.

Timken® Torrington® Cylindrical Roller Thrust Bearings

Size range:
15 mm – 90 mm bore
(0.59" – 3.5433")

Cylindrical roller thrust bearings feature a hardened-steel cage and are guided by either the shaft or housing. These bearings can be used on either hardened or ground raceways or on thrust washers. These high-capacity bearings are used for heavy thrust loads within a wide range of operating speeds. Typical applications include material handling equipment, lifting mechanisms and transmissions.



Timken® Torrington® Cylindrical Thrust Type TP

Size range:
50.8 mm – 609.6 mm bore
(2" – 24")

Type TP cylindrical thrust bearings have two flat-hardened and ground steel races with a cage retainer holding one or more controlled-contour rollers in each pocket. If specifications call for two or more rollers per pocket, they are manufactured to different lengths. The longer rollers are placed in alternate positions in adjacent pockets. The overlapping roller paths help prolong bearing life. This robust design permits minor radial displacement of the races during operation and eases installation.

Timken® Torrington® Aligning Cylindrical Thrust Type TPS

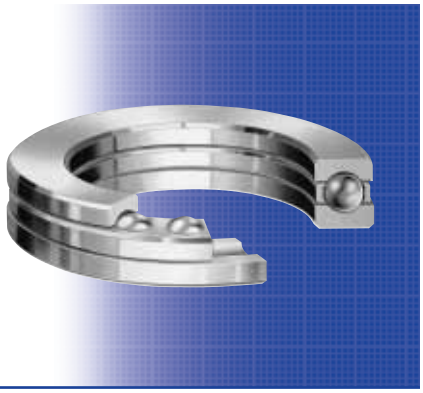
Size range:
50.8 mm – 406.4 mm bore
(2" – 16")

The TPS cylindrical thrust bearing is similar to the TP style except that the bottom assembly is comprised of two washers with spherically ground contacting faces. The TPS bearing is self-adjusting to initial misalignment. It is not, however, suggested for installations where alignment may be continuously changing (dynamic misalignment).

Timken® Torrington® Ball Thrust Bearings Type TVB

Size range:
127 mm – 406.4 mm bore
(5" – 16")

Timken Torrington TVB ball thrust bearings consist of two hardened and ground steel rings. The precision ground and lapped balls run in a grooved raceway, separated by a bronze cage. This ball thrust bearing is easy to mount, with the rotating ring usually shaft mounted. The stationary ring should be housed with an outside diameter clearance that allows the bearing to assume a normal operating position.



Type TVL

Timken® Torrington® Ball Thrust Type TVL/DTVL

Type TVL

Size range:
228.6 mm – 1,371.6 mm bore
(9" – 54")

Type DTVL

Size range:
508 mm – 1,374.775 mm
(20" – 54.125")

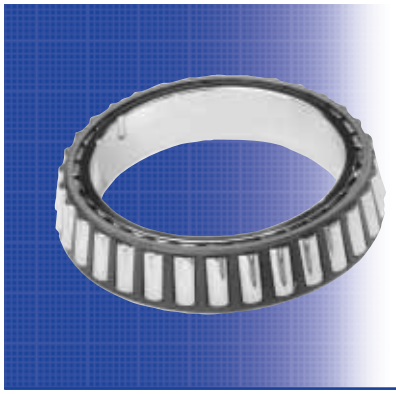
Type TVL is an angular-contact thrust ball bearing featuring hardened and ground steel races with precision ground and lapped steel balls, separated by a bronze cage. The larger ring is identified as the outer ring and the smaller as the inner ring. The inner ring is usually the rotating element and is shaft mounted.

TVL bearings are designed primarily to handle thrust loads combined with some radial loading. The design provides exceptionally low friction, cool running and quiet performance when operated at high speeds.

The DTVL ball thrust bearing incorporates an upper and lower complement of angular contact balls with three race elements. This design is capable of carrying thrust in one direction, comparable to the TVL series, with lighter thrust in the opposite direction.

TIMKEN® SPEXX™ PERFORMANCE BEARINGS

The Timken® Spexx™ family of bearings and related products is designed for extended life in demanding industrial applications. Enhancements in metallurgy, internal geometry and surface finish allow greater performance in existing applications or housings, and enhanced power density in new equipment.



DuraSpexx™

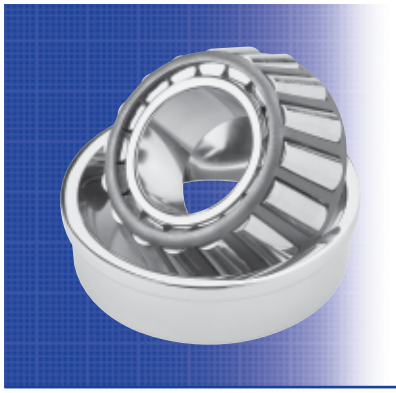
Size range:
203.2 mm – 2,133.6 mm OD
(8″ – 84″)

DuraSpexx™ bearings offer versatility and reliability through customized designs. These bearings can extend life up to four times over traditional bearings by incorporating enhanced material, finish, and/or profile designs. They are most advantageous in heavily loaded and thin lubricant film environments.

DuraSpexx™ Power Rating Series

Size range:
76.2 mm – 609.6 mm OD
(3″ – 24″)

The DuraSpexx™ Power Rating Series offers twice the catalog life in performance of normal bearings under normal operating conditions through a unique combination of material, finish and profile. These enhancements produce a 23 percent higher rating. Power Rating Series bearings typically utilize a special DX or NP prefix part number and are specifically targeted to extend bearing life in high maintenance and heavily-loaded applications such as gear drives, rolling mills and oilfield equipment.



P900™

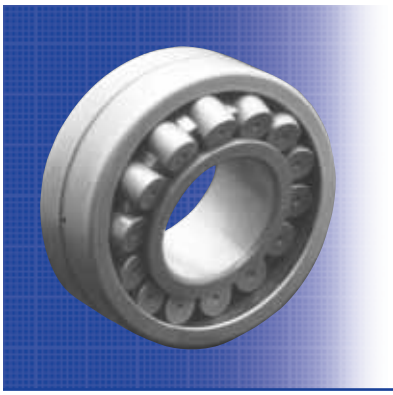
Size range:
0 mm – 203.2 mm OD
(0″ – 8″)

These tapered roller bearings utilize a combination of material, internal geometry modifications and enhanced finishes to extend fatigue life up to four times in a variety of demanding load and marginal lubrication environments. They are typically used to upgrade the performance of existing systems or to reduce the size, weight and cost of new designs.

AquaSpexx™

Size range:
12.7 mm – 914.4 mm OD
(0.5" – 36")

AquaSpexx™ bearings utilize proprietary zinc-alloy coating technology to provide corrosion resistance in environments subjected to water ingress and other water-based damage. Typical applications include food processing, maritime, rolling mills and pillow blocks. The technology is used primarily on ball, tapered and cylindrical bearings.



Thin Dense Chrome™ Bearings

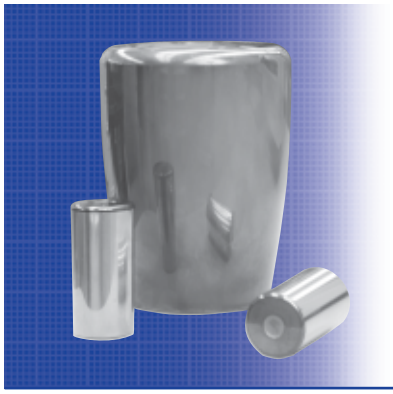
Size range:
0 mm – 1,016 mm OD
(0" – 40")

Thin Dense Chrome™ bearings use a proprietary hard coating technology to provide superior corrosion resistance in wet or corrosive environments including acidic and basic solutions. This technology can be applied to ball, spherical, cylindrical and tapered bearings for applications in paper mills, maritime, heavy movable structures, food processing, aerospace and pillow blocks.

Debris Solutions

Size ranges:
Typically 203.2 mm and larger
(8" and larger)

The Timken debris solutions program combines enhanced bearing products with unique application services. When sand, dirt, scale and wear particles hinder bearing performance, causing surface dents, debris cracks and premature failures, customers can apply Timken debris-resistant bearings. This technology can mitigate the effects of debris damage to extend life up to two times that of traditional bearings. Debris Signature Analysis™ is a computer-based modeling tool that quantifies the effect of debris damage on bearing life. The debris solutions program is available for tapered, cylindrical and spherical bearings.



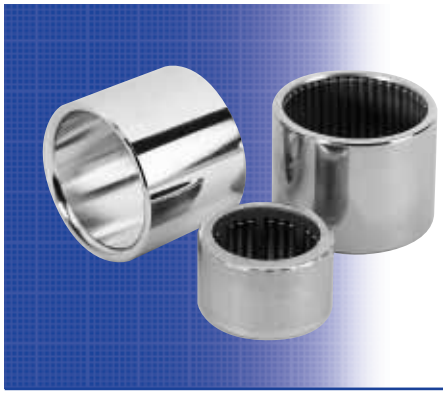
Engineered Surfaces

- **Available on tapered, spherical and cylindrical bearings as well as other non-bearing components**

This Timken technology incorporates a range of enhancements from topographical modifications that reduce friction to extremely hard coatings that combine high abrasion resistance and low friction. Tribological surface treatments improve wear, fatigue and frictional performance of components (i.e., gears and bearings) in applications. Engineered surfaces can be applied to all bearing types and a host of related components, including gears. These surfaces help protect against debris damage, false brinelling, scuffing, scoring, wear and marginal lubricant-related fatigue.

TIMKEN® TORRINGTON® NEEDLE ROLLER BEARINGS

Timken produces a broad range of radial and thrust needle roller bearings and bearing assemblies under the Torrington brand. Our needle bearings and assemblies are used in a variety of markets, including consumer products, construction, agriculture, automotive and general industrial goods.



Heavy Duty Needle Roller Bearings

Size range:
5 mm – 175 mm bore
(0.19685" – 6.88976")

Heavy duty needle roller bearings consist of a machined and ground channel-shaped outer ring with a complement of needle rollers retained and guided by a cage. The thick outer ring provides maximum load capacity and shock resistance with a relatively small radial cross section. With the high-strength cage retaining and guiding the rollers, this design provides optimum speed and lubrication retention capability. An optional lubrication groove and hole in the outer ring facilitate relubrication.

These bearings can be used with or without a machined and ground inner ring, depending on the suitability of the shaft as a raceway surface. Typical applications include gear pumps, sheaves, automotive transmissions and two-cycle engines.

