

Ball screws



**Miniature, grade C3.
Standard accuracy up
to 0.00003mm/mm**



Precision
Screw Dia. 4mm to 10mm
Lead Range 1mm to 2mm
Lengths up to 600mm

CONTENTS

Miniature, Grade C3

- 4mm Diameter
- 6mm Diameter
- 8mm Diameter
- 10mm Diameter

[Page 3-2](#)

[Page 3-3](#)

[Page 3-4](#)

[Page 3-5](#)

For Technical Information
please see [Page T3-1](#)



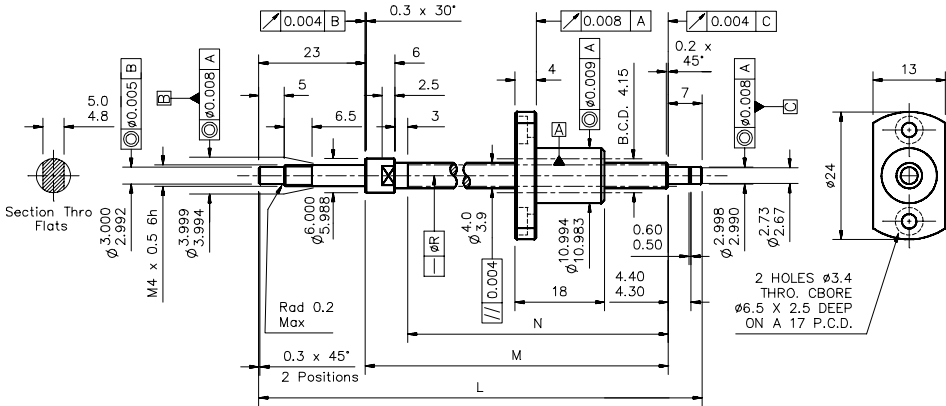
METRIC Dia: 4mm Lead: 1mm

All dimensions in mm
General tolerances +/- 0.1mm
Materials: Shaft & Nut - Bearing Steel
Hardness - Hrc57-64

Reliance Miniature Ballscrews

Associated Products

Bearings : [page 10-2](#)
Linear slides : [page 5-2](#)
Reli-a-Flex™ coupling : [page 8-2](#)
Stepper motors : [page 12-1](#)



Part Number Selection Table							
Part Number	Basic Load Rating		Effective Stroke	L *	Straightness R	M	N
	Dynamic Ca (N)	Static Coa (N)					
RMBS-0401-90-C3	590	930	26	90	0.004	60	54
RMBS-0401-110-C3			46	110	0.005	80	74
RMBS-0401-130-C3			66	130	0.006	100	94
							Max Axial Play

* Lengths up to 240mm available on request

- Standard accuracy C3.
C5 and C7 (ANSI/AFBMA STD 20 1977) accuracies are available.
- Rotational life equals 10^6 revs at rated loads.
- Labyrinth sealed nuts are also available, add -S to part number.
- Ballscrews are supplied with CRC3.36 lubricant.
- Operating temperature range -40°C to 80°C.
- For technical information see [page T3-1](#).



