

# High Precision Integral-Shaft Bearings

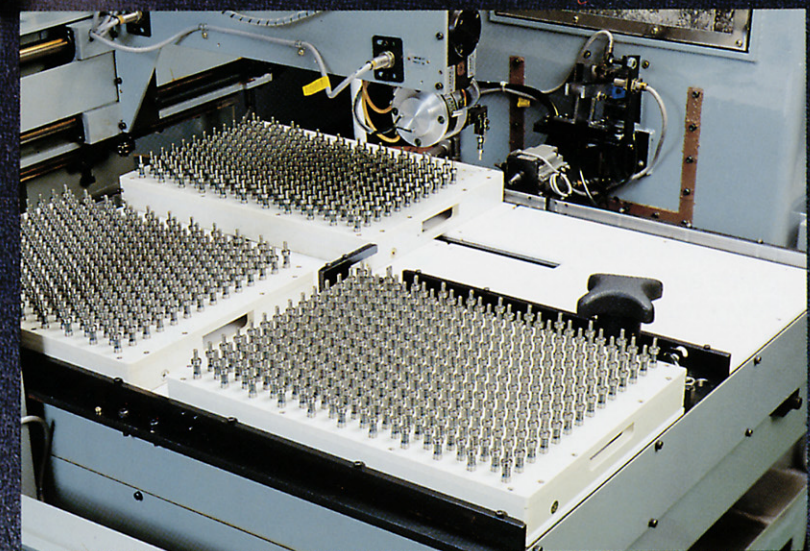
For Video Cassette Recorders \_\_\_\_\_ VCR or VTR  
For Digital Audio Tape Recorders \_\_\_\_\_ DAT  
For Hard Disk Drives \_\_\_\_\_ HDD  
For Laser Beam Printers \_\_\_\_\_ LBP

*High Precision Integral-Shaft Bearings that meet the most advanced technology of audio-visual (AV) or office automation (OA) equipment.*



# High Precision Integral-Shaft Bearings offer higher precision, greater convenience.

The number and sophistication of AV and OA applications are growing rapidly, and nearly all of them utilize small high-precision motors. To achieve high fidelity for VCR's and DAT's, high density for HDD's, and high quality printing by LBP's, very high running accuracy (repetitive and non-repetitive runout) of bearings is required. Beside this, users want minimum noise and vibration, low torque, and easy assembly. NSK's High Precision Integral-Shaft Bearings provide a simple and quick solution to all of these requirements.

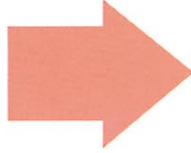


Automated Assembly Line for High Precision Integral-Shaft Bearings

# Features of High Precision Integral-Shaft Bearings

## Requirements

High Running Accuracy for Faithful Recording and Reproduction

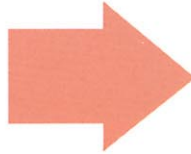


## Bearing Features

### Minimum Runout of Shaft

- Runout caused by the fitting between the shaft and inner ring is eliminated by combining them.
- The outer ring can be thicker, if necessary, to reduce deformation caused by fitting between the outer ring and housing.

Lower Power Consumption



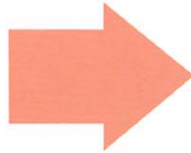
### Low Torque

- Combining the shaft and inner ring reduces the ball pitch diameter resulting in lower torque.

Examples:

4BVD	Shaft diameter	4
	Ball pitch diameter	5.2
684ZZ	Shaft diameter	4
	Ball pitch diameter	6.4

High Shaft Rigidity and Small Size



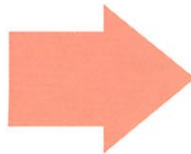
### Flexible Design

- Eliminating the inner ring allows the shaft to be larger for higher rigidity or the outer ring to be smaller for more compact designs.

Examples:

4BVD	Shaft diameter	4
	Outside diameter	8
684ZZ	Shaft diameter	4
	Outside diameter	9

Easy Assembling



### Less Assembly Time Required

- No preload adjustment
- No selective matching of shafts and inner rings required

## Typical Applications for High Precision Integral-Shaft Bearings

Drum spindles for VCR's (VTR's)  
Direct-drive capstan motors for VCR's (VTR's)  
Drum spindles for DAT's  
Spindles for HDD's  
Swing arms for HDD's  
Polygonal mirror scanners for LBP's

