

# Air Motor Spindle

## AMS-20・50

### OPERATION MANUAL

OM-K0261E Rev.A

Thank you for purchasing AMS-20・50. AMS-20・50 is designed to be driven with Air Line Kit. 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

- ① The AMS-20・50 is not designed for hand use. Install it on a machine like a special purpose machine or an NC lathe.
- ② Do not touch the spindle while it is running.
- ③ Wear safety glasses, dust mask and hearing protection, and use a protective cover around the spindle whenever spindle is operating.
- ④ Check the chuck tightness before each use.
- ⑤ Do not apply excessive force. This may cause tool slippage or tool damage.
- ⑥ Do not use bent, broken, chipped, out of round or sub-standard tools. They can shatter or explode, and may cause injury.

### CAUTION

- ① Do not drop or hit the spindle because shock can damage the internal components.
- ② An Air Line Kit is necessary for use with AMS-20・50. The motor speed will be decreased and the lifetime will be shortened without the use of an Air Line Kit.
- ③ Always drain water from the air filter(Air Line Kit). Water or ground particles will cause rust or damage to the internal parts of the turbine.
- ④ 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.
- ⑤ Do not exceed the maximum allowable tool speed.
- ⑥ Always clean the tool shank before installing in the spindle.
- ⑦ Do not strike the spindle or disassemble it.
- ⑧ Do not over tighten the chuck. This may cause spindle damage.
- ⑨ Select suitable products or tools for the applications. Do not exceed the capabilities of the spindles or cutting tools.
- ⑩ Stop working immediately when abnormal rotations or unusual vibration are observed.
- ⑪ Use only tools with shank diameter tolerance similar to the chuck I.D. tolerance.
- ⑫ Check if Air pressure is appropriate for Air Line Kit; tools, chucks or chuck nuts are damaged before working.

## 2 Features

- ① The spindle housing is made from precision ground, hardened, stainless steel(SUS-416) and easy to be attached for the special purpose machines.
- ② Air driven system generates extremely little heat, even after many hours of continuous use,
- ③ Various sizes of collet chucks are available CH5 0.3mm-6.35mm. Standard collet chuck is CH5 6.0 mm.

## 3 Specifications & Dimensions

### 3-1 Specifications

Motor Speed	AMS-20	2,200min <sup>-1</sup> (AMS-20R Forward Rotation) 2,100min <sup>-1</sup> (AMS-20L Reverse Rotation)
	AMS-50	4,000min <sup>-1</sup> (AMS-50R Forward Rotation) 3,800min <sup>-1</sup> (AMS-50L Reverse Rotation)
Appropriate Air Pressure	0.3-0.5MPa	
Air Consumption	172Nℓ/min (0.5MPa)	
Inlet Air Hose	I.D. φ 5.0mm×O.D. φ 7.0mm 2m (Length)	
Exhaust Air Hose	I.D. φ 6.0mm×O.D. φ 8.0mm 1m (Length)	
Standard Size Collet Chuck (CH5-□□)	φ 6.0mm	
Weight	2,620g (AMS-20)	2,500g (AMS-50)
Available Max. Grindstone Diameter	φ 125mm	

<Optional>

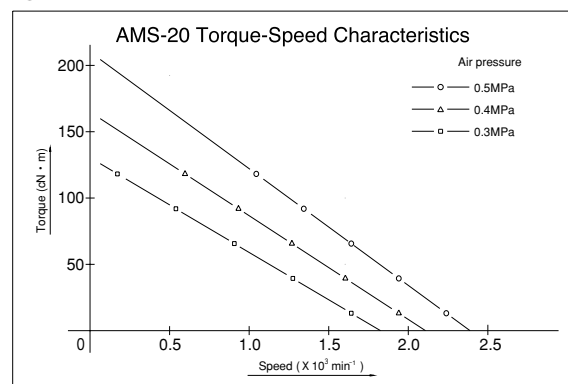
Collet Chuck (CH5-□□)	φ 0.3mm-φ 6.0mm in 0.1mm increments and φ 2.35mm, 3.175mm, 6.35mm
Chuck Nut	CHN-02
Grindstone Flange (AGF-19)	For φ 19.05mm (I.D.)×φ 100mm (O.D.)×10mm (Wide) Grindstone
Metal Saw Axis (KCH-01E)	φ 6.0mm (I.D.)×φ 30mm (O.D.)
Drill Chuck Axis (DCH-J0E)	For Jacob's Taper No.0

