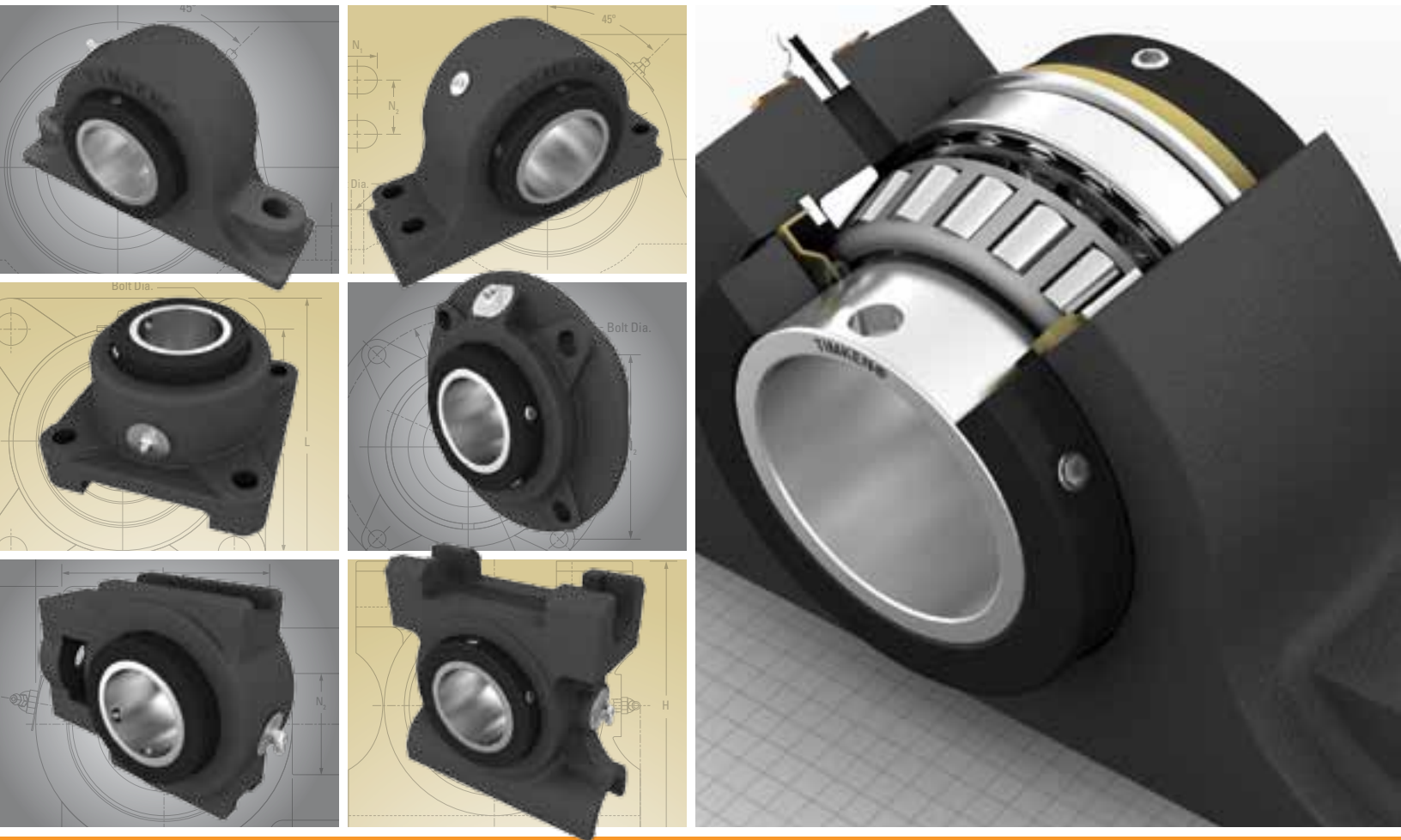


Timken® Tapered Roller Bearing Housed Units



Type E Tapered Roller Bearing Designs

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Every reasonable effort has been made to ensure the accuracy of the information contained in this writing, but no liability is accepted for errors, omissions or for any other reason.

Quality and Performance Come Standard

The Timken name stands for high quality and outstanding performance. Using our capabilities in bearing technology, manufacturing, engineering support and distribution, we provide our customers with smart, cost-effective friction management and power transmission solutions that help them outperform the competition.

Our latest innovation is our new series of Timken® Type E roller housed units. Performance life testing data yields a design life for our new Type E bearing that is 55 percent higher than current industry leading designs, which utilize standard Timken bearings.

At Timken, our brand stands for outstanding quality, from product design and manufacturing to engineering support and distribution. Our commitments to quality, service and delivery add up to an unbeatable value for customers everywhere.

Quality Solutions

As the only premium bearing manufacturer to also make super-clean, high-alloy bearing steel, we know how critical quality materials are to product performance. We also implement the Timken Quality Management System in every plant worldwide, so each bearing product meets the same high performance standards – no matter where in the world it is manufactured.

Dependable Service

Our roller housed units are backed with the service of our industry leading experts, who are ready to assist you with product design, application knowledge and 24/7 field engineering support – to help improve uptime and maximize equipment performance.

Ontime Delivery

We know short lead times are critical to keeping your operations up and running. Many of our Type E roller housed units are in stock for immediate shipping. For special orders, we work quickly to manufacture and deliver your products on time.

Expanded Housed Unit Offering

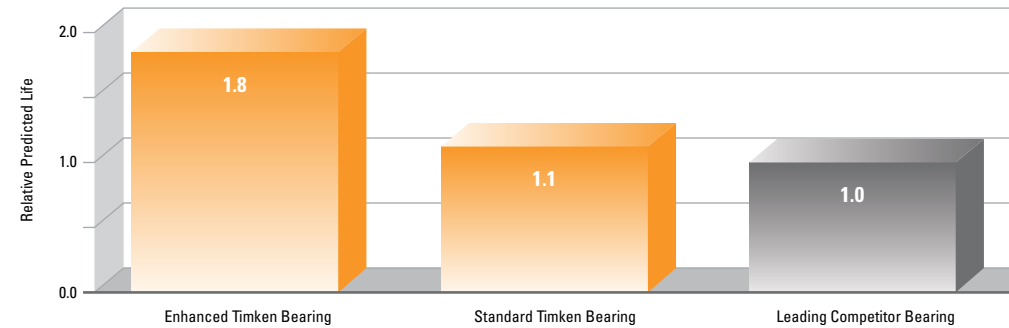
From the manufacturer that brought you reliable Fafnir® ball bearing housed units and Timken® SAF® pillow blocks, comes a growing line of roller bearing housed units. We've expanded our offering to include Timken® Type E housed units featuring our own advanced tapered roller bearings and seals.



Outstanding Performance from the Bearing Expert

Timken engineers have applied more than 110 years of expertise in bearing technology – and leadership in tapered roller bearings – to bring you an optimized performance tapered roller bearing housed unit. We have improved our own design to create the new standard in performance.

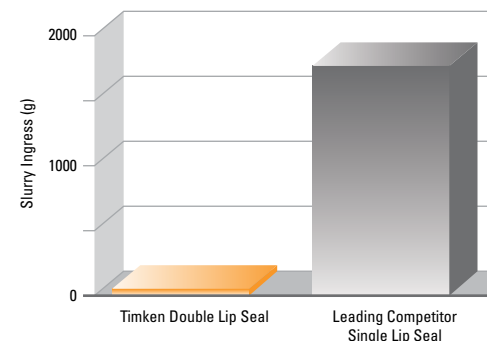
Bearing Life Analysis Comparison



Analytical analysis of the new, optimized Timken bearing compared to a standard Timken bearing (used widely by most Type E suppliers) and a new bearing from a leading industry competitor.

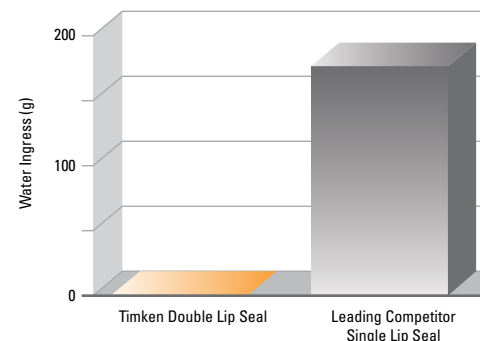
Note: Life tests of Timken tapered roller bearings verified by Germanischer Lloyd.

Seal Performance (Mud/Salt Slurry Ingress Test)



Slurry ingress test results of the optimized Timken Type E seal compared with the single lip seal design of a leading competitor. Seal operating at 250 rpm in a salt and mud slurry mixture for 75 hours.

Seal Performance (Water Ingress Test)



Water ingress test results of the new Timken Type E seal compared with the single lip seal design of a leading competitor. Seal operating at 250 rpm with three gallons of water per minute directed at the shaft-seal interface for four hours.

From the bearings, seals and grease to housings and collars, our innovative design incorporates features that can help withstand some of the most demanding application conditions. This can help decrease downtime, maintenance intervals and the overall cost of ownership.

Enhanced Performance, Lower Total Cost of Ownership

Enhanced Performance Bearings

Timken® Type E tapered roller bearings have a significantly higher load carrying capability. Performance life testing data yields a design life for our new Type E bearing that is 55 percent higher than current industry leading designs, which utilize standard Timken tapered roller bearings. Our Type E bearings also experience lower internal contact stresses and frictional drag due to optimized bearing profiles and improved surface textures. This results in up to three-times greater misalignment capability and improved lubrication performance than industry standard designs.



Double Lip Seals

By helping keep debris and water out while retaining grease longer than seals used in industry standard designs, Timken-designed double lip seals help lower maintenance costs. The seals in our Type E housed units optimize lip contact to help improve grease retention and significantly reduce contaminant ingress.



Premium Grease

Timken roller housed units further help reduce maintenance costs because they use Timken® Premium All Purpose Industrial Grease. Our unique grease formulation contains extreme-pressure and anti-wear additives as well as corrosion inhibitors. This grease works effectively in applications with operating temperatures ranging from

-40°F to +300°F (-40°C to +149°C) and is compatible with calcium- and lithium-thickened greases.

Housings and Locking Collars

Our design incorporates ASTM A48 Grade 30 Cast Iron for the housing. Electrodeposition coating (E-coating) on the housing and collar provides better corrosion resistance than the industry standard powder coating. E-coating also helps reduce overall maintenance costs by protecting exposed surfaces.

In addition, our Type E housed units are dimensionally interchangeable with current suppliers for all key characteristics, including the bolt hole and shaft centerline dimensions.



Timken® Type E Tapered Roller Bearing Housed Unit

Type E tapered roller bearing housed units are available in a wide variety of sizes and configurations to meet the requirements of demanding applications. Popular part numbers are in stock for immediate availability. Metric sizes also are available in shaft diameters ranging from 35 mm to 125 mm.