# Specifications, Accuracies and Bearing Numbers.



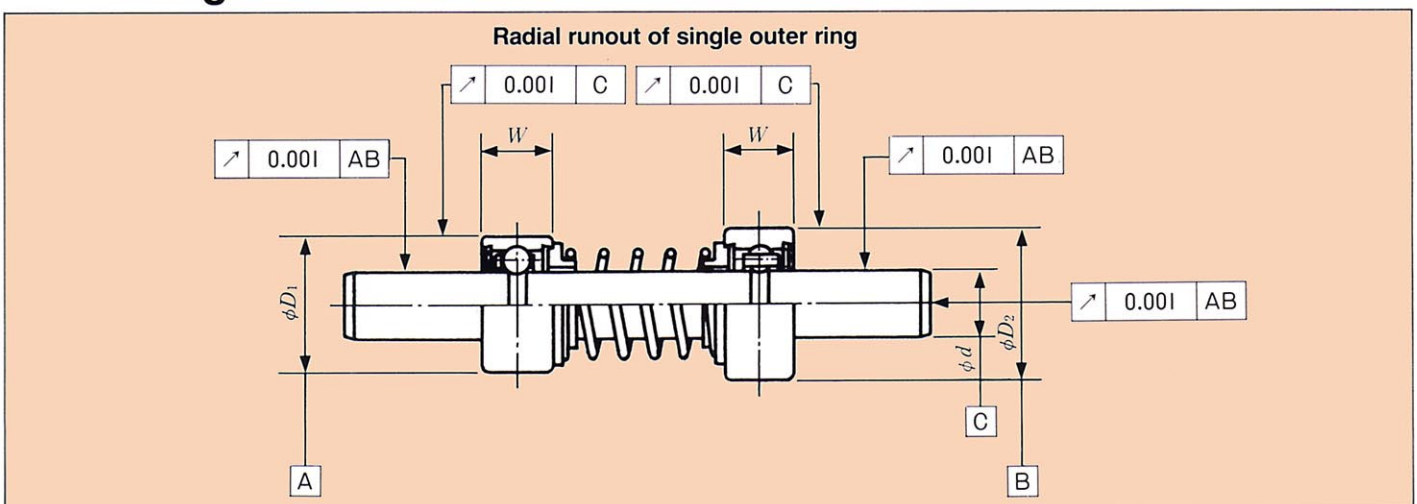
## Specifications for High Precision Integral-Shaft Bearings

Dimensions in mm

Shaft Diameter	Outer Ring Outside Diameter		Outer Ring Width	Basic Load Ratings			
	$D_1$	$D_2$		(N)		(kgf)	
				$C_r$	$C_{or}$	$C_r$	$C_{or}$
3	6.45	7.05	3.5	435	124	45	13
4	8	10	4	550	173	56	18
5	9	10	4	640	223	65	23
6	10	12	4	710	271	73	28
7	13	15	5	980	365	100	37
8	15	17	6	1330	505	135	52