Track Rollers/ Cam Followers

Size range:
16 mm – 100 mm OD
(0.6299" – 3.937")

Track rollers (also known as cam followers) are characterized by their thick-walled outer rings that run directly on a track. The thick outer rings permit high load-carrying capability while minimizing both distortion and bending stresses. These bearings, which contain a full complement of needle rollers, are available in two basic designs: with an inner ring for straddle mounting in a yoke or with an integral stud for cantilever mounting. A screwdriver slot or hexagonal wrench socket in the head of the stud facilitates mounting.

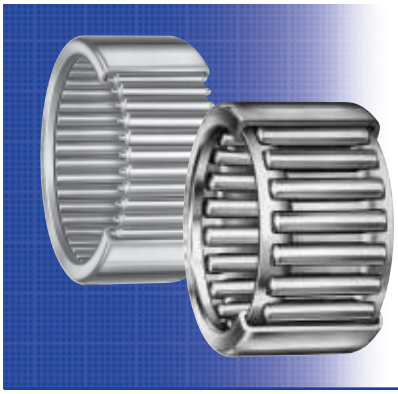
Sealed designs with internal thrust washers help extend service life under conditions of infrequent lubrication. Typical applications include ram support rollers, material handling and indexing equipment.

TIMKEN® TORRINGTON® NEEDLE ROLLER BEARINGS

DRAWN CUP

Drawn Cup Needle Roller Bearings

Size range:
8 mm – 55 mm bore
(0.31496" – 2.16535")



Drawn cup needle roller bearings support radial loads and reduce friction between rotating components with a drawn outer shell serving as a raceway for the rollers. The low cross section of the drawn cup bearing provides high load-carrying capability with minimum required space. Drawn cup bearings are easily installed with a press fit in the housing.

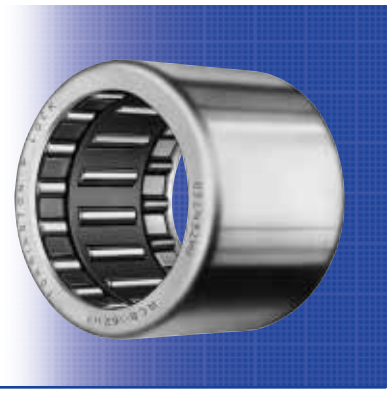
The full complement version (shown on the left) has the maximum number of rollers mechanically retained by the drawn outer shell. Closed-end bearings also are available. Typical applications include transmissions, transfer cases, engines, valve trains, steering and braking systems, axle supports, outboard engines, power tools, copiers, fax machines, paper-moving equipment and appliances.

The standard caged version (on the right) contains a one-piece steel cage to guide and retain the rollers. This design provides high speed and maximum lubricant retention capability. Closed-end and sealed bearings also are available. These bearings are applied in applications similar to the full complement design, especially where higher speed is required.

Drawn Cup Needle Roller Clutches and Drawn Cup Clutch and Bearing Assemblies

Size range:
4 mm – 35 mm bore
(0.15748" – 1.37795")

Drawn cup needle roller clutches are similar to drawn cup needle bearings in design, but allow free rotation in only one direction while transmitting torque in the opposite direction. These designs utilize the same small radial section as drawn cup needle roller bearings and are offered as clutch-only units or as clutch and bearing assemblies. They are compact, lightweight and operate directly on a hardened shaft with either the shaft or housing acting as the input member. Installation is easily accomplished with a simple press fit. Typical applications include office equipment, paper-towel dispensers, exercise equipment, appliances and two-speed gearboxes.



Heavy-Walled Drawn Cup Bearings

- **A variety of sizes available for industrial applications**

Heavy-walled drawn cup bearings can maximize load-carrying capacity and minimize shaft stress. This bearing type is designed to optimize bearing life in applications with excessive shaft slope. Heavy-walled bearings are used in a variety of applications including hydraulic pumps and axle shafts.

Thin-Walled Drawn Cup Bearings

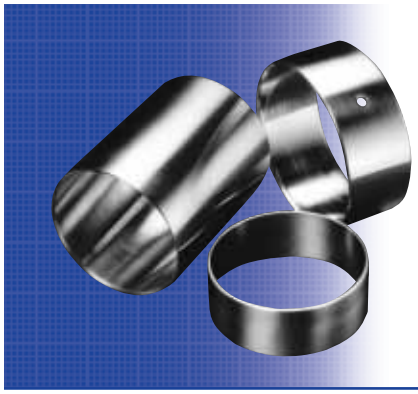
- **A variety of sizes available for industrial applications**

Thin-walled drawn cup bearings provide radial support with a minimal cross section. They often are specially designed for applications where space and weight are limited. Typical applications include speed changers and gearboxes.

Inverted Drawn Cup Bearings

- **A variety of sizes available for industrial applications**

Inverted cup bearings are designed with the rollers on the outside diameter of a drawn sleeve. The inner sleeve is used as the raceway and the housing is used as the outer raceway. These bearings are ideal for applications where grinding the shaft is not required, such as planetary gear sets.



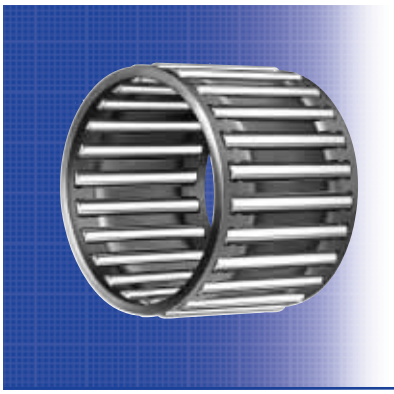
Drawn Sleeves

- **A variety of sizes available for industrial applications**

Drawn sleeves are used as inner raceways when the shaft does not meet bearing race requirements. Manufacturing costs may be reduced when drawn sleeves are placed over a machined and non-hardened shaft. Typical applications include transmissions, drives and motors.

TIMKEN® TORRINGTON® NEEDLE ROLLER BEARINGS

ROLLER AND CAGE ASSEMBLIES



Needle Roller and Cage Assemblies

Size range:
3 mm – 165 mm bore
(0.118″ – 6.496″)

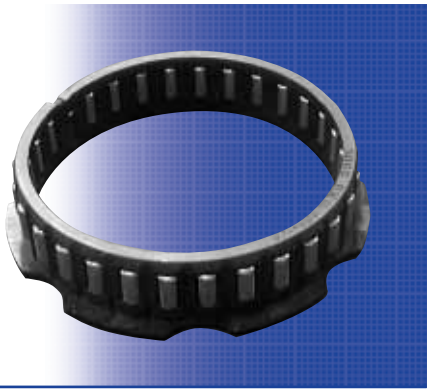
Needle roller and cage assemblies are a complement of needle rollers held in place by a cage. With no inner or outer ring, the low cross section provides a high load capacity and high limiting speed within the smallest envelope.

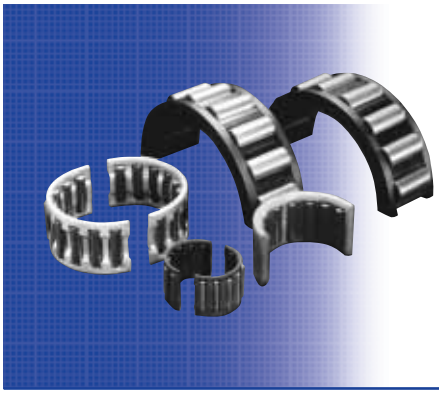
The mating shaft and housing are normally used as inner and outer raceways. The unitized design makes for easy handling and installation. Controlled-contour rollers reduce end stresses and allow operation under moderate misalignment. A variety of cage designs, styles and materials, as well as multiple roller paths and segmented constructions, meet broad application requirements. Typical applications include agricultural and construction equipment, two-cycle engines, pumps, compressors and automotive and truck transmissions.

Roller and Cage Bearings with Integral Flange

Size range:
3 mm – 165 mm bore
(0.118″ – 6.496″)

Integral flanges on roller and cage bearings help locate the bearing and manage limited thrust loads. The scalloped flange also helps to facilitate lubrication flow. Typical applications for these flanged bearings include drives and speed reducers.





Two-Piece Roller and Cage Bearing Assemblies

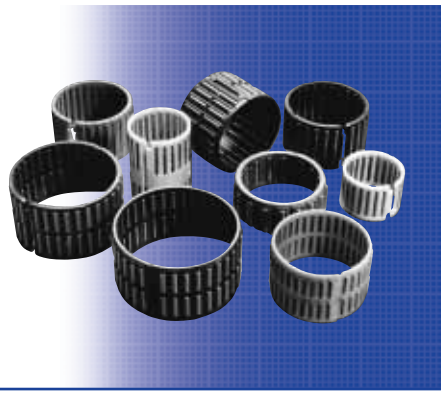
Size range:
8 mm – 85 mm bore
(0.314″ – 3.346″)

Two-piece roller and cage assemblies are used in applications where a one-piece cage cannot be installed. These specialized bearings are ideal for engine crankshafts. Cages are available with platings for applications with limited lubrication. In addition, these cages can be produced using engineered polymers capable of withstanding high temperatures.

One-Piece Split Cage and Roller Bearings

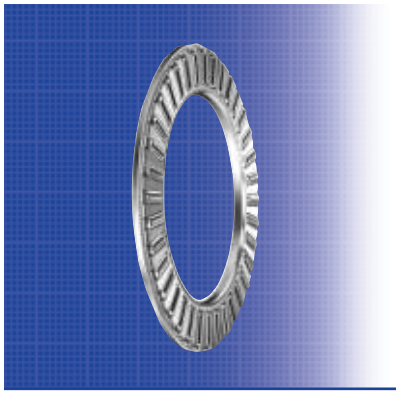
Size range:
3 mm – 165 mm bore
(0.118" – 6.496")

These bearings have a split design with a snap-together feature that eases installation. Bearings can be slipped over shafts that previously could not accommodate a slip-over unit. The unique single-piece design also prevents false brinelling in transmissions, speed changers and other applications.



TIMKEN® TORRINGTON® NEEDLE ROLLER BEARINGS

THRUST BEARINGS AND RACES

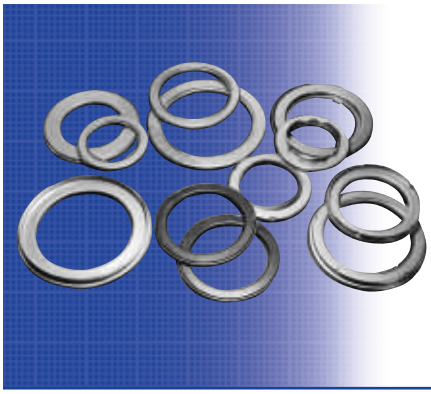


Thrust Needle Bearings and Races

Size Range:
6 mm – 160 mm bore
(0.236" – 6.299")

Thrust needle roller and cage assemblies are complements of small diameter needle rollers arranged in a spoke-like configuration. The needle rollers are equally spread and retained using a cage. This provides a unitized assembly. Needle thrust bearings offer a relatively small cross section capable of carrying high axial loads. Thrust bearing cages can be either heat-treated steel or polymer, depending on the application requirements.