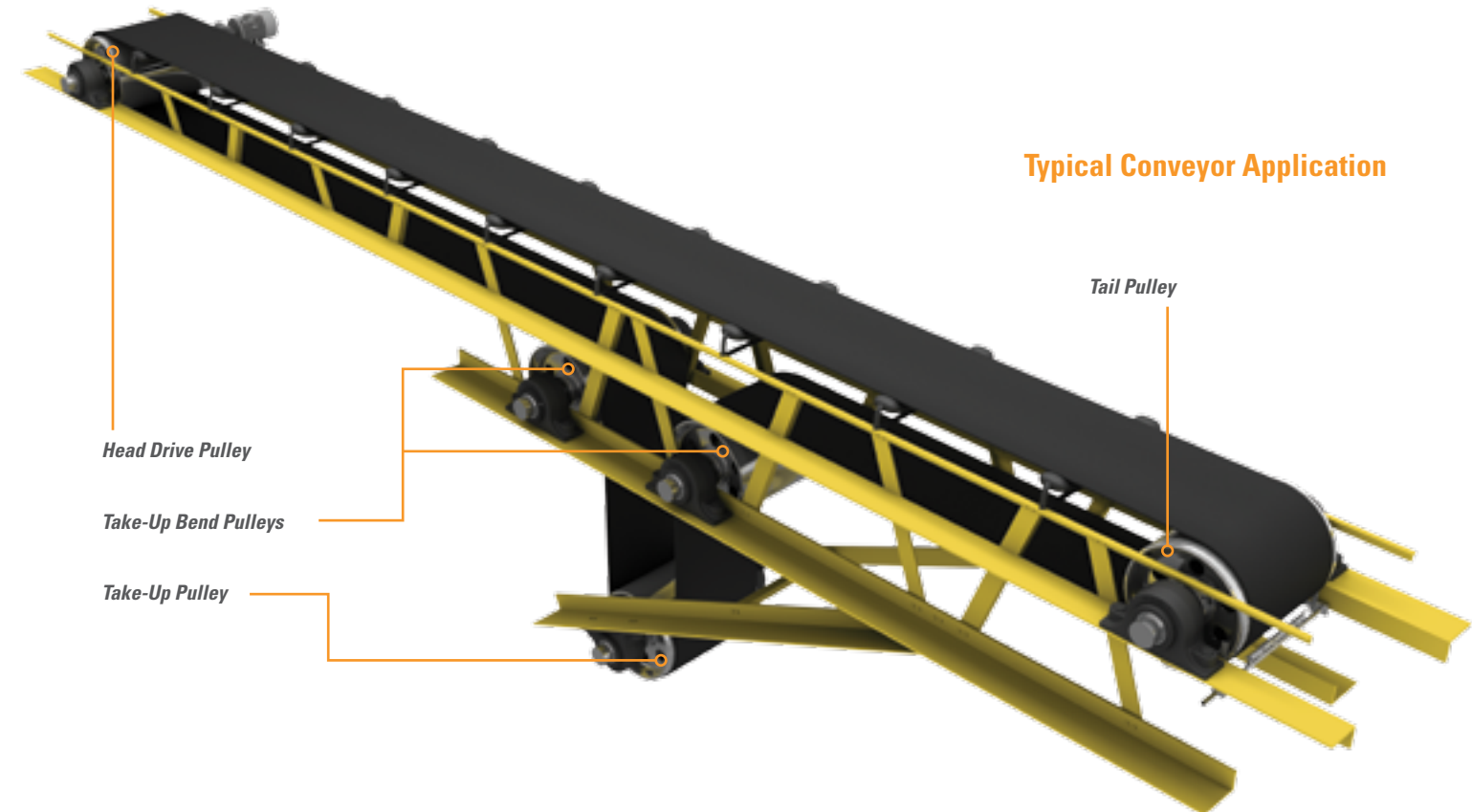
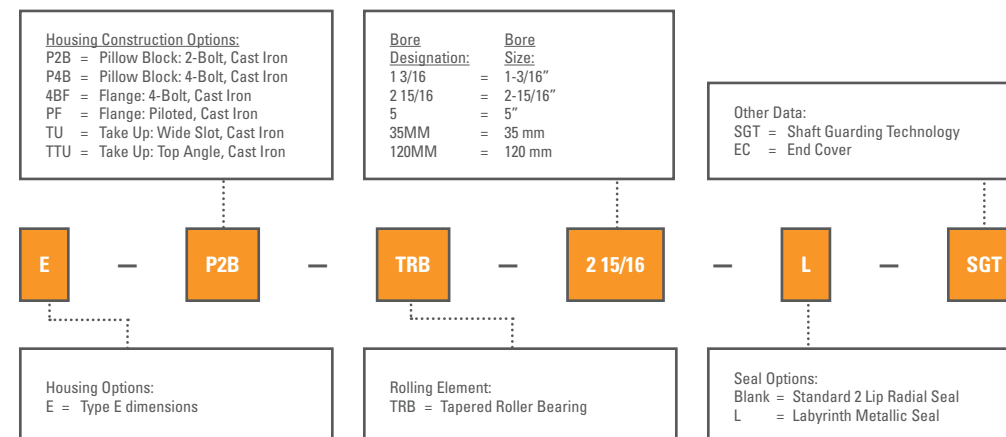
Shaft Size Ranges

Housed Unit Configuration	Inches (in)	Metric (mm)
Pillow Block: 2-Bolt Base	1-3/16 thru 3-1/2	35 thru 90
Pillow Block: 4-Bolt Base	2-1/4 thru 5	60 thru 125
Flange: 4-Bolt	1-3/16 thru 4-1/2	35 thru 115
Flange: Piloted	1-3/16 thru 5	35 thru 125
Take Up: Wide Slot	1-3/8 thru 3	35 thru 75
Take Up: Top Angle	1-3/4 thru 4	45 thru 100

Designs



Nomenclature



Typical Conveyor Application

Common Applications

Common applications include processing and material handling equipment used in the pulp and paper, power generation, mining, cement and aggregate industries. Tapered roller bearing housed units are also widely used in air-handling equipment and water and waste-water treatment. Other common machine applications include mixing, vibrating and ovens/furnaces.

Features and Benefits

- Enhanced tapered roller bearings yield a 55 percent increase in design life over standard Timken bearings and 14 percent more load capacity.
- Optimized bearing profiles and improved surface textures help improve lubrication performance.
- Double lip seals optimize lip contact to improve grease retention and

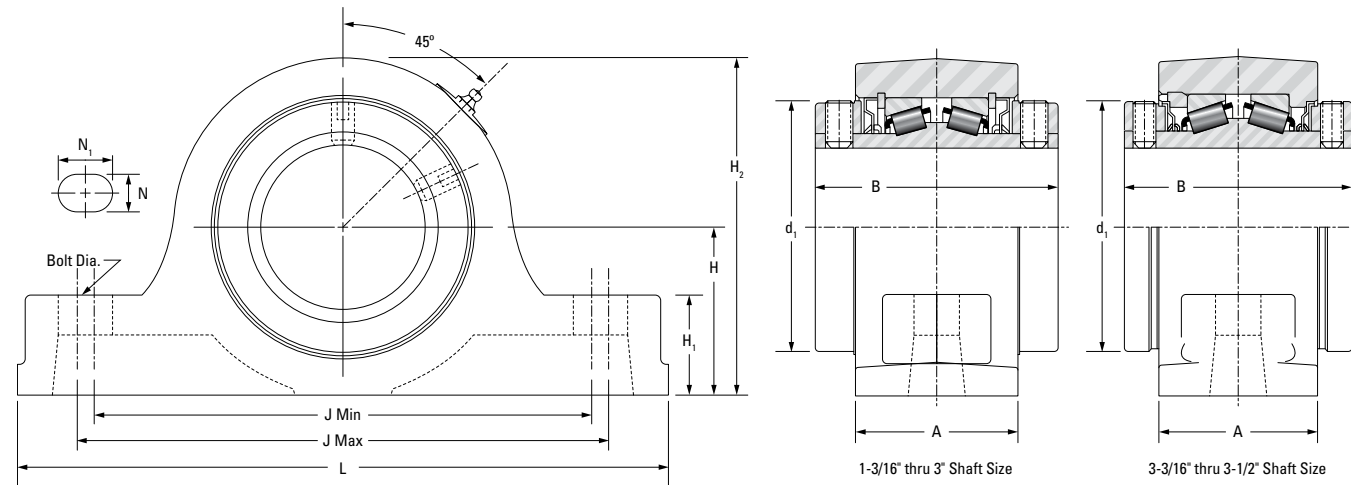
significantly reduce contaminant ingress. Additionally, the rotating collar acts as an initial flinger.

- Bolt holes and shaft centerline dimensions in the housing are interchangeable, consistent with industry practices.
- E-coating on the housing and collar provides better corrosion resistance than powder coating.

- Specially designed collar features nylon patch set screws with a 65-degree angle for maximum locking power and greatly reduced set screw back-out, even in the most severe applications.

Timken® Type E Tapered Roller Bearing Housed Unit Selection

Pillow Block: 2-Bolt Base

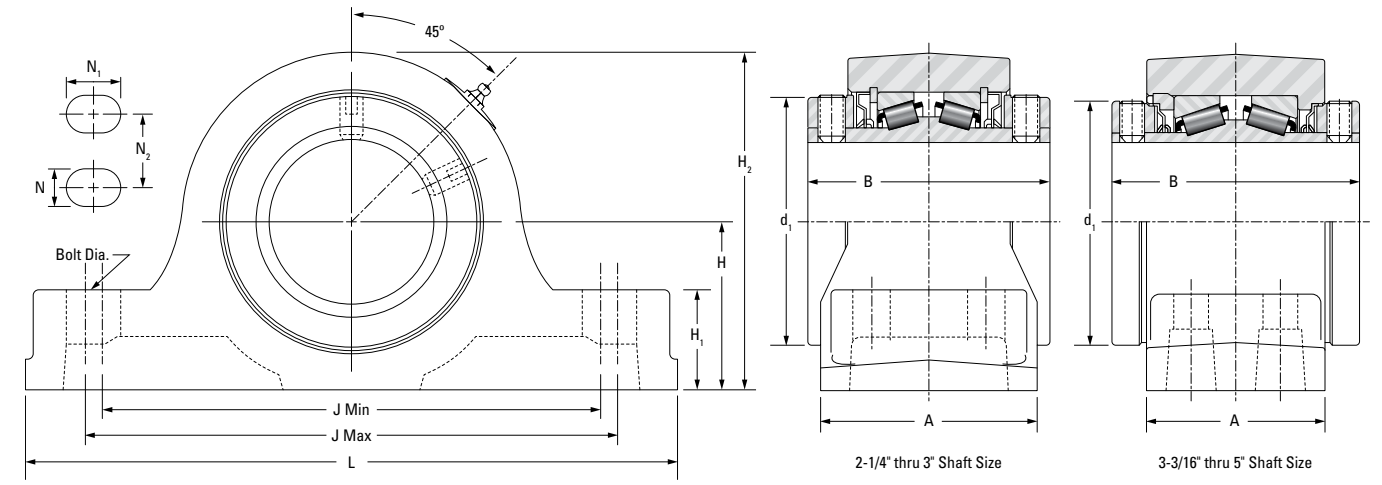


Dimensions in Inches Unless Otherwise Noted													Weight LBS (Approx)		
Shaft Size	Part Number	B	L	A	J		Bolt Dia.	N	N ₁	H ₁	H ₂	d ₁		H	
					Min.	Max.									
1-3/16	E-P2B-TRB-1 3/16	2-3/4	6	1-7/8	4-3/4	4-13/16	1/2	9/16	19/32	7/8	3	2-1/4	1-1/2	4	
1-1/4	E-P2B-TRB-1 1/4				4										
1-3/8	E-P2B-TRB-1 3/8	3	7-3/8	2-1/8	5-5/8	5-7/8	1/2	5/8	3/4	1-1/8	3-3/4	2-3/4	1-7/8	7	
1-7/16	E-P2B-TRB-1 7/16				7										
35 mm	E-P2B-TRB-35MM	3-3/8	7-7/8	2-3/8	6-1/8	6-3/8	1/2	5/8	3/4	1-1/4	4-1/4	3-3/16	2-1/8	7	
1-1/2	E-P2B-TRB-1 1/2				10										
1-5/8	E-P2B-TRB-1 5/8	3-1/2	8-7/8	2-1/2	6-7/8	7-1/8	5/8	3/4	7/8	1-5/16	4-1/2	3-7/16	2-1/4	10	
1-11/16	E-P2B-TRB-1 11/16				10										
40 mm	E-P2B-TRB-40MM	3-3/4	9-5/8	2-5/8	7-5/8	7-7/8	5/8	3/4	7/8	1-1/2	5	3-3/4	2-1/2	10	
1-3/4	E-P2B-TRB-1 3/4				12										
1-7/8	E-P2B-TRB-1 7/8	4	10-1/2	2-7/8	8-3/8	8-5/8	5/8	3/4	7/8	1-5/8	5-23/32	4-1/16	2-3/4	12	
1-15/16	E-P2B-TRB-1 15/16				12										
2	E-P2B-TRB-2	4-1/2	12	3	9-5/16	9-11/16	3/4	27/32	1	1-7/8	6-1/4	4-23/32	3-1/8	12	
45 mm	E-P2B-TRB-45MM				12										
50 mm	E-P2B-TRB-50MM	5	14	3-1/2	10-13/16	11-3/16	7/8	1	1-3/16	2-1/4	7-1/2	5-17/32	3-3/4	12	
2-3/16	E-P2B-TRB-2 3/16				15										
55 mm	E-P2B-TRB-55MM	6-1/4	15-1/4	4-1/2	12-1/4	12-3/4	3/4	7/8	1-1/8	2-1/4	2-7/16	8-1/2	6-1/16	4-1/4	15
2-1/4	E-P2B-TRB-2 1/4				24										
2-7/16	E-P2B-TRB-2 7/16	6-3/4	16-5/8	4-5/8	13-5/16	13-11/16	3/4	15/16	1-1/8	2-1/2	2-3/4	9-3/8	6-47/64	4-3/4	23
2-1/2	E-P2B-TRB-2 1/2				23										
60 mm	E-P2B-TRB-60MM	7-1/4	18-1/2	5-1/8	15-1/4	15-3/4	7/8	1	1-1/4	2-7/8	3	10-7/8	7-1/2	5-1/2	23
65 mm	E-P2B-TRB-65MM				23										
2-11/16	E-P2B-TRB-2 11/16	5	14	3-1/2	10-13/16	11-3/16	7/8	1	1-3/16	2-1/4	7-1/2	5-17/32	3-3/4	28	
2-3/4	E-P2B-TRB-2 3/4				28										
2-15/16	E-P2B-TRB-2 15/16	6-1/4	15-1/4	4-1/2	12-1/4	12-3/4	3/4	7/8	1-1/8	2-1/4	2-7/16	8-1/2	6-1/16	4-1/4	29
3	E-P2B-TRB-3				29										
70 mm	E-P2B-TRB-70MM	7-1/4	18-1/2	5-1/8	15-1/4	15-3/4	7/8	1	1-1/4	2-7/8	3	10-7/8	7-1/2	5-1/2	28
75 mm	E-P2B-TRB-75MM				29										
3-3/16	E-P2B-TRB-3 3/16	6-3/4	16-5/8	4-5/8	13-5/16	13-11/16	3/4	15/16	1-1/8	2-1/2	2-3/4	9-3/8	6-47/64	4-3/4	46
3-1/4	E-P2B-TRB-3 1/4				46										
3-7/16	E-P2B-TRB-3 7/16	5	14	3-1/2	10-13/16	11-3/16	7/8	1	1-3/16	2-1/4	7-1/2	5-17/32	3-3/4	45	
3-1/2	E-P2B-TRB-3 1/2				44										
80 mm	E-P2B-TRB-80MM	6-1/4	15-1/4	4-1/2	12-1/4	12-3/4	3/4	7/8	1-1/8	2-1/4	2-7/16	8-1/2	6-1/16	4-1/4	46
85 mm	E-P2B-TRB-85MM				46										
90 mm	E-P2B-TRB-90MM	7-1/4	18-1/2	5-1/8	15-1/4	15-3/4	7/8	1	1-1/4	2-7/8	3	10-7/8	7-1/2	5-1/2	44
90 mm	E-P2B-TRB-90MM				44										