Remarks: For shaft lengths, please contact **NSK**

## Basic Design and Accuracies



## Example of Bearing Number Composition

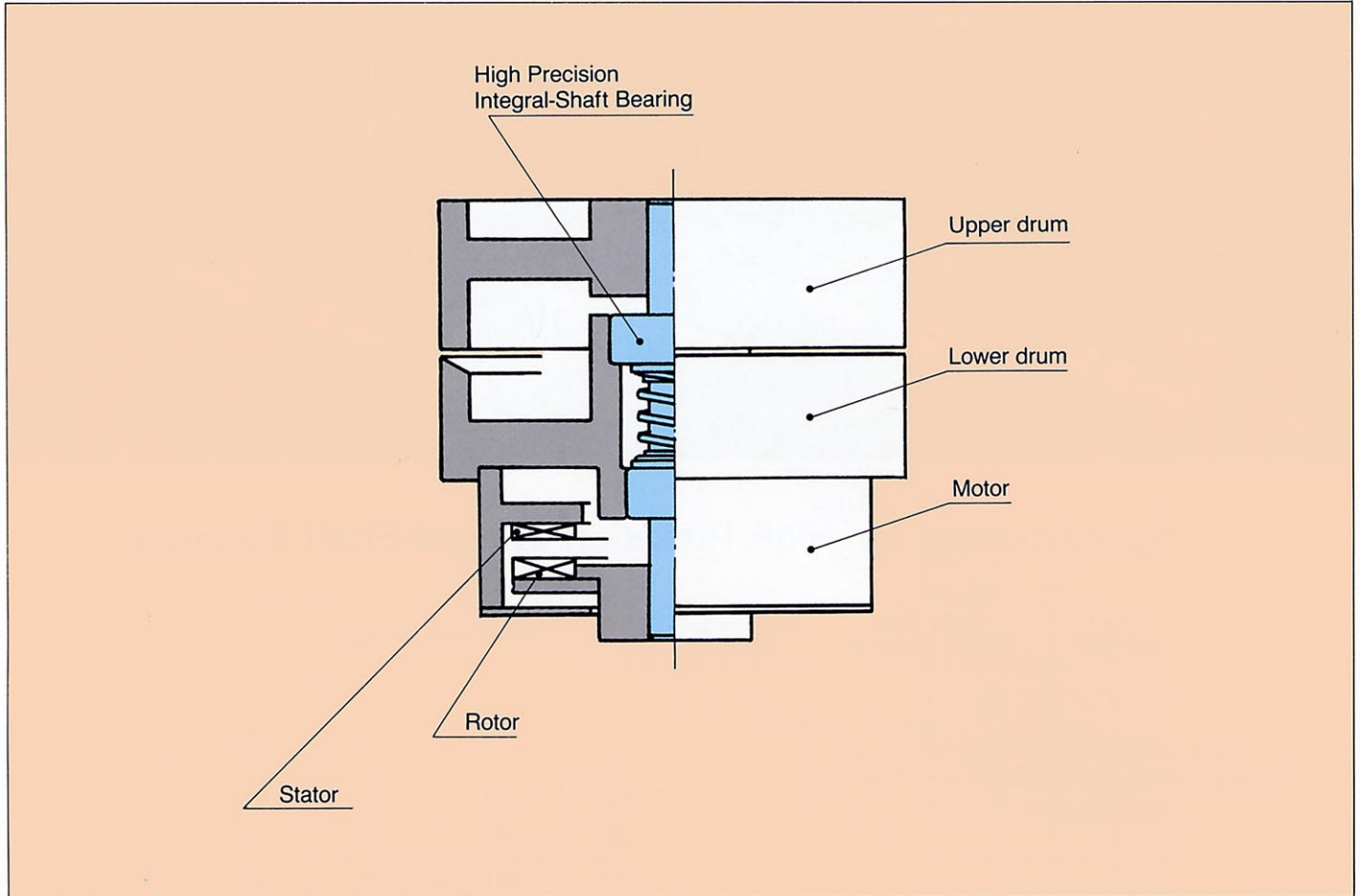
4 BVD 039 07 MC3

Shaft diameter, 4mm  
High Precision Integral-Shaft Bearing

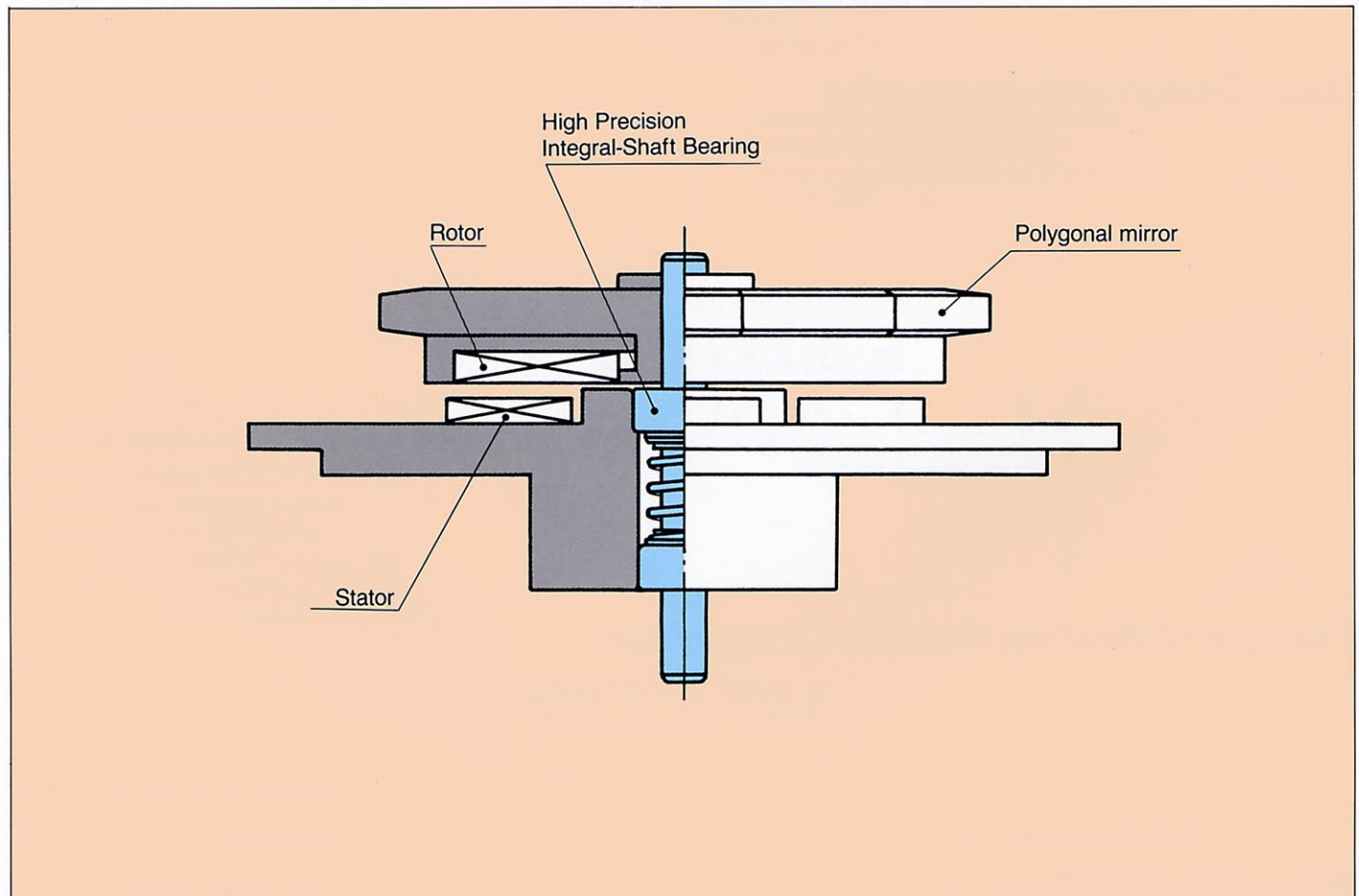
Radial internal clearance, MC3  
Model No.  
Shaft length, 39mm

