

# xiros<sup>®</sup>

Polymer ball bearings



# xiros<sup>®</sup> polymer ball bearings | Application examples

Other exciting applications ► [www.igus.sk/xiros-applications](http://www.igus.sk/xiros-applications)

## Labelling machine

Depending on the size of the system, between 12 and 36 guide rollers are used in the Sleeveomatic's film storage. Two xiros<sup>®</sup> ball bearings are used per guide roller. (Krones AG)





### Thermoforming machine

In this Thermoforming machine for coffee-cream portion packs, xiros® A500 plastic ball bearings are used for their high chemical resistance. (frischli Milchwerke GmbH)



### Bike wash system

To mount the washing brushes, the manufacturer of the "cycleWash" has used two xiros® slewing ring ball bearings with stainless steel balls. The bearing rings consist of the wear-resistant ball bearing material xirodur® B180.



### Wet film thickness gauge

This precision tester for accurate and rapid measurement of all liquid paint, coatings, oil coatings and adhesives is equipped with a durable and solvent-resistant xiros® B180 polymer ball bearing.



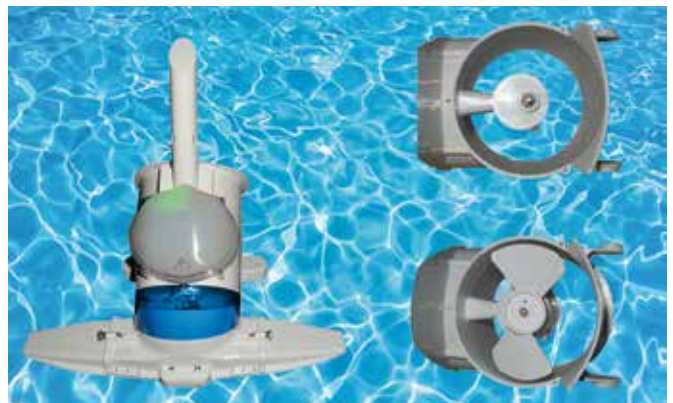
### Film guide rollers

There is no contamination of the films through lubricants, due to the use of maintenance-free xiros® flange bearings.



### Pellet ovens

Two lubrication-free polymer ball bearings are used in the mechanical drive unit. These ensure that the pellets are fed into the combustion chamber via the roller. (Erwin Koppe – Keramische Heizgeräte GmbH)



### Pool cleaner

xiros® B180 polymer ball bearings from igus® allow pool cleaners a lubrication-free underwater operation. Resistant to chemicals, lightweight and maintenance-free.

