Technical information for cross-roller bearings

Cross-roller bearings are characterised by the arrangement of the cylindrical rollers, which are positioned perpendicular to each other in a rectangular track and separated from each other by spacers. This design enables them to absorb high loads from various directions, both radially and axially, as well as torque loads. The high rigidity and compact dimensions of the inner and outer rings make the cross-roller bearing particularly suitable for applications such as swivel joints in industrial robots, rotary stages in machine tools, swivelling devices for manipulators, precision rotary stages, medical equipment, measuring instruments and machines for semiconductor production.
Cross-roller bearings offer high-precision concentricity, as the spacers prevent the rollers from tilting, thus reducing the torque load caused by friction. Unlike conventional bearings with steel cages, there is no one-sided contact or blocking of the rollers, which ensures stable rotation even under tension. In addition, the inner and outer rings can be separated, enabling adjustable tension and precise rotation.
The spacers ensure that the rollers remain correctly aligned and prevent tilting. This eliminates friction between the rollers, ensuring stable torques.

Cross-roller bearing, steel 23831:

The integrated inner/outer ring structure increases the rigidity of the components compared to cross-roller bearings that have a split outer ring. This reduces the impact on the accuracy and rigidity of the housing and ensures stable performance.

Order number:	Bearing play:	Tolerance class (P0):
23831-002008	0 ~ 14µm (C1)	Radial deviation of inner ring: 13µm Axial deviation of inner ring: 13µm Radial deviation outer ring: 20µm Axial deviation of outer ring: 20µm
23831-102008	-8µm ~ 0 (S1)	
23831-002508	0 ~ 24µm (C1)	Radial deviation of inner ring: 15µm Axial deviation of inner ring: 15µm Radial deviation of inner ring: 20µm Axial deviation of inner ring: 20µm
23831-102508	-8µm ~ 0 (S1)	
23831-003010	0 ~ 24µm (C1)	Radial deviation of inner ring: 15µm Axial deviation of inner ring: 15µm Radial deviation outer ring: 20µm Axial deviation of outer ring: 20µm
23831-103010	-8µm ~ 0 (S1)	
23831-003510	0 ~ 24µm (C1)	Radial deviation of inner ring: 15µm Axial deviation of inner ring: 15µm Radial deviation outer ring: 20µm Axial deviation of outer ring: 20µm
23831-103510	-8µm ~ 0 (S1)	
23831-004010	0 ~ 28µm (C1)	Radial deviation of inner ring: 20µm Axial deviation of inner ring: 20µm Radial deviation outer ring: 25µm Axial deviation of outer ring: 25µm
23831-104010	-8µm ~ 0 (S1)	
23831-004510	0 ~ 28µm (C1)	Radial deviation of inner ring: 20µm Axial deviation of inner ring: 20µm Radial deviation outer ring: 25µm Axial deviation of outer ring: 25µm
23831-104510	-8µm ~ 0 (S1)	
23831-005013	0 ~ 28µm (C1)	Radial deviation of inner ring: 20µm Axial deviation of inner ring: 20µm Radial deviation outer ring: 25µm Axial deviation of outer ring: 25µm
23831-105013	-8µm ~ 0 (S1)	
23831-006013	0 ~ 28µm (C1)	Radial deviation of inner ring: 20µm Axial deviation of inner ring: 20µm Radial deviation outer ring: 25µm Axial deviation of outer ring: 25µm
23831-106013	-8µm ~ 0 (S1)	
23831-007013	0 ~ 38µm (C1)	Radial deviation of inner ring: 25µm Axial deviation of inner ring: 25µm Radial deviation outer ring: 35µm Axial deviation of outer ring: 35µm
23831-107013	-8µm ~ 0 (S1)	

Order number:	Bearing play:	Tolerance class (P0):
23831-008016	0 ~ 38µm (C1)	Radial deviation of inner ring: 25µm Axial deviation of inner ring: 25µm Radial deviation outer ring: 35µm Axial deviation of outer ring: 35µm
23831-108016	-8µm ~ 0 (S1)	
23831-009016	0 ~ 38µm (C1)	Radial deviation of inner ring: 25µm Axial deviation of inner ring: 25µm Radial deviation outer ring: 35µm Axial deviation of outer ring: 35µm
23831-109016	-8µm ~ 0 (S1)	

Cross-roller bearing, steel, compact 23831-05:

The extremely small cross-section permits light and compact applications. The inner and outer ring are machined from a single piece of material and can be used for either inner or outer ring rotation.

