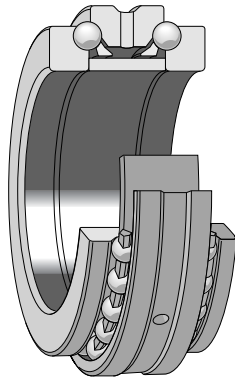


MRC DT100 series double direction angular contact ball bearings are able to locate a spindle axially in both directions and are designed to be used with the NN31X series double row cylindrical roller bearings having the same bore and outside diameter.

The bearings are separable and have a one-piece housing washer, two cages with a large number of balls, and two shaft washers separated by a spacer sleeve. The outside diameter of the housing washer is made to tolerances that result in radial clearance between the washer and housing bore. This is to insure that this bearing will carry only axial loads.

The DT100 series bearings have a  $60^\circ$  contact angle per row and are typically mounted at the side of the cylindrical roller having the smaller inside diameter (tapered bore).

To facilitate lubrication, all bearings have a groove and three lubrication holes in the housing washer.



### Tolerances

MRC double direction angular contact ball bearings have the same dimensional and running accuracy as the series NN31X cylindrical roller bearings. The tolerances are given in the tables on page 62. The maximum and minimum values listed for single diameters, washer widths and bearing heights, represent the permissible deviations from the nominal dimensions given in the bearing tables.

### Symbols

d	nominal bore diameter
$d_s$	single diameter of bore
D	nominal outside diameter
$D_s$	single diameter of outside cylindrical surface
$C_s$	single height (width) of housing washer
$S_i, S_e$	thickness variation, measured from middle of raceway to back (seating face) of shaft washer and housing washer, respectively
B	single height of bearing

# Double Direction Angular Contact Ball Bearings

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## Tolerances in Inches (Shaded) and Millimeters

d, D (mm)	Over Incl	18 30	30 50	50 80	80 120	120 150	150 180	180 250	250 315
d <sub>s</sub>	MAX	+ .00004 + .001	+ .00004 + .001	+ .00008 + .002	+ .00012 + .003	+ .00012 + .003	+ .00012 + .003	+ .00016 + .004	—
	MIN	— - .00035 - .009	— - .00043 - .011	— - .00055 - .014	— - .0007 - .018	— - .0008 - .021	— - .0008 - .021	— - .0010 - .026	—
D <sub>s</sub>	MAX	—	- .0008 - .020	- .0009 - .024	- .0011 - .028	- .0013 - .033	- .0013 - .033	- .0015 - .037	- .0016 - .041
	MIN	—	- .0011 - .027	- .0013 - .033	- .0015 - .038	- .0017 - .044	- .0018 - .046	- .0020 - .052	- .0023 - .059
B	MAX	+ .0020 + .050	+ .0024 + .060	+ .0028 + .070	+ .0033 + .085	+ .0037 + .095	+ .0037 + .095	+ .0047 + .120	—
	MIN	— - .0031 - .080	— - .0039 - .100	— - .0047 - .120	— - .0055 - .140	— - .0063 - .160	— - .0063 - .160	— - .0079 - .200	—
S <sub>i</sub> , S <sub>e</sub>	MAX	.00012 .003	.00012 .003	.00016 .004	.00016 .004	.0002 .005	.0002 .005	.0002 .005	—
CS	MAX	—	.000 - .0024	.000 - .0024	.000 - .0024	.000 - .0024	.000 - .0024	.000 - .0024	.000 - .0024
	MIN	—	- .060	- .060	- .060	- .060	- .060	- .060	- .060

## Preload

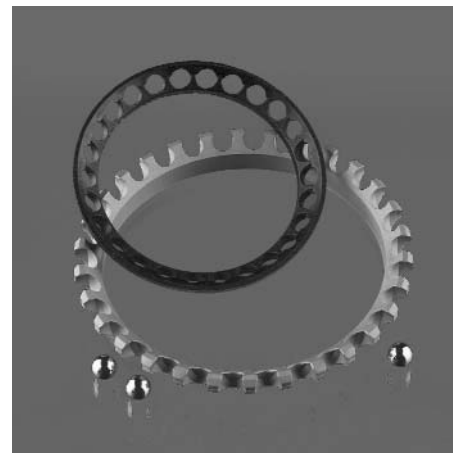
MRC double direction angular contact bearings are supplied with a preload as specified in table below.

The values quoted in the table apply to bearings before mounting. When mounted, the bearings may have a higher preload, depending on the shaft tolerance selected.