# xiros® polymer ball bearings | Product overview

## xiros® radial deep groove ball bearings – standard product range



**The classic:**

PA cage



**FDA**

**Cost-effective and FDA-compliant:**

B180 cage



**FDA**

**FDA-compliant:**

PE cage



**With shield or labyrinth seal:**

LCC with B180 cage

## xiros® radial deep groove ball bearings – standard product range



**Lightweight and non-metallic:**

xirodur® A500, PAI balls



**Antistatic:**

xirodur® F180, PA cage



**FDA**

**Antistatic and FDA-compliant:**

xirodur® F180, PE cage



**Conductive:**

xirodur® F182, PA cage

## xiros® radial deep groove ball bearings with flange and guide rollers



**Single flange:**

xirodur® B180, PA cage



**With double flange:**

xirodur® B180, PA cage



**Antistatic:**

xirodur® F180, PA cage



**Guide roller:**

Aluminium tube

## xiros® – other designs



**With profile:**

xirodur® B180



**Spherical radial deep groove ball bearings:**

xirodur® B180



**Double row for higher loads:**

xirodur® B180



**Multi-axis bearing:**

xirodur® B180, PP balls

## xiros® thrust bearings and slewing ring ball bearings



**Single row:**

xirodur® B180, glass/stainless steel balls



**Double row:**

xirodur® B180, glass/PAI/stainless steel balls



**Thrust bearing:**

xirodur® B180, glass/stainless steel balls



**Slewing ring ball bearings:**

xirodur® B180, with gear teeth or with cage



**Black (for visible parts):**  
xirodur® S180,  
PA cage



**High resistance to chemicals:**  
xirodur® C160, PP cage



**For high temperatures up to +120°C:**  
xirodur® A500, PA cage



**FDA**

**For heat and chemicals:**  
xirodur® A500,  
PEEK cage

**xiros® radial deep groove ball bearings – further materials**



**High speeds:**  
xirodur® D180,  
PA cage



**FDA**

**Detectable:**  
xirodur® M180,  
xirodur® M180 cage



**For the tobacco industry:**  
xirodur® T220,  
PP cage



**For temperatures up to +120°C:**  
xirodur® G220, PP cage



**Guide roller:**  
Plastic approved for food contact



**Guide roller:**  
Carbon fibre tube with ball bearing



**End caps:**  
xirodur® B180,  
PA cage



**Skate wheel:**  
xirodur® B180,  
PA cage



**FDA**

**Fixed flange ball bearing, FDA-compliant, fixed version:** xirodur® B180



**Polymer balls transfer units:**  
wxirodur® B180 and F182



**Axial polymer ball transfer units:**  
with spherical roller

**xiros® combinations with igubal®**



**FDA**

**Pillow block ball bearing, FDA-compliant, fixed version:** xirodur® B180



**Pillow block ball bearing, fixed or pivoting**



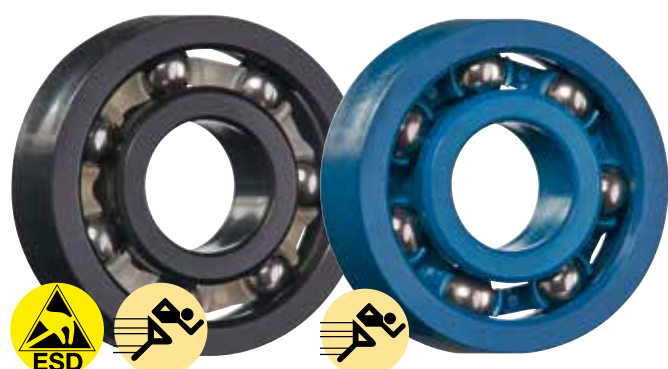
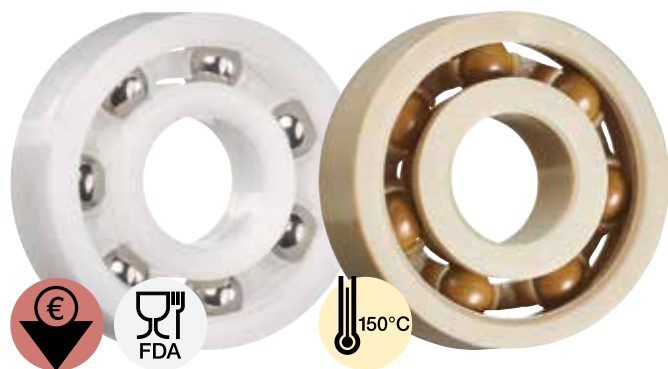
**4-hole fixed flange ball bearing, pivoting**



**2-hole fixed flange ball bearing, pivoting**

# xiros<sup>®</sup> polymer ball bearings | Advantages

Lubrication and maintenance-free



## Lubrication-free polymer ball bearings

xiros<sup>®</sup> polymer ball bearings revolutionise the ball bearing market. Thanks to their maintenance-free dry operation and the use of xirodur<sup>®</sup> high-performance polymers, many applications can be successfully implemented in which conventional metal ball bearings are not suitable.

- Lubrication and maintenance-free
- Corrosion-resistant
- Non-metallic (due to the use of glass and plastic balls), therefore non-magnetic
- For temperatures up to +150°C (depending on material)
- High media resistance, suitable for washdown
- Lightweight
- Electrically insulating (or ESD-compliant)
- FDA-compliant (depending on material)
- Predictable service life

### Typical application areas

- Packaging
- Textile industry
- Test engineering and quality assurance
- Optical industry
- Model making



#### Available from stock

Detailed information about delivery time online.



