

# Motor Spindle EMS Series

## OPERATION MANUAL

OM-K0404E Rev.A

Thank you for purchasing EMS Series. EMS Series are motor spindles for E400Z/500Z which are suitable for grinding, small diameter drilling and milling. These motor spindles are designed to be driven with Control Unit.

Read this operation manual carefully before use to ensure years of trouble-free operation.

### 1 Cautions for handling and operation

Read these cautions carefully and only use in the manner intended.

Safety instructions are intended to avoid potential hazards that could result in personal injury or damage to the device. Safety instructions are classified as follows in accordance with the seriousness of the risk.

Class	Degree of Risk
<b>WARNING</b>	A hazard that could result in bodily injury or damage to the device if the safety instructions are not followed.
<b>CAUTION</b>	A hazard that could result in light or moderate bodily injury or damage to the device if the safety instructions are not followed.

#### WARNING

- The EMS Series are not designed for hand use. Install them on a machine like a special purpose machine or an NC lathe.
- Do not touch the spindle while it is running.
- Wear safety glasses, dust mask and hearing protection, and use a protective cover around the spindle whenever spindle is operating.
- Check the chuck tightness before each use.
- Do not apply excessive force. This may cause tool slippage or tool damage.
- Do not exceed the maximum allowable tool speed. For your safety, use tools below the maximum allowable speed.
- Do not use bent, broken, chipped, out of round or sub-standard tools. They can shatter or explode, and may cause injury.

#### CAUTION

- Do not drop or hit the spindle because shock can damage the internal components.
- Always clean the chuck. If ground particles or metal chips stick to the inside of spindle or the chuck, this will cause damage to the chuck or spindle and loss of precision.
- Always clean the tool shank before installing in the spindle.
- Do not strike the spindle or disassemble it.
- Do not over tighten the chuck. This may cause spindle damage.
- Select suitable products or tools for the applications. Do not exceed the capabilities of the spindles or cutting tools.
- Stop working immediately when abnormal rotations or unusual vibration are observed.
- Carefully direct coolant spray to the cutting tool. Do not spray directly on the spindle body.
- Use only tools with shank diameter tolerance similar to the chuck I.D. tolerance.
- Check if tools, chucks or chuck nuts are damaged before working.
- Check the ASTRO-E400Z/500Z operation manual about the control unit operation or connection.

### 2 Features

- The spindle housing is made from precision ground, hardened, stainless steel (SUS-416) with an outside diameter of  $\phi 30$ mm.
- The EMS-3046 utilizes angular bearings for 40,000min<sup>-1</sup>. The EMS-3057 utilizes ceramic bearing for 50,000min<sup>-1</sup>.
- To shorten the overall length, motor and spindle are unified.
- Easy to detach the motor spindle, the cord with quick disconnect is attached.
- Using a high-speed brushless motor, eliminate the nuisance of brush replacement and maintenance.
- Various sizes of collet chucks are available CHK 0.5mm-6.35mm. Standard collet chuck is CHK 3.0mm.

### 3 Specifications & Dimensions

#### 3-1 Specifications

Model	EMS-3046	EMS-3057
Maximum allowable motor speed	2,000-40,000min <sup>-1</sup>	2,000-50,000min <sup>-1</sup>
Spindle Accuracy	Within 1 $\mu$ m	Within 1 $\mu$ m
Max. Output	250W	250W
Cord	Length 4m (Cord with Quick Disconnect)	Length 4m (Cord with Quick Disconnect)
Air Coolant hose	Length 4m	Length 4m
Standard Size Collet Chuck(CHK-3.0)	$\phi 3.0$ mm( $\phi 3.175$ mm for USA market)	$\phi 3.0$ mm( $\phi 3.175$ mm for USA market)
Weight	1,067g(W/Cord)	1,067g(W/Cord)
Control Unit	NE147-400	NE147

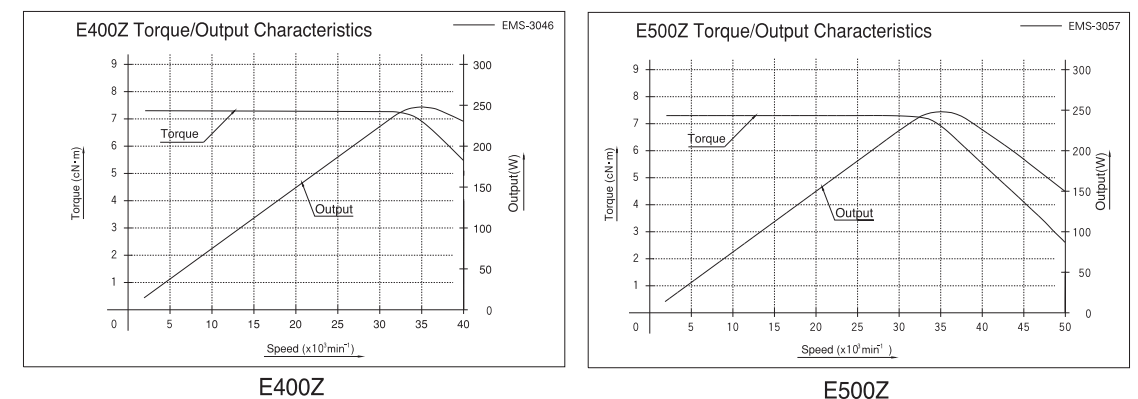
(Optional)