Hardened thrust races are used when thrust bearing backup surfaces cannot be used as raceways. Races can be designed for bore or outer diameter piloting and can be supplied with special features to aid in customer assembly or to meet unique application performance requirements. These races also can be supplied separately or unitized to the thrust bearing assembly. Typical applications include compressors, drives, speed reducers and transmissions.



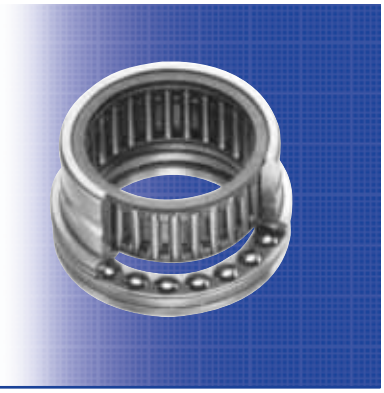
Unitized Thrust Bearing Assemblies

Unitized thrust bearing and washer assemblies allow for easy installation and eliminate the need for heat treatment and precision finishing of one or both thrust bearing backup surfaces. Special features can be added to the races for anti-reversal, during installation, and for lubrication flow and anti-rotation in the application.

Combined Radial/Thrust Bearings

Size range:
12 mm – 70 mm bore
(0.4724" – 2.7559")

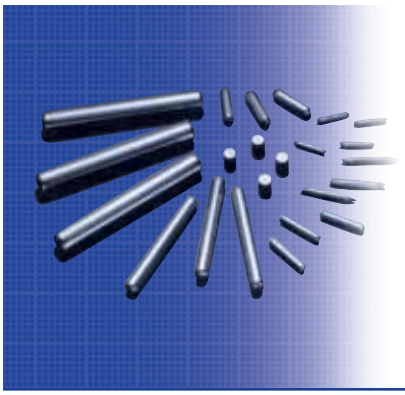
Used for combination loads, machined radial/thrust bearing units are available with either thrust ball or cylindrical rollers or with angular contact balls (single or double direction). This bearing is found in general industrial applications.



TIMKEN® TORRINGTON® PINS AND SHAFTS

Needle Rollers

Size range:
1.5 mm – 12.7 mm diameter
(0.059" – 0.5")



Needle rollers are primarily used as bearing rolling elements to reduce friction and support a load. They also can serve as precision shafts or as precision locating pins. Standard roller material is high-carbon bearing steel with G2, G3 and G5 outer-diameter tolerances. Needle rollers with a controlled-contour profile are available to reduce end stresses. In addition, special end forms provide performance benefits for specific applications. Precision needle rollers have multiple uses in a variety of industries including farm and construction equipment, two-cycle engines, outboard engines, and automotive, truck, and consumer durables.

Precision Shafts

Size range:
5 mm – 23 mm diameter
(0.197" – 0.905")

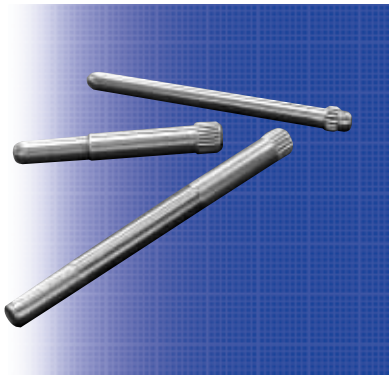
10 mm – 105 mm length
(0.393" – 4.134")

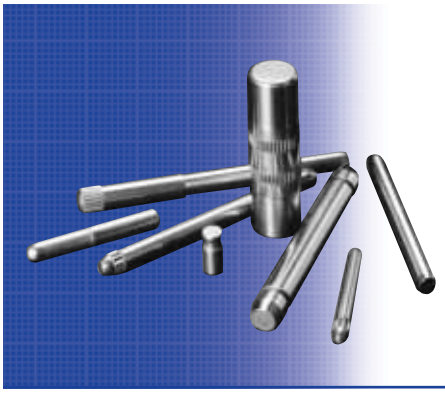
Precision shafts are used in planetaries, differentials and engine valve trains. They can be made from high- or low-carbon bearing-quality steel. All shafts have a raceway hardness of 60 to 64 HRC. Special features available are optional soft ends for staking, axial and radial lubrication holes, crowned outer diameters, broached ends, and both axial and circumferential location features.

Special Features for Pins and Shafts

Size range:
3 mm – 12 mm diameter
(0.118" – 0.472")

Timken offers a variety of special features for pins and shafts to meet many industrial applications. Our facilities utilize state-of-the-art design and manufacturing equipment including in-house heat treating, precision grinding and a complete on-site metallurgical lab in order to produce high quality, precision parts. Some standard features include spherical ends, corner radius, grooves, knurls, end holes, and machined tenons. Customized features include threads, flats, cross holes and form ground diameters. Timken pins and shafts are found in diesel engine fuel pump shafts, gear shafts, steering column pins, aircraft gear reducers, automated assembly applications and a wide array of automotive applications.





MACHINING, HEAT TREAT AND GRINDING TECHNOLOGY
DIMENSIONAL CAPABILITIES

DIAMETER			LENGTH		
MILLIMETER		INCH	MILLIMETER		INCH
0.75-20	Min. – Max. Size	0.030-0.787	2-150	Min. – Max. Size	0.080-5.91
0.025	Machine Tolerance – Soft	0.001	0.075	Machine Tolerance – Soft	0.003
0.04	Machine Tolerance – Hard	0.0015	0.15	Machine Tolerance – Hard	0.006
0.0025	Standard Grind Tolerance	0.0001	0.015	Grind Tolerance	0.0006
0.001	Precision Grind Tolerance	0.00004	0.004	Squareness	0.00016
0.0006	Roundness	0.00002	0.200 μm	End Face Finish, Ra	8 μin.
0.001-0.013 mm/mm	Straightness	0.000040-0.0005 in./in.			
0.08-0.20 μm		Surface Finish, Ra	3-8 μin.		

TIMKEN® FAFNIR® BALL BEARINGS

Timken is a premier manufacturer of ball bearings. Whether it's a standard single-row deep groove radial ball bearing or an advanced integral design, Timken has a solution. Timken® Fafnir® ball bearings are found in a broad range of applications including agriculture, food processing, pumps and compressors, electric motors and other precision industrial applications.

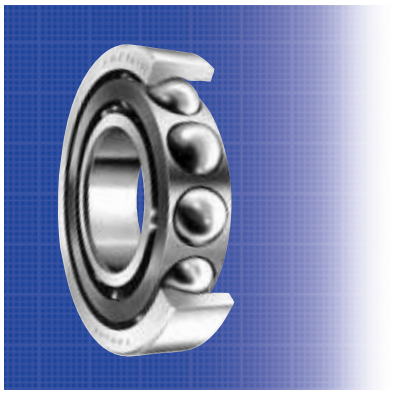
Radial Ball Bearings

Size range:
3 mm – 600 mm bore
(0.12" – 23.62")

Radial ball bearings consist of an inner and outer ring with a cage containing a complement of precision balls. The standard Conrad-type bearing has a deep-groove construction capable of handling radial and axial loads from either direction in versatile designs that permit relatively high-speed operation.

In addition to standard single-row deep groove bearings, Timken offers special designs, including a maximum capacity series and an extra large (XLS) radial series bearing.

Various seal and shield configurations, which help protect internal bearing components and retain lubricants, are available to suit a wide array of applications. Also, many Timken Fafnir ball bearings are available with snap ring grooves to simplify mounting.



Single-Row Angular Contact Ball Bearings

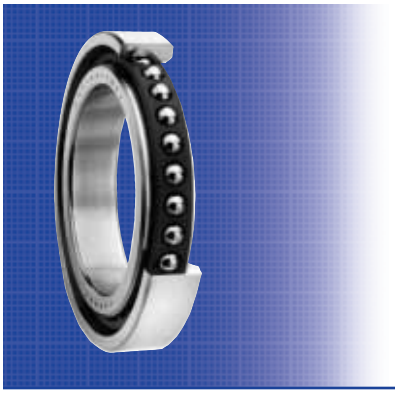
Size range:
10 mm – 150 mm bore
(0.3937" – 5.9055")

Double-Row Angular Contact Ball Bearings

Size range:
12 mm – 150 mm bore
(0.4724" – 5.9055")

Timken Fafnir angular contact ball bearings are designed for maximum radial and axial loading. Single-row bearings have high thrust capacity in one direction. Some single-row bearings are specifically designed for duplex mounting in sets for maximum performance. The special geometry of angular contact bearing raceways and shoulders creates ball contact angles that support higher axial loads. Different designs offer contact angles ranging from 20 to 40 degrees. Higher angles provide more axial load capacity.

Double-row angular contact bearings offer rigidity, compactness and high capacity. The two rows of balls provide large radial capacity with moderate thrust capacity in either direction. They are available in Conrad (K) construction with uninterrupted race shoulders, as well as the maximum-capacity type. These bearings are suited for pumps, compressors and general industrial applications.



Angular Contact Machine Tool Ball Bearings

Size range:
10 mm – 300 mm bore
(0.3937" – 11.811")

Timken® Fafnir® super precision ball bearings are designed to meet demanding machine tool requirements for high speeds, accuracy and rigidity. These bearings are manufactured to ABEC-9 running tolerances, the most precise tolerances recognized by the ball bearing industry. Most super-precision ball bearings have contact angles of 15 or 25 degrees for different combinations of radial and axial loads. Special raceway finishes and ball bearing designs achieve the highest possible operating speeds. Typical applications include high-speed grinding, high-speed boring and milling, precision-vertical and horizontal milling spindles and high-speed routing.

High Speed Sealed Angular Contact Bearings

Size range:
10 mm – 140 mm bore
(0.3937" – 5.5118")

Timken® Fafnir® super precision sealed angular contact spindle bearings are specifically designed to increase spindle productivity by extending bearing service intervals. The design protects the lubricants from contamination and ensures lubricant retention. Bearings operate accurately and at cooler temperatures in spindle applications – even at speeds 20 percent higher than competitor bearings.