### Standard Equipment Accessories

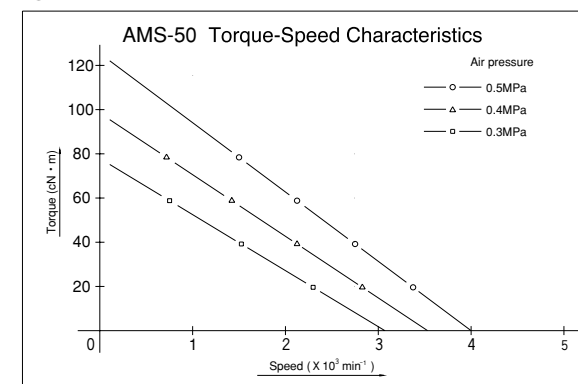
- Collet Chuck φ 6.0mm (CH5-6.0)···provided 1pc
- Inlet Air Hose (With Filter Joint)
- Spanner (20×24) 1pc
- Operation Manual
- Chuck Nut (CHN-02)···provided 1pc
- Exhaust Air Hose (With Eraser)
- Spanner (12×14) 1pc

### 3-2 Torque-Motor Speed Characteristics

① AMS-20 Table 1



② AMS-50 Table 2



### 3-3 Overviews

① AMS-20

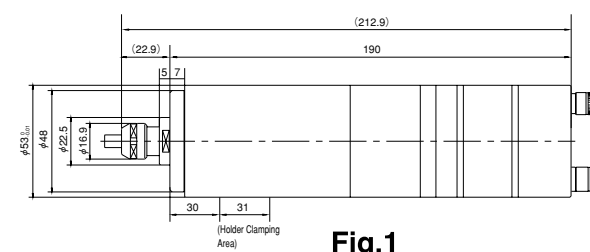


Fig.1

② AMS-50

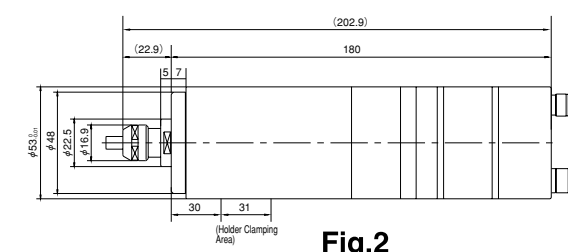


Fig.2

## 4 Replacement of tools

Replace the tools according to the following procedure.

- ① Place the provided 20mm spanner on the spindle shaft to fasten.
- ② Place the provided 14mm spanner on the chuck nut, and turn it counterclockwise to loosen the chuck. And pull out the tool. (The chuck nut will loosen but the collet will not release the tool after one turn, turn it more, and the chuck will open.)
- ③ Shorten the length of max. tool mounting as possible when inserting another tool.
- ④ Turn the chuck clockwise to fasten the tool.

### 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 test bar as this will result in a damage to the collet, spindle and collet nut and make it impossible to remove the collet.

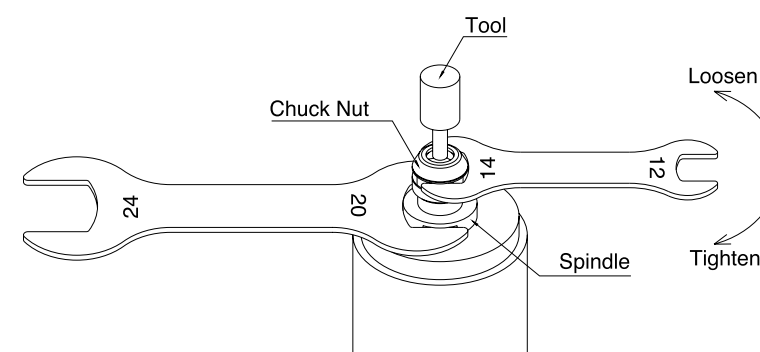


Fig.3

## 5 Replacement of the chuck

Replace the chuck according to the following procedure.

- ① The chuck nut is loosened together with the tool according to the "4 Replacement of Tools" procedure above. And unscrew the chuck nut and remove the collet and chuck nut. Then remove the tool from the chuck.(Fig.4)
- ② Hold the chuck nut in one hand and push the collet diagonally toward the spanner flat to remove the collet from the chuck nut.(Fig.5)
- ③ The chuck nut can be attached by inserting the new chuck diagonally toward the spanner flat (Fig.5) and pressing straight down.

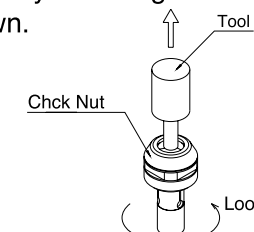


Fig.4

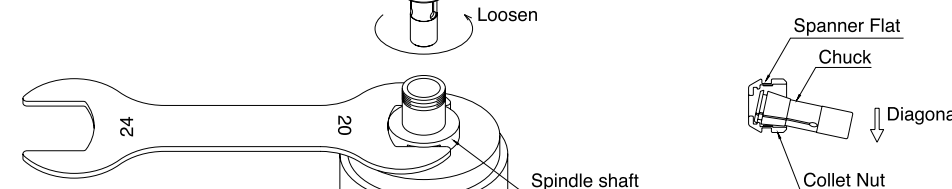


Fig.5

## 6 Attachment of Grindstone Flange(AGF-19)

- ① Detach the chuck and the chuck nut from the spindle according to the "5 Replacement of the chuck".