#### Price breaks online

No minimum order value. No minimum order quantity.



max. +150°C  
min. -100°C



10 xirodur<sup>®</sup> materials  
Ø 3–60mm



Imperial dimensions available  
► Page 1611



Service life calculation  
► [www.igus.sk/xiros-expert](http://www.igus.sk/xiros-expert)

# xiros® polymer ball bearings | Product overview

## Overview types



### xiros® radial deep groove ball bearings – standard product range for 3 materials:

- xirodur® B180 – cost-effective standard
- xirodur® C160 – resistant to chemicals
- xirodur® A500 – for heat and chemicals



### xiros® radial deep groove ball bearings with flange and guide rollers

- With single or double flange
- Made from xirodur® B180 or F180
- xiros® system solution: Aluminium, PVC or carbon fibre tube with 2 fixed flange ball bearings



### xiros® radial deep groove ball bearings – materials for special applications

- xirodur® M180 – detectable
- xirodur® T220 – for the tobacco industry
- xirodur® G220 – for temperatures up to +120°C
- xirodur® S180 – black (for visible parts)
- xirodur® F180 – antistatic
- xirodur® F182 – conductive
- xirodur® D180 – high speeds



### xiros® radial deep groove ball bearings – further designs

- With spherical outer diameter
- Double row for higher loads
- Multi-axis bearing for rotary and linear movements



### xiros® thrust bearing

- For absorbing axial loads
- Various options



### xiros® slewing ring ball bearings

- With glass or stainless steel balls
- Outer toothed profile
- With cage



### xiros® combinations with igubal®

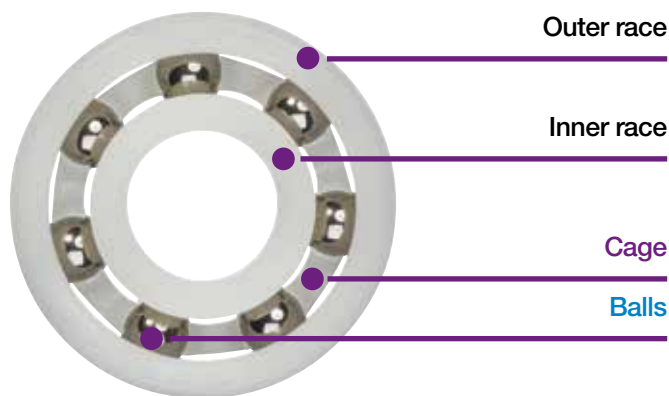
- Fixed or pivoting versions
- For maintenance-free use in conveyor belts and guide rollers

## Radial deep groove ball bearings design

The xiros® polymer ball bearings are single-row deep groove ball bearings based on DIN 625. The lubrication and maintenance-free ball bearings consist of four components:

### The outer and inner races

The suitability of a xiros® polymer ball bearings is largely determined by the materials of the two races. These are made from igus® tribo-polymers to maximise service life and minimise friction. Choice of 5 materials. They allow different values of application temperature, media resistance and price. The table of materials provides exact information on this topic.



### The cage

The material of the ball bearing cage must fit well to the application. The various material options have quite different chemical and temperature resistance values. The cage materials are compatible with all the different race options within xiros®.

### The balls

The ball materials differ most significantly. In addition to steel, glass or plastics are used. This produces a large difference in mass, which in turn affects inertia, weight and chemical resistance. Stainless steel balls (1.4401) are cost-effective, resistant to chemicals and suitable for high temperatures, but are the heaviest in the range. Glass balls (soda-lime glass) are also resistant to chemicals and have a medium weight. Just like polymer balls, they are non-metallic and non-magnetic. In addition to their excellent chemical resistance, the polymer balls (PAI) are even lighter than stainless steel or glass balls.

## Other designs

### xiros® radial deep groove ball bearings

The other designs include:

- Convex rollers which can run directly on a profile
- Profiled rollers, e.g. for thread/cable guidance
- Thrust and slewing ring ball bearings for absorbing axial loads
- Multi-axis bearings for linear and radial movements
- Ball bearings designed e.g. for installation in tube ends (also for guide rollers)
- Double-row bearings for absorbing higher forces

### Pillow block and fixed flange bearings

This range is made up by combining xiros® polymer ball bearings with the igubal® pillow block and fixed flange housings, resulting in a higher flexibility in terms of installation of the bearings. The bearing housings make it easy for the user to install these maintenance-free components. Both fixed flange and pillow block bearings are available as fixed or as pivoting design. The difference between the two options is that the pivoting type can compensate for shaft and/or bearing misalignment. A spherical outer race is pressed into the bearing housing, ensuring self-aligning action. If necessary, the inner bearing can be pivoted in all directions. Possible misalignment of two bearing points lying together can thus be compensated for.

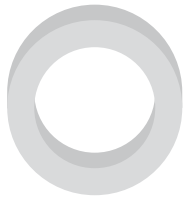
### Measurement requirement for injection-moulded xiros® polymer ball bearings

The outer race of our ball bearings has a conical shape. This simplifies the installation in a suitable housing (with the narrow side first). After press-fit into a housing machined to a H7 tolerance the bearing clearance is reduced. Therefore the bearings must be measured over the entire width of the ball bearing. Starting at an angle of 90° from the injection point.