Ceramic Hybrid Angular Contact Bearings WI and HX Series

Size range:
10 mm – 200 mm bore
(0.3937" – 7.874")

Timken® Fafnir® hybrid ball bearings combine ceramic rolling elements with superfinished steel rings to run faster, cooler and longer in high-speed machine tool spindles and other demanding applications. The advanced design and materials help improve rigidity while reducing noise, vibration and operating temperature. They can be ordered with or without seals and obtained with standard (WI) designs for slow to moderate speeds or with Timken proprietary high-speed (HX) design for fast- to ultra-high operating speeds. Typical applications include high-speed machining and grinding spindles, high-speed mills, precision instruments, pumps and compressors, biotechnology equipment and aircraft generators.

Ball Screw Support Bearings and Housings

Size range:
17 mm – 100 mm bore
(0.6693" – 3.937")

Ball screw support bearings are manufactured to ABEC-9 ISO tolerances in the axial direction, the most precise tolerances recognized by the ball bearing industry. They are pre-lubricated and supplied in sets with 60-degree contact angles and a maximum ball complement for high capacity and axial rigidity. They are preload ground to the highest industry standards to optimize stiffness and tool positioning.

Ball screw support bearings are available in single-row and double-row designs, and in cartridge units that house two to six ball screw bearings. Multi-row varieties offer easy and flexible installation.

Ball screw support bearings are widely used in motion-control applications, including grinding, milling and machining centers.

TIMKEN® TORRINGTON® BALL BEARINGS

HEAVY INDUSTRY

Type BC/BIC

Size range:
305 mm – 900 mm bore
(12" – 35.43")

Type BC/BIC heavy industry ball bearings are a series with extra large diameters. They are of the Conrad or non-filling slot design and their compact sections make them particularly adaptable in applications where space is restricted.

Type BA/BIH

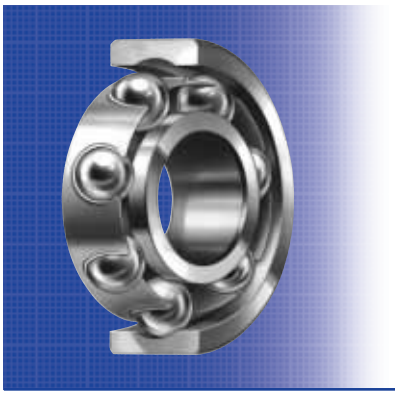
Size range:
305 mm – 900 mm bore
(12" – 35.43")

Type BA/BIH heavy industry ball bearings are maximum capacity angular contact bearings and feature a counter bored outer ring that permits an increased number of balls. These bearings can carry thrust in only one direction against the full-shouldered side of the outer race. Their compact sections make them particularly adaptable in applications where space is restricted.

TIMKEN® BALL BEARINGS

SUPER PRECISION MINIATURE AND INSTRUMENT BEARINGS

Timken produces precision bearings and assemblies in miniature, instrument and thin-section series. All are manufactured with quality steel, tolerances and features that meet demanding application challenges. These precision bearings and assemblies are applied in surgical and medical imaging devices, precision pumps, measurement and material handling equipment as well as guidance, weapons and space applications.



Radial Ball Bearings

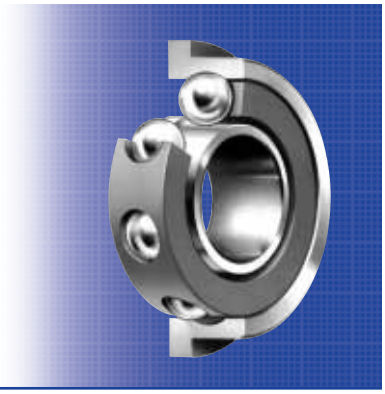
Size Range:
1 mm – 9 mm bore
(0.039" – 0.35433")

Radial ball bearings are manufactured to ABEC-7P tolerances. These bearings use 440C stainless steel. However, 52100 also is available. Steel, ceramic and titanium carbide steel balls are used as well as shields, seals and flanges. Typical applications include guidance systems, medical equipment (surgical instruments and devices) and flow meters.

Angular Contact Ball Bearings

Size Range:
0.635 mm – 12.7 mm
(0.025" – 0.5")

Super precision angular contact ball bearings are available in inch sizes. Angular contact bearings are manufactured to the same tolerances and standards as the radial ball bearings. A variety of standard retainer materials and flanges is available within standard specifications. Typical applications include gyroscopes used in guidance systems, dental hand pieces and other high-speed applications.



TIMKEN® BALL BEARINGS

SUPER PRECISION THIN SECTION AND TORQUE TUBE BEARINGS

Radial Ball Bearings

Size Range:
9.53 mm – 152.4 mm bore
(0.375" – 6")

These Conrad bearings are available in standard ABEC-5T precision. The deep-groove construction allows handling of radial, thrust or combination loads. These are offered primarily with 440C stainless steel rings and balls with a one-piece fully machined snap-in phenolic cage. Other material and separator options are available. Steel and ceramic balls are available as standard. Standard Buna-N rubber shields and seals are offered as well. Typical applications include gimbals, rotary joints and robotics. Fractured race bearings are available for specialty applications.

Angular Contact Ball Bearings

Size Range:
9.53 mm – 152.4 mm bore
(0.375" – 6")

Thin-section and torque-tube angular contact bearings offer maximum ball complement with a one-piece precision-machined retainer. They are available in standard ABEC-5T precision. The increased ball complement, combined with a relatively high contact angle, maximizes axial stiffness. Rings and balls are normally 440C stainless steel, but other material options are available. Steel and ceramic balls are available as standard. Typical applications use preloaded pairs for maximum stiffness and precise positioning.

TIMKEN® FAFNIR® BALL BEARINGS

WIDE INNER RING

Wide Inner Ring Ball Bearings

Size range:
15 mm – 75 mm shaft
(0.59" – 2.9528")

Wide inner ring ball bearings consist of a single-row ball bearing and an extended inner ring. Designed for ease of mounting and maximum shaft support, Timken® Fafnir® wide inner ring ball bearings carry radial, axial and combination loads. The extended inner ring slips onto the shaft and secures with a locking mechanism. These bearings are used in a variety of agricultural, fan and blower, food processing and conveyor applications.

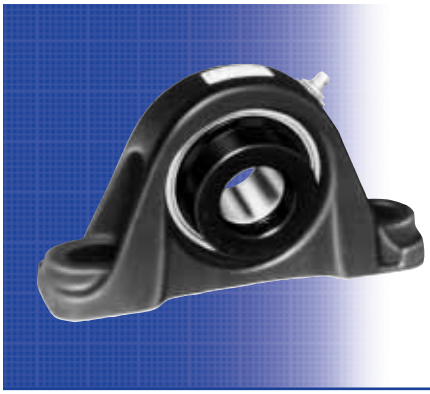
Timken Fafnir wide inner ring ball bearings are available with a variety of shaft locking collars, set screws and concentric locking collars.

Locking Devices

- **Eccentric locking collars provide superior holding power and minimum shaft distortion. They are designed to tighten during operation**
- **Concentric locking collars combine the ease of use of set screws while eliminating inner ring distortion**
- **Set screws provide a simple method of mounting that is well suited for reversing applications**

TIMKEN® FAFNIR® HOUSED UNITS

Timken® Fafnir® housed units are available in a wide variety of types and sizes to accommodate a complete range of operating conditions. The units typically are made from iron and feature inner-ring locking devices that ease installation.



Ball Bearing Pillow Block Units

Size range:
12.7 mm – 75.4 mm shaft size
(0.50" – 2.968")

Equipped with a wide inner ring bearing and a spherical outer ring, these units are easy to mount and install. Timken® Fafnir® pillow block units are available in standard, medium and heavy series. The standard series pillow blocks are offered in a low or high base to center height configurations.

While most popular housed units employ a cast iron housing, other material options include malleable iron, pressed steel or rubber. Typical applications include agricultural equipment, fans and blowers, food processing and conveyors.

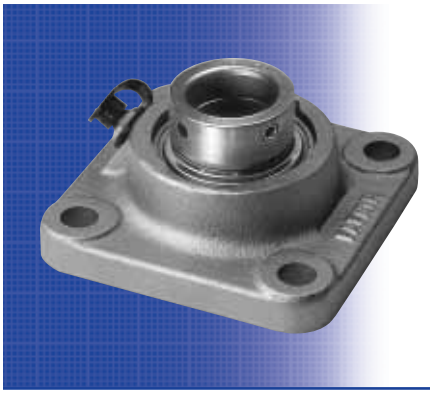
Ball Bearing Flanged Units

Size range:
Four-bolt flanged unit
12.7 mm – 75 mm shaft size
(0.50" – 2.953")

Two-bolt flanged unit
12.7 mm – 55 mm shaft size
(0.50" – 2.1875")

Ball bearing flanged units have similar features to pillow blocks and are mounted by bolts through the housing flange. The standard housing material is cast iron. Housings also are available in heavy-duty malleable iron, pressed steel or rubber for two-, three- or four-bolt fastening.

A complete range of safety end caps is available to protect workers from exposed shafts (see next page). Similar to pillow blocks, typical applications include agricultural equipment, fans and blowers, food processing and conveyors.



Survivor® Series Housed Units

Size range:
NT Series
17 mm – 75 mm shaft size
(0.669" – 2.953")

PT Series
20 mm – 40 mm shaft size
(0.75" – 1.5")

Survivor® Series housed units and flanged cartridges are ideal for highly corrosive environments. Available in several varieties, the NT design features an electroless nickelplated housing, stainless steel balls, a stainless steel self-locking collar and FDA/USDA-compliant grease to prevent contamination. The PT series features polymer housings and a 300 series stainless steel insert to provide the highest possible corrosion resistance.

Safety End Caps

- **Guards exposed rotating shafts, reducing hazards around many types of equipment**

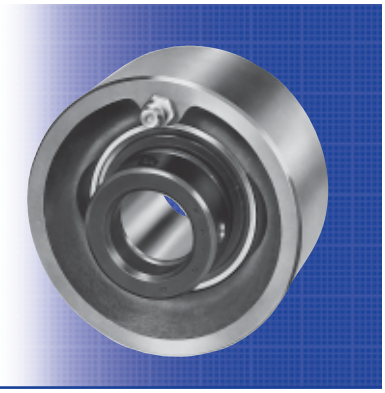
Easy-to-install safety end caps guard exposed rotating shafts, reducing hazards around many types of equipment. This product line consists of mounting rings and snap-on covers, both molded in durable, bright yellow polymer.

Safety end caps snap into adhesive-backed rings that adhere to the outboard face of most flanged bearing housings. The secure, 360-degree fit also provides basic protection from contaminants. Safety end caps meet all applicable OSHA requirements.