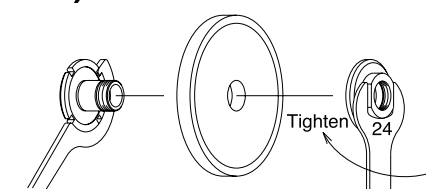


Fig.6

- ② Fasten the grindstone to the flange with the 24 mm spanner and the hook spanner. (For O.D.45 mm) (Fig.6)

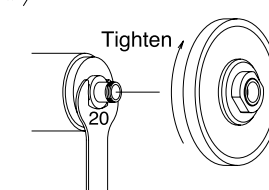


Fig.7

- ③ Place the spanner 20mm on the spindle shaft to fasten. Turn the flange with the grindstone clockwise to attach on the spindle, and fasten it with the hook spanner.(Fig.7)

- ④ Insert the bolt into the spindle, fasten the flange with the hexagon wrench.(Fig.8)

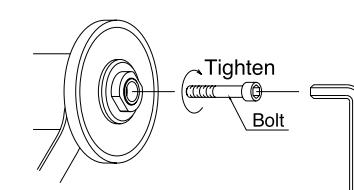


Fig.8

### CAUTION

- ① Never attach the large Grindstones which need balance check. Because the grindstone flange(AGF-19) has no balance check functions.
- ② The grindstone of the grindstone flange(AGF-19) can be available for less than O.D. φ 125mm, Wide 8mm-13mm(Standard 10mm), I.D. 19.05mm.
- ③ When using the grindstone detached from the new grindstone or the new flange, dress it before use.
- ④ The grindstones are tighten by screws which turns to the right. Check if the screw turns is right or left before use to avoid the screw loosen.

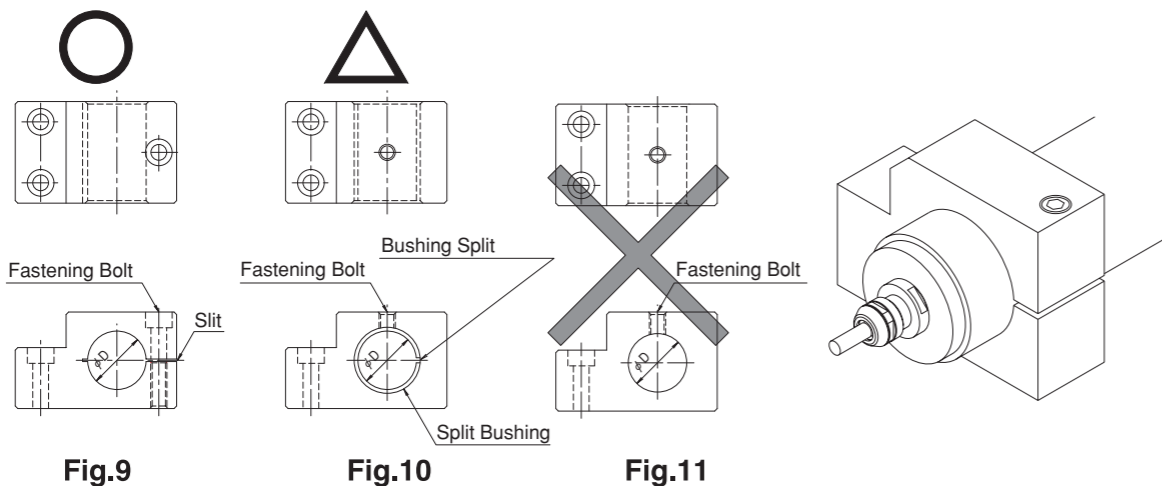
## 7 Installation of Motor and Spindle

The installation shown in Fig.9 is the recommended installation method. Therefore, the installation as shown in Fig.9 is the most recommended.

(In case the above is impossible, install as shown in Fig.10)

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.11.

This can cause deformation of the spindle body and damage internal components.



## 8 Connection of Air Line Kit (AL-0304)

- Connect the Filter Joint at the end of the Air Intake Hose of AMS-20·50 to the connector for the hose of Air Line Kit.
- Connect the another of the Air Intake Hose to the easy connection joint of AMS-20·50.
- Fill oil reservoir through the Oil Filler Cap with recommended NAKANISHI oil(liquid paraffin ISO VG15) to upper limit on the Reservoir. Disconnect from air supply prior to opening Oil Filler Cap. Do not over or under fill.
- Put the hose for air piping to the connector for air hose. Attach the reversed side of the hose for air piping to the air compressor.
- Supply air from the air compressor and turn regulator knob clockwise(clockwise=high)to set air pressure between 0.3-0.5MPa.
- Run the motor at the proper pressure. Close the Oil Drip Rate Adjusting Screw by turning counterclockwise and then turn Oil Drip Rate Adjusting Screw clockwise to adjust drip rate to 30-40 drops/min. (If you're not using an NAKANISHI lubricator, adjust between 1-3 drops/min.)