# xiros<sup>®</sup> polymer ball bearings | Technical data



Housing  
(H7 tolerance)



Front  
(balls visible)



Back  
(cage visible)



Press in front of ball  
bearing first



Shaft (h6 tolerance),  
fit with chamfer side  
facing in



A locating spigot is  
required

To press in the xiros<sup>®</sup> polymer ball bearing over the entire width of the housing, apply pressure on the outer race. xiros<sup>®</sup> radial deep groove ball bearings are only suitable for limited axial loads.

## Development and tests

Through numerous tests the race materials were optimised. The polymers we have developed for use with ball bearings allow higher speeds, greater loads, and longer service life. But the development continues. We believe that polymer ball bearing technology will continue to advance, especially with our experience in the development of tribological polymer materials. Challenge us, talk to us about your applications, tell us what you need from a polymer ball bearing. In the igus<sup>®</sup> test laboratory the service life and wear of xiros<sup>®</sup> polymer ball bearings are tested. In addition to the actual material comparison, tests indicate these experiments also answer questions about the impact of external influences such as temperature, humidity or dust.



igus<sup>®</sup> extends the xiros<sup>®</sup> test stand in the industry's largest test laboratory for plastics in motion

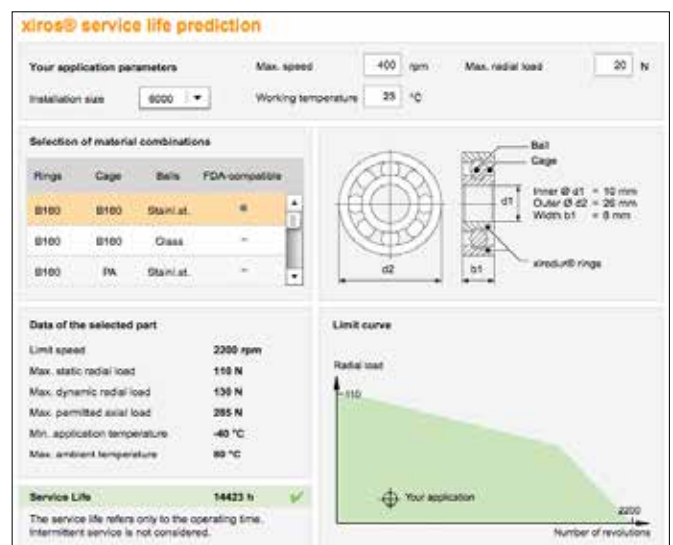
## Predictability

As part of the development of xiros<sup>®</sup> polymer ball bearing tests are carried out continuously. The high number of test results makes it very difficult to present this information in tabular form. It is for this reason that igus<sup>®</sup> has developed the online service life calculator, which uses real test results to give an accurate calculation.

The predictability of xiros<sup>®</sup> polymer ball bearings is one of the most important advantages. Based on the results of many wear tests, the user can calculate the service life of xiros<sup>®</sup> polymer ball bearings reliably and interpret the application.



► [www.igus.sk/xiros-expert](http://www.igus.sk/xiros-expert)



Download the online tool  
app now



# xiros® polymer ball bearings | Technical data

## Material properties and chemical resistance

General properties	Unit	xirodur®			
		B180	S180	C160	A500
Density	g/cm <sup>3</sup>	1.41	1.40	1.11	1.30
Colour		white	black	opaque	brown
Max. moisture absorption at +23°C/50% r.h.	% weight	0.2	0.2	0.1	0.1
Max. total moisture absorption	% weight	0.7	0.7	0.2	0.4
Mechanical properties					
Flexural modulus	MPa	2,500	2,700	1,900	4,300
Flexural strength at +20°C	MPa	68	65	35	130
Shore D hardness		77	78	67	85
Electrical properties					
Specific volume resistance <sup>1)</sup>	Ωcm	> 10 <sup>14</sup>	> 10 <sup>13</sup>	> 10 <sup>14</sup>	> 10 <sup>14</sup>
Surface resistance <sup>1)</sup>	Ω	> 10 <sup>14</sup>	> 10 <sup>13</sup>	> 10 <sup>14</sup>	> 10 <sup>14</sup>
Thermal properties of xiros® polymer ball bearings <sup>1)</sup>					
Max. long-term application temperature	°C	+80	+80	+60	+150 (PEEK) +120 (PA)
Min. long-term application temperatures (in combination with cage material)	°C	-40	-40	0	-100 (PEEK) -40 (PA)

