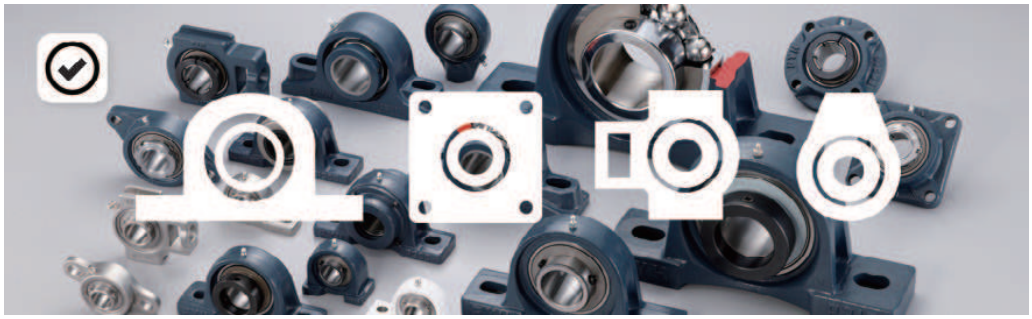
2 Selection Guide

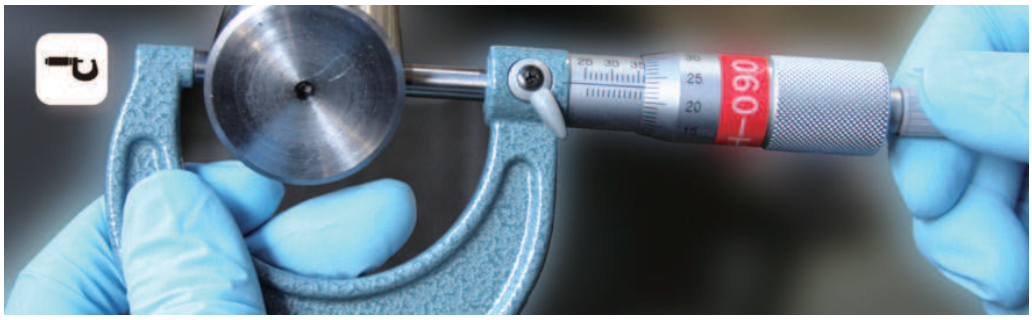
2.1 Selection Guide

1. Select the housing style that best suits your application.

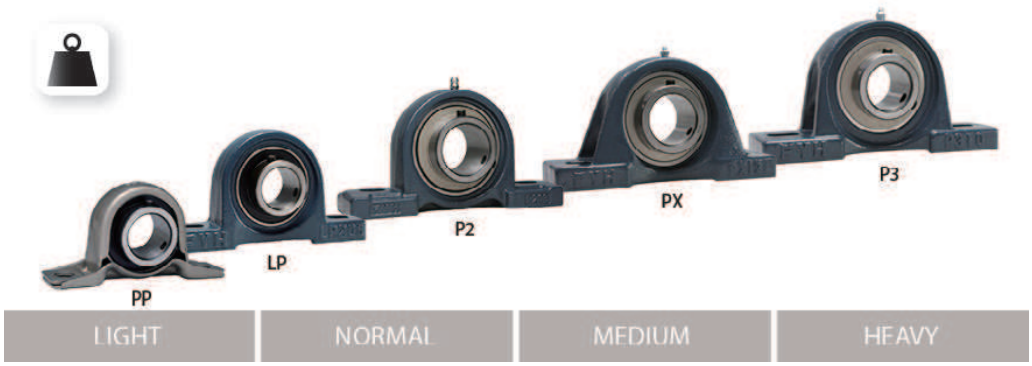


P - PILLOW BLOCK **PA** - TAPPED-BASE **PH** - HIGH-BASE **LP** - LIGHT **IP** - THICK **PP** - STAMPED STEEL
F - 4-BOLT FLANGE **FS** - SQUARE PILOTED
FL - 2-BOLT FLANGE **LF** - LIGHT **PFL** - STAMPED STEEL **FA** - ADJUSTABLE
FB - 3-BOLT FLANGE
FC - 4-BOLT FLANGE CARTRIDGE
T - TAKE-UP
C - CARTRIDGE
H - HANGER