Collet Chuck (CHK-□□)	$\phi 0.5$ mm- $\phi 6.0$ mm 0.1mm increments and $\phi 2.35$ mm, $\phi 3.175$ mm, $\phi 6.35$ mm
Chuck Nut	K-265

#### Standard Equipment Accessories

- Collet Chuck  $\phi 3.0$ mm (CHK-3.0)···1pcs (provided )
- Chuck Nut (K-265)···1pcs (provided)
- Spanner (12×14) 2pcs
- Reducer
- Air Coolant Hose
- Operation Manual

#### 3-2 Torque Characteristics



#### 3-3 Dimensions

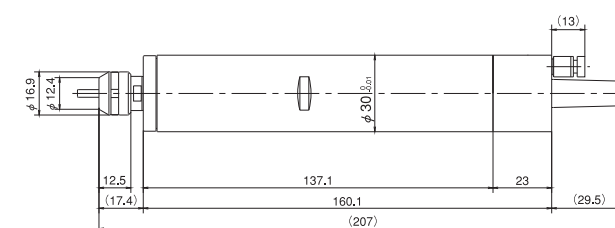


Fig.1

## 4 Changing Tools

- ① Set the provided 12mm wrench on the spindle.
- ② Place the provided 14mm wrench on the chuck nut and turn it counterclockwise to loosen the collet and remove the cutting tool. (the first turn will loosen the chuck nut, but the tool will not release and turning will become stiff. Keep turning through the stiffness and the collet will open.)
- ③ Inset the new tool and tighten the collet by turning clockwise.

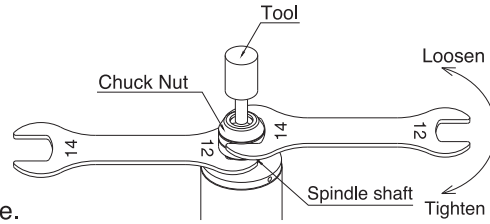


Fig.2

### CAUTION

Never install a collet into the spindle quill without first assembling it in the chuck nut. Do not tighten the collet without mounting a cutting tool or dummy bur as this will result in damage to the collet, spindle and chuck nut and make it impossible to remove the collet.

## 5 Replacing the Collet

- ① Remove the cutting tool according to the "4 Changing Tools" procedure above and remove chuck nut assembly (Fig.3).
- ② The collet and chuck nut are held together by a groove in the collet and a flange in the chuck nut. To remove the collet hold the chuck nut in one hand and push diagonally down on the collet. The collet should pop out. (Fig.4)
- ③ Install the new collet in the chuck nut by positioning the collet in the chuck nut and pressing down on a flat surface. (Fig.4)

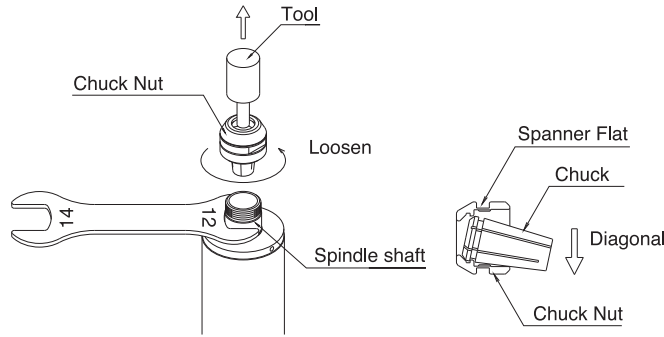


Fig.3

Fig.4

## 6 Installation of Motor Spindle

- ① When mounting the spindle avoid the area where bearings are located. If the spindle is mounted inappropriately, this will cause and damage to the spindle. (Refer to the clamping area drawing in Fig.5)

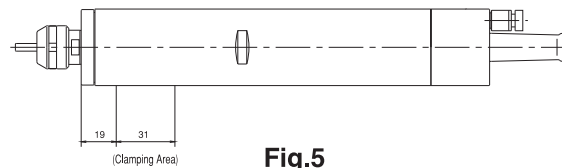


Fig.5

- ② The installation shown in Fig.6 is the recommended installation method. (In case the above is impossible, install as shown in Fig.7)

When installing a spindle, it is not recommended to fix the spindle with a fastening bolt in direct contact with the spindle body as shown in Fig.8. This can cause deformation of the spindle body and damage internal components.

