

Cylindrical Roller Bearings

Cylindrical roller bearings are manufactured by NTN-Bower in several series which differ in proportion, width, and load rating. Bore size for each series increases in multiples of five or more millimeters and for each bore size a selection of different narrow and wide series is available to meet the needs of most applications. External dimensions and tolerances conform to RBEC #1 metric bearing standards as defined in the Anti-Friction Bearing Manufacturers Association (AFBMA) and American National Standards Institute (ANSI).

NTN-Bower standard product lines include two basic series: the "M" series for light and medium radial loads and the "W" series for heavy to extra heavy radial loads. Only complete bearing assemblies interchange between the Max-Pak and the "M" series bearings; separable rings and roller assemblies do not.

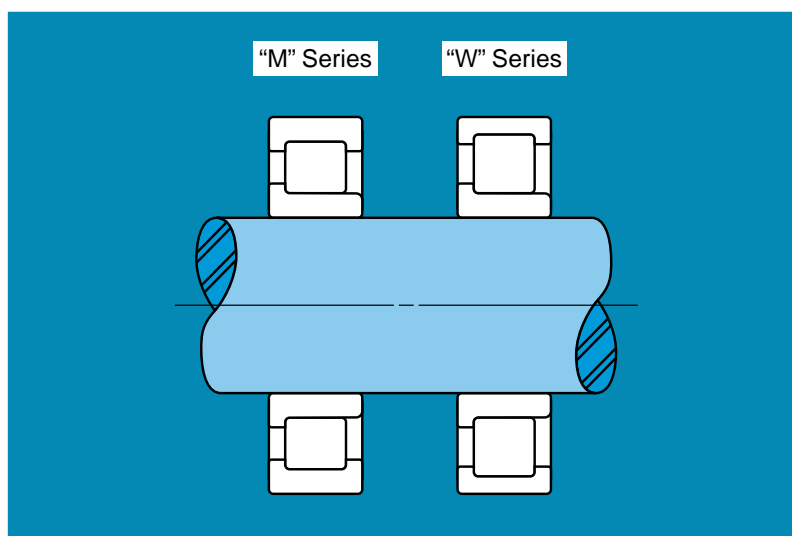
The "W" (Max-Pak) series provides an average radial load rating increase of 20 percent and a life increase of 80 percent. These increases are possible by reducing the wall thickness of the bearing rings. This reduction provides additional space for larger rollers resulting in higher calculated ratings.

While cylindrical roller bearings are designed primarily for high radial loads, certain types are capable of handling light and intermittent thrust loads, which also permits them to be used for axial shaft location.

The cylindrical roller bearing is a nonadjustable design. The correct radial internal clearance is built in at time of manufacture; when properly installed, the bearing has the correct running clearance. by using an "A" style outer ring, a press fit for the outer ring is obtained when installed in a housing previously designed to produce a tap fit.

NTN-Bower also manufactures a limited number of specialty bearings that include the "MOJ" and "MOX" style, custom "R" series, mast and chain guide bearings. A part number listing, dimensional data and load ratings can be found in the special bearing section of this catalog. Page 70.

Radial Section Comparison



Bearing Design

“M” SERIES BEARINGS

The “M” series designated by the prefix letter “M” satisfies most commercial applications and is available in a broad range of sizes and types up to 20” (508 mm) outside diameter. This series is available with several types of cages including composite steel, “X” bar, stamped steel, and *Fibron. This series is also available with a full complement of rollers i.e., (no cage).



“W” (MAX-PAK) SERIES BEARINGS

The Max-Pak series with the prefix letter “W” interchanges with the “M” series and is designed for applications with very heavy radial loads. This series can be produced in most of the same types and sizes as the “M” series and is available with an “X” bar steel or stamped steel cage.

“A” style (oversize outer ring for heavy press fit in a standard size housing bore) is the standard Outside Diameter for the Max-Pak series.

For individual part number availability, contact NTN Sales.