Order number:	Bearing play:	Tolerance class (P0):
23831-05-002005	0 ~ 15µm (C1)	Radial deviation of inner ring: 13µm Axial deviation of inner ring: 13µm Radial deviation outer ring: 20µm Axial deviation of outer ring: 20µm
23831-05-102005	-8µm ~ 0 (S1)	
23831-05-003005	0 ~ 15µm (C1)	Radial deviation of inner ring: 13µm Axial deviation of inner ring: 13µm Radial deviation outer ring: 13µm Axial deviation of outer ring: 13µm
23831-05-103005	-8µm ~ 0 (S1)	
23831-05-004005	0 ~ 15µm (C1)	Radial deviation of inner ring: 13µm Axial deviation of inner ring: 13µm Radial deviation outer ring: 13µm Axial deviation of outer ring: 13µm
23831-05-104005	-8µm ~ 0 (S1)	
23831-05-005005	0 ~ 15µm (C1)	Radial deviation of inner ring: 13µm Axial deviation of inner ring: 13µm Radial deviation outer ring: 13µm Axial deviation of outer ring: 13µm
23831-05-105005	-8µm ~ 0 (S1)	
23831-05-005008	0 ~ 15µm (C1)	Radial deviation of inner ring: 13µm Axial deviation of inner ring: 13µm Radial deviation outer ring: 13µm Axial deviation of outer ring: 13µm
23831-05-105008	-8µm ~ 0 (S1)	
23831-05-006005	0 ~ 15µm (C1)	Radial deviation of inner ring: 13µm Axial deviation of inner ring: 13µm Radial deviation outer ring: 13µm Axial deviation of outer ring: 13µm
23831-05-106005	-8µm ~ 0 (S1)	
23831-05-006008	0 ~ 15µm (C1)	Radial deviation of inner ring: 13µm Axial deviation of inner ring: 13µm Radial deviation outer ring: 13µm Axial deviation of outer ring: 13µm
23831-05-106008	-8µm ~ 0 (S1)	
23831-05-007005	0 ~ 15µm (C1)	Radial deviation of inner ring: 15µm Axial deviation of inner ring: 15µm Radial deviation outer ring: 15µm Axial deviation of outer ring: 15µm
23831-05-107005	-8µm ~ 0 (S1)	
23831-05-007008	0 ~ 15µm (C1)	Radial deviation of inner ring: 15µm Axial deviation of inner ring: 15µm Radial deviation outer ring: 15µm Axial deviation of outer ring: 15µm
23831-05-107008	-8µm ~ 0 (S1)	
23831-05-008005	0 ~ 15µm (C1)	Radial deviation of inner ring: 15µm Axial deviation of inner ring: 15µm Radial deviation outer ring: 15µm Axial deviation of outer ring: 15µm
23831-05-108005	-8µm ~ 0 (S1)	

Order number:	Bearing play:	Tolerance class (P0):
23831-05-008008	0 ~ 15µm (C1)	Radial deviation of inner ring: 15µm Axial deviation of inner ring: 15µm Radial deviation outer ring: 15µm Axial deviation of outer ring: 15µm
23831-05-108008	-8µm ~ 0 (S1)	
23831-05-009005	0 ~ 15µm (C1)	Radial deviation of inner ring: 15µm Axial deviation of inner ring: 15µm Radial deviation outer ring: 15µm Axial deviation of outer ring: 15µm
23831-05-109005	-8µm ~ 0 (S1)	
23831-05-009008	0 ~ 15µm (C1)	Radial deviation of inner ring: 15µm Axial deviation of inner ring: 15µm Radial deviation outer ring: 15µm Axial deviation of outer ring: 15µm
23831-05-109008	-8µm ~ 0 (S1)	

Cross-roller bearing, steel, with fastening holes 23831-10:

The inner and outer rings are machined from a single piece and have mounting holes, eliminating the need for a housing or special flanges. This enables easy assembly without compromising performance. In addition, a high level of concentricity and stable running behaviour is guaranteed. Both the inner and outer ring can rotate.

Order number:	Bearing play:	Tolerance class (P0):
23831-10-002012	0 ~ 24µm (C1)	Radial deviation of inner ring: 13µm Axial deviation of inner ring: 13µm Radial deviation outer ring: 20µm Axial deviation of outer ring: 20µm
23831-10-102012	-8µm ~ 0 (S1)	
23831-10-003515	0 ~ 28µm (C1)	Radial deviation of inner ring: 15µm Axial deviation of inner ring: 15µm Radial deviation outer ring: 20µm Axial deviation of outer ring: 20µm
23831-10-103515	-8µm ~ 0 (S1)	
23831-10-005515	0 ~ 38µm (C1)	Radial deviation of inner ring: 20µm Axial deviation of inner ring: 20µm Radial deviation outer ring: 25µm Axial deviation of outer ring: 25µm
23831-10-105515	-8µm ~ 0 (S1)	

Bearing play/clearance:

The bearing play can be best visualised by holding a cross-roller bearing in your hand. If you try to move the inner ring of the bearing up and down or side to side while holding the outer ring still, you will notice a small amount of movement in both the radial and axial directions. This movement is known as bearing play. Alternatively, the inner ring can be fixated and the outer ring moved. This is also referred to as bearing play.

Tolerance class

The cross-roller bearings from norelem conform to tolerance class P0, which is the standard tolerance class for roller bearings. Other tolerance classes can be supplied on request.