## Examples of Applications

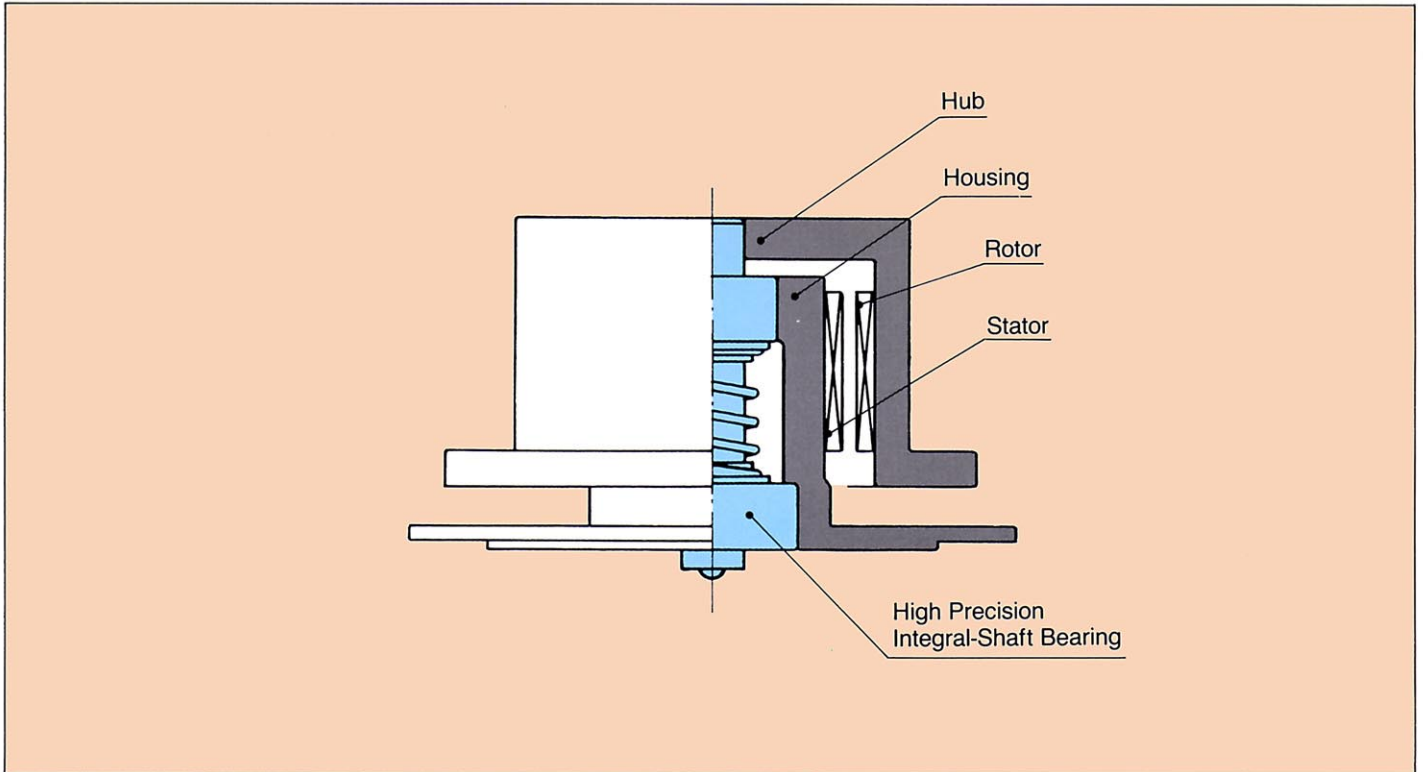
### Drum Spindle for Camcorder (VCR)



### Polygonal Mirror Scanner for LBP



## Spindle for HDD



## With Sleeves