Series Interchange

M Series	Max-Pak
M1900	W61900
M1000	W61000
M1200	W61200
M5200	W65200
M1300	W61300
M7300	W67300

*“Fibron” is the NTN—Bower trade name for nonmetallic cages

Bearing Design

CAGES

“M” series bearings are supplied with one of four basic cage styles; composite steel, one piece steel, “X” bar, and Fibron. Bearing load ratings and speed limitations for various cage styles are included in the “Dimensions and Load Ratings” section and “Engineering” section of this catalog. Load ratings for bearings using Fibron cages are the same as the column for inner ring assemblies with one-piece steel cages.

The composite steel cage provides more rollers for a given bearing size than is possible with other designs to offer greater radial load carrying capacity. Guidance for this cage is located on the ground ribs of the ring containing the rollers.

The one piece steel cage provides a maximum number of equally spaced rollers for a given bearing size. This cage is simple, light weight and exceptionally strong. Its open construction permits free flow of lubricant through the bearing, which is especially important for relatively high temperature and high speed applications.

MATERIAL

Both rings and rollers of NTN-Bower cylindrical roller bearings are made from case hardened alloy steel of “Bearing Quality” to provide maximum fatigue life and reliability. Precise control of heat treatment, dimensions, and surface finish of the components further contribute to reliable bearing performance.

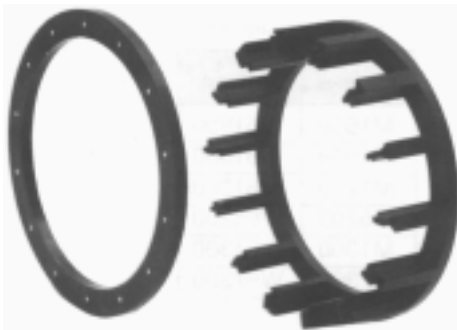
CROWNED ROLLERS

NTN-Bower’s pioneering efforts in developing crowned rollers for cylindrical roller bearings have resulted in greater load carrying capacity and substantially longer bearing life. Crowned rollers, under load, distribute stress equally along their full length of contact with the raceways, thereby eliminating stress concentration at the roller ends. This design concept also compensates for minor misalignment between shaft and housing bores and deflections under load by reducing stress concentratons.

Crowned rollers are manufactured in two basic profiles. A full crown roller is used in small size bearings or in applications where high misalignment is expected and a modified “dubbed” crown in the large size bearings.



X BAR STEEL CAGE



FIBRON CAGE

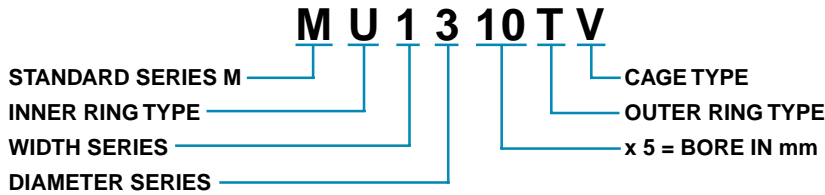


**ONE PIECE
STEEL CAGE**



COMPOSITE STEEL CAGE

Numbering System



PREFIX LETTERS

1	2	3	4	
C	A			Plain Inner Ring
		B		Special Features
			B	Mast and Chain Guide Bearings
		C		Special Features
		D	D	Inner Ring Bore 5mm Undersize (Max-Pak Series Only)
		E	E	Inner Ring Bore 10mm Undersize (Max-Pak Series Only)
		F		Unground Rib O.D.
		F	F	Inner Ring Bore 15mm Undersize (Max-Pak Series Only)
			G	Inner Ring Bore 20mm Undersize (Max-Pak Series Only)
			G	Standard Metric Series
M				Inner Ring Plate
N	N	N		Custom Series
R				One Ribbed Inner Ring
	R			Short, One Ribbed Inner Ring
	S			5mm or 10mm Undersize Bore
		T	T	Two Ribbed Inner Ring
	U			Max-Pak 6000Series
W				Unground Rib O.D.
		X		

