

The ULTAGE series deep groove ball bearings for high-speed servo motors [MA type] are products with an optimized internal design for high-speed servo motors. These bearings have improved durability and longer grease life for high-speed operation and rapid acceleration/ deceleration.

1. Features

1) High speed and high reliability

Deformation from high-speed operation is reduced and limiting speeds of $d_{m,n}$ value 1 million are achieved by using high performance cages. These cages are made of self-lubricating resin and have interlocking tabs for high rigidity (see Fig. 1).

* $d_{m,n}$ value:

$$d_m \text{ (rolling element pitch diameter mm)} \times n \text{ (rotational speed min}^{-1}\text{)}$$

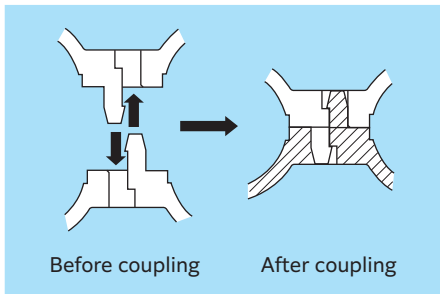


Fig.1 MA resin cage

2) Longer grease life

Outer ring grease pockets designed to maintain grease near the rolling elements improve lubrication reliability. In addition, long-life grease for motors “ME-1” [refer to Table 11.6 (A-116)] is applied for the initial grease fill.

(Longer life of five times or more is achieved compared with the lithium-based grease used for general purposes.)

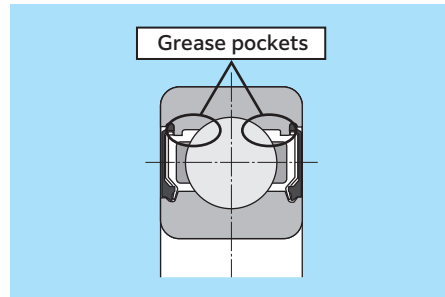


Fig. 2 Grease pockets

3) Low noise

A new resin interlocking cage design allows for low noise operation. The noise is reduced by 3 dB-A with respect to pressed steel cages.

Table 1 Measurement result of noise values

Specification	Noise value
Pressed steel cage	57 dB-A
ULTAGE product	54 dB-A

2. Part number

6 3 08 MA LLB-BR C3 P5 / L700 QTK

- 6: Bearing type: Deep groove ball bearing (type code 6)
- 3: Diameter series: 3
- 08: Nominal bearing bore diameter: 40 mm
- MA: Cage code: ULTAGE series MA type
- LLB-BR: Seal code: Synthetic rubber seal (non-contact type)
- C3: Radial internal clearance: C3 clearance (15 to 33 μm)
- P5: Accuracy code: JIS Class 5
- L700: Grease code: ME-1
- QTK: Grease fill code

3. Allowable temperature range

-20 to 120 °C

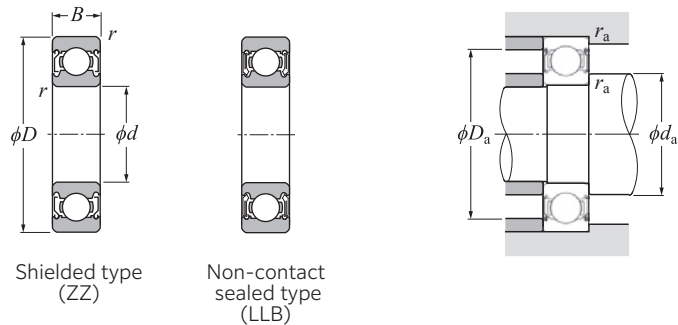
4. Allowable speed

The allowable speed refers to a rotational speed of the bearing based on:

- Maximum outer ring temperature of 80 °C
- Standard ME-1 grease filled to a fill volume of 15 to 20 % of the free space.
- Spring preload is applied to the bearing.
- Bearing operation at room temperature after break-in procedure.

The bearing temperature increase differs depending on the usage condition (operating load, environmental temperature, rotational speed pattern, etc.); therefore, the bearings must be selected with sufficient allowable speed as specified in the catalog.

If the bearing will continuously operate above 80 % of the allowable speed listed in the bearing dimension tables, please consult **NTN Engineering**.



Boundary dimensions	Basic load rating				Fatigue load limit kN C_u	Factor f_0	Allowable speed min^{-1} Grease lubrication ZZ, LLB	Bearing number		
	mm	dynamic kN C_r	static kN C_{0r}	Shielded type				Non-contact sealed type		
d	D	B	$r_s \text{ (min}^{-1}\text{)}$							
40	90	23	1.5	45.0	24.0	1.83	13.2	15 400	6308MAZZ	6308MALLB
45	85	19	1.1	36.0	20.4	1.60	14.1	14 300	6209MAZZ	6209MALLB
50	90	20	1.1	39.0	23.2	1.82	14.4	15 400	6210MAZZ	6210MALLB
	110	27	2	68.5	38.5	2.99	13.2	12 200	6310MAZZ	6310MALLB
60	130	31	2.1	90.5	52.0	4.10	13.2	10 500	6312MAZZ	6312MALLB

1) Smallest allowable dimension for chamfer dimension r .
Note: For models not listed in the dimension table, please contact **NTN** Engineering.

Dynamic equivalent radial load

$$P_r = XF_r + YF_a$$

$\frac{f_0 \cdot F_a}{C_{0r}}$	e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
		X	Y	X	Y
0.172	0.19				2.30
0.345	0.22				1.99
0.689	0.26				1.71
1.03	0.28				1.55
1.38	0.30	1	0	0.56	1.45
2.07	0.34				1.31
3.45	0.38				1.15
5.17	0.42				1.04
6.89	0.44				1.00

Static equivalent radial load

$$P_{0r} = 0.6F_r + 0.5F_a$$

When $P_{0r} < F_r$ use $P_{0r} = F_r$.

Installation-related dimensions				Mass
d_a		D_a	r_{as}	kg
Min.	Max.	Max.	Max.	(approx.)
48	54	82	1.5	0.634
51.5	55.5	78.5	1	0.398
56.5	60	83.5	1	0.454
59	68.5	101	2	1.07
71	80.5	119	2	1.73