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METRIC

Dia: 8mm

Lead: 2mm

All dimensions in mm

General tolerances $\pm 0.1\text{mm}$

Materials: Shaft & Nut - Bearing Steel

Hardness - Hrc57-64

Reliance Miniature Ballscrews

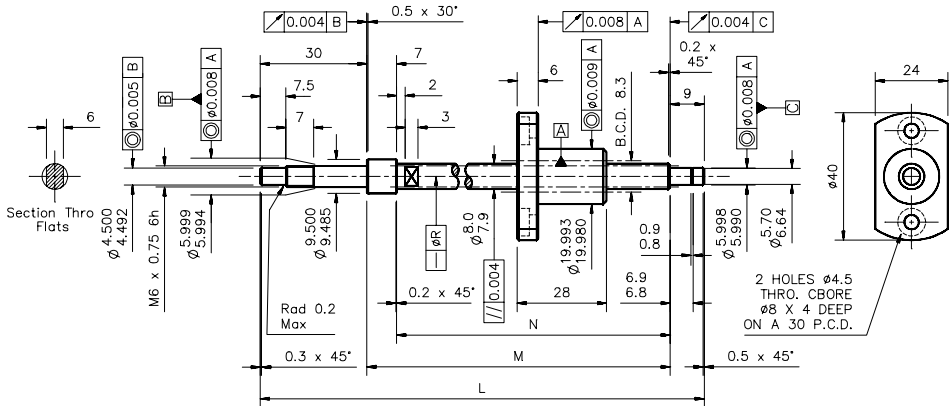
Associated Products

Bearings : [page 10-2](#)

Linear slides : [page 5-2](#)

Reli-a-Flex™ coupling : [page 8-2](#)

Stepper motors : [page 12-1](#)



Part Number Selection Table

Part Number	Basic Load Rating		Effective Stroke	L *	Straightness R	M	N	Max Axial Play
	Dynamic Ca (N)	Static Coa (N)						
RMBS-0802-188-C3	2500	4200	100	188	0.008	149	142	0.005
RMBS-0802-338-C3			250	338	0.015	299	292	
RMBS-0802-438-C3			350	438	0.019	399	392	

* Lengths up to 480mm available on request

- Standard accuracy C3.
C5 and C7 (ANSI/AFBMA STD 20 1977) accuracies are available.
- Rotational life equals 10^6 revs at rated loads.
- Labyrinth sealed nuts are also available, add **-S** to part number.
- Ballscrews are supplied with CRC3.36 lubricant.
- Operating temperature range -40°C to 80°C .
- For technical information see [page T3-1](#).



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METRIC
Dia: 10mm
Lead: 2mm



Associated Products

Bearings : [page 10-2](#)

Linear slides : [page 5-2](#)

Reli-a-Flex™ coupling : [page 8-2](#)

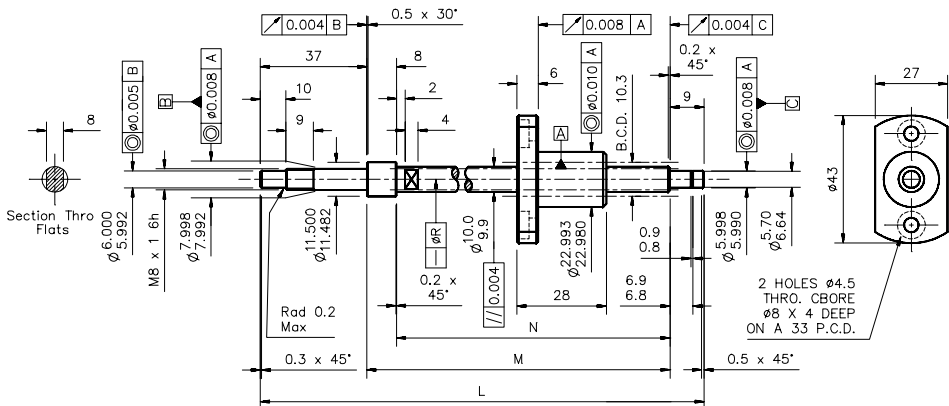
Stepper motors : [page 12-1](#)

All dimensions in mm

General tolerances +/- 0.1mm

Materials: Shaft & Nut - Bearing Steel

Hardness - Hrc57-64



Part Number Selection Table

Part Number	Basic Load Rating		Effective Stroke	L *	Straightness R	M	N	Max Axial Play
	Dynamic Ca (N)	Static Coa (N)						
RMBS-1002-248-C3	2800	5300	150	248	0.011	202	194	0.005
RMBS-1002-348-C3			250	348	0.015	302	294	
RMBS-1002-498-C3			400	498	0.017	452	444	

* Lengths up to 600mm available on request

- Standard accuracy C3.
C5 and C7 (ANSI/AFBMA STD 20 1977) accuracies are available.
- Rotational life equals 10^6 revs at rated loads.
- Labyrinth sealed nuts are also available, add **-S** to part number.
- Ballscrews are supplied with CRC3.36 lubricant.
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Ordering Code

To order a complete ballscrew use the example below. Please note, add - **S** to part number for labyrinth sealed. For unsealed ballscrews no suffix is required.