2. Select the shaft size and duty that is needed for your application.



SU - FROM 10 MM TO 30 MM BORE
SA & SB - FROM 12 MM & 1/2" TO 40 MM & 1-9/16" BORE
UC - FROM 12 MM & 1/2" TO 140 MM BORE
NA - FROM 12 MM & 1/2" TO 75 MM & 3" BORE
NC - FROM 20 MM & 3/4" TO 60 MM & 2-7/16" BORE
UK - FROM 20 MM & 3/4" TO 120 MM BORE



3. Do you need to customize the bearing for your application? Select STANDARD as the default.

TEMP - **D2K2** -58°F TO 248°F (-50°C TO 120°C), **D1K2** -40°F TO 356°F (-40°C TO 180°C), **D9K2** -4°F TO 446°F (-20°C TO 230°C)
WASH DOWN - STAINLESS STEEL UNITS, PLASTIC HOUSING UNITS,
AIR HANDLING - **S3** AIR HANDLING FIT UNITS, **S5** NON CONTACT SEAL
DUST - **L3** TRIPLE LIP SEAL, COVERS
DIRT - **LT3** TIGHT TRIPLE LIP SEAL, COVERS

4. Select the locking style type for your insert.

UC - SETSCREW LOCK
NA - ECCENTRIC COLLAR LOCK
NC - CONCENTRIC COLLAR LOCK
UK - ADAPTER SLEEVE LOCK

5. YOUR UNIT

Selection application is available for download in the mobile device.

Available on the App Store

https://itunes.apple.com/us/app/fyh/id807018499?mt=8

2 Selection Guide

TEMP

2.2 High / Low Temperature Series

(suffix codes - High temperature: D1K2 & D9K2, Low temperature: D2K2)

For applications that require bearing units to be used at a higher or lower temperature range than our standard models FYH offers several options. For high temperature units that require lubrication please specify D1K2 as a suffix to the standard part number. For high temperature units that do not require lubrication specify D9K2.
The D9K2 insert uses a fluoro-grease that allows for excellent heat resistance and operation with minimal maintenance.
Specifications for the high temperature and low temperature units are shown in **Table 2.1**.

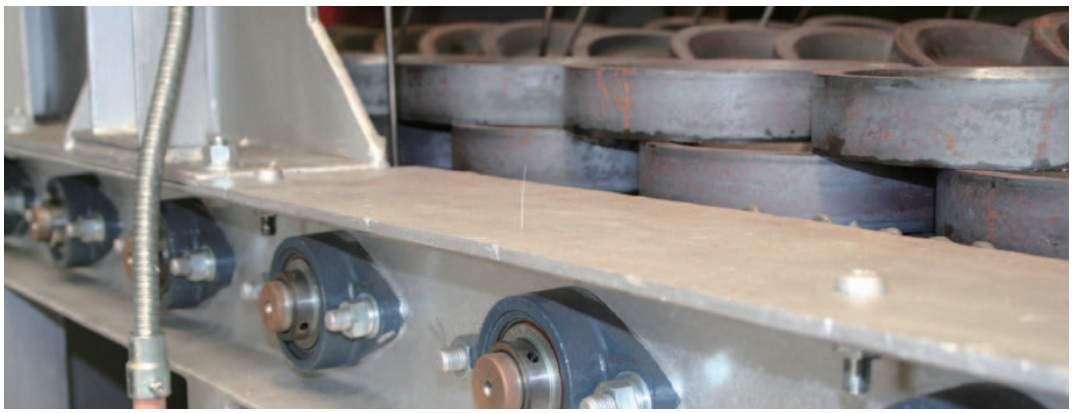


Table 2.1 Specifications of High / Low Temperature Series

Specifications of High / Low Temperature Series							
Category	Suffix code	Operating temperature range		Grease	Seal rubber material	Bearing internal clearance	
		(°C)	(°F)			UC type	UK type
Standard	-	−20 to 100	−4 to 212	FYH Lithium Bearing Grease (lithium complex)	Nitrile	CN	C3
Cold resistant	D2K2	−50 to 120	−58 to 248	SH33M (lithium)	Silicone	CN	C3
Heat resistant	D1K2	−40 to 180	−40 to 356	U-RET EDM-1 (diurea)	Silicone	C4	C5
Heat resistant	D9K2	−20 to 230	−4 to 446	Demnum L-200 (fluorinated grease)	Silicone	C4	C5