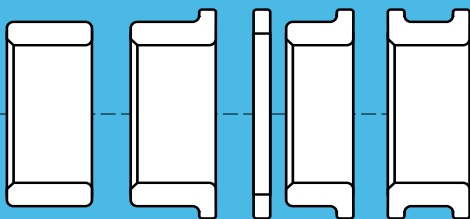
SUFFIX LETTERS

1	2	3	4	5	
	A	A			Oversized O.D. for Heavy Press Fit in Standard Housing Bore
	B	B	B		Special Features
C	C	C			Plain Outer Ring
D	D				One Ribbed Outer Ring
E	E				Two Ribbed Outer Ring
F					Unground Rib I.D.
F	F	F	F	F	Fibron Cage
G	G	G			Snap Ring Groove in Outer Ring O.D.
	H	H			Blind Dowel Hole in Outer Ring O.D.
J	J	J	J	J	Brass or Bronze Cage
L	L	L	L	L	Composite Steel Cage
	M	M	M	M	Full Complement Bearing (No Cage)
	N				Outer Ring Plate
			R	R	Snap Ring Assembled in Outer Ring O.D.
S					Short, One Ribbed Outer Ring
T	T	T			Two Retaining Rings in Outer Ring I.D.
U	U				One Rib, One Retaining Ring in Outer Ring I.D.
V	V	V	V	V	One Piece Steel Cage
X					Unground Rib I.D.
X	X	X	X	X	"X" Bar Composite Steel Cage