Note: All units have a 1/8" pipe thread grease fitting

Timken® Type E Tapered Roller Bearing Housed Unit Selection

Pillow Block: 4-Bolt Base

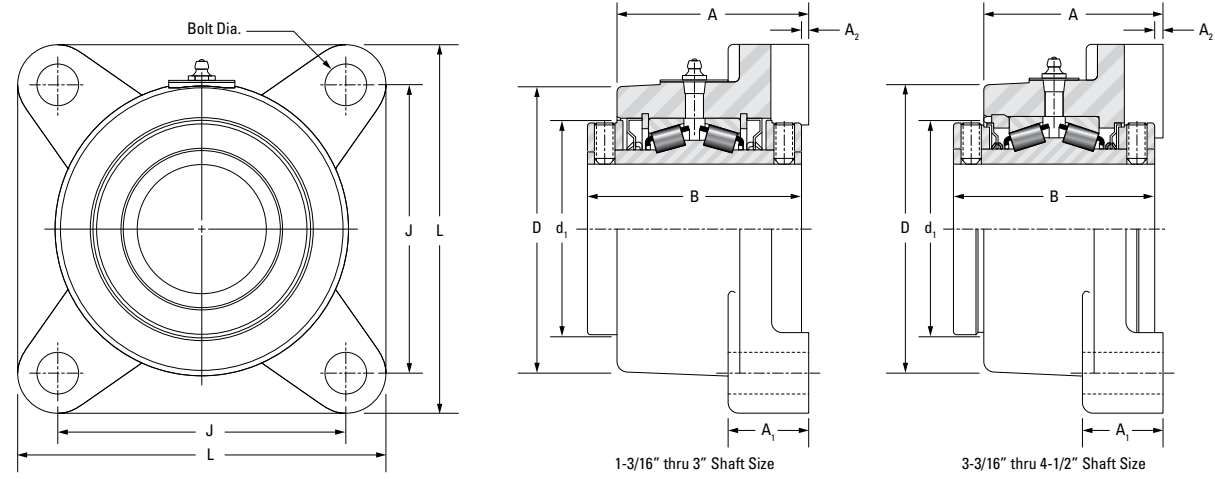


Dimensions in Inches Unless Otherwise Noted													Weight LBS (Approx)		
Shaft Size	Part Number	B	L	A	J		Bolt Dia.	N	N ₁	N ₂	H ₁	H ₂		d ₁	H
					Min.	Max.									
2-1/4	E-P4B-TRB-2 1/4	4	10-1/2	3-1/2	8-5/16	8-11/16	5/8	11/16	7/8	1-7/8	1-5/8	5-23/32	4-1/16	2-3/4	23
2-7/16	E-P4B-TRB-2 7/16				22										
2-1/2	E-P4B-TRB-2 1/2	4-1/2	12	4	9-3/16	9-13/16	5/8	11/16	1	2-1/8	1-7/8	6-1/4	4-23/32	3-1/8	22
60 mm	E-P4B-TRB-60MM				22										
65 mm	E-P4B-TRB-65MM	5	13-1/2	4-1/2	10-3/4	11-1/4	3/4	15/16	1-3/16	2-3/8	2-1/4	7-1/2	5-17/32	3-3/4	22
2-11/16	E-P4B-TRB-2 11/16				30										
2-3/4	E-P4B-TRB-2 3/4	6-1/4	15-1/4	4-1/2	12-1/4	12-3/4	3/4	7/8	1-1/8	2-1/4	2-7/16	8-1/2	6-1/16	4-1/4	29
2-15/16	E-P4B-TRB-2 15/16				28										
3	E-P4B-TRB-3	6-3/4	16-5/8	4-5/8	13-5/16	13-11/16	3/4	15/16	1-1/8	2-1/2	2-3/4	9-3/8	6-47/64	4-3/4	28
70 mm	E-P4B-TRB-70MM				30										
75 mm	E-P4B-TRB-75MM	7-1/4	18-1/2	5-1/8	15-1/4	15-3/4	7/8	1	1-1/4	2-7/8	3	10-7/8	7-1/2	5-1/2	29
3-3/16	E-P4B-TRB-3 3/16				47										
3-1/4	E-P4B-TRB-3 1/4	5	14	3-1/2	10-13/16	11-3/16	7/8	1	1-3/16	2-1/4	7-1/2	5-17/32	3-3/4	46	
3-7/16	E-P4B-TRB-3 7/16				45										
3-1/2	E-P4B-TRB-3 1/2	6-1/4	15-1/4	4-1/2	12-1/4	12-3/4	3/4	7/8	1-1/8	2-1/4	2-7/16	8-1/2	6-1/16	4-1/4	44
80 mm	E-P4B-TRB-80MM				47										
85 mm	E-P4B-TRB-85MM	7-1/4	18-1/2	5-1/8	15-1/4	15-3/4	7/8	1	1-1/4	2-7/8	3	10-7/8	7-1/2	5-1/2	46
90 mm	E-P4B-TRB-90MM				45										
3-15/16	E-P4B-TRB-3 15/16	6-3/4	16-5/8	4-5/8	13-5/16	13-11/16	3/4	15/16	1-1/8	2-1/2	2-3/4	9-3/8	6-47/64	4-3/4	71
4	E-P4B-TRB-4				71										
100 mm	E-P4B-TRB-100MM	7-1/4	18-1/2	5-1/8	15-1/4	15-3/4	7/8	1	1-1/4	2-7/8	3	10-7/8	7-1/2	5-1/2	71
4-7/16	E-P4B-TRB-4 7/16				91										
4-1/2	E-P4B-TRB-4 1/2	5	14	3-1/2	10-13/16	11-3/16	7/8	1	1-3/16	2-1/4	7-1/2	5-17/32	3-3/4	90	
110 mm	E-P4B-TRB-110MM				91										
115 mm	E-P4B-TRB-115MM	6-1/4	15-1/4	4-1/2	12-1/4	12-3/4	3/4	7/8	1-1/8	2-1/4	2-7/16	8-1/2	6-1/16	4-1/4	90
4-15/16	E-P4B-TRB-4 15/16				134										
5	E-P4B-TRB-5	7-1/4	18-1/2	5-1/8	15-1/4	15-3/4	7/8	1	1-1/4	2-7/8	3	10-7/8	7-1/2	5-1/2	132
125 mm	E-P4B-TRB-125MM				132										

Note: All units have a 1/8" pipe thread grease fitting

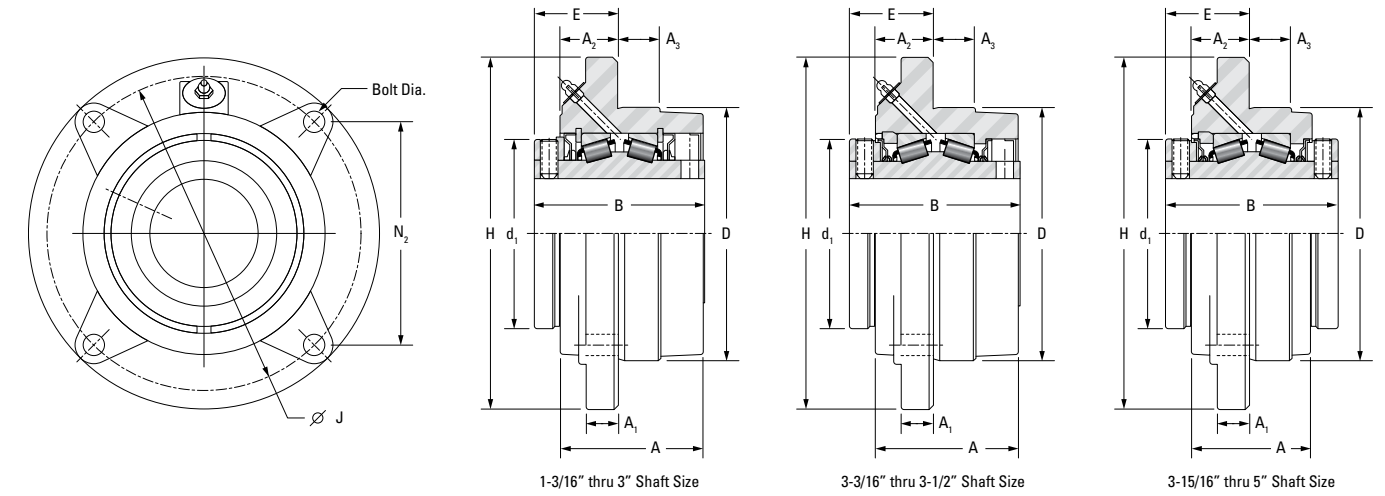
Timken® Type E Tapered Roller Bearing Housed Unit Selection