<sup>1)</sup> Depending on the geometry

Table 01: Material data

Medium	xirodur®			
	B180	S180	C160	A500
Alcohols	+	+	+	+
Greases, oils without additives	+	+	+	+
Hydrocarbons	+	+	+ up to 0	+
Fuels	+	+	+ up to 0	+
Strong alkali	+ up to 0	+ up to 0	+	+
Strong acid	-	-	+ up to 0	+
UV radiation	-	0	0	+
Diluted base	+	+	+	+
Diluted acid	0 to -	0 to -	+	+

+ resistant 0 conditionally resistant - non-resistant

Table 02: Chemical resistance of xiros® materials

## Recommended tolerances

Fitting	Housing hole	Shaft
Standard:	H7	h6
Press-fit		

For further questions about the dimensioning of the hole and the shaft please contact us.

xirodur®							igumid
F180	F182	D180	M180	T220	G220	G	
1.36	1.42	1.22	1.67	1.28	1.14	1.37	
black	black	blue	blue	beige	grey	black	
0.2	0.2	0.5	0.2	0.3	2.1	1.4	
1.3	0.7	1.4	0.6	0.5	8.9	5.6	
1,600	3,000	135	2,500	1,800	3,000	7,800	
70	95	n.a.	68	65	n.a.	240	
79	79	48	77	76	n.a.	79	
$< 10^{12}$ <sup>1)</sup>	$< 10^4$	$> 10^{14}$	$> 10^9$	$> 10^{10}$	$> 10^{13}$	$> 10^{11}$	
$< 10^{12}$ <sup>1)</sup>	$< 10^4$	$> 10^{14}$	$> 10^9$	$> 10^{10}$	$> 10^{12}$	$> 10^{11}$	
+80	+80	+80	+80	+100	+100	+120	
-40	-40	-50	-40	-40	-40	-40	

xirodur®							igumid
F180	F182	D180	M180	T220	G220	G	
+	+	+ up to 0	+	+	0	+	
+	+	+	+	+	+	+	
+	+	+	+	+	+	+	
+	+	+	+	+	+	+	
+ up to 0	+ up to 0	+ up to 0	+ up to 0	+ up to 0	+ up to 0	-	
-	-	0	-	-	-	+ up to 0	
0	0	-	-	+	-	-	
+	+	+ up to 0	+	+	+	0 to -	
0 to -	0 to -	+ up to 0	0 to -	0 to -	0 to -	+	

## Ball materials

Description	Specification
ES: Stainless steel	1.4401
GL: glass	Soda-lime glass or borosilicate glass
PAI: plastic	Polyamide-imide
PP: plastic	Polypropylene

# xiros® polymer ball bearings | Selection guide

## According to material properties

xirodur®	B180				S180	C160		
Cage material	PA		B180		PE	PA	PP	
Ball material	ES	GL	ES	GL	ES	ES	ES	GL
<b>Descriptive technical specifications</b>								
Smooth running	●	●	●	●	●	●	●	●
Low moisture absorption	●	●	●	●	●	●	●	●
Chemical resistance			●	●	●		●	●
Seawater-resistant			●	●			●	●
Dirt-resistant	●	●	●	●	●	●	●	●
Higher temperatures								
Higher speeds								
Cost-effective			●	●				
<b>Approvals and standards</b>								
For contact with food			●		●			
Antistatic								
Conductive								
Non-metallic		●		●				●
Detectable								
<b>Availabilities / variants</b>								
Radial deep groove ball bearings	●	●	●	●	●	●	●	●
Radial deep groove ball bearings with flange	●	●	●	●				
End cap	●	●						
Spherical outer diameter	●	●						
Double row	●	●						
Slewing ring ball bearings			●					
Thrust bearing			●	●				

A500					F180		F182	D180	M180	T220	G220
PA		PEEK			PA	PE	PA	PA	M180	PP	PA
ES	GL	ES	GL	PAI	ES	ES	ES	ES	ES	ES	ES
●	●	●	●	●	●	●	●		●	●	
●	●	●	●	●	●	●	●		●	●	
		●	●	●							
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