Ball Bearing Cartridge Units

Size range:
12.7 mm – 61.9 mm shaft size (0.5" – 2.437")

Ball bearing cartridge units have straight and spherical bore mountings. These units feature positive contact seals. Cast iron housings are used for normal duty and rubber housings are for light-duty. Options include coated bearing inserts with nickelplated or polymer housings that resist corrosion in difficult operating environments. Typical applications include agricultural equipment, fans, blowers, food processing machines and conveyors.

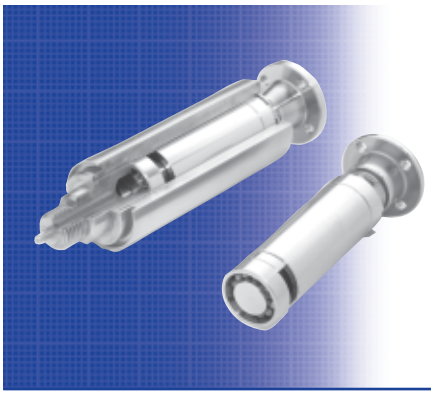


Take-Up Units

Size range:
12.7 mm – 61.9 mm shaft size (0.5" – 2.437")

Take-up units are used when shaft adjustment and belt tensioning devices are required. The bearings are mounted in the housing and both ball and roller bearings can be used. Cast iron and pressed steel housings are available. The adjustable travel lengths are up to 457.2 mm (18") for ball bearings and 915 mm (36.0236") for roller bearings.

Options include coated bearing inserts with nickelplated or polymer housings that can resist corrosion in difficult operating environments. Take-up units can be adhered to shafts through self-locking collars, setscrews or concentric collars. Typical applications are agricultural equipment, fans and blowers, food processing and conveyors.



Extreme Environment Bearings

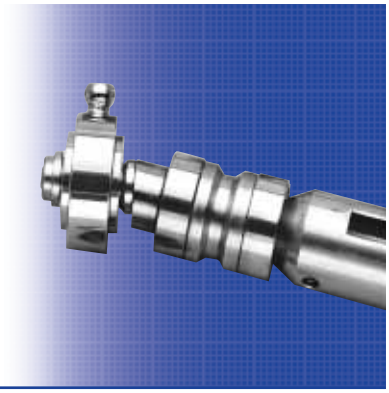
- **Extreme environment bearings extend bearing life.**

Timken offers products that stand up to the most extreme environments by working with nontraditional materials and processes to extend bearing life. Extreme environments are those such as highly corrosive, high temperature, vacuum, lacking lubrication or requiring non-magnetic operations. Typical applications include x-ray tubes, space mechanisms, semiconductor equipment, flow meters and can seaming.

Precision Assemblies

- **Custom integration and application design considerations are a specialty**

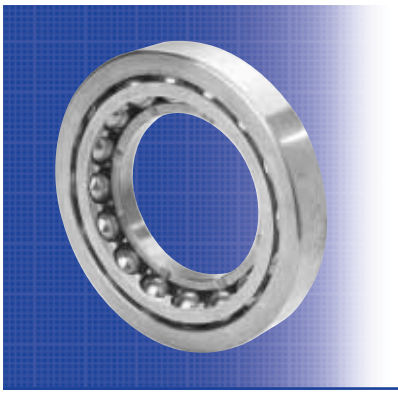
From missile guidance systems to robotic joints and solar array drive applications, Timken is leading the way in technology with precise, miniature instrument and thin-section bearing assemblies. Multiple component assemblies are redesigned for reduced tolerance stack-up, enhanced performance and ease of handling. The design often incorporates standard bearings into complex assemblies.



TIMKEN AEROSPACE BEARINGS AND PRECISION COMPONENTS

While based on standard configurations, aerospace bearings are designed to meet the unique requirements of the industry. Most bearings used in aerospace applications are made from vacuum-melt 52100 or VIM-VAR M-50 and are normally manufactured to ABEC/RBEC 5 tolerances with high-strength machined cages. Other special materials are available for performance enhancement. Standard configurations are available in sizes from 10mm bore to 300 mm OD with special designs up to 600 mm OD.

Ball Bearings for Aerospace Applications



Various ball bearing configurations are available for aerospace applications and are specially designed to handle radial, thrust, moment, reversible thrust or combination loads as required. Bearings may be supplied as single units or in preloaded sets.

There are two basic Conrad constructions. The HK series is designed to handle radial, thrust, moment, reversible thrust or combination loads. It also has high-strength Conrad separator options that can manage severe loads and speeds. The HD series, with its innovative fractured outer ring design, allows for maximum ball complement in a radial deep-groove bearing. This provides significant improvements in dynamic load capacity and predicted service life.

Two angular contact configurations are available. The HA series is a non-separable design with counter-bored outer rings and one-piece, high-strength separators. It is used in preloaded and/or thrust-type applications. Options include deep-groove outer and relieved inner races for ultra-high-speed applications. The high-performance HT series, with full deep-groove outer rings, one-piece, high-strength separators and two extra-deep-groove inner ring halves, is typically used on high-speed shafts with reversing thrust loads.

Cylindrical Roller Bearings for Aerospace Applications

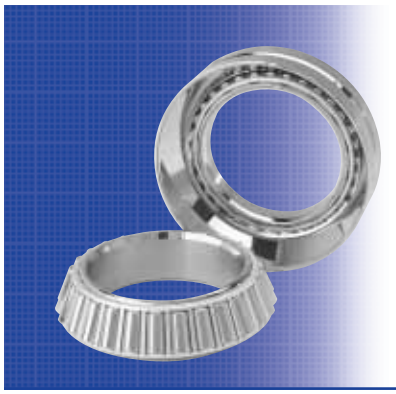
All cylindrical roller bearing configurations, except RAA, provide precision control of the rollers for operation over a wide range of speeds with precision-ground, double-ribbed guide flanges on one ring. These roller bearings are found in turbine engine mainshaft, transmission and gearbox applications with high radial loads.

RF and RJ configurations work well with applications requiring axial position control or limited thrust capabilities in one direction. Under higher loads and at higher speeds, the RJ configuration is easier to lubricate with an oil jet onto the inner race. RU and RN are full-floating configurations that allow limited axial motion during operation. RN is less prone to slip or skid under lighter loads or varying loads at high speeds. RU is easier to lubricate under heavier loads.

RUS and RNH bearings are used in integral designs where the rollers run directly on a hardened and ground shaft or housing. Performance characteristics are similar to RU and RN. The RAA configuration has single-ribbed inner and outer rings and performs under low speeds or oscillating conditions. It has high guide flanges to accept some thrust in one direction.

Timken cylindrical roller bearings achieve superior performance through exceptional control of roller geometry. Rollers in all sizes over 3.5 mm are contoured by crown blending for uniform stress distribution under load. The length is closely matched for uniform minimum clearance within the guide flanges to ensure optimum tracking at all speeds. These "square" rollers have superior ability to accept thrust and misalignment. Rollers of diameter-to-length ratio less than one can be supplied where it is critical to maximize capacity and accommodate load conditions and OD restrictions.

Tapered Roller Bearings for Aerospace Applications



Timken tapered roller bearings are used in landing wheels on commercial airliners worldwide because Timken is the brand of choice. Tapered roller bearings can withstand high accelerations and decelerations, heavy loads and a variety of temperature and environmental conditions.

Timken aircraft landing wheel bearings have been designated "2-629" (imperial) or "N-629" (metric), signifying that they are designed and manufactured for the application, achieving superior performance through tightened tolerances. The typical design is the single-row TS type that can be set to a required clearance or preload to optimize performance.

Tapered roller bearings also are used extensively in helicopter transmissions and rotor support systems, where heavy combined radial/axial/moment load requirements are found. In addition to standard single-row configurations, double-row dissimilar series designs with asymmetric thrust capacity may be supplied with or without mounting flanges for unique applications.

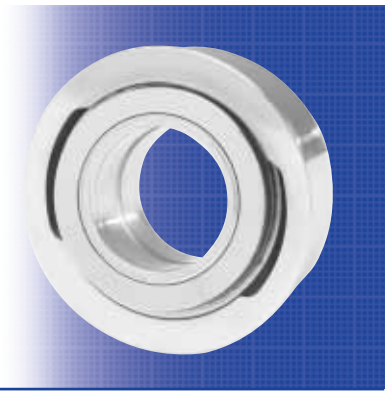
To help extend bearing life in landing wheels and helicopter transmissions, Timken can apply engineered surfaces, including topographical enhancements and coatings, that help prevent scuffing damage and other surface-to-surface issues.

Needle Roller Bearings for Aerospace Applications

Timken offers a broad selection of needle bearing designs, from drawn cup and machined-race bearings to track rollers, thrust bearings and combined axial/radial bearings. These are generally used for high-load applications requiring low to moderate speeds. Timken® aircraft products are designed for specific applications requiring high load capacity within minimum space requirements.

Assemblies incorporating rollers or cam followers are manufactured in accordance with the requirements of the application, particularly in the case of flight controls. Special design options include a wide range of geometries, clearances, seals, lubricants and performance features. Self-aligning units and high-temperature capabilities are available. Special steels – with surface treatments such as coating and plating with copper, chromium, silver and even gold – are used for specific operating conditions.

Timken products have a reputation for reliable performance in airframe and landing systems, as well as mechanical accessories such as engine nozzle controls, helicopter rotor blade supports and various servo controls.



Spherical Roller Bearings for Aerospace Applications

Timken self-aligning spherical roller bearings combine excellent radial load capacity and moderate thrust load capacity. They are the preferred choice when conditions include heavy loads and difficulties with housing alignment or shaft deflection. These loading conditions are compensated for by the internal self-alignment of the bearing elements during operation. Optimal bearing capacity can often be realized with up to ± 1.5 degrees of misalignment.

For most aerospace applications, the bearings are made with integral gears on the outer ring for use in planetary gear sets of speed reduction systems. Typical uses are in main reduction gear transmissions for helicopter main rotor drives and turboprop gas turbine aircraft engines.

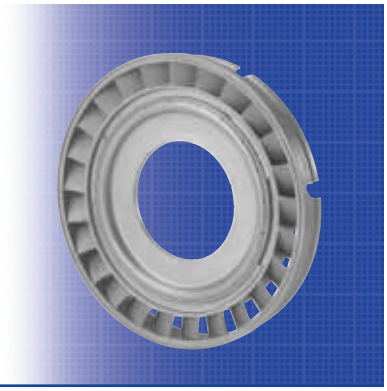
Both single- and double-row configurations are available. Design modifications include: machined-steel, high-strength cages with low-friction coatings; corrosion-resistant plating or coating and high-temperature alloys and proprietary gear teeth coatings for increased service life under high load conditions.