Flange: 4-Bolt



Timken® Type E Tapered Roller Bearing Housed Unit Selection

Flange: Piloted



Dimensions in Inches Unless Otherwise Noted											Weight LBS (Approx)
Shaft Size	Part Number	B	L	A	J	A ₂	Bolt Dia.	A ₁	D	d ₁	
1-3/16	E-4BF-TRB-1 3/16	2-3/4	3-3/4	2-11/32	2-7/8	1/16	3/8	1	2-15/16	2-1/4	4
1-1/4	E-4BF-TRB-1 1/4										4
1-3/8	E-4BF-TRB-1 3/8	3	4-5/8	2-19/32	3-1/2	1/16	1/2	1-1/16	3-1/2	2-3/4	7
1-7/16	E-4BF-TRB-1 7/16										7
35 mm	E-4BF-TRB-35MM										7
1-1/2	E-4BF-TRB-1 1/2	3-3/8	5-3/8	2-31/32	4-1/8	1/8	1/2	1-3/16	4-3/16	3-3/16	11
1-5/8	E-4BF-TRB-1 5/8										11
1-11/16	E-4BF-TRB-1 11/16										11
40 mm	E-4BF-TRB-40MM										11
1-3/4	E-4BF-TRB-1 3/4										12
1-7/8	E-4BF-TRB-1 7/8	3-1/2	5-5/8	3-3/32	4-3/8	1/8	1/2	1-3/16	4-7/16	3-7/16	12
1-15/16	E-4BF-TRB-1 15/16										12
2	E-4BF-TRB-2										12
45 mm	E-4BF-TRB-45MM										12
50 mm	E-4BF-TRB-50MM										12
2-3/16	E-4BF-TRB-2 3/16	3-3/4	6-1/4	3-9/32	4-7/8	1/8	5/8	1-3/8	4-7/8	3-3/4	15
55 mm	E-4BF-TRB-55MM										15
2-1/4	E-4BF-TRB-2 1/4	4	6-7/8	3-9/16	5-3/8	3/16	5/8	1-1/2	5-5/16	4-1/16	21
2-7/16	E-4BF-TRB-2 7/16										20
2-1/2	E-4BF-TRB-2 1/2										19
60 mm	E-4BF-TRB-60MM										20
65 mm	E-4BF-TRB-65MM										19
2-11/16	E-4BF-TRB-2 11/16	4-1/2	7-3/4	3-15/16	6	3/16	3/4	1-5/8	6	4-23/32	28
2-3/4	E-4BF-TRB-2 3/4										28
2-15/16	E-4BF-TRB-2 15/16										27
3	E-4BF-TRB-3										26
70 mm	E-4BF-TRB-70MM										29
75 mm	E-4BF-TRB-75MM	26									
3-3/16	E-4BF-TRB-3 3/16	5	9-1/4	4-1/2	7	1/4	3/4	1-7/8	7-1/4	5-1/2	52
3-1/4	E-4BF-TRB-3 1/4										51
3-7/16	E-4BF-TRB-3 7/16										50
3-1/2	E-4BF-TRB-3 1/2										50
80 mm	E-4BF-TRB-80MM										52
85 mm	E-4BF-TRB-85MM	50									
90 mm	E-4BF-TRB-90MM	50									
3-15/16	E-4BF-TRB-3 15/16	6-1/4	10-1/4	5-5/8	7-3/4	1/4	7/8	2-1/8	8-1/4	6	75
4	E-4BF-TRB-4										75
100 mm	E-4BF-TRB-100MM										75
4-7/16	E-4BF-TRB-4 7/16										90
4-1/2	E-4BF-TRB-4 1/2										90
110 mm	E-4BF-TRB-110MM	6-3/4	10-7/8	5-15/16	8-3/4	11/32	7/8	2-7/16	8-3/4	6-29/64	90
115 mm	E-4BF-TRB-115MM										90
115 mm	E-4BF-TRB-115MM										90

Note: All units have a 1/8" pipe thread grease fitting

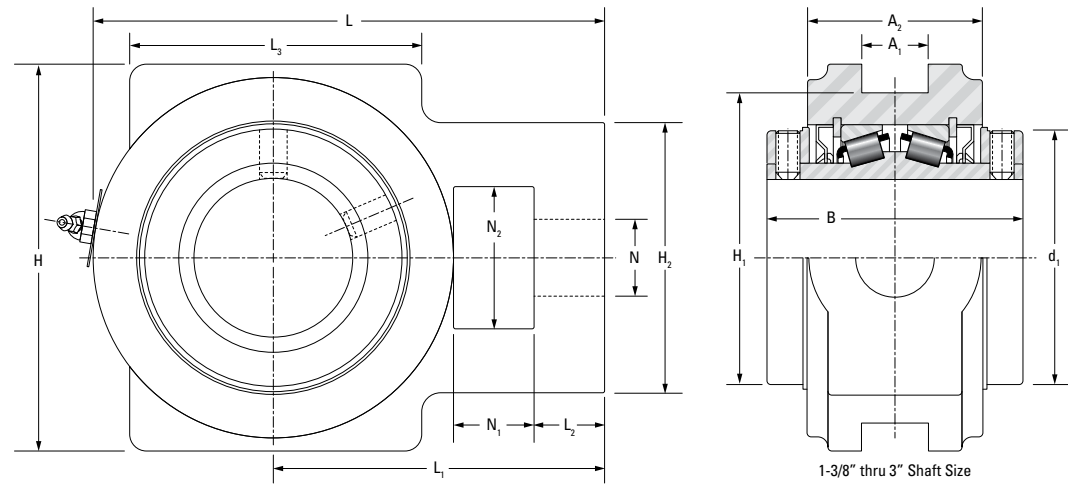
Dimensions in Inches Unless Otherwise Noted														Weight LBS (Approx)
Shaft Size	Part Number	B	H	A	N ₂	J	A ₃	Bolt Dia.	E	A ₁	D*	d ₁	A ₂	
1-3/16	E-PF-TRB-1 3/16	2-3/4	5	2-7/32	2.92	4-1/8	3/4	3/8	1-5/16	7/16	3-3/8	2-1/4	27/32	5
1-1/4	E-PF-TRB-1 1/4													5
1-3/8	E-PF-TRB-1 3/8	3	5-1/4	2-15/32	3.09	4-3/8	7/8	3/8	1-1/2	1/2	3-5/8	2-3/4	1-1/32	6
1-7/16	E-PF-TRB-1 7/16													6
35 mm	E-PF-TRB-35MM													6
1-1/2	E-PF-TRB-1 1/2	3-3/8	6-1/8	2-25/32	3.62	5-1/8	1-1/16	7/16	1-9/16	1/2	4-1/4	3-3/16	1-1/32	10
1-5/8	E-PF-TRB-1 5/8													9
1-11/16	E-PF-TRB-1 11/16													9
40 mm	E-PF-TRB-40MM													9
1-3/4	E-PF-TRB-1 3/4													11
1-7/8	E-PF-TRB-1 7/8	3-1/2	6-3/8	2-29/32	3.80	5-3/8	1-3/16	7/16	1-9/16	9/16	4-1/2	3-7/16	1-1/32	10
1-15/16	E-PF-TRB-1 15/16													10
2	E-PF-TRB-2													10
45 mm	E-PF-TRB-35MM													10
50 mm	E-PF-TRB-50MM													10
2-3/16	E-PF-TRB-2 3/16	3-3/4	7-1/8	3-3/32	4.24	6	1-3/16	1/2	1-11/16	9/16	5	3-3/4	1-3/32	14
55 mm	E-PF-TRB-55MM													14
2-1/4	E-PF-TRB-2 1/4	4	7-5/8	3-5/16	4.60	6-1/2	1-5/16	1/2	1-13/16	5/8	5-1/2	4-1/16	1-3/16	18
2-7/16	E-PF-TRB-2 7/16													18
2-1/2	E-PF-TRB-2 1/2													17
60 mm	E-PF-TRB-60MM													18
65 mm	E-PF-TRB-65MM													17
2-11/16	E-PF-TRB-2 11/16	4-1/2	8-3/4	3-11/16	5.30	7-1/2	1-1/2	5/8	2	3/4	6-3/8	4-23/32	1-1/4	25
2-3/4	E-PF-TRB-2 3/4													25
2-15/16	E-PF-TRB-2 15/16													25
3	E-PF-TRB-3													25
70 mm	E-PF-TRB-70MM													27
75 mm	E-PF-TRB-75MM	25												
3-3/16	E-PF-TRB-3 3/16	5	10-1/4	4-3/16	6.10	8-5/8	1-1/4	3/4	2-7/16	15/16	7-3/8	5-1/2	1-11/16	44
3-1/4	E-PF-TRB-3 1/4													44
3-7/16	E-PF-TRB-3 7/16													43
3-1/2	E-PF-TRB-3 1/2													42
80 mm	E-PF-TRB-80MM													44
85 mm	E-PF-TRB-85MM	43												
90 mm	E-PF-TRB-90MM	42												
3-15/16	E-PF-TRB-3 15/16	6-1/4	10-7/8	4-1/2	6.63	9-3/8	1-1/2	3/4	2-11/16	1	8-1/8	6	1-13/16	59
4	E-PF-TRB-4													58
100 mm	E-PF-TRB-100MM													58
4-7/16	E-PF-TRB-4 7/16													110
4-1/2	E-PF-TRB-4 1/2													110
110 mm	E-PF-TRB-110MM	6-3/4	13-1/2	4-5/8	5-7/8**	11-3/4	1-1/2	3/4**	3	1	10-1/4	6-29/64	1-15/16	110
115 mm	E-PF-TRB-115MM													110
115 mm	E-PF-TRB-115MM													110
4-15/16	E-PF-TRB-4 15/16	7-1/4	14-3/4	5-1/16	6-3/8**	12-3/4	1-3/4	7/8**	2-31/32	1-1/4	11	7-29/64	1-7/8	130
5	E-PF-TRB-5													130
125 mm	E-PF-TRB-125MM													130

Note: All units have a 1/8" pipe thread grease fitting * +.000 / -.002 ** 6 holes equally spaced (chordal spacing shown)

Note: 1-3/16 to 3-1/2 utilize one collar; 3-15/16 to 5 utilize two collars

Timken® Type E Tapered Roller Bearing Housed Unit Selection

Take Up: Wide Slot

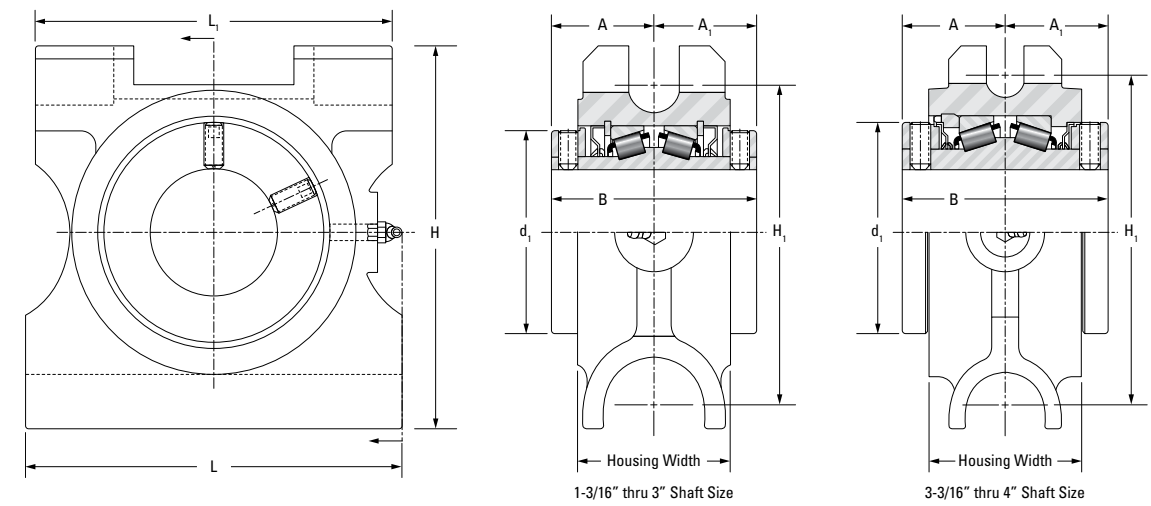


Dimensions in Inches Unless Otherwise Noted															Weight LBS (Approx)	
Shaft Size	Part Number	B	L	A ₁	L ₃	L ₁	N	L ₂	N ₁	H ₂	N ₂	d ₁	H ₁	H	A ₂	Weight LBS (Approx)
1-3/8	E-TU-TRB-1 3/8	3	5-3/32	17/32	2-3/4	3-7/32	3/4	11/16	5/8	2-7/16	1-7/16	2-3/4	3-1/2	4-1/8	2-1/16	8
1-7/16	E-TU-TRB-1 7/16															8
1-1/2	E-TU-TRB-1 1/2															10
35 mm	E-TU-TRB-35MM															8
1-5/8	E-TU-TRB-1 5/8	3-3/8	6	11/16	3-1/4	3-13/16	1	15/16	3/4	3-5/16	1-15/16	3-3/16	4	4-3/4	2-5/16	10
1-11/16	E-TU-TRB-1 11/16															10
1-3/4	E-TU-TRB-1 3/4															12
40 mm	E-TU-TRB-40MM															10
1-7/8	E-TU-TRB-1 7/8	3-1/2	6-5/16	11/16	3-3/4	3-15/16	1	15/16	3/4	3-5/16	1-15/16	3-7/16	4	4-3/4	2-7/16	12
1-15/16	E-TU-TRB-1 15/16															12
2	E-TU-TRB-2															12
45 mm	E-TU-TRB-45MM															12
50 mm	E-TU-TRB-50MM	3-3/4	7-1/8	13/16	3-3/4	4-5/8	1-1/8	1	1-1/4	3-7/8	2-1/4	3-3/4	4-1/2	5-1/4	2-9/16	12
2-3/16	E-TU-TRB-2 3/16															16
2-1/4	E-TU-TRB-2 1/4															21
55 mm	E-TU-TRB-55MM															16
2-7/16	E-TU-TRB-2 7/16	4	7-13/16	1-1/16	4-1/2	5-1/16	1-1/4	1-1/16	1-1/4	4-1/4	2-1/2	4-1/16	5-1/8	6	2-3/4	21
2-1/2	E-TU-TRB-2 1/2															21
2-11/16	E-TU-TRB-2 11/16															30
60 mm	E-TU-TRB-60MM															21
65 mm	E-TU-TRB-65MM	4-1/2	9-1/8	1-13/16	4-3/4	5-7/8	1-1/2	1-1/8	1-1/2	4-7/8	2-3/4	4-23/32	5-15/16	6-3/4	3	21
2-3/4	E-TU-TRB-2 3/4															30
2-15/16	E-TU-TRB-2 15/16															30
70 mm	E-TU-TRB-70MM															30
75 mm	E-TU-TRB-75MM	4-1/2	9-1/8	1-13/16	4-3/4	5-7/8	1-1/2	1-1/8	1-1/2	4-7/8	2-3/4	4-23/32	5-15/16	6-3/4	3	30
70 mm	E-TU-TRB-70MM															30
75 mm	E-TU-TRB-75MM															30