Example part no. - **RMBS - 0401 - 110 - S**

Screw
Diameter

Lead

Overall
Length

Labyrinth
Sealed
(optional)

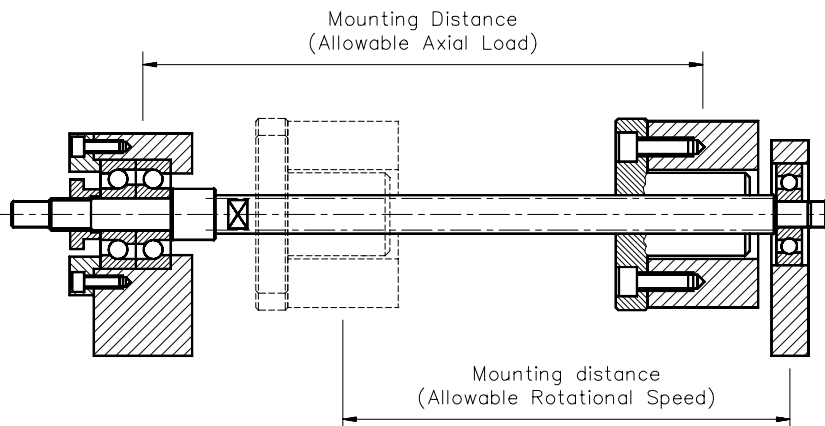
Lubrication

Adequate lubrication of Reliance ballscrews is necessary to ensure high accuracy, high efficiency and long life. The ballscrews are supplied ready coated with CRC3.36 for protection, lubrication and rust prevention. If the shaft is revolving at high speed it may be necessary to use a viscous lubricant to prevent oil leaving the shaft and the oil film splitting. Viscous lubricants Nos. 90 to 180 are recommended.

Typical Applications

Miniature ballscrews are particularly suitable for applications where high accuracy, strength and reliability are significant factors. These applications are likely to include: Semiconductor machinery, Co-ordinate Measurement Machines, Scanners, Injection Moulding Machines and many Medical and Aerospace applications.

Mounting Details



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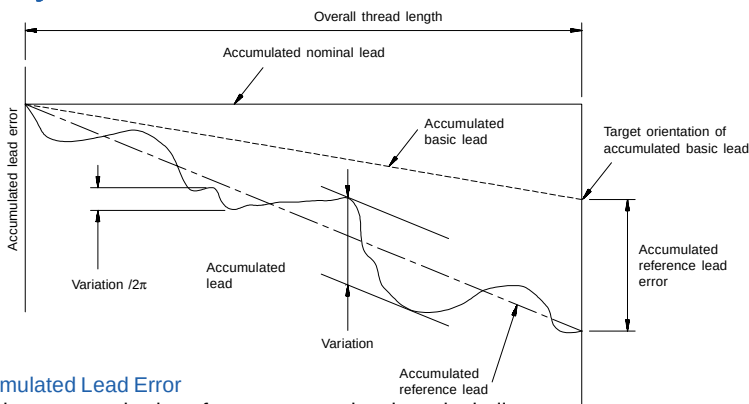
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Accuracy



1. Accumulated Lead Error

This is the measured value of error at any point along the ballscrew.

2. Target Orientation of Accumulated Basic Lead

Accumulated basic lead is usually the same as accumulated nominal lead unless it is necessary to modify it intentionally. The accumulated nominal lead may be set in advance or at a plus or minus value by applying an extension to the threaded shaft, applying an external load to expand or contract the threaded shaft, or considering the expansion and contraction due to temperature changes.

3. Accumulated Reference Lead Error

Shown by a straight line that represents the average of variation.

4. Variation/ 2π Wobble

This is the measured value of error for 1 complete revolution of the ballscrew (once per rev error).

5. Variation

The variation of the measured error referred to the accumulated reference lead.