Specifications of Extreme High Temperature Series							
Category	Suffix code	Operating temperature range		Grease	Seal rubber material	Bearing internal clearance	
		(°C)	(°F)			UC type	UK type
Heat resistant	D9P4S6Y2	−20 to 260	−4 to 500	Demnum L-200 (fluorinated grease)	-	C4	-
Extreme heat resistant	S6Y3	300 to 450	572 to 842	Solid graphite lubricant	-	Special	-

Table 2.2 Grease Schedule of Ball Bearing Units

Grease schedule of ball bearing units						
Operating temperature °C		Grease Intervals			Bearing used	Grease supplied
Over	Incl.	Substantially clean	Excessive dust	Excessive dust and moisture		
	50	(3 months)	(2 months)	(1 month)		SH33M
		not necessary	1 year	4 months	(Low temperature D2K2)[1]	
50	70	1 year	4 months	1 month	Standard bearing	FYH Lithium -
70	100	6 months	2 months	2 weeks		Bearing Grease
100	120	2 months	2 weeks	5 days		
120	150	2 weeks	5 days	2 days	High temperature D1K2	U-RET EDM-1
150	180	1 week	2 days	1 day		

Note 1) Greasing intervals in parentheses are applicable to low temperature grease (D2K2).
Remark Greasing intervals shown in this table are applicable to a unit operated for 8 to 10 hours per day.
If the time of operation is greater than this range, then a more frequent greasing interval must be specified.
For example, if the unit is operated 16 to 20 hours per day, then the greasing interval must be twice as frequent.

http://www.fyhbearings.com/html/temp.html

2.2.1 Rotational speed adjustment due to shaft fit

A marginal degree of clearance is typically used to facilitate easy installation of a bearing to a shaft.

The amount of clearance between the bearing and shaft must be factored in to determine the maximum allowable rotational speed, and as rotational speed is increased, the amount of clearance must be decreased.

Table 2.3 shows the factor that must be used to correct the allowable rotational speed. The maximum rotational speed is determined by multiplying the speed found in **Table 6.1** by the factors below.

Table 2.3 Fitting factor of ball bearing units f_c (recommended)

Type of ball bearing units	Fitting factor f_c					
	Shaft tolerance range class					
	h5, j5	j6	h6	h7	h8	h9
Heat resistant type (Suffix code: D1K2)	–	–	–	1	1	0.7
Cold resistant type (Suffix code: D2K2)	–	–	–	1	1	0.7

2.2.2 Correction of basic load rating due to temperature

If a ball bearing unit is used at a relatively high temperature the physical composition of the bearing material is changed leading to decreased hardness. This decreased hardness leads to the basic dynamic load rating being reduced. Once the structure of the bearing material has been changed, it will remain this way for the life of the unit, even when it returns to room temperature.

When using a ball bearing unit at 150 ºC or more, the basic load rating must be corrected by multiplying the basic dynamic load rating shown in the dimensional table by the temperature factor shown in **Table 2.4**.

Table 2.4 Temperature factor

Bearing temperature, ºC	125	150	175	200	250
Temperature factor	1	1	0.95	0.9	0.75

2.2.3 Operating temperature range

The operating temperature of a ball bearing unit depends on the type of grease, the material of the seal, and the internal clearance of the bearing. FYH Ball Bearing Units are available in high temperature (D1K2, D9K2) and low temperature (D2K2) series, in addition to the standard models, to allow selection of the correct bearing for your operational temperature (see **Table 2.1**). The correct unit must be chosen for the desired temperature range, and it is equally important to use the appropriate grease according to the specified schedule.

2.2.4 Operating temperature and internal clearance of bearings

When bearings are operated in a high ambient temperature environment, or when the operating temperature is high because of rotational speed, differential expansion rates occur within the bearing components. This causes higher friction, grease breakdown, and eventual seizure.

If the temperature difference between the inner and outer ring is known, or can be approximated, then the following **Formula (2.1)** may be applied.