Note: All units have a 1/8" pipe thread grease fitting

Timken® Type E Tapered Roller Bearing Housed Unit Selection

Take Up: Top Angle



Dimensions in Inches Unless Otherwise Noted											Weight LBS (Approx)
Shaft Size	Part Number	B	H ₁	H	d ₁	A	A ₁	Housing Width	L	L ₁	Weight LBS (Approx)
1-3/4	E-TTU-TRB-1 3/4	3-1/2	5-3/16	6-3/8	3-7/16	1-3/4	1-3/4	2-9/16	6-1/2	6	14
1-7/8	E-TTU-TRB-1 7/8										14
1-15/16	E-TTU-TRB-1 15/16										14
2	E-TTU-TRB-2										14
45 mm	E-TTU-TRB-45MM	3-3/4	5-13/16	6-7/8	3-3/4	1-7/8	1-7/8	2-9/16	6-3/4	7	14
50 mm	E-TTU-TRB-50MM										14
2-3/16	E-TTU-TRB-2 3/16										16
55 mm	E-TTU-TRB-55MM										16
2-1/4	E-TTU-TRB-2 1/4	4	6-1/4	7-7/16	4-1/16	2	2	3	7-1/2	7	21
2-7/16	E-TTU-TRB-2 7/16										21
2-1/2	E-TTU-TRB-2 1/2										21
60 mm	E-TTU-TRB-60MM										21
65 mm	E-TTU-TRB-65MM	4-1/2	7-3/16	8-5/16	4-23/32	2-1/4	2-1/4	3	8-1/2	8	21
2-11/16	E-TTU-TRB-2 11/16										29
2-3/4	E-TTU-TRB-2 3/4										29
2-15/16	E-TTU-TRB-2 15/16										29
3	E-TTU-TRB-3	5	8-5/16	9-5/8	5-1/2	2-1/2	2-1/2	3-3/4	9-1/2	9	29
70 mm	E-TTU-TRB-70MM										29
75 mm	E-TTU-TRB-75MM										29
3-3/16	E-TTU-TRB-3 3/16										43
3-1/4	E-TTU-TRB-3 1/4	5	8-5/16	9-5/8	5-1/2	2-1/2	2-1/2	3-3/4	9-1/2	9	43
3-7/16	E-TTU-TRB-3 7/16										42
3-1/2	E-TTU-TRB-3 1/2										42
80 mm	E-TTU-TRB-80MM										43
85 mm	E-TTU-TRB-85MM	6-1/4	9-1/16	11	6	3-1/8	3-1/8	4-3/4	11	10-1/2	42
90 mm	E-TTU-TRB-90MM										42
3-15/16	E-TTU-TRB-3 15/16										62
4	E-TTU-TRB-4										62
100 mm	E-TTU-TRB-100MM	62									

Note: All units have a 1/8" pipe thread grease fitting

Table 1: Timken® Type E Tapered Roller Bearing Load Rating Selection Table

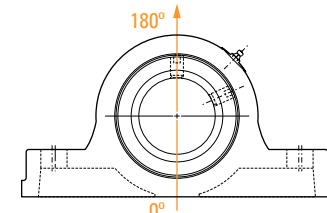
The table below shows the Timken Dynamic Load Rating for a given shaft size, speed and L₁₀ life under normal operating conditions with adequate lubrication. Refer to the discussion in the following pages of this catalog to determine the criteria for combinations not shown in this table or for combined load applications.

Note: The shaded area in this table indicates radial loads that exceed the Maximum Allowable Slip Fit Radial Load (F_{r-max}). Operation at these conditions may require line-to-line (g6 or h6) or light press fit (m6) on the shaft.

Shaft Size	C ₉₀ Basic Dynamic Load Rating (LBS)	Max Speed (RPM) Timken Double Lip Seal	L ₁₀ Life (HRS)	Equivalent Radial Loads (P _r , LBS) Allowed at Various Speeds (RPM)																			
				50	100	150	250	500	750	1000	1200	1360	1530	1640	1750	2060	2420	2730	3050	3320	3820	4490	
1-3/16" 1-1/4"	3400	4490	10,000	4727	3840	3400	2917	2369	2098	1924	1822	1755	1694	1659	1627	1549	1476	1424	1377	1343	1287	1226	
			30,000	3400	2762	2445	2098	1704	1509	1384	1310	1262	1218	1193	1170	1114	1062	1024	991	966	926	882	
			40,000	3119	2533	2243	1924	1563	1384	1270	1202	1158	1118	1095	1073	1022	974	939	909	886	849	809	
			60,000	2762	2243	1986	1704	1384	1226	1124	1064	1025	990	969	950	862	832	805	784	752	716		
			100,000	2369	1924	1704	1462	1187	1051	965	913	880	849	831	815	777	740	714	690	673	645	615	
1-3/8" 1-7/16" 35 mm	5430	3820	10,000	7550	6132	5430	4658	3784	3350	3073	2910	2803	2705	2650	2598	2474	2358	2274	2200	2144	2056		
			30,000	5430	4411	3905	3350	2721	2410	2211	2093	2016	1946	1906	1869	1780	1696	1635	1582	1542	1479		
			40,000	4981	4046	3582	3073	2496	2211	2028	1920	1849	1785	1748	1714	1632	1555	1500	1451	1415	1356		
			60,000	4411	3582	3172	2721	2211	1957	1795	1700	1637	1580	1548	1518	1446	1377	1328	1285	1253	1201		
			100,000	3784	3073	2721	2335	1896	1679	1540	1458	1405	1356	1328	1302	1240	1182	1140	1102	1075	1030		
1-1/2" 1-5/8" 1-11/16" 40 mm	7000	3320	10,000	9732	7905	7000	6005	4878	4319	3962	3751	3613	3487	3415	3350	3190	3039	2931	2835	2764			
			30,000	7000	5685	5034	4319	3508	3106	2849	2698	2598	2508	2456	2409	2294	2186	2108	2039	1988			
			40,000	6421	5215	4618	3962	3218	2849	2614	2475	2384	2301	2253	2210	2104	2005	1934	1871	1824			
			60,000	5685	4618	4089	3508	2849	2523	2314	2191	2111	2037	1995	1957	1863	1775	1712	1656	1615			
			100,000	4878	3962	3508	3010	2445	2165	1986	1880	1811	1748	1712	1679	1599	1523	1469	1421	1385			
1-3/4" 1-7/8" 1-15/16" 2" 45 mm 50 mm	9200	3050	10,000	12791	10390	9200	7893	6411	5677	5207	4930	4748	4584	4489	4402	4192	3994	3853	3727				
			30,000	9200	7473	6617	5677	4611	4083	3745	3546	3415	3297	3229	3166	3015	2873	2771	2680				
			40,000	8439	6855	6070	5207	4230	3745	3435	3253	3133	3024	2962	2905	2766	2635	2542	2459				
			60,000	7473	6070	5374	4611	3745	3316	3042	2880	2774	2678	2622	2572	2449	2334	2251	2177				
			100,000	6411	5207	4611	3956	3213	2845	2610	2471	2380	2297	2250	2206	2101	2002	1931	1868				
2-3/16" 55 mm	9740	2730	10,000	13542	11000	9740	8356	6787	6010	5513	5220	5027	4853	4753	4661	4438	4229	4079					
			30,000	9740	7911	7005	6010	4882	4322	3965	3754	3616	3490	3418	3352	3192	3042	2934					
			40,000	8935	7257	6426	5513	4478	3965	3637	3444	3317	3202	3136	3075	2928	2790	2691					
			60,000	7911	6426	5690	4882	3965	3511	3221	3049	2937	2835	2776	2723	2593	2471	2383					
			100,000	6787	5513	4882	4188	3402	3012	2763	2616	2520	2432	2382	2336	2224	2120	2044					
2-1/4" 2-7/16" 2-1/2" 60 mm 65 mm	10400	2420	10,000	14460	11745	10400	8922	7247	6417	5887	5573	5368	5181	5075	4977	4739	4516						
			30,000	10400	8447	7480	6417	5212	4615	4234	4008	3861	3727	3650	3579	3409	3248						
			40,000	9540	7749	6861	5887	4781	4234	3884	3677	3541	3418	3348	3283	3127	2979						
			60,000	8447	6861	6076	5212	4234	3749	3439	3256	3136	3027	2965	2907	2769	2638						
			100,000	7247	5887	5212	4472	3632	3216	2950	2793	2690	2597	2543	2494	2375	2263						
2-11/16" 2-3/4" 2-15/16" 3" 70 mm 75 mm	10900	2060	10,000	15155	12310	10900	9351	7596	6726	6170	5841	5626	5431	5319	5216	4967							
			30,000	10900	8854	7840	6726	5463	4837	4437	4201	4046	3906	3825	3752	3572							
			40,000	9999	8121	7191	6170	5011	4437	4070	3854	3712	3583	3509	3441	3277							
			60,000	8854	7191	6368	5463	4437	3929	3604	3412	3287	3172	3107	3047	2902							
			100,000	7596	6170	5463	4687	3807	3371	3092	2928	2820	2722	2666	2614	2489							
3-3/16" 3-1/4" 3-7/16" 3-1/2" 80 mm 85 mm 90 mm	17400	1640	10,000	24193	19651	17400	14928	12125	10736	9849	9324	8981	8669	8490									
			30,000	17400	14133	12514	10736	8721	7722	7083	6706	6459	6235	6106									
			40,000	15961	12965	11480	9849	8000	7083	6498	6152	5925	5719	5602									
			60,000	14133	11480	10165	8721	7083	6272	5753	5447	5246	5064	4960									
			100,000	12125	9849	8721	7482	6077	5381	4936	4673	4501	4345	4255									
3-15/16" 4" 100 mm	23900	1530	10,000	33230	26991	23900	20504	16655	14747	13528	12808	12336	11907										
			30,000	23900	19413	17189	14747	11978	10606	9729	9212	8872	8564										
			40,000	21924	17808	15768	13528	10988	9729	8925	8450	8139	7856										
			60,000	19413	15768	13962	11978	9729	8615	7903	7482	7206	6956										
			100,000	16655	13528	11978	10276	8347	7391	6780	6419	6182	5968										
4-7/16" 4-1/2" 110 mm 115 mm	29400	1360	10,000	40877	33203	29400	25223	20487	18141	16641	15755	15174											
			30,000	29400	23880	21145	18141	14735	13047	11968	11331	10914											
			40,000	26969	21906	19397	16641	13517	11968	10979	10394	10011											
			60,000	23880	19397	17175	14735	11968	10598	9721	9204	8865											
			100,000	20487	16641	14735	12641	10268	9092	8340	7896	7605											
4-15/16" 5" 125 mm	40500	1200	10,000	56311	45739	40500	34746	28222	24990	22924	21703												
			30,000	40500	32896	29129	24990	20298	17973	16487	15610												
			40,000	37151	30176	26720	22924	18620	16487	15124	14319												
			60,000	32896	26720	23660	20298	16487	14599	13392	12679												
			100,000	28222	22924	20298	17414	14145	12525	11489	10877												

Table 2: Housing Ratings – Type E Pillow Blocks: 2-Bolt Base, 4-Bolt Base

Shaft Size	Maximum Housing Rating (LBS) Gray Iron at 180°
1-3/16" thru 1-1/4"	1,600
1-3/8" thru 1-7/16" 35 mm	3,150
1-1/2" thru 1-11/16" 40 mm	3,000
1-3/4" thru 2" 45 mm thru 50 mm	5,150
2-3/16" 55 mm	3,500
2-1/4" thru 2-1/2" 60 mm thru 65 mm	6,550
2-11/16" thru 3" 70 mm thru 75 mm	7,000
3-3/16" thru 3-1/2" 80 mm thru 90 mm	15,700
3-15/16" thru 4" 100 mm	16,250
4-7/16" thru 4-1/2" 110 mm thru 115 mm	21,000
4-15/16" thru 5" 125 mm	22,860



- These ratings have been calculated for initial bearing selection. These include a nominal safety factor for the standard Type E two- and four-bolt pillow blocks. The following conditions apply: standard cast iron material, the force is applied perpendicular to the shaft axis and the housing bolts are properly clamped.
- These limits should not be applied to operating conditions that include impact (shock) loads or combined radial and thrust loads that are not directed into the pillow block base.
- If heavy cap loads are expected, use the following modifications to mounting method or equipment design: Grade 8 base bolts and hardened washers; ensure that proper installation torque is achieved and is uniform.
- If axial loads are expected, provide mechanical stops or shear bars with strength sufficient to support the load. Specification of the strength, material, method of fastening and precision location are the responsibility of the machinery designer.