INNER RING TYPES

Prefix Letters

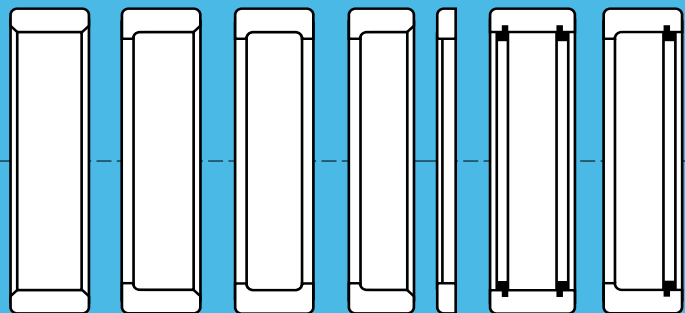
A R N S U



OUTER RING TYPES

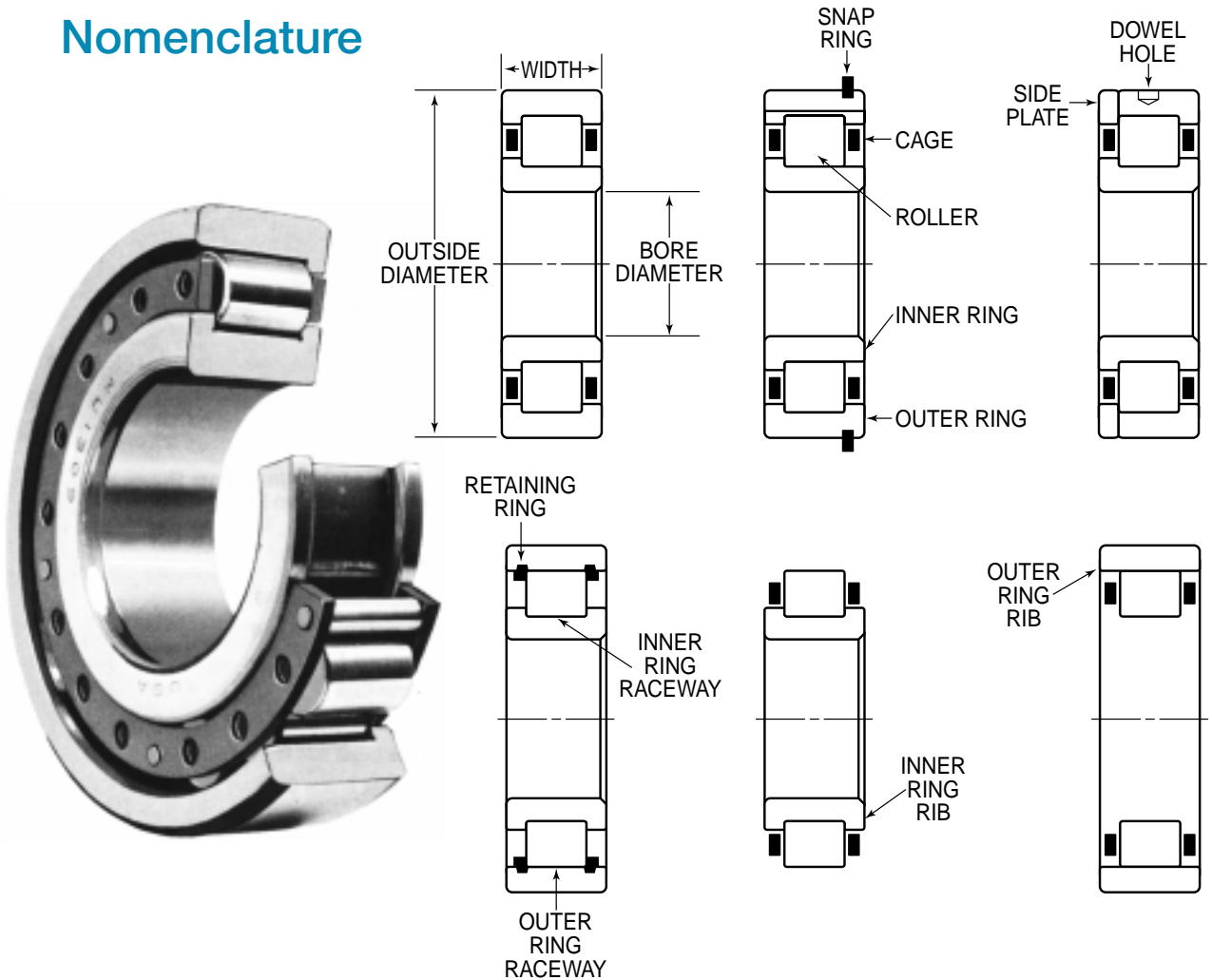
Suffix Letters

C D E S N T U



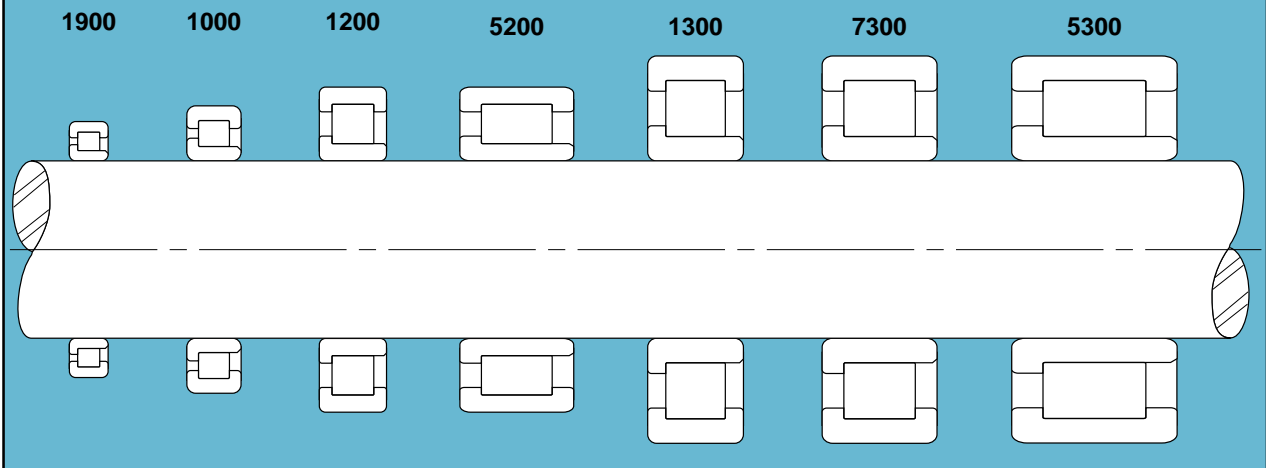
Cylindrical Roller Bearings

Nomenclature





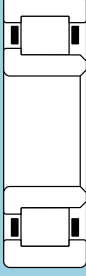

RELATIVE BEARING SIZES

Seven M series bearings having the same bore size.