Bore diameter mm	Axial preload		Bore diameter mm	Axial preload	
	N	lbf		N	lbf
40	360	81	100	690	155
45	390	88	105	710	160
50	415	93	110	735	165
55	440	99	120	800	180
60	470	106	130	870	196
65	490	110	140	940	211
70	515	116	150	1015	228
75	545	123	160	1100	247
80	575	129	170	1185	266
85	600	135	180	1290	290
90	625	141	190	1385	311
95	655	147	200	1525	343

## Cages

Depending on the bearing size, the cages are either machined brass or heat stabilized glass reinforced polyamide, ball centered. Either material can be used at operating temperatures up to 120°C (248°F). Cage properties are not affected by the lubricants normally used with the exception of some synthetic oils and greases with a synthetic oil base.



Cages for double direction angular contact ball bearings

## Accuracy of Bearing Seatings on Spindles

Bore diameter d (mm)		Deviations						Tolerances			
		High		Low		Cylindricity runout					
		mm	in	mm	in	t <sub>1</sub>		t <sub>2</sub>			
Over	Incl					mm	in	mm	in		
40	50	.000	.0000	-.007	-.00028	.0025	.0001	.0025	.0001		
50	80	.000	.0000	-.008	-.0003	.003	.00012	.003	.00012		
80	120	.000	.0000	-.010	-.0004	.004	.00015	.004	.00015		
120	180	.000	.0000	-.012	-.0005	.0045	.0002	.0045	.0002		
180	250	.000	.0000	-.014	-.0006	.0050	.0002	.0050	.0002		

## Accuracy of Bearing Seatings in Housing Bore

Outside diameter D (mm)		Deviations			
		Low		High	
		mm	in	mm	in
Over	Incl				
50	80	-.010	-.0004	+.003	+.0001
80	120	-.013	-.0005	+.002	+.0001
120	180	-.015	-.0006	+.003	+.0001
180	250	-.018	-.0007	+.002	+.0001
250	315	-.020	-.0008	+.003	+.0001

## Design of Bearing Arrangement

Double direction angular contact ball bearings are mounted with radial clearance in the same housing bore seating as the appropriate cylindrical roller bearing. Fits tighter than those recommended should never be used even if they are required for the cylindrical roller bearing.

# **Double Direction Angular Contact Ball Bearings**

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## **Equivalent Dynamic and Static Bearing Loads**

For double direction angular contact ball bearings subjected to thrust loads only, the equivalent radial load is as follows:

$$\begin{array}{ll} \text{Dynamic} & P = F_A \\ \text{Static} & P_0 = F_A \end{array}$$

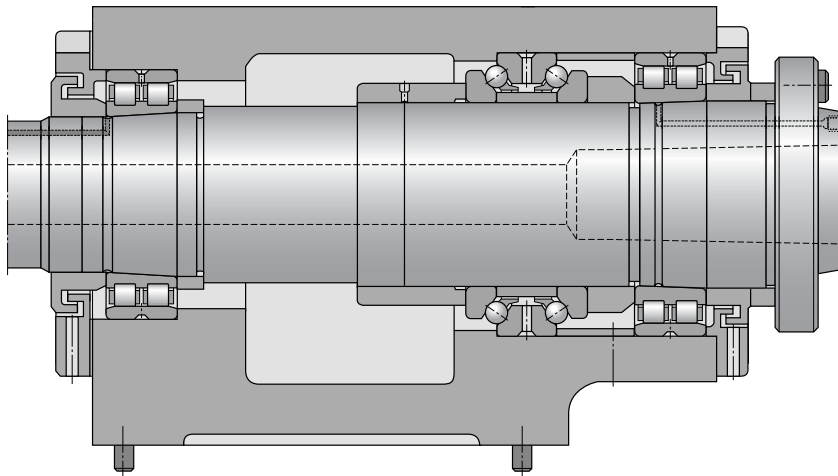
where,  $F_A$  = applied thrust load.

## **Mounting Instructions**

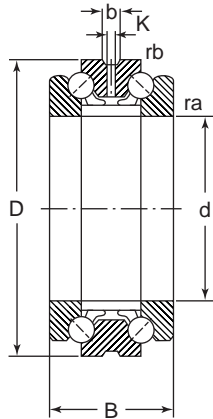
When mounting double direction angular contact ball bearings, care should be taken not to mix the components of one bearing with those of other bearings.

Care should be exercised in applying axial force since the spacer sleeve could be deformed resulting in excessive preload and increased temperature, causing shortened bearing life. Suitable values for axial force to be applied range from (80 N to 200 N)  $d$ , or (18 lbf to 45 lbf)  $d$  ( $d$  = bearing bore in mm).

Typical mounting arrangement is shown below.