Precision Components and Subsystems for Aerospace Applications

In addition to its leadership position in aerospace bearings, Timken now offers an expanding line of precision components for gas turbine engines and accessory systems. The broad range of high-quality products includes complete gears, first- and second-stage nozzles and oil coolers, as well as detail parts such as power transmission supports, gearbox covers and housings, and combustion liners or nozzles.

Through innovative design and manufacturing, Timken is able to offer creative solutions with higher performance and lower cost.

Combining these products with bearings expands our ability to deliver innovative solutions through complex assemblies, integrated subsystems and extended services to aviation customers.



Repair Services for Aerospace Applications

Timken operates repair stations around the globe to support the maintenance and overhaul needs of commercial and military aviation.

Timken offers FAA/DER- and OEM-approved bearing repairs, including comprehensive services on most engine mainshaft, gearbox and accessory applications. Bearing repair and overhaul requires far less time than manufacturing replacements.

Quick turnaround times also are supported through pools of overhauled bearings for customers, allowing them to reduce inventory and support just-in-time and other cost-minimization programs.

Strict quality requirements are met throughout the repair process, which varies from simple cleaning and inspection to honing, polishing or replacing rings. In most cases, the rolling elements are replaced.

Timken aerospace services are approved by the FAA, a number of aerospace OEMs and branches of the U.S. military.

In addition, Timken's capabilities now include the development of proprietary repair and restoration procedures for critical gas turbine engine components and systems. Timken specialized technologies include turbine nozzle casting replacement, nozzle shield restoration, combustion liner refurbishment and the repair and restoration of many other parts, such as diffusers, compressors and gear cases. All repairs are completed under OEM manual or DER-developed, FAA approved guidelines.

TIMKEN INTEGRATED ASSEMBLIES

The Timken Company strives to provide customers with solutions that add value through performance and convenience. Packaged designs combine several elements – bearings, pins, casings and electronic sensors – to reduce friction and improve efficiency. Packaged products are also pre-lubricated and sealed to ease installation and maintenance while protecting components against debris and other wear conditions.

AP™ Bearings

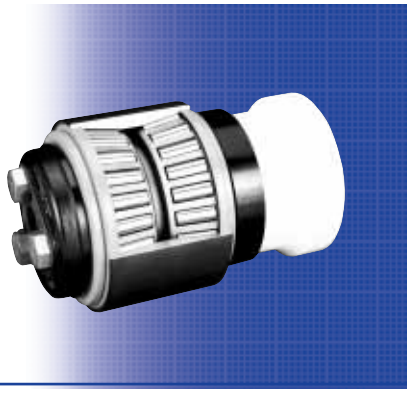
Size range:
85.725 mm – 203.2 mm bore
(3.375" – 8")

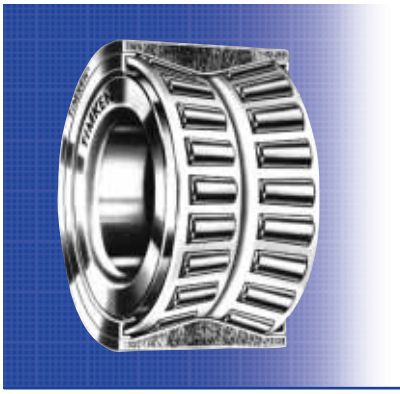
The AP™ bearing is a self-contained, preset, pre-lubricated and sealed tapered roller bearing assembly. Originally designed for railroad cars and locomotives, AP bearings now also are used in crane wheels, table rolls and sheaves. These applications may require modifications to the end cap and backing ring, as well as the addition of lubrication fittings.

AP-2™ Bearings

Size range:
144.4498 mm – 165.0873 mm bore
(5.687" – 6.4995")

With the Timken AP bearing as the foundational design, the AP-2™ carries heavier loads at a reduced bearing weight. Its shorter journal minimizes axle flexure, which reduces fretting wear between the bearing components. The AP-2 is used in rail and industrial applications.





UNIPAC™/ UNIPAC-PLUS™

- **Bearing life is optimized through reduced bearing setting**

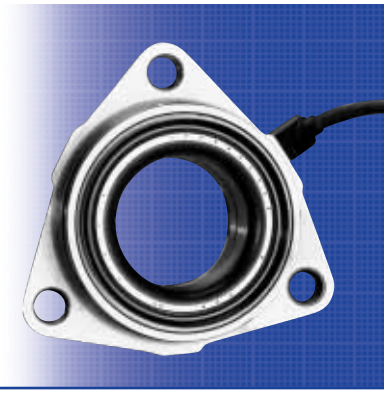
The UNIPAC™ is a two-row tapered roller bearing, supplied as a maintenance free, pre-set, pre-lubricated and sealed package. Originally designed for the high-volume needs of passenger car wheels, the UNIPAC bearing now has wider applications in wheel hubs of heavy vehicles and industrial equipment.

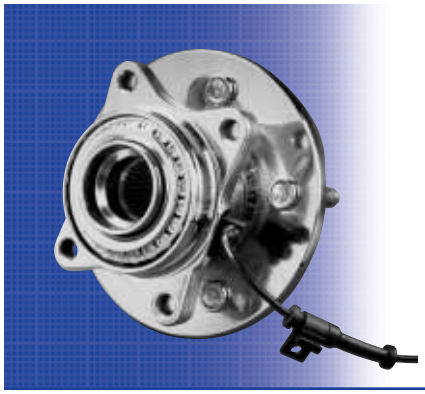
Extending the functionality of the UNIPAC bearing, the UNIPAC-PLUS™ incorporates a flange to ease mounting of the bearing assembly and to simplify servicing.

SENSOR-PAC™

- **Active sensor transmits speeds as low as zero**
- **Lowers total system costs**
- **Internally mounted sensor protects against debris**

This bolt-on automotive wheel bearing package for light-duty applications features an integral sensing system designed to improve performance for anti-lock brake systems and traction control systems. SENSOR-PAC™ provides superior performance in minimal space with equal load capacity.





Formed Hub Wheel End System

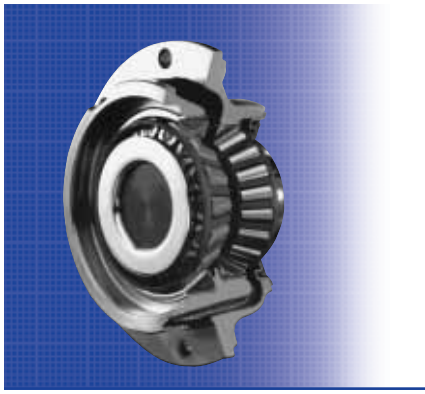
- **Lowers total system cost by eliminating the expense of added components**
- **Reduces weight by using fewer components**

The formed hub wheel end system is a single integrated unit that can be bolted directly onto passenger car and light truck wheel corners, eliminating the need for conventional components such as washers, spacers and nuts. It also holds bearing settings more consistently since there is not a nut to loosen and back off. This also allows the formed hub wheel end system to deliver reduced rotor runout and improved brake performance. Since it is self-clamped, it eliminates the high axial clamp load of conventional wheel ends.

Generation III™ Bearing

- **Reduces assembly costs**
- **Smaller package allows wheel end designers to make more robust components**
- **Minimizes scrub radius for improved braking and maneuverability**

The Generation III™ bearing is a self-retained, integrated package bearing with active sensing technology that offers design flexibility and bolt-on simplicity. This bearing package also features improved stiffness and brake performance and reduced weight. The fully serviceable wheel speed sensor is internally mounted and protected from road hazards, debris and potential damage.



Pinion-Pac™

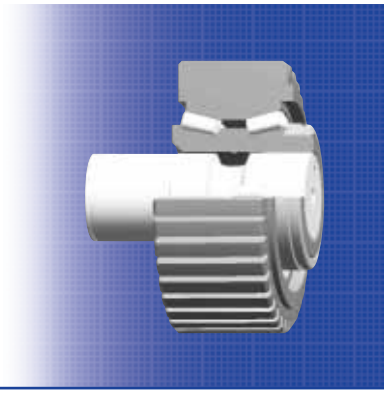
- **Improves gear reliability and bearing life**
- **Reduces noise, vibration and harshness**

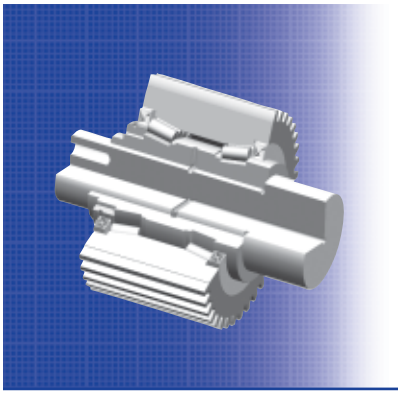
The Pinion-Pac™ is a ready-to-install, pre-sealed, pre-set tapered roller bearing unit that speeds axle assembly and improves system performance. The superior system stiffness delivers improved gear reliability and reduces noise, vibration and harshness. The Pinion-Pac also features an integrated seal, which reduces the finishing requirements for the companion flange.

Integrated Flex Pin Bearing

- Reduces gear misalignment
- Improves power density
- Pre-set bearing clearance eases installation

The integrated flex pin bearing is designed to improve the performance of epicyclical gearing systems by reducing gear misalignment, decreasing unit loading, improving load distribution among the planet idlers, enhancing power density and, in some cases, significantly extending bearing life. The outer races are integrated into the gear, while the inner races are integrated into the sleeve. This assembly comes with a preset bearing clearance for easy mounting in wind turbines.





Integrated Planet Gear

- Operates at lower temperatures
- Increases gear and bearing life
- Seal design allows for easy greasing

The integrated planet gear bearing features a seal design that allows for greasing. It can be configured with one- or two-piece carriers, and both operate at lower temperatures to increase gear and bearing life.

RacePac®

- Increases horsepower by decreasing torque
- Runs 20 to 30 percent cooler
- Improves handling and safety
- Ideal for both short and long courses

Improved safety and increased speed is what Timken® RacePac® packaged wheel bearings offer racing teams. Designed as a packaged hub using specially engineered Timken tapered roller bearings and a patented seal design, RacePac is pre-assembled and ready for installation on front- and rear-wheel ends.

TIMKEN SENSOR TECHNOLOGY

Timken's core competencies in sensor technology center around speed, direction and position. Our engineers have extensive application knowledge of variable reluctance, magnetorestrictive and Hall-effect technologies. Patents in these areas have led us to unique magnetic designs, integrated circuit designs and custom sensor packages. Timken sensor applications range from high-resolution magnetic encoder feedback to simple active-speed sensing.