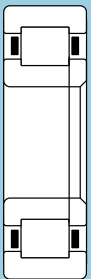
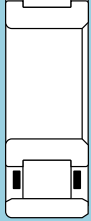

Bearing Types

SEPARABLE INNER RINGS

 <p>MA---EL</p>	<p><u>Design Features</u></p> <ul style="list-style-type: none"> • Two ribbed outer ring. • Straight, separable inner ring. • Rollers retained with outer ring. • Composite steel cage. <p><u>Application</u></p> <ul style="list-style-type: none"> • Permits axial float of shaft. • Accomodates contraction or expansion at one end of a shaft. Bearing at opposite end locates shaft.
 <p>MA---TV</p>	<p><u>Design Features</u></p> <ul style="list-style-type: none"> • Two split retaining rings in outer ring. • Straight, separable inner ring. • Rollers retained with outer ring. • One-piece steel cage. <p><u>Application</u></p> <ul style="list-style-type: none"> • Permits axial float of shaft. • Low cost bearing type. • Accomodates contraction or expansion at one end of a shaft. Bearing at opposite end locates shaft.
 <p>MR---EL</p>	<p><u>Design Features</u></p> <ul style="list-style-type: none"> • Two ribbed outer ring. • One ribbed, separable inner ring. • Rollers retained with outer ring. • Composite steel cage. <p><u>Application</u></p> <ul style="list-style-type: none"> • Takes moderate thrust loads or locates shaft in one direction only. • When used in pairs on a common shaft, thrust loads can be taken or shaft located in either direction.
 <p>MR---TV</p>	<p><u>Design Features</u></p> <ul style="list-style-type: none"> • Two split retaining rings in outer ring. • One ribbed, separable inner ring. • Rollers retained with outer ring. • One-piece steel cage. <p><u>Application</u></p> <ul style="list-style-type: none"> • Outer ring is located, axially, in one direction by inner ring rib. Location in opposite direction must be provided for. • Rib on inner ring can be used to facilitate its removal from shaft. • Will not accomodate thrust loads or locate shaft.



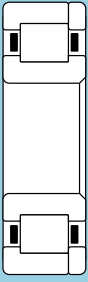
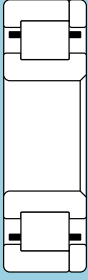
Bearing Types

SEPARABLE INNER RINGS (continued)

 <p>MR---UV</p>	<p><u>Design Features</u></p> <ul style="list-style-type: none"> • One split retaining ring and one rib in outer race. • One ribbed, separable inner ring. • Rollers retained with inner ring. • One-piece steel cage. <p><u>Application</u></p> <ul style="list-style-type: none"> • Takes moderate thrust loads or locates rotating member in one direction. • When used in pairs on a common shaft, thrust loads can be taken or shaft located in either direction.
 <p>MSN---EL</p>	<p><u>Design Features</u></p> <ul style="list-style-type: none"> • Two ribbed outer ring. • Removable, short, one ribbed inner ring and loose side plate. • Rollers retained with outer ring. • Composite steel cage <p><u>Application</u></p> <ul style="list-style-type: none"> • Takes moderate thrust loads or locates rotating member, axially, in both directions. • Bearing can be installed separately or as a unit.
<h3>SEPARABLE OUTER RINGS</h3>	
 <p>MU---CL</p>	<p><u>Design Features</u></p> <ul style="list-style-type: none"> • Straight, separable outer ring. • Two ribbed inner ring. • Rollers retained with inner ring. • Composite steel cage <p><u>Application</u></p> <ul style="list-style-type: none"> • Permits axial float of shaft like MA—EL but rollers are retained with inner ring; desirable for some applications. • Straight outer ring design is ideal for oil flow and purging contaminants.
 <p>MU---CV</p>	<p>Same design features and application as described above for MU—CL, except uses one-piece steel cage.</p>