Under these conditions, decrease in the internal clearance must be calculated, and the internal clearance of bearing needs to be selected properly.

$$S_{t1} = \alpha \cdot D_e \cdot \Delta_t \quad \cdots\cdots (2.1)$$

Whereas,

S_{t1}: Decrease in the internal clearance of bearings depending on the difference in the temperatures of the bearing inner ring and the bearing outer ring can be found by formula, mm

α: Line expansion factor of bearing steel, 12.5×10^{-6}

D_e: Raceway dia. of bearing outer ring, mm

Diameter series 2, X ····· $D_e \fallingdotseq 0.92\ D$

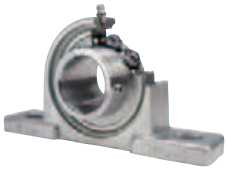
Diameter series 3 ····· $D_e \fallingdotseq 0.9\ \ D$

D: Nominal bearing outer dia., mm

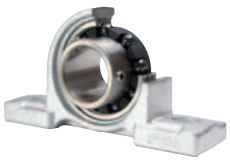
Δ_t: Difference in temperatures of bearing inner ring and outer ring, ºC

If a ball bearing unit is used in a high temperature environment, an abnormal load will result due to thermal expansion of the shaft. This must be compensated for by allowing free movement of one side of the shaft.
(See "**9 Design of shaft and base**")

CERAMIC BALL UNITS



Y2: Ceramic balls with stainless units



Y3: Ceramic balls with a solid self-lubricating lubricant

Ceramic Ball Units features

- Reduced maintenance costs
- Green bearings
- Independent operation
- Low friction
- High stress resistance
- Non-conductive

http://fyhbearings.com/html/cs_exp_e.html

2 Selection Guide

2.3 Corrosion Resistant Series

The Corrosion Resistant Series is available in a wide array of sizes and styles, and units may be customized with a number of different specialized options to accommodate virtually any application. Federal compliance can be assured with FYH Bearing Units.

WASH DOWN

S6 STAINLESS INSERT

RINGS	Stainless steel (SUS 440C equivalent)
BALLS	SUS 440C
CAGE	SUS304
GREASE	H1 FOOD GRADE (FDA /USDA)
SEALS	NBR
SLINGER	SUS304
ANTI-ROTATION PIN	SUS304
SET SCREWS	SUS304
AVAILABLE SIZES	201X - 203X , 204 - 212
CLEARANCE	C3

S7 PLATED INSERT

RINGS	SUJ2 + (zinc plated + trivalent chromate treatment)
BALLS	SUJ2
CAGE	NYLON
GREASE	H1 FOOD GRADE (FDA /USDA)
SEALS	NBR
SLINGER	SPCC + (zinc plated + trivalent chromate treatment)
ANTI-ROTATION PIN	SUS304
SET SCREWS	SCM435 + (zinc plated + trivalent chromate treatment)
AVAILABLE SIZES	204 - 210
CLEARANCE	C3

VP VF VFL VPA
Thermoplastic Housings

Thermoplastic Polyester

H1, H9
Stainless Steel Housings

Lost Wax Casting
(SUS304 or 316 equivalent)

Z5
Nickel Plated Housings

Cast Iron + Nickel Plating

http://www.fyhbearings.com/html/corrosion.html

AIR HANDLING

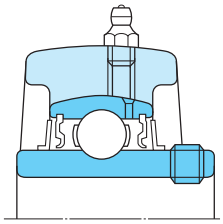
2.4 Air Handing Series

Units for HVAC and air handling (suffix code: S3, S5)

Ball bearing units for blowers must meet the demands of high speed rotation, low vibration, low noise, and decreased temperature output.
To meet these performance needs FYH produces the S3 and S5 series with tighter bore tolerances.
S5 uses non-contact seals as well as an improved machining accuracy to cut down on heat, noise, and vibration.

Table 2.5 Specifications of air handling units

Air Handling Fit	
100% Noise Check	
P11	The anti-rotation pin

Air Handling Fit	
100% Noise Check	
P11	The anti-rotation pin
C2	Internal bearing clearance is defined as the allowable space between the rolling elements and the raceways. **C2** is smaller clearance than the standard, and it reduces the noise and vibration in high speed applications.
P18	**P18** is the suffix code that designates smaller bore tolerance which allows for a tighter fit with the shaft. This, in turn, reduces vibration and noise and dramatically increases bearing life.
K3	Non contact lip seal is available for the lighter torque. 

http://www.fyhbearings.com/html/airhandling.html

2 Selection Guide

2.4.1 Features of the air handring units

The air handling unit is manufactured with original fitting called the air handling fit which exists in the middle with fitting "H" which can be assembled more easily than a standard fit "J." In addition, "J" fit the standard is fit that there is not the need for the anti-rotation pin, but can be very secure in high speed applications by adding the anti-rotation pin.