Table 3: Tapered Roller Bearing – Radial and Thrust Factors; Speed and Slip-Fit Load Limits

Shaft Size	e	F _a /F _r ≤ e		F _a /F _r > e		K Factor	C ₉₀ Dynamic Load Rating (LBS) (1)	C ₀ Static Load Rating (LBS)	F _{a-max} Maximum Permissible Thrust Load (LBS) (2)	Max Speed (RPM) (3)	F _{r-max} Maximum Allowable Slip Fit Radial Load (LBS) (4)
		X	Y	X	Y						
1-3/16"	0.49	0.87	1.77	0.70	2.14	1.23	3400	15,760	2000	4,490	3,100
1-1/4"											
1-3/8"	0.46	0.87	1.89	0.70	2.28	1.31	5430	26,000	2590	3,820	5,000
1-7/16"											
35 mm											
1-1/2"	0.44	0.87	1.96	.70	2.37	1.36	7000	33,000	2590	3,320	6,400
1-1/2"											
1-5/8"											
1-11/16"											
40 mm											
1-3/4"	0.33	.87	2.64	.70	3.18	1.83	9200	43,000	2590	3,050	8,400
1-7/8"											
1-15/16"											
2"											
45 mm											
50 mm											
2-3/16"	0.36	0.87	2.38	0.70	2.87	1.65	9740	48,200	3454	2,730	8,900
55 mm											
2-1/4"											
2-7/16"	0.40	0.87	2.17	0.70	2.63	1.51	10400	54,000	3454	2,420	9,500
2-1/2"											
60 mm											
65 mm											

Bearing Life Calculations / Selection

Bearing Life

Many different performance criteria exist that dictate how a bearing should be selected. These include bearing fatigue life, rotational precision, power requirements, temperature limits, speed capabilities, sound, etc. The life can also be limited by other system components such as the shaft, shaft interface and the housing. This publication deals primarily with bearing life as related to material associated fatigue. Bearing life is defined here as the length of time, or number of revolutions, until a fatigue spall of 6 mm² (0.01 in.²) develops. Since metal fatigue is a statistical phenomenon, the life of an individual bearing is impossible to precisely predetermine. Bearings that may appear to be identical can exhibit considerable life scatter when tested under identical conditions. Thus it is necessary to base life predictions on a statistical evaluation of a large number of bearings operating under similar conditions. The Weibull distribution function is commonly used to predict the life of a population of bearings at any given reliability level.

Rating Life

Rating life, (L₁₀), is the life that 90 percent of a group of apparently identical bearings will complete or exceed before a fatigue spall of 6 mm² (0.01 in.²) develops. The L₁₀ life also is associated with 90 percent reliability for a single bearing under a certain load.

Bearing Life Equations

The L₁₀ life has been calculated as follows for bearings under radial or combined loading where the dynamic equivalent radial load, (P_r), has been determined.

Tapered roller bearings often use a dynamic load rating (C₉₀) based on ninety million cycles, yielding the equations as follows:

$$L_{10} = \left(\frac{C_{90}}{P_r} \right)^{10/3} (90 \times 10^6) \text{ revolutions}$$

or based on shaft speed, n (RPM),

$$L_{10} = \left(\frac{C_{90}}{P_r} \right)^{10/3} \left(\frac{90 \times 10^6}{60n} \right) \text{ hours}$$

Timken has expanded standard life equations to include certain additional variables that can affect bearing performance. The approach whereby these factors are considered in the bearing analysis and selection has been termed Bearing Systems Analysis (BSA).

The Timken expanded bearing life equation is:

$$L_{10a} = a_1 a_2 a_{3d} a_{3k} a_{3l} a_{3m} a_{3p} \left(\frac{C_{90}}{P_r} \right)^{10/3} \left(\frac{90 \times 10^6}{60n} \right) \text{ hours}$$

Where,

- a₁ = Reliability Life Factor
- a₂ = Material Life Factor
- a_{3d} = Debris Life Factor
- a_{3k} = Load Zone Life Factor
- a_{3l} = Lubrication Life Factor
- a_{3m} = Misalignment Life Factor
- a_{3p} = Low Load Life Factor

More details on Life Adjustment Factors can be found in the Engineering Section of the Timken Product Catalog or by contacting a Timken technical sales representative. Other factors that can be taken into account within the simple bearing life equation are shock or vibration. These are known to occur in many industrial applications due to combined factors including imbalanced dynamic forces, abusive handling, equipment misuse or neglect. These are difficult to predict. When these conditions are known or suspected to occur, we suggest that equipment designers use a multiplication factor of (1.5 x P_r) to estimate effects on housed unit selection and system reliability. Performance testing or advanced analysis is strongly suggested to validate final product selection.

Timken® Roller Housed Unit Selection

The Timken double extended tapered roller bearings used in the roller housed units in this catalog are suited for carrying radial, thrust or a combination of both types of loading. This section will describe the bearing selection process using different methods based on selection criteria and application details.

Method 1 – Selection table (radial loads only)

Note: Based on reference conditions with adequate lubrication.

1. Determine criteria for bearing selection
 - a. L₁₀ life required.
 - b. Size of bearing based on shaft size (if known).
 - c. Loading conditions (radial and thrust) of the application.
 - d. Shaft speed (RPM).
2. Use Table 1: Timken® Type E Tapered Roller Bearing Load Rating Selection Table:
 - a. Find speed criteria on upper row.
 - b. Proceed in the column directly below that speed to the radial load (F_r) that is equal to or greater than that required.
 - c. Follow that row to the left to determine what the minimum shaft size should be for the required L₁₀ life (hours). Many values are listed to help in selecting the proper bearing.

Bearing Life Calculations / Selection - continued

Method 2 – Using bearing life equation to select bearing for a different L₁₀ life (radial loads only)

If a different life is required than what is found in Table 1: Timken® Type E Tapered Roller Bearing Load Rating Selection Table, it can be calculated from the bearing life equation. Note that each value in the selection table was calculated using this equation. The equation can be re-written based on the unknown value.

Take the bearing life equation shown previously:

$$L_{10} = \left(\frac{C_{90}}{P_r} \right)^{10/3} \left(\frac{90 \times 10^6}{60n} \right) \text{ hours}$$

Or re-written as:

$$L_{10} = \left(\frac{C_{90}}{P_r} \right)^{10/3} \left(\frac{1,500,000}{n} \right) \text{ hours}$$

Then to solve for C₉₀:

$$C_{90} = \left(\frac{L_{10} \times n}{1,500,000} \right)^{0.3} \left(P_r \right)$$

After calculating the C₉₀, check Table 1: Timken® Type E Tapered Roller Bearing Load Rating Selection Table to determine the shaft size needed. (Note: ensure that the application speed does not exceed the maximum RPM – found on that same table). Check the radial load as well with

regards to the maximum allowable slip fit radial load (Fr-max, see Table 3: Tapered Roller Bearing - Radial and Thrust Factors; Speed and Slip-Fit Load Limits). If this value is exceeded, then a tighter line-to-line or press fit is required.

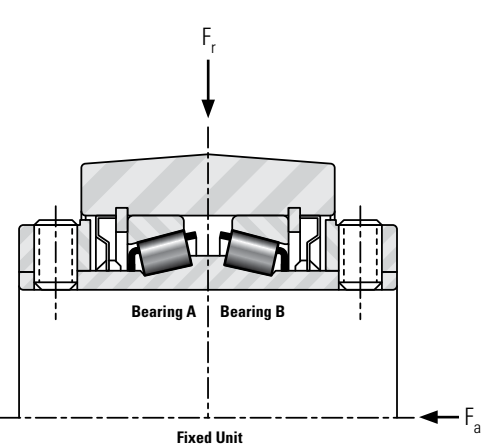
Timken Method 3a – Determine equivalent radial loads and use bearing life equation (for radial and thrust loaded applications)

For combined radial and thrust loaded applications, it is necessary to calculate an equivalent dynamic radial bearing load, designated by P_r, before applying the L₁₀ bearing life equation. The dynamic equivalent radial load is defined as a single radial load that, if applied to the bearing, will result in the same life as the combined loading under which the bearing operates.

Tapered roller bearings are ideally suited to carrying all types of loads - radial, thrust and any combination of both. Due to the tapered design of the bearing, a radial load will induce a thrust reaction that must be opposed by an equal or greater thrust load in order to keep the bearing cone and cup from separating. The ratio of the radial to the thrust load and the bearing included cup angle determine the load zone in a given bearing. The number of rollers in contact as a result of this ratio determines the load zone in the bearing. If all the rollers are in contact, the load zone is referred to as being 360 degrees. When only radial load is applied to a tapered roller bearing, for convenience it is assumed in using the traditional calculation method that half the rollers support the load – the load zone – is 180 degrees.

Note that the dynamic radial equivalent loads can be easily calculated using the Timken Bearing Selection Guide (TBSG) software. This is a simple program that calculates the bearings loads, catalog life and even BSA life. If the TBSG is not used, then the subsequent procedure should be followed.

Table 4: Equivalent Radial Load Calculations

Design	Thrust Condition	Dynamic Equivalent Radial Load
	$F_a \leq \frac{0.6 F_r}{K}$	$P_{rA} = 0.5 F_r + 0.83 K F_a$ $P_{rB} = 0.5 F_r - 0.83 K F_a$
	$F_a > \frac{0.6 F_r}{K}$	$P_{rA} = 0.4 F_r + K F_a$ $P_{rB} = 0$

Bearing Life Calculations / Selection - *continued*

For Type-E roller housed units with no external thrust load ($F_a = 0$), the dynamic equivalent radial load (P_r) equals F_r . This P_r value can then be used in the bearing life equation shown on page 16.

For Type-E units with thrust loading, Table 4: Equivalent Radial Load Calculations can be used. In this table, only bearing A has an applied thrust load. If bearing B has the applied thrust load, each A in the equations should be replaced by a B and vice versa.

The equations in the first row of Table 4 yield single row equivalent radial loads (P_{rA} and P_{rB}). To find the two-row (Type-E housed unit) life, the following equations must be used to solve for L_{10} life of each bearing row, and then combined for the system unit life:

$$L_{10A} = \left(\frac{C_{90}}{1.74 \times P_{rA}} \right)^{10/3} \left(\frac{1,500,000}{n} \right) \text{ hours}$$

and,

$$L_{10B} = \left(\frac{C_{90}}{1.74 \times P_{rB}} \right)^{10/3} \left(\frac{1,500,000}{n} \right) \text{ hours}$$

then,

$$L_{10} = \left[\left(\frac{1}{L_{10A}} \right)^{3/2} + \left(\frac{1}{L_{10B}} \right)^{3/2} \right]^{-2/3} \text{ hours}$$

In the second row of Table 4: Equivalent Radial Load Calculations, $P_{rB} = 0$; therefore, $P_{rA} = P_r$ in the standard bearing life equation shown on page 16.