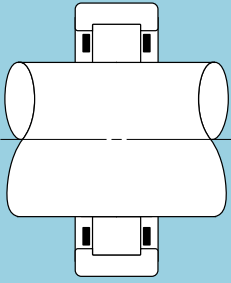
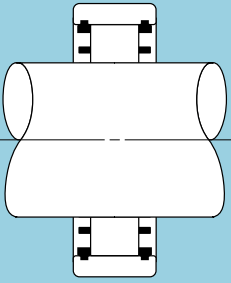
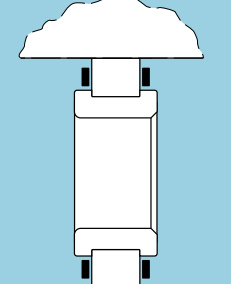
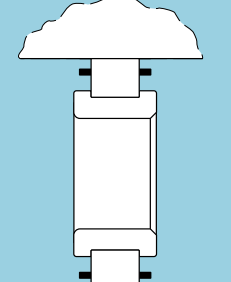
Bearing Types

SEPARABLE OUTER RINGS (continued)

 <p>MU----DL</p>	<p><u>Design Features</u></p> <ul style="list-style-type: none"> • One ribbed, separable outer ring. • Two ribbed inner ring. • Rollers retained with inner ring. • Composite steel cage. <p><u>Application</u></p> <ul style="list-style-type: none"> • Takes moderate thrust loads or locates shaft in one direction only. • When used in pairs on common shaft, thrust loads can be taken or shaft located in either direction.
 <p>MU----DV</p>	<p>Same design features and applications as MU—DL above, except uses one-piece steel cage.</p>
 <p>MU----SNL</p>	<p><u>Design Features</u></p> <ul style="list-style-type: none"> • Removable, short, one ribbed outer ring and loose side plate. • Two ribbed inner ring. • Rollers retained with inner ring. • Composite steel cage <p><u>Application</u></p> <ul style="list-style-type: none"> • Takes moderate thrust loads or locates rotating members axially in both directions. • Bearing can be installed separately or as a unit.
 <p>MU----SNV</p>	<p>Same design features and application as MU—SNL above except uses one-piece steel cage.</p>

Bearing Types





INNER OR OUTER RING OMITTED

 <p>M---EL</p>	<p><u>Design Features</u></p> <ul style="list-style-type: none"> • Two ribbed outer ring. • Inner ring omitted. • Composite steel cage. <p><u>Application</u></p> <ul style="list-style-type: none"> • Where mounting space is limited, rollers run directly on a hardened and ground shaft.* • Shaft diameter can be increased to replace omitted outer ring for added stiffness. • Savings are possible by using a smaller bearing and eliminating inner ring.
 <p>M---TV</p>	<p><u>Design Features</u></p> <ul style="list-style-type: none"> • Two split retaining rings in outer ring. • Inner ring omitted. • One-piece steel cage. <p><u>Application</u></p> <ul style="list-style-type: none"> • Use is similar to M—EL above.
 <p>MU---L</p>	<p><u>Design Features</u></p> <ul style="list-style-type: none"> • Outer ring is omitted. • Two ribbed inner ring. • Composite steel cage. <p><u>Application</u></p> <ul style="list-style-type: none"> • Where space is limited, housing bore can be reduced—permitting rollers to run directly on hardened and ground housing bore.* • Shaft diameter can be increased for added stiffness by eliminating outer ring and using next larger size bearing bore. Housing bore is modified to suit diameter over the rollers. • Savings are possible through eliminating outer ring.
 <p>MU---V</p>	<p>Same design features and application as MU—L above except bearing uses one-piece steel cage.</p>

*Note: Shaft or housing bore surfaces functioning as bearing raceways must have a hardness of Rockwell C58 to64 and a maximum surface finish of 18 AA. Deviation from this surface finish or hardness will require a reduction in the catalog rating of the bearing. Consult NTN Engineering for a recommendation.