S3 and S5 bearings are sound tested in order to make sure the noise level is low enough to be suitable for high speed applications such as blowers.

2.4.2 Feature of air handring S5 specification for blowers

(1) Dimensional tolerances of shafts for blowers (used with set screw bearings)

For bearings used in blowers (suffix code: S5), a C2 internal ball clearance is recommended to reduce vibration and noise during operation.

Therefore, the shaft tolerance classes shown in **Table 2.6** are recommended for bearings with set screws.

Refer to (**"11.3 Internal bearing clearance"**) Details of the internal C2 ball clearance.

Table 2.6 Dimensional tolerance of shaft used for bearings (set screw type) for blowers

unit: μm

Shaft dia. (mm)		Dimensional tolerance of shaft			
		h5		j5	
Over	Incl.	Max.	Min.	Max.	Min.
10	**18**	0	− 8	+5	− 3
18	**30**	0	− 9	+5	− 4
30	**50**	0	−11	+6	− 5
50	**80**	0	−13	+6	− 7
80	**120**	0	−15	+6	− 9
120	**180**	0	−18	+7	−11

(2) Tolerance of inner rings of S5 specification

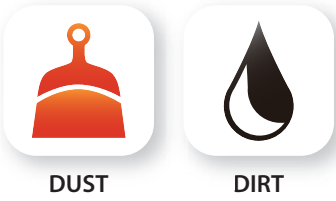
P18 is the suffix code that designates smaller bore tolerance which allows for a tighter fit with the shaft. This, in turn, reduces vibration and noise and dramatically increases bearing life.

Table 2.7 Tolerance and tolerance values of inner rings of P18 suffix (unit: μm)

Nominal bearing bore dia. d (mm)		Variation of tolerance of average bore dia. in plane Δ_{dmp}		Unequal bore dia. in plane V_{dsp}	Radial runout of inner ring K_{ia}
Over	Incl.	Max.	Min.	Max.	Max.
10	**18**	+13	0	6	7
18	**31.75**	+13	0	6	8
31.75	**50.8**	+13	0	10	10
50.8	**80**	+15	0	10	10

Table 2.8 Tolerance and tolerance values of inner rings of ISO standard (unit: μm)

Nominal bearing bore dia. d (mm)		Variation of tolerance of average bore dia. in plane Δ_{dmp}		Unequal bore dia. in plane V_{dsp}	Radial runout of inner ring K_{ia}
Over	Incl.	Max.	Min.	Max.	Max.
10	**18**	+15	0	10	15
18	**31.75**	+18	0	12	18
31.75	**50.8**	+21	0	14	20
50.8	**80**	+24	0	16	25

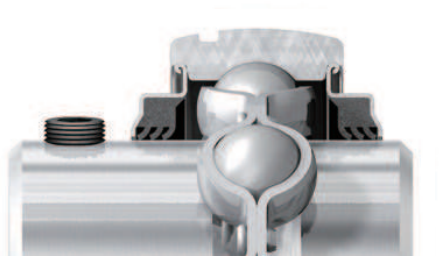


2.5 Dust Resistant Units

The FYH Dust Resistant Units consists of a variety of supplemental sealing options that function extremely well in the exclusion of foreign matter. These options can work well by themselves or in combination with each other. From food processing and agricultural to wash-down and mining and aggregate, the FYH Dust From food processing and agricultural to wash-down and mining and aggregate, the FYH Dust Resistant Units can stand up to the toughest contamination challenges.

Triple-Lip Seals (suffix code: L3)

The L3 seal consists of a stamped steel shield with a molded NBR try-ply seal affixed to the inner portion of the shield, all of which is attached to the outer ring of the bearing. The triple-lip seal is excellent for resisting all types of contamination and is appropriate for low to moderate speeds.