ISO Method 3b

The ISO Method uses the following equation to determine the equivalent dynamic radial load:

$$P_r = XF_r + YF_a$$

Where,

- P_r = Dynamic Equivalent Radial Load
- F_r = Applied Radial Load
- F_a = Applied Axial Load
- X = Radial Load Factor
- Y = Axial Load Factor

The values for X and Y are found in Table 3: Tapered Roller Bearing - Radial and Thrust Factors. In order to find these values, the value of F_r / F_a must be compared to the "e" value. Determine if the value is greater than or less than the "e" and then use the corresponding X and Y values below that formula.

After the P_r value is calculated, then use the bearing life equation as shown on page 16.

ISO Method 4 – (thrust only applications)

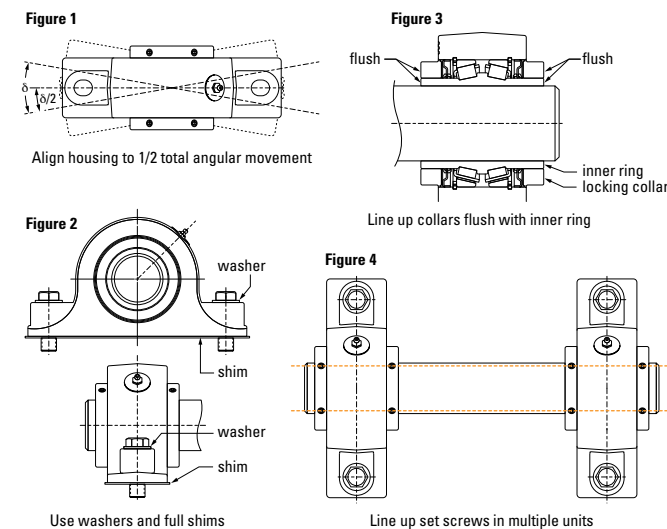
Use the equation $P_r = YF_a$. Use Y from Table 3: Tapered Roller Bearing - Radial and Thrust Factors (for $F_a / F_r > e$). Then use this P_r value for the equivalent radial load in the bearing life equation. This value can also be used as the radial load in the selection table.

After selection has been made, verify that the application does not exceed the maximum allowable speed, allowable thrust loads and allowable housing loads. Heavy loads should be directed through the base of the units. See Table 2: Housing Ratings for the uplift housing loads. The housings need to be bolted down with adequate strength.

Installation / Lubrication

Installation

Proper installation of the housed unit is necessary. This includes the use of shafts that are clean, free from nicks and burrs, straight and of proper diameter. Follow Table 5: Recommended Shaft Tolerances. Do not mount the bearing on a worn section of the shaft. Use of shafts with hardness greater than Rc 45 will reduce effectiveness of locking devices. Also, it is necessary that the housed units and shafts are in alignment (Fig. 1). Verify that the mounting surfaces are in the same flat plane to help make sure good alignment is achieved. If shimming is required to minimize misalignment, use full shims across the entire housing base (Fig. 2). The bolts then need to be alternately torqued securely to their mounting supports. Flat washers should be used when installing any kind of housed unit (Fig. 2). Washers should be



Installation / Lubrication - *continued*

properly sized to the bolt diameter and should not be an SAE grade, which is smaller. After the locking collars are lined up flush with the end of the cone (inner ring) face (Fig. 3), set screws then need to be properly tightened per Table 6: Recommended Set Screw Tightening Torque. Set screws in multiple units should be aligned to each other (Fig. 4).

Lubrication

To help maintain a rolling bearing's anti-friction characteristics, lubrication is needed to:

- Minimize rolling resistance due to deformation of the rolling elements and raceway under load by separating the mating surfaces.
- Minimize sliding friction occurring between rolling elements, raceways and cage.
- Protect from corrosion and, with grease lubrication, from contaminant ingress.

Bearings have been factory prelubricated with Timken® Premium All Purpose Industrial Grease, which is an NLGI No. 2 lithium-complex based grease. This is suitable for normal operating conditions. Units should be relubricated with the Timken grease or one that is compatible and made for roller bearings. **It is vital that the greases used are compatible. Please consult with a Timken representative for the grease specifications if the use of a grease other than the Timken grease mentioned above is needed.** Normal service is considered as operation in a clean, dry environment at temperatures between -30° F and +180° F (-34° C to +82° C). If service is beyond normal conditions due to speed, temperature, or exposure to moisture, dirt or corrosive chemicals, periodic relubrication may be advisable. For extreme conditions or conditions in which special chemicals are used, a Timken representative should be consulted.

After extended storage or periods when the unit is not in operation, fresh grease should be added.

For units operating in dirty or wet environments, the bearing should contain as much grease as possible, based on the shaft speed, to help protect against contamination. For slower applications, with shaft speeds typically less than 200 RPM, the unit should have additional grease added at start-up to fill the bearing.

Lubrication affects the bearing operating temperature as well. If the bearing does not have enough grease, this could lead to higher temperature operation due to inadequate lubrication film thickness. Excessive grease will lead to higher operating temperatures due to grease churning. This can cause bearing overheating. To avoid this, it may be necessary to remove some of the grease inside the unit. The grease fitting may be removed briefly in this circumstance to allow excess grease to purge. The grease fitting must be put back in place. It is best to observe the bearing and its temperature and adjust the lubrication as needed.

Relubrication cycle

Adequate lubrication is an essential element to the bearing life. The two primary considerations that determine the relubrication cycle on any application are operating temperature and contamination. Every attempt should be made to maintain seals at peak efficiency. The higher the temperature, the more rapidly the grease oxidizes. Grease life is reduced by approximately half for every 10° C (18° F) rise in temperature. The higher the operating temperature, the more often the grease must be replenished. Table 7: Suggested Relubrication Intervals can be used as a suggested initial point of reference. Relubrication frequency and quantity intervals are best developed through experience for each application based on types of service, which may differ from the suggestions in Table 7: Suggested Relubrication Intervals.

When the bearing is not in operation for an extended period of time, grease should be added to prevent corrosion.

The recommended shaft tolerances shown in Table 5: Recommended Shaft Tolerance are for normal loaded applications. Refer to Table 3: Tapered Roller Bearing Radial and Thrust Factors to verify the maximum allowable slip fit radial load ($F_{r,max}$) and to determine if a tighter fit is required. Table 7: Suggested Relubrication Intervals shows general lubrication suggested starting points only. Please read the entire installation instructions prior to using these tables. Applications should be regularly reviewed and lubrication amounts and intervals modified as needed to assure best results.

Table 5: Recommended Shaft Tolerance

Shaft Size	Tolerance
Up thru 1-1/2" 35 mm	+0.000 to -.0005 +.000 to -.013 mm
1-5/8" thru 4" 40 mm thru 100 mm	+0.000 to -.0010 +.000 to -.025 mm
4-7/16" thru 5" 110 mm thru 125 mm	+0.000 to -.0015 +.000 to -.038 mm

NOTE: Refer to the Timken Product Catalog for ISO g6, h6 or m6 shaft tolerance data.

Table 6: Recommended Set Screw Tightening Torque

Shaft Size	Set Screw Size	Tightening Torque (in.-lbs)
1-3/16" thru 1-11/16" 35 mm thru 40 mm	5/16-18	155
1-3/4" thru 2-1/2" 45 mm thru 65 mm	3/8-16	275
2-11/16" thru 3-1/2" 70 mm thru 90 mm	1/2-13	615
3-15/16" thru 5" 100 mm thru 125 mm	5/8-11	1315

Table 7: Suggested Relubrication Intervals (based on eight hours/day operation)

Environment	Clean: Un-Exposed			Moderate: Exposed			Extreme: Harsh		
	Low	Med	Hi	Low	Med	Hi	Low	Med	Hi
**Application Speed									
Greasing Interval	1 year	2 months	2 weeks	1 month	2 weeks	*	1 week	1 week	*

* Use extra caution due to heat generation.

** (Low < 25% max RPM; 25% < Med < 75%; 75% < Hi) – See Table 3: Tapered Roller Bearing – Radial and Thrust Factors Speed and Slip-Fit Load Limits for max RPM values.

Relubrication frequency and quantity are best developed through experience. And at all times, follow Original Equipment Manufacturer's maintenance instructions.

Timken® Type E Tapered Roller Bearing Interchange

Timken® Type E tapered roller bearing housed units are available in a wide variety of sizes and configurations to meet the requirements of demanding applications. They are dimensionally interchangeable with current suppliers for all key characteristics, including the bolt hole and shaft centerline dimensions. Popular part numbers are in stock for immediate availability. Metric sizes also are available in shaft diameters ranging from 35 mm to 125 mm. Contact your Timken sales representative for details.

Pillow Block: 2-Bolt Base

Shaft Size	Timken Part No.	Dodge Part No.	Sealmaster Part No.	Browning Part No.	Royersford Part No.	Moline Part No.
1 3/16"	E-P2B-TRB-1 3/16	023000 (P2B-E-103R)	RPB-103 -2 or -C2	PBE-920-1 3/16	20-02-0103	19321103
1 1/4"	E-P2B-TRB-1 1/4	023001 (P2B-E-104R)	RPB-104 -2 or -C2	PBE-920-1 1/4	20-02-0104	19321104
1 3/8"	E-P2B-TRB-1 3/8	023002 (P2B-E-106R)	RPB-106 -2 or -C2	PBE-920-1 3/8	20-02-0106	19321106
1 7/16"	E-P2B-TRB-1 7/16	023003 (P2B-E-107R)	RPB-107 -2 or -C2	PBE-920-1 7/16	20-02-0107	19321107
1 1/2"	E-P2B-TRB-1 1/2	023004 (P2B-E-108R)	RPB-108 -2 or -C2	PBE-920-1 1/2	20-02-0108	19321108
1 5/8"	E-P2B-TRB-1 5/8	023005 (P2B-E-110R)	RPB-110 -2 or -C2	PBE-920-1 5/8	20-02-0110	19321110
1 11/16"	E-P2B-TRB-1 11/16	023006 (P2B-E-111R)	RPB-111 -2 or -C2	PBE-920-1 11/16	20-02-0111	19321111
1 3/4"	E-P2B-TRB-1 3/4	023007 (P2B-E-112R)	RPB-112 -2 or -C2	PBE-920-1 3/4	20-02-0112	19321112
1 7/8"	E-P2B-TRB-1 7/8	023008 (P2B-E-114R)	N/A	N/A	20-02-0114	19321114
1 15/16"	E-P2B-TRB-1 15/16	023009 (P2B-E-115R)	RPB-115 -2 or -C2	PBE-920-1 15/16	20-02-0115	19321115
2"	E-P2B-TRB-2	023010 (P2B-E-200R)	RPB-200 -2 or -C2	PBE-920-2	20-02-0200	19321200
2 3/16"	E-P2B-TRB-2 3/16	023011 (P2B-E-203R)	RPB-203 -2 or -C2	PBE-920-2 3/16	20-02-0203	19321203
2 1/4"	E-P2B-TRB-2 1/4	023012 (P2B-E-204R)	RPB-204 -2 or -C2	PBE-920-2 1/4	20-02-0204	19321204
2 7/16"	E-P2B-TRB-2 7/16	023013 (P2B-E-207R)	RPB-207 -2 or -C2	PBE-920-2 7/16	20-02-0207	19321207
2 1/2"	E-P2B-TRB-2 1/2	023014 (P2B-E-208R)	RPB-208 -2 or -C2	PBE-920-2 1/2	20-02-0208	19321208
2 11/16"	E-P2B-TRB-2 11/16	023015 (P2B-E-211R)	RPB-211 -2 or -C2	PBE-920-2 11/16	20-02-0211	19321211
2 3/4"	E-P2B-TRB-2 3/4	023016 (P2B-E-212R)	RPB-212 -2 or -C2	PBE-920-2 3/4	20-02-0212	19321212
2 15/16"	E-P2B-TRB-2 15/16	023017 (P2B-E-215R)	RPB-215 -2 or -C2	PBE-920-2 15/16	20-02-0215	19321215
3"	E-P2B-TRB-3	023018 (P2B-E-300R)	RPB-300 -2 or -C2	PBE-920-3	20-02-0300	19321300
3 3/16"	E-P2B-TRB-3 3/16	023019 (P2B-E-303R)	RPB-303 -2 or -C2	PBE-920-3 3/16	20-02-0303	19321303
3 1/4"	E-P2B-TRB-3 1/4	023020 (P2B-E-304R)	N/A	N/A	20-02-0304	19321304
3 7/16"	E-P2B-TRB-3 7/16	023021 (P2B-E-307R)	RPB-307 -2 or -C2	PBE-920-3 7/16	20-02-0307	19321307
3 1/2"	E-P2B-TRB-3 1/2	023022 (P2B-E-308R)	RPB-308 -2 or -C2	PBE-920-3 1/2	20-02-0308	19321308