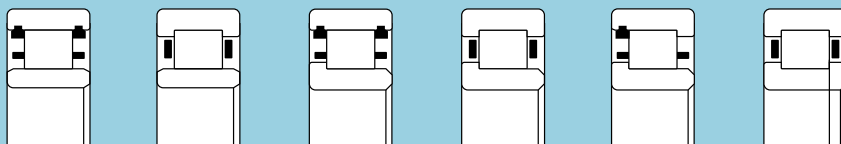
Bearing Types

NON-SEPARABLE BEARINGS

 <p>MU----TV</p>	<p><u>Design Features</u></p> <ul style="list-style-type: none"> • Two split retaining rings in outer ring. • Two ribbed inner ring. • One-piece steel cage. <p><u>Application</u></p> <ul style="list-style-type: none"> • Used where bearing must be assembled as a unit and where design has no provision to retain outer ring axially. • Will not accommodate thrust loads or locate shaft.
 <p>MU----UV</p>	<p>Same design features and applications as MU—TV above, except outer ring contains one split retaining ring and one solid rib which will take moderate thrust loads or locate shaft in one direction.</p>
 <p>MU----TM</p>	<p><u>Design Features</u></p> <ul style="list-style-type: none"> • Two split retaining rings in outer ring. • Two ribbed inner ring. • No cage (full complement of rollers). <p><u>Application</u></p> <ul style="list-style-type: none"> • Use is similar to MU—TV above. • Cage is omitted and rollers are added for increased radial load capacity. Permissible bearing speed, however, is less than the caged type bearing.
 <p>MU----UM</p>	<p>Same design features and application as MU—TM above except outer ring contains one split retaining ring and one solid rib that will take a moderate thrust load or locate shaft in one direction.</p>

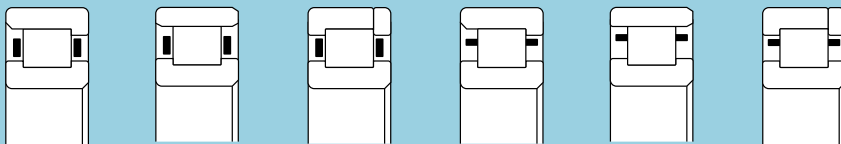
Interchange Charts for Basic Series*

SEPARABLE INNER RING TYPE BEARINGS



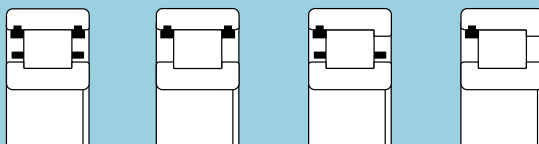
BOWER	MA---TV	MA---EL	MR---TV	MR---EL	MR---UV	MSN---EL
AFBMA	--RM--	--RU--	--RR--	--RJ--	--RS--	--RT--
FAG		NU---		NJ--		NUP---
HYATT	A---TS	A---WB	R---TS	R---WB	R---YS	JRN---WB
LINK BELT	MA---TV	MA---EX	MR---TV	MR---EX	MR---UV	MSN---EX
ROLL WAY	E---B	E---U	L---B	L---U	L---J	LP---U
SKF	HNU---A		HNJ---A			
NTN		NU--		NJ--		NUP--

SEPARABLE OUTER RING TYPE BEARINGS



BOWER	MU---DL	MU---CL	MU---SNL	MU---DV	MU---CV	MU---SNV
AFBMA	--RF--	--RN--	--RP--	--RF--	--RN--	--RP--
FAG	NF---	N---		NF--	N---	
HYATT	BU---L	BU---Z	BU---LNJ	BU---L	BU---Z	BU---LNZ
LINK BELT	MU---DX	MU---CX	MU---SNX	MU---DX	MU---CX	MU---SNX
ROLL WAY	U---L	U---E	U---LP	U---L	U---E	U---LP
SKF						
NTN	NF--	N--	NP--	NF--	N--	NP--

NON-SEPARABLE TYPE BEARINGS



BOWER	MU---TV	MU---TM	MU---UV	MU---UM
AFBMA	--RK--	--RK-V	--RY--	--RY-V
FAG				
HYATT	U---TS	U---TM	U---YS	U---YM
LINK BELT	MU---TV	MU---TM	MU---UV	MU---UM
ROLL WAY	U---B	UM---B	U---J	UM---J
SKF	HNC---A	HNC---AV		
NTN		NV--		

* Charted bearings interchange for boundary dimensions (I.D., O.D., width) and bearing types. They may not interchange due to differences in load ratings or cage styles.