Tight Triple-Lip Seals (suffix code: LT3)

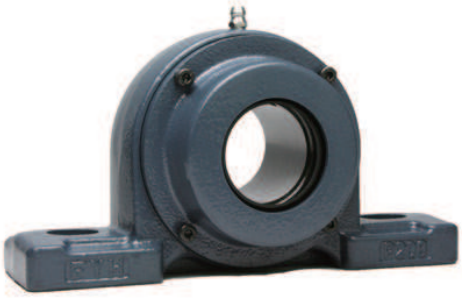
The LT3 Triple-Lip seal fits tighter than the standard L3 seal. The rotating torque of the LT3 seal is approximately double that of the standard L3 seal, and it is appropriate where contamination or moisture are very high and rotating speeds are very low.

2 Selection Guide

Stamped steel and cast iron covers are available in open or closed versions in a complete range of sizes. They are easy to install and they offer great resistance to wet and dry contaminates, and shocks and heats. Covers protect the entire bearing insert from contamination and they also help to provide a safer working environment.

Stamped Steel Open Covers

Cast Iron Open Covers



BACKSIDE GUARD

The nitrile rubber shields can be mounted on the backside of two and four bolt flange units and the equipment it is bolted onto. The back-side guard protects your bearings from dust and moisture and help lead to longer bearing life in applications where this can be an issue.

The nitrile rubber on the steel plate come without a drain slot and is designed for dust protection. Some applications where this product could be used include: aggregate applications, fertilizer spreaders, salt spreaders and agricultural applications where dirt can reach the backside of bearing units.
The nitrile rubber on the 304 stainless steel plate with the drain slot is designed to protect your bearing units in applications that are exposed to moisture and where moisture or water build up can create issues. These backside guards can be utilized in food and beverage applications where they are being washed down as well as pharmaceutical applications. The stainless steel core is perfect for situations where regular steel can rust quickly.

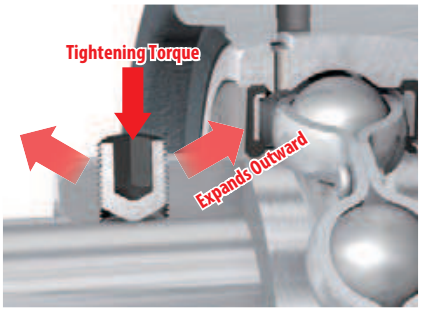
http://fyhbearings.com/html/backside_guard.html

ORIGINAL DESIGNED SET SCREW

BULLET POINT®

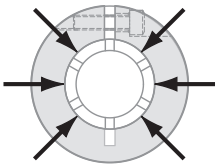
The innovative FYH Bullet Point set screw is a one piece ball point set screw which is designed to expand the threads of the screw as the point of the screw contacts the surface of the shaft.The resulting force creates superior holding power especially where vibration is present. Other set screws have larger contact areas with sharp edges at the point of the screw to bite into the shaft. However, these sharp edges damage more easily from vibration which creates a gap between the point of the set screw and the shaft. Once this gap is established, the set screw will begin to loosen.

When the Bullet Point set screw is tightened, the original shape of the point causes the threads of the screw to expand up to and beyond the elastic limit to achieve the maximum possible holding power. The thickness of the point is also designed to expand easily. This specialized design drastically reduces the potential for damage to both the set screw and shaft from normal use or for severe vibration, shock load, and high speed.



360° SHAFT CONTACT TRUE Concentric-LOC

NU-LOC®



The **FYH NU-LOC** bearing grips the shaft more uniformly, which allows for 360 degrees of equalized locking contact.
Compared to set screw bearings, the roundness of the ball path on the NU-LOC bearings results in better operation and longer life.

NU-LOC concentric locking collars are designed to prevent shafting from becoming marred or burred. A single standard hex head cap screw can be tightened quickly and easily, and NU-LOC bearings can replace either setscrew or eccentric locking collar inserts.

NU-LOC concentric locking collar with a single cap screw provides excellent holding power. The collar is installed over the slotted inner ring on the shaft concentrically.
Quick & Easy Installation with a single hex cap screw.

NU-LOC's standard tolerance specification is designed for air handring applications, and the greater roundness of the ball path enable the use of smaller internal ball clearance.

The bore tolerance is also smaller since NU-LOC has the 360 degrees of equalized locking contact. NU-LOC is not only good for the air handring applications, but great for the other applications as well.