**Two NN31X series double row cylindrical roller bearings and one double direction angular contact ball bearing.**



MRC bearing number	Bore d		Outside diameter D		Width B		Fillet radius <sup>1)</sup>				Basic radial load rating				Speed rating					
							r <sub>a</sub>		r <sub>b</sub>		K		b		Dynamic C <sub>2</sub> <sup>2)</sup>		Static C <sub>0</sub>		Grease RPM	Oil RPM
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	N	lbf	N	lbf		
DT108	40	1.5748	68	2.6772	36	1.4173	1.0	.039	0.1	.004	3.0	.12	5.5	.22	21600	4860	60000	13500	9500	12000
DT109	45	1.7717	75	2.9528	38	1.4961	1.0	.039	0.1	.004	3.0	.12	5.5	.22	24700	5550	71000	16000	9000	11000
DT110	50	1.9685	80	3.1496	38	1.4961	1.0	.039	0.1	.004	3.0	.12	5.5	.22	25500	5730	78000	17500	8500	10000
DT111	55	2.1654	90	3.5433	44	1.7323	1.0	.039	0.3	.012	3.0	.12	5.5	.22	33800	7600	104000	23400	7000	8500
DT112	60	2.3622	95	3.7402	44	1.7323	1.0	.039	0.3	.012	3.0	.12	5.5	.22	34500	7760	108000	24300	7000	8500
DT113	65	2.5591	100	3.9370	44	1.7323	1.0	.039	0.3	.012	3.0	.12	5.5	.22	35800	8050	116000	26100	6700	8000
DT114	70	2.7559	110	4.3307	48	1.8898	1.0	.039	0.3	.012	3.0	.12	5.5	.22	43600	9800	143000	32100	6300	7500
DT115	75	2.9528	115	4.5276	48	1.8898	1.0	.039	0.3	.012	3.0	.12	5.5	.22	44200	9940	150000	33700	6000	7000
DT116	80	3.1496	125	4.9213	54	2.1260	1.0	.039	0.3	.012	4.5	.18	8.3	.33	54000	12100	180000	40500	5300	6300
DT117	85	3.3465	130	5.1181	54	2.1260	1.0	.039	0.3	.012	4.5	.18	8.3	.33	54000	12100	190000	42700	5300	6300
DT118	90	3.5433	140	5.5118	60	2.3622	1.5	.059	0.3	.012	4.5	.18	8.3	.33	62400	14000	220000	49500	4800	5600
DT119	95	3.7402	145	5.7087	60	2.3622	1.5	.059	0.3	.012	4.5	.18	8.3	.33	63700	14300	232000	52200	4800	5600
DT120	100	3.9370	150	5.9055	60	2.3622	1.5	.059	0.3	.012	4.5	.18	8.3	.33	66300	14900	245000	55100	4800	5600
DT121	105	4.1339	160	6.2992	66	2.5984	2.0	.079	0.6	.024	4.5	.18	8.3	.33	74100	16700	275000	61800	4300	5000
DT122	110	4.3307	170	6.6929	72	2.8346	2.0	.079	0.6	.024	4.5	.18	8.3	.33	92300	20700	335000	75300	4000	4800
DT124	120	4.7244	180	7.0866	72	2.8346	2.0	.079	0.6	.024	4.5	.18	8.3	.33	93600	21000	360000	80900	3800	4500
DT126	130	5.1181	200	7.8740	84	3.3071	2.0	.079	0.6	.024	6.0	.24	11.1	.44	117000	26300	455000	102000	3400	4000
DT128	140	5.5118	210	8.2677	84	3.3071	2.0	.079	0.6	.024	6.0	.24	11.1	.44	117000	26300	475000	107000	3200	3800
DT130	150	5.9055	225	8.8583	90	3.5433	2.0	.079	0.6	.024	7.5	.30	13.9	.55	140000	31500	570000	128000	3000	3600
DT132	160	6.2992	240	9.4488	96	3.7795	2.0	.079	0.6	.024	7.5	.30	13.9	.55	156000	35100	640000	144000	2800	3400
DT134	170	6.6929	260	10.2362	108	4.2520	2.0	.079	0.6	.024	7.5	.30	13.9	.55	195000	43800	780000	175000	2400	3000
DT136	180	7.0866	280	11.0236	120	4.7244	2.0	.079	0.6	.024	9.0	.35	16.7	.66	225000	50600	915000	206000	2000	2600
DT138	190	7.4803	290	11.4173	120	4.7244	2.0	.079	0.6	.024	9.0	.35	16.7	.66	225000	50600	950000	214000	2000	2600
DT140	200	7.8740	310	12.2047	132	5.1968	2.0	.079	0.6	.024	9.0	.35	16.7	.66	265000	59600	1100000	247000	1900	2400

<sup>1)</sup> Fillet radius indicates maximum fillet radius on shaft or in housing which bearing corner will clear.

<sup>2)</sup> Rating for one million revolutions or 500 hours at 33 1/3 RPM.