Speed, Direction and Position Sensing

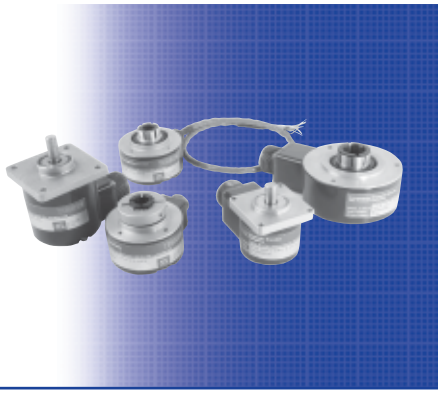
- **Offers custom and standardized solutions for speed and directional sensing**
- **Provides sensing for angular and linear positioning**

Timken offers unique solutions for speed, direction and position sensing that help customers develop safe, reliable and efficient systems. The speed and directional devices provide data for automotive and industrial systems in braking, steering, hydraulic controls and automatic transmissions. Timken also provides solutions for linear and angular position sensing. Our products are a result of extensive experience in Hall-effect and magnetic targets and are used in all-wheel steering on vehicles, hydraulic swash plates, steering wheels and columns.

Industrial Encoders

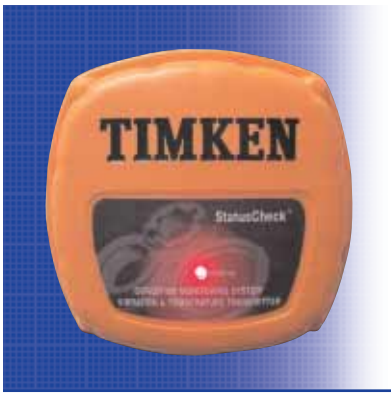
- **Resists high shock and vibration**
- **Offer resolutions of up to 4096 PPR**

Timken's line of shafted and hollow shaft high-resolution industrial encoders offers robust performance at an economical price. These industrial encoders feature high shock and vibration resistance, providing improved reliability in rugged operating environments. Resolutions of up to 4096 PPR with index pulse are available, depending on model. The designs incorporate dual ball bearings and shaft seals and can be designed for speeds in excess of 8,000 rpm.



CONDITION MONITORING

Timken has a broad offering of condition monitoring products and services that includes portable instruments, continuous monitoring devices and online systems. These products and services can help maximize uptime with the development of cost-effective solutions to achieve maximum output and reliable service. Increasing the useful life and productivity of your machinery directly impacts the bottom line.



StatusCheck™ Wireless Condition Monitoring System

- **One to 100 transmitters per system**
- **Software displays temperature and vibration**
- **Standard and intrinsically safe units available**

Timken StatusCheck™ condition monitoring system offers a comprehensive approach to tracking temperature and vibration trends. Wireless transmitters, which can be installed on hard-to-reach equipment, periodically send data to receivers that are integrated into computer systems. Transmitters, receivers and software are included in the StatusCheck system.

Handheld and Online Condition Monitoring Systems

- **Early detection of bearing damage and marginal lube film conditions**
- **Measures overall vibration to detect imbalance, misalignment and looseness conditions**
- **Advanced analysis techniques with preprogrammed evaluation models**
- **Available software to generate reports and trend results**

The Timken Company can help you monitor critical components and maximize uptime by implementing a cost-effective solution for your most demanding applications. Timken offers a range of products, from handheld instruments to online monitoring devices and systems.

TIMKEN LUBRICANTS

Lubricants

- Premium All Purpose Industrial Grease
- Ball Bearing Electric Motor Grease
- Construction and Off-Highway Grease
- Ball Bearing Pillow Block Grease
- Mill Grease
- Ultra-High Speed Spindle Grease
- Food Safe Grease
- Synthetic Industrial Grease
- Multi-Use Lithium Grease
- Available in a variety of sizes including 14-ounce cartridges, one-pound tubs, 35-pound pails, 120-pound kegs, 400-pound drums, blister packs, syringes and bulk quantities
- Timken Minapure® Grease

Building on extensive tribological bearing design and manufacturing knowledge, Timken has developed a proprietary line of industrial lubricants that help keep bearings and related components operating efficiently in a variety of environments. High-temperature, anti-wear and water-resistant additives offer additional protection in challenging conditions. Timken Minapure® Grease was introduced in response to an industry need for pure, ultra-clean grease suitable for use in miniature and instrument bearings and related components. Minapure Grease exceeds the requirements for MIL-PRF-81937 for purity and performance. It is available in one-pound containers.

TIMKEN SINGLE-POINT LUBRICATORS

Single-Point Lubricators

G-POWER (Gas Powered):

- Model 101 – 120 cc (4.05 fl. oz.) metal canister
- Model 102 – 100 cc (3.38 fl. oz.) plastic canister
- Model 103 – 120 cc (4.05 fl. oz.) metal canister

M-POWER (Motorized):

- Model 300 – 59.9 cc (2.03 fl. oz.), 120 cc (4.05 fl. oz.), 249.3 cc (8.45 fl. oz.)
- Model 400 – 59.9cc (2.03 fl. oz.), 120 cc (4.05 fl. oz.), 249.3 cc (8.45 fl. oz.)

Poor lubrication is one of the leading causes of bearing damage. To remedy this issue, Timken offers G-Power and M-Power single-point lubricators. These gas and motorized units lubricate bearings, chains, guideways and other equipment, helping to improve productivity and reduce maintenance costs.

Timken also offers a wide range of accessories, including brackets, adapters, hose extensions, mountings and other items, to connect G-Power and M-Power lubricators to your equipment.

TIMKEN MAINTENANCE TOOLS

Timken understands the importance of proper maintenance procedures that help maximize component and equipment life. High-quality Timken maintenance products help decrease downtime and lower operating costs. Timken's line of maintenance tools is an example of friction management solutions beyond bearings that keep your business running smoothly. These value-added products are grounded in our knowledge of motion, lubrication, friction and metallurgy. They are designed to help you extend bearing life through proper installation, removal and service.

Induction Heaters

- **Available for mounting gears, rings, couplings, bearings, railroad wheels, gears and other components**

Proper mounting extends the life of bearings. When mounting bearings or other components, induction heating is superior to traditional methods. In addition to providing even, damage-free heating, it saves time and energy. Preheating is unnecessary and induction heating is quick, safe and environmentally friendly.

Timken offers a large assortment of high-quality induction heaters designed for demanding industrial applications. They can heat and radially expand a variety of gears, rings, couplings, bearings and other components. All heaters are produced in accordance with international health and safety requirements. They feature a micro-processor-controlled power supply, automated time-and-temperature control and automatic demagnetization.

Impact Fitting Tools

- **Available for mounted products such as bearings, bushings, sealing rings, cam wheels and pulleys**

IMPACT COLLETS:
10 – 15 mm bore (0.4" – 0.6")
26 – 110 mm OD (1.02" – 4.3")

IMPACT SLEEVES:
18, 32, 52 mm bore (0.7", 1.3", 2.04")

Designed to permit safe, precise and quick mounting of bearings, bushings, sealing rings, cam wheels and pulleys, the Timken impact fitting tool set features impact-resistant plastic collets, which help deter metal-to-metal contact and the resulting shaft damage that can occur.

During the mounting of bearings such as ball and spherical roller bearings, where the faces lie in the same plane, the collets enable the load to be transmitted to the ring with the interference fit. Thus, mounting forces are not transmitted via the rolling elements and damage to the raceways is avoided.

Hydraulic Pullers

- **Excellent for removal of all kinds of shaft-fitted parts**

Timken has a wide range of self-contained, portable hydraulic pulling systems with capacities from four to 30 tons. These pullers consist of an integrated pump and safety-release valve. Each set is supplied with a carrying case and can be used to pull a variety of press-fit parts, including bearings, wheels, bushings, gears and pulleys. The pump handle is able to rotate 360-degrees, providing flexibility to use the puller in the most convenient position. Timken hydraulic pullers come with two and three legs.

Hydraulic Nuts

Supplied with:

- **Quick connection fittings (male G 1/4 and female 3/8 N.P.T.)**
- **Two pipe plugs (G 1/4)**
- **One set of spare O-rings**
- **Male-to-male extension**
- **Metal bar**

Hydraulic nuts are used to press parts with a tapered bore onto tapered seats, where the drive-up force of lock nuts and pressure bolts is not sufficient. With better control of the mounting process, proper internal clearance reduction can be obtained, improving fits and deterring premature bearing failures. These hydraulic nuts ease installation, even in tight workspaces.

INDUSTRIAL SEALS

Timken offers an extensive line of sealing solutions. These seals are used in a full range of equipment for thousands of applications such as manufacturing, off-highway, power transmission and oil refineries. Our industrial seals are made from innovative materials and processes that enhance life and performance in many industrial applications. Timken industrial seals are backed by the company's experienced technical support and distribution networks, giving distributors a single source for a wide range of bearings and value-added extras to keep bearings running optimally.

Industrial Seals

Timken offers a range of seal solutions, including oil and grease seals, V-Seals™, Redi-Seals® service, Redi-Sleeve™ technology, shaft repair kits and Redi-Coat®. Oil and grease seals prevent abrasives, corrosive moisture and other harmful contaminants from entering the mechanics of machines in a variety of environments.

V-Seals are made of Nitrile or Viton® and are highly elastic, easing installation. They also fit a broader range of shaft sizes and can be used on eccentric and misaligned shafts.

Redi-Seals service is an innovative program that provides customers with high-quality sealing devices within 24 hours of order.

Redi-sleeves are steel wear sleeves designed to be pressed onto a shaft. They provide an option to quickly repair damaged, grooved or worn shafts.

Shaft repair kits provide an alternate solution to replacing a shaft.

Redi-Coat is a patented sealant that fills nicks and scratches in poorly finished bores.

TIMKEN EXPRESS SERVICES

The speed of business today requires all participants in the supply chain to deliver products cost effectively and efficiently to end users. In some cases, product delivery must be expedited so that equipment can quickly return to full operation. Timken Express Services was developed to address those urgent needs.

Timken Express Services bridges the gap between readily available product at distributor locations and product that is difficult to locate or not inventoried. The four components of the program leverage our flexible global manufacturing capabilities to meet urgent requests.

Spacer Assembly Value Express (S.A.V.E.)

- **Electronically locate bearing components from a network of warehouses**

S.A.V.E. electronically identifies bearing components from Timken's network of warehouses and plants, transfers inventory to a central location for assembly and delivers finished product in three days to eight weeks, depending on need.