Pillow Block: 4-Bolt Base

Shaft Size	Timken Part No.	Dodge Part No.	Sealmaster Part No.	Browning Part No.	Royersford Part No.	Moline Part No.
2 1/4"	E-P4B-TRB-2 1/4	023023 (P4B-E-204R)	RPB-204 -4 or -C4	PBE-920F-2 1/4	20-04-0204	19341204
2 7/16"	E-P4B-TRB-2 7/16	023024 (P4B-E-207R)	RPB-207 -4 or -C4	PBE-920F-2 7/16	20-04-0207	19341207
2 1/2"	E-P4B-TRB-2 1/2	023025 (P4B-E-208R)	RPB-208 -4 or -C4	PBE-920F-2 1/2	20-04-0208	19341208
2 11/16"	E-P4B-TRB-2 11/16	023026 (P4B-E-211R)	RPB-211 -4 or -C4	PBE-920F-2 11/16	20-04-0211	19341211
2 3/4"	E-P4B-TRB-2 3/4	023027 (P4B-E-212R)	RPB-212 -4 or -C4	PBE-920F-2 3/4	20-04-0212	19341212
2 15/16"	E-P4B-TRB-2 15/16	023028 (P4B-E-215R)	RPB-215 -4 or -C4	PBE-920F-2 15/16	20-04-0215	19341215
3"	E-P4B-TRB-3	023029 (P4B-E-300R)	RPB-300 -4 or -C4	PBE-920F-3	20-04-0300	19341300
3 3/16"	E-P4B-TRB-3 3/16	023030 (P4B-E-303R)	RPB-303 -4 or -C4	PBE-920F-3 3/16	20-04-0303	19341303
3 1/4"	E-P4B-TRB-3 1/4	023031 (P4B-E-304R)	N/A	N/A	20-04-0304	19341304
3 7/16"	E-P4B-TRB-3 7/16	023032 (P4B-E-307R)	RPB-307 -4 or -C4	PBE-920F-3 7/16	20-04-0307	19341307
3 1/2"	E-P4B-TRB-3 1/2	023033 (P4B-E-308R)	RPB-308 -4 or -C4	PBE-920F-3 1/2	20-04-0308	19341308
3 15/16"	E-P4B-TRB-3 15/16	023690 (P4B-E-315R)	RPB-315 -4 or -C4	PBE-920F-3 15/16	20-04-0315	19341315
4"	E-P4B-TRB-4	023691 (P4B-E-400R)	RPB-400 -4 or -C4	PBE-920F-4	20-04-0400	19341400
4 7/16"	E-P4B-TRB-4 7/16	023692 (P4B-E-407R)	RPB-407 -4 or -C4	PBE-920F-4 7/16	20-04-0407	19341407
4 1/2"	E-P4B-TRB-4 1/2	023693 (P4B-E-408R)	RPB-408 -4 or -C4	PBE-920F-4 1/2	20-04-0408	19341408
4 15/16"	E-P4B-TRB-4 15/16	023694 (P4B-E-415R)	RPB-415 -4 or -C4	PBE-920F-4 15/16	20-04-0415	19341415
5"	E-P4B-TRB-5	023695 (P4B-E-500R)	RPB-500 -4 or -C4	PBE-920F-5	20-04-0500	19341500

Timken® Type E Tapered Roller Bearing Interchange

Flange: 4-Bolt

Shaft Size	Timken Part No.	Dodge Part No.	Sealmaster Part No.	Browning Part No.	Royersford Part No.	Moline Part No.
1-3/16"	E-4BF-TRB-1 3/16	023093 (F4B-E-103R)	RFB-103 or -C	FBE-920-1 3/16	20-05-0103	19311103
1-1/4"	E-4BF-TRB-1 1/4	023094 (F4B-E-104R)	RFB-104 or -C	FBE-920-1 1/4	20-05-0104	19311104
1-3/8"	E-4BF-TRB-1 3/8	023095 (F4B-E-106R)	RFB-106 or -C	FBE-920-1 3/8	20-05-0106	19311106
1-7/16"	E-4BF-TRB-1 7/16	023096 (F4B-E-107R)	RFB-107 or -C	FBE-920-1 7/16	20-05-0107	19311107
1-1/2"	E-4BF-TRB-1 1/2	023097 (F4B-E-108R)	RFB-108 or -C	FBE-920-1 1/2	20-05-0108	19311108
1-5/8"	E-4BF-TRB-1 5/8	023098 (F4B-E-110R)	RFB-110 or -C	FBE-920-1 5/8	20-05-0110	19311110
1-11/16"	E-4BF-TRB-1 11/16	023099 (F4B-E-111R)	RFB-111 or -C	FBE-920-1 11/16	20-05-0111	19311111
1-3/4"	E-4BF-TRB-1 3/4	023100 (F4B-E-112R)	RFB-112 or -C	FBE-920-1 3/4	20-05-0112	19311112
1-7/8"	E-4BF-TRB-1 7/8	023101 (F4B-E-114R)	N/A	N/A	20-05-0114	19311114
1-15/16"	E-4BF-TRB-1 15/16	023102 (F4B-E-115R)	RFB-115 or -C	FBE-920-1 15/16	20-05-0115	19311115
2"	E-4BF-TRB-2	023103 (F4B-E-200R)	RFB-200 or -C	FBE-920-2	20-05-0200	19311200
2-3/16"	E-4BF-TRB-2 3/16	023104 (F4B-E-203R)	RFB-203 or -C	FBE-920-2 3/16	20-05-0203	19311203
2-1/4"	E-4BF-TRB-2 1/4	023105 (F4B-E-204R)	RFB-204 or -C	FBE-920-2 1/4	20-05-0204	19311204
2-7/16"	E-4BF-TRB-2 7/16	023106 (F4B-E-207R)	RFB-207 or -C	FBE-920-2 7/16	20-05-0207	19311207
2-1/2"	E-4BF-TRB-2 1/2	023107 (F4B-E-208R)	RFB-208 or -C	FBE-920-2 1/2	20-05-0208	19311208
2-11/16"	E-4BF-TRB-2 11/16	023108 (F4B-E-211R)	RFB-211 or -C	FBE-920-2 11/16	20-05-0211	19311211
2-3/4"	E-4BF-TRB-2 3/4	023109 (F4B-E-212R)	RFB-212 or -C	FBE-920-2 3/4	20-05-0212	19311212
2-15/16"	E-4BF-TRB-2 15/16	023110 (F4B-E-215R)	RFB-215 or -C	FBE-920-2 15/16	20-05-0215	19311215
3"	E-4BF-TRB-3	023111 (F4B-E-300R)	RFB-300 or -C	FBE-920-3	20-05-0300	19311300
3-3/16"	E-4BF-TRB-3 3/16	023112 (F4B-E-303R)	RFB-303 or -C	FBE-920-3 3/16	20-05-0303	19311303
3-1/4"	E-4BF-TRB-3 1/4	023113 (F4B-E-304R)	N/A	N/A	20-05-0304	19311304
3-7/16"	E-4BF-TRB-3 7/16	023114 (F4B-E-307R)	RFB-307 or -C	FBE-920-3 7/16	20-05-0307	19311307
3-1/2"	E-4BF-TRB-3 1/2	023115 (F4B-E-308R)	RFB-308 or -C	FBE-920-3 1/2	20-05-0308	19311308
3-15/16"	E-4BF-TRB-3 15/16	023116 (F4B-E-315R)	RFB-315 or -C	FBE-920F-3 15/16	20-04-0315	19311315
4"	E-4BF-TRB-4	023117 (F4B-E-400R)	RFB-400 or -C	FBE-920F-4	20-04-0400	19311400
4-7/16"	E-4BF-TRB-4 7/16	023118 (F4B-E-407R)	RFB-407 or -C	N/A	20-04-0407	19311407
4-1/2"	E-4BF-TRB-4 1/2	023119 (F4B-E-408R)	RFB-408 or -C	N/A	20-04-0408	19311408
go up to 5"						

Flange: Piloted

Shaft-Size	Timken Part No.	Dodge Part No.	Sealmaster Part No.	Browning Part No.	Royersford Part No.	Moline Part No.
1-3/16"	E-PF-TRB-1 3/16	023120 (FC-E-103R)	RFP-103 or -C	N/A	20-06-0103	N/A
1-1/4"	E-PF-TRB-1 1/4	023121 (FC-E-104R)	RFP-104 or -C	N/A	20-06-0104	N/A
1-3/8"	E-PF-TRB-1 3/8	023122 (FC-E-106R)	RFP-106 or -C	N/A	20-06-0106	N/A
1-7/16"	E-PF-TRB-1 7/16	023123 (FC-E-107R)	RFP-107 or -C	N/A	20-06-0107	N/A
1-1/2"	E-PF-TRB-1 1/2	023124 (FC-E-108R)	RFP-108 or -C	N/A	20-06-0108	N/A
1-5/8"	E-PF-TRB-1 5/8	023125 (FC-E-110R)	RFP-110 or -C	N/A	20-06-0110	N/A
1-11/16"	E-PF-TRB-1 11/16	023126 (FC-E-111R)	RFP-111 or -C	N/A	20-06-0111	N/A
1-3/4"	E-PF-TRB-1 3/4	023127 (FC-E-112R)	RFP-112 or -C	N/A	20-06-0112	19331112
1-7/8"	E-PF-TRB-1 7/8	023128 (FC-E-114R)	N/A	N/A	20-06-0114	19331114
1-15/16"	E-PF-TRB-1 15/16	023129 (FC-E-115R)	RFP-115 or -C	N/A	20-06-0115	19331115
2"	E-PF-TRB-2	023130 (FC-E-200R)	RFP-200 or -C	N/A	20-06-0200	19331200
2-3/16"	E-PF-TRB-2 3/16	023131 (FC-E-203R)	RFP-203 or -C	N/A	20-06-0203	19331203
2-1/4"	E-PF-TRB-2 1/4	023132 (FC-E-204R)	RFP-204 or -C	N/A	20-06-0204	19331204
2-7/16"	E-PF-TRB-2 7/16	023133 (FC-E-207R)	RFP-207 or -C	N/A	20-06-0207	19331207
2-1/2"	E-PF-TRB-2 1/2	023134 (FC-E-208R)	RFP-208 or -C	N/A	20-06-0208	19331208
2-11/16"	E-PF-TRB-2 11/16	023135 (FC-E-211R)	RFP-211 or -C	N/A	20-06-0211	19331211
2-3/4"	E-PF-TRB-2 3/4	023136 (FC-E-212R)	RFP-212 or -C	N/A	20-06-0212	19331212
2-15/16"	E-PF-TRB-2 15/16	023137 (FC-E-215R)	RFP-215 or -C	N/A	20-06-0215	19331215
3"	E-PF-TRB-3	023138 (FC-E-300R)	RFP-300 or -C	N/A	20-06-0300	19331300
3-3/16"	E-PF-TRB-3 3/16	023139 (FC-E-303R)	RFP-303 or -C	N/A	20-06-0303	19331303
3-1/4"	E-PF-TRB-3 1/4	023140 (FC-E-304R)	N/A	N/A	20-06-0304	19331304
3-7/16"	E-PF-TRB-3 7/16	023141 (FC-E-307R)	RFP-307 or -C	N/A	20-06-0307	19331307
3-1/2"	E-PF-TRB-3 1/2	023142 (FC-E-308R)	RFP-308 or -C	N/A	20-06-0308	19331308
3-15/16"	E-PF-TRB-3 15/16	023143 (FC-E-315R)	RFP-315 or -C	N/A	20-06-0315	19341315
4"	E-PF-TRB-4	023144 (FC-E-400R)	RFP-400 or -C	N/A	20-06-0400	19341400
4-7/16"	E-PF-TRB-4 7/16	023145 (FC-E-407R)	RFP-407 or -C	N/A	20-06-0407	19341407
4-1/2"	E-PF-TRB-4 1/2	023146 (FC-E-408R)	RFP-408 or -C	N/A	20-06-0408	19341408
4-15/16"	E-PF-TRB-4 15/16	023147 (FC-E-415R)	RFP-415 or -C	N/A	20-06-0415	19341415
5"	E-PF-TRB-5	023148 (FC-E-500R)	RFP-500 or -C	N/A	20-06-0500	19341500

The Timken Company

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Industrial Services

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