Part Number	Critical Speed rpm	Effective Thread Length (mm)	Accumulated Reference Lead error (mm)	Variation (mm)	Variation/ 2π Wobble (mm)	Axial Clearance (mm)
RMBS-0401-90-C3	16949	54	0.008			
RMBS-0401-110-C3	16949	74	0.010	0.008	0.006	0-0.005
RMBS-0401-130-C3	16949	94	0.010			
RMBS-0601-143-C3	11290	103	0.010			
RMBS-0601-198-C3	11290	158	0.010	0.008	0.006	0-0.005
RMBS-0601-273-C3	11290	233	0.012			
RMBS-0802-143-C3	8536	142	0.010	0.008		
RMBS-0802-338-C3	8536	292	0.013	0.010	0.006	0-0.005
RMBS-0802-438-C3	6269	392	0.013	0.010		
RMBS-1002-248-C3	6796	194	0.012	0.008		
RMBS-1002-348-C3	6796	294	0.013	0.010	0.006	0-0.005
RMBS-1002-498-C3	6437	444	0.015	0.010		

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Temperature Considerations

Temperature rise in a screw shaft in operation results in thermal expansion of the screw shaft, causing the positioning accuracy to be reduced. The thermal expansion of a screw shaft is given by the equation:

$$e = p \times t \times s$$

e = Change in axial expansion of the screw shaft (mm)

p = Thermal expansion coefficient ($12 \times 10^{-6} / ^\circ\text{C}$)

t = Change in the temperature of the screw shaft ($^\circ\text{C}$)

s = Effective length of the threaded section (mm)

A temperature rise of 1°C in the screw shaft causes it to expand by $12\mu\text{m}$ per metre. When a ballscrew is used under a high speed condition and the resulting heating becomes large, the temperature rise may cause poorer positioning accuracy. When high precision is required, measures to reduce temperature rise should be taken.

Please contact Reliance Technical Sales for advice.

Ballscrew Life Considerations

The basic dynamic load rating (C_a) is used to calculate the expected life of a ballscrew under operating conditions. It is defined as the load, with no variation in direction or magnitude, in which the rated life becomes equal to 10^6 revolutions when a group of identical ballscrews are operated separately.

1. Rated Life

L = Rated Life
(total number of revolutions)

C_a = Basic dynamic load rating (kN)

F_a = Axial Load (kN)

fw = Load factor

Working condition	fw
Smooth motion without shock	1.0 ~ 1.2
Ordinary motion	1.2 ~ 1.5
Motion with shock	1.5 ~ 2.0

2. Static Load Considerations

If a ballscrew, either at rest or in motion, undergoes an excessive load or a large impact load, permanent local deformation is produced between the rolling surface and the balls.

If the amount of the permanent deformation exceeds a certain limit it hinders smooth operation of the ballscrew. Generally, the basic static load rating (C_{0a}) is taken as the allowable axial load.

3. Basic Static Load Rating

The basic static load rating (C_{0a}) provides the allowable axial load of a ballscrew. Depending on the condition of use the basic static load rating requires the following static safety factor to be considered in the load calculation. Special attention should be given to reciprocating linear mechanisms, in particular, because an unexpectedly large load could be produced by the inertial force of the moving body when it starts or stops.

$F_{a_{\max}}$ = C_{0a}/f_s

$F_{a_{\max}}$ = Allowable axial load (kN)

C_{0a} = Basic static load rating (kN)

f_s = Static safety factor

Working condition	f_s
Ordinary Motion	1.0 ~ 2.0
Motion with shock	2.0 ~ 3.0



Miniature ballscrews are a new addition to Reliance Gear Company Ltd's standard product range. Selected because of their suitability for high precision motion control applications, such as semi conductor machinery, co-ordinate measuring machines, scanners, injection moulding machines and many medical and aerospace applications, the ballscrews have diameters ranging from 4mm to 10mm and leads of 1mm and 2mm. Lengths of up to 600mm are available.

Reliance's range of standard products is put together to aid the design engineer in the conception, sourcing, assembly, production and testing of high precision motion control systems. Reliance can undertake any or all of these functions in-house for their customers.