Bearing Express

- **Obtain small quantities of bearings with compressed lead times**

A recent expansion of part numbers provides customers with a growing list of options when cups and cones are needed on short order.

Mill Express

- **Mill products delivered routinely, to ease maintenance practices**

Timken offers four-row roll neck assemblies to the rolling mill industry in one-, three-, six- and eight-week delivery categories.

Precision Express

- **Precision bearings delivered in one-, three- and six-week lead-time categories**

The Precision Express service provides short lead-time solutions – six weeks or less – for Timken® precision bearings. In addition, to satisfy immediate requests, customers can rely on the Precision To Go℠ program, which provides access to the top 1,000 precision part numbers.

TIMKEN INDUSTRIAL SERVICES

Timken Industrial Services adds value by helping customers effectively manage, improve and maintain powertrain components. We are a single source for consolidated shipping and have the ability to establish a customized exchange program based on maintenance schedules. We offer technical and service solutions, focused on mechanical powertrains, for a variety of industrial manufacturing settings. Services include technical baselining and problem solving, bearing repair and reclamation services, chock/bearing housing repair, roll repair, integrated maintenance programs, and condition monitoring products and services.

Bearing Repair

- **Refurbishes tapered, cylindrical, spherical, ball, crossed-roller and thrust roller bearings with 254 mm – 6,096 mm (10" – 240") ODs**

Timken repairs a variety of bearings, regardless of manufacturer, including tapered, cylindrical, spherical, ball, crossed-roller and thrust-roller, in sizes from 10-inch to 240-inch outside diameters and slewing rings up to 240 inches. Repairs can range from cleaning and minor troubleshooting to major component replacement.

Rail Bearing Services

- **Process includes cleaning and inspecting bearings**
- **Returns bearings to like-new condition for a fraction of the cost of new bearings**

Timken Rail Bearing Services is the worldwide leader in rail bearing reconditioning. For more than 25 years, Timken has injected new life into previously used bearings by replacing worn or damaged parts with new or requalified components. All of Timken's rail bearing services are approved by the Association of American Railroads (AAR) and certified under the AAR M-1003 Quality Assurance Program.

Reclamation Services

- **Reclaims bearings with bores as small as 76.2 mm (3")**

Timken has developed a cost-effective way to reclaim bearings – even those with bores as small as three inches. By thoroughly cleaning, inspecting and applying a proprietary polishing finish, bearings can be returned to nearly new condition. Typical applications include casting machines, ferrous and non-ferrous strip levelers, aggregate and mining equipment, pellet mills, and transfer and conveyor rolls. Minimum quantities per reclaim are required.

Roll Repair

- **Includes roll repairs and roll overlays**

Timken Industrial Services' roll repair and overlay operations feature technologically advanced capabilities that help extend mill maintenance intervals and maximize production capabilities. Using Timken's proprietary overlay process and strict metallurgical controls, new and repaired rolls are supplied with customized steel alloy chemistries that can help increase roll life up to five times. Typical roll applications include edgers, pinch rolls, levelers, straighteners, table rolls, scale-breaker rolls, guide-box rolls, wrapper/blocker rolls, coil-car rolls, crop-shear measuring rolls, tension-bridle rolls, deflector rolls, burr-masher rolls and caster rolls, including segments, containment zones, strand guides, withdrawal straighteners and run-out table rolls.

Chock/Bearing Housing Repair

- **Repair, refurbish or rebuild services for chocks**

Timken Industrial Services' chock refurbishing operation builds upon our bearing design expertise by understanding the critical relationship that exists between bearings and chocks. Whether it is a work roll or back-up chock, services range from mini-rebuilds where critical surfaces are repaired, to full rebuilds that return equipment to like-new condition. We also manufacture new chocks/housings. Chock/bearing housing repair offers a cost savings of up to 50 percent over new product.

MILLTEC℠ Roll Shop Management

- **Assumes complete responsibility for customer roll shops**

MILLTEC℠ Roll Shop Management is a complete program where Timken assumes complete responsibility for customer roll shops within mills. Services available include site design, process development, routine maintenance, management of roll grinding, roll tracking and movement, chocking and de-chocking of rolls, bearing repair and coordination of component repairs, and purchases. A "best practices" approach, based on more than 90 years of steelmaking, can help optimize mill performance.

Timken also provides diagnostic and problem-solving services that can identify additional cost savings.

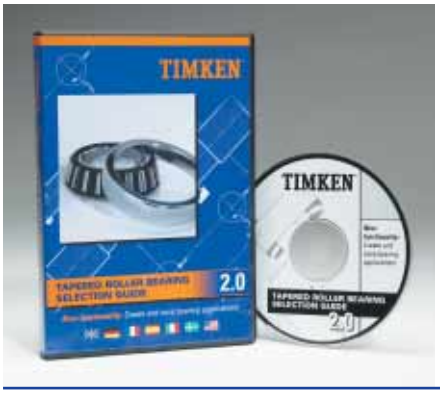
Timken Reliability Services

- **Monitors machine performance using a variety of tools, including vibration analysis, infrared thermography, shock-pulse monitoring and oil analysis**

Timken Reliability Services helps customers diagnose premature machine failures and monitor ongoing machine operations through technologically advanced services such as vibration analysis, infrared thermography, wear-particle analysis and balancing/alignment tracking. Timken field personnel monitor the performance of internal bearings and parts to help identify and analyze potential issues before unexpected downtimes occur. These services are currently available in certain regions of the United States. Contact your Timken sales representative to learn more.

TIMKEN ELECTRONIC SERVICES

The electronic services offered by The Timken Company have been created to help original equipment manufacturers and distributors learn more about, and answer questions regarding, our products and services. We offer easy access to information via our Web site, timken.com, and ordering through online stores – Timkenstore.com, Endorsia.com and PTplace.com. Our CD-ROM selection guides allow users to look up part numbers and identify the best bearing configurations for their applications.



Timken Tapered Roller Bearing Selection Guide

- **Software includes catalog data and interactive, application-specific analysis**

The Tapered Roller Bearing Selection Guide allows designers and part buyers to choose the most appropriate Timken tapered roller bearing for their applications. The interactive program suggests bearings by part number or size and guides users through the selection process to choose products that maximize system life. Application-specific information can be stored for future reference, or forwarded to Timken for a more detailed analysis.

Timken.com/ Online Services

- **Provides instant access to Timken product and application information**

Timken Online Services is a free and unique set of value-added online applications that provide instant access to Timken product and application information. By registering on our Internet site, **www.timken.com/onlineservices,** you gain access to a wide range of reference catalogs, handbooks and guides, as well as detailed product data for bearings, steel and components. You also can subscribe to news, safety and informational bulletins.

Timkenstore.com, Endorsia.com and PTplace.com

- **Distributors can locate pricing and availability, order items, and access product and application information**

Customers can request access to locate pricing and availability, order items, and access product and application information online. In the United States and Canada, use Timkenstore.com and PTplace.com. In Europe, Asia, India and Latin America, use Endorsia.com.

TIMKEN TRAINING PROGRAMS

Training and knowledge sharing is an integral part of Timken's approach to customer service. We offer in-depth programs for original equipment design engineers, distributors and plant maintenance teams. Some programs are conducted on site at customer locations; while others are held at Timken facilities around the world. Each program leverages our experience and strength as a world leader in bearing and steel research, design and manufacturing. We equip customers with the information they need to enhance performance, improve designs and reduce downtime.

Rail 202 Training Course

- **This course is designed to help improve technical knowledge of rail related service engineering**

The Timken Rail 202 course enhances participants' understanding of bearing performance and maintenance topics. This course consists of a lecture and group study that teaches attendees the basics of bearing damage analysis, trackside bearing inspection, bearing removal and installation, and how to improve bearing performance. This three-day course is specifically tailored for end users working in mechanical departments and provides each participant the opportunity to gain hands-on knowledge of systems that affect bearing performance.

Bearing Certified Maintenance Programs

- **Industry-specific training certifies maintenance teams on bearing practices**

Timken offers industry-specific bearing maintenance training programs, which provide knowledge that can be applied directly to day-to-day operations to improve performance and lower maintenance costs. Specific training is available for mining operations, power generation plants, rolling mills, aerospace applications, pulp and paper mills, heavy-duty trucks, industrial gear boxes, rock quarries and calenders.

Seminars are taught by a team of Timken engineers who provide insight on bearing handling, installation, lubrication and maintenance during four-hour basic classes or three-day advanced training. These training classes are approved as continuing education units by Stark State College of Technology in Canton, Ohio.

Organizations that are committed to ongoing training and audits may become Timken Bearing Certified. This distinction demonstrates a facility's dedication to the best practices that are recognized by The Timken Company. Individuals who complete Timken training also are eligible to earn this certification.

Distributor Training School

- **Mobile training program educates distributors and customers on bearing fundamentals**

The Distributor Training School is a mobile education unit that travels throughout North America educating customers on bearing fundamentals and how to maximize the performance and life of bearings. Information presented is applicable to bearings produced by all manufacturers. The two-and-a-half-day class combines classroom instruction with specially prepared displays, computer presentations, demonstrations and literature. End-user training also is available and can be offered at distributor locations.

Rolling Mill Training

- **Presents fundamental bearing information related to rolling mills**

When it comes to bearings in rolling mills, lack of knowledge can lead to significant downtime. Timken has developed a training program specific to rolling mills that teaches maintenance personnel and mill operators the bearing fundamentals needed to reduce maintenance costs and downtime. Attendees have the opportunity to learn from Timken's wealth of resources, including access to steel and bearing facilities, to see concepts applied firsthand. Timken service and application engineers are instructors.

Paper Mill Training

- **Presents fundamental bearing information related to paper mills**

Timken has developed training programs specific to paper mills that teach mill operators the bearing fundamentals and how to maximize performance in paper-making equipment. Timken service and application engineers facilitate these programs. Attendees will receive classroom instructions as well as hands-on modules.

TIMKEN TECHNICAL SERVICES

Timken Technical Services

- **Application testing**
- **Bearing setting and gauging**
- **Calibration and pyrometry**
- **Manufacturing and metallurgical services**
- **Metrology and measurement services**
- **Prototype manufacturing**
- **Tribology and lubrication analysis**

Through Timken Technical Services, customers gain access to experienced associates, simulation laboratories and other equipment to help diagnose issues and test new ideas.

Customers benefit by partnering with a respected, innovative solutions provider and leveraging Timken resources. Timken's global team solves difficult product development issues and suggests ways to improve productivity and reduce costs.

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