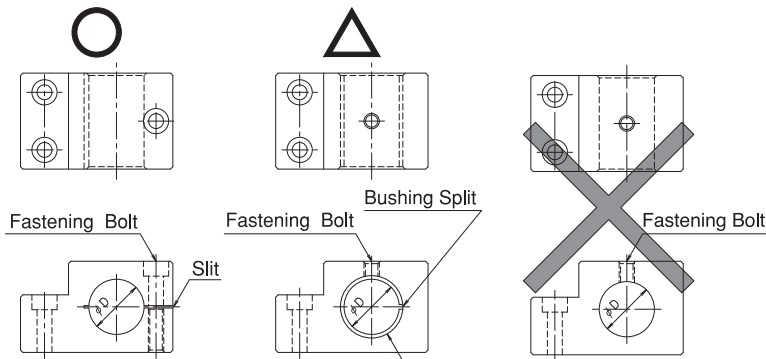


Fig.6

Fig.7

Fig.8

### CAUTION

Caution about tightening the bolt

Do not over tighten the bolt. This may cause damage to the spindle's precision. Tighten the bolt until the spindle body can not be turned by hand within the Fixture. Apply working force and check that the spindle is tightened before use.

Caution about bushing type Holder

Insert a shim to the holder bore, and tighten the bolt with the regulated torque.

Manufacture the holder with roundness and cylindrical tolerance of less than 5 μm.

Insert a thin shim into the split in the holder to maintain the split gap at 5 μm (Reference value) and tighten the clamping bolt to the torque specified for that size and type of bolt.

The final responsibility for ensuring a product's suitability for use in a given application is left to the designer of the equipment in which NAKANISHI's spindle is installed. NAKANISHI offers spindles with a wide variety of capabilities and specifications. Please carefully check the product's specifications against the requirements of your application and verify suitability and safety prior to initial use.

## 7 Caution in handling tools

- ① The proper surface speed for vitrified grindstones is 600-1800m/min.

### CAUTIONS

Do not exceed a surface speed of 2,000m/min for grinding.

$$\text{Surface Speed (m/min)} = \frac{3.14 \times \text{Diameter (mm)} \times \text{rotation Speed (min}^{-1}\text{)}}{1,000}$$

- ② Do not exceed 13mm overhang for mounted grindstones. In case overhang must exceed 13mm reduce the motor speed in accordance with Fig.9.
- ③ Do not use tools with bent or broken shanks, cracks or excessive runout.
- ④ Dress the grindstone prior to use.
- ⑤ For grinding the maximum depth of cut should not exceed 0.01mm radially or axially. Reciprocate the tool several times after each in feed step.
- ⑥ Always operate tools within the tool manufacturer's recommended speed limits. Use of a tool outside of the manufacturer's recommended speed limits could cause damage to the spindle and injury to the operator.
- ⑦ Keep the tool shank and collet clean. If contaminants are left in the collet they can cause excessive runout and damage the tool and spindle.
- ⑧ Do not drop or hit spindle.

Table 1 .Overhang and Speed

Overhang (mm)	Speed (min <sup>-1</sup> )
20	N × 0.5
25	N × 0.3
50	N × 0.1

N=Max.Operating Speed at 13mm Overhang

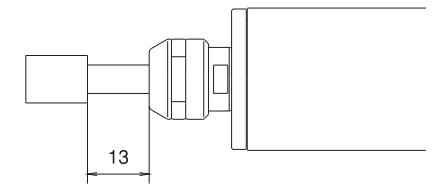


Fig.9

## 8 Troubleshooting

When the trouble is found, please check the following prior to consulting your dealer

Trouble	Cause	Inspect /Corrective Action
Tool Slippage	Contaminants inside the chuck or the spindle.	Clean the inside of the chuck and the spindle.
	Collet Nut is not properly positioned.	Set the chuck the chuck nut properly.
	Cutting tool is bent.	Change the cutting tool.
	Ball bearing is worn out.	Send to NAKANISHI repairs.
Noise or vibration during rotation	Bent tool.	Change the tool.
	Contaminants inside the ball bearing. Ball bearing worn out.	Send to NAKANISHI repairs.

※Contents are subject to change without notice.

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