### CAUTION

NAKANISHI's lubricators deliver approximately 3% of the visible drip rate into the air line, but air flow and oil viscosity could affect this rate. Please adjust the oil drip rate so that a full oil bowl depletes from the upper gauge to the downer gauge (Approximately 40cc) in 40-50 hours.

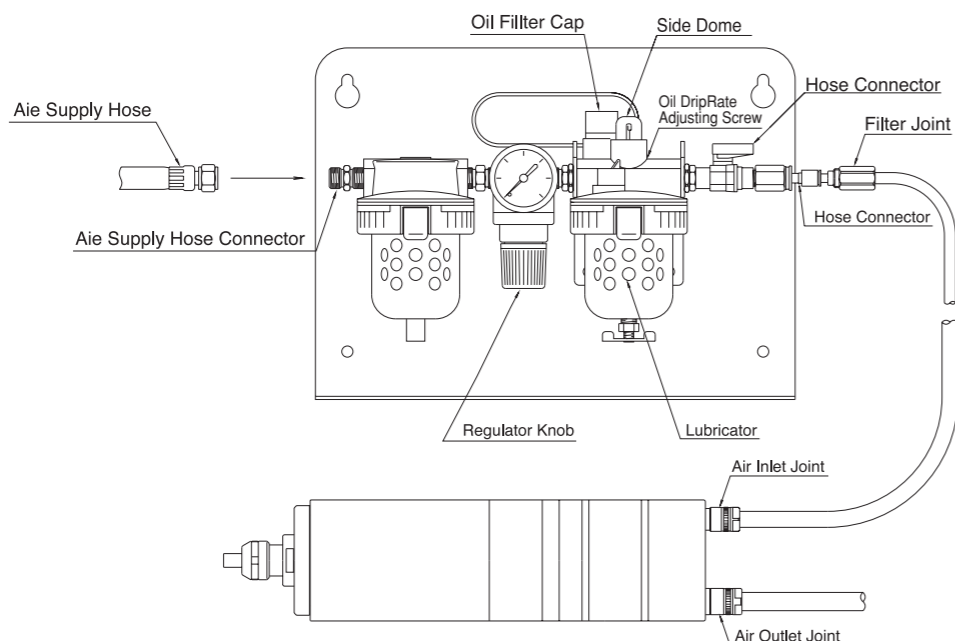


Fig.12

### Caution for Air Line Kits

- AMS-20·50 require a clean, dry air supply to the air line kit for proper operation. Please connect an air filter and/or dryer between the compressor and NAKANISHI's air line kit to ensure a clean, dry air supply. Mount the air line kit as close as possible to the spindle to ensure a constant oil supply. In high humidity areas please use a large capacity filter and/or dryer to ensure years of trouble free operation.
- Check that all hose connections are secure and strong to avoid accidental disconnection during operation. Do not exceed 1.0MPa for incoming air pressure to the air line kit. Incoming air pressure from the compressor in excess of 1.0MPa may cause the air hose to burst.
- About connection, operation and cautions of Air Line Kit, refer to "Air Line Kit Operation Manual".

## 9 Air Line Kit Operation

### 1 Moisture in the Air Filter (Fig.13)

Drain moisture from the Air Filter by pushing the Drain Valve sideways.

### 2 Oil Volume (Fig.14)

Check the oil volume at least once a week. If the oil level is low, fill to the upper limit. If the oil level is above the upper limit, remove the excess oil. Take care not to over or under fill the oil reservoir as this can cause the oil delivery rate to vary.

### CAUTION

When adding or removing oil, be sure to disconnect the incoming air supply from the Compressor, prior to opening the Oil Filler Cap.

### 3 Adjusting the Oil Drip Rate (Fig.15)

Run the AMS-20·50 at the specified air pressure and adjust the oil drip rate to the recommended rate by turning the Oil Drip Rate Adjusting Screw. (About 30 to 40 drips/min) Turn the screw counterclockwise to increase the rate and clockwise to decrease. If using a stopped lubricator, adjust the oil drip rate to about 1-3 drips/min.

### 4 Remove Oil and Moisture Regularly (Fig.16)

Remove and replace the oil in the Reservoir once a month, to ensure a pure oil source for the motor. Moisture may collect and mix with the oil in the Reservoir and damage the motor. Open the Drain Valve at the bottom of the reservoir by turning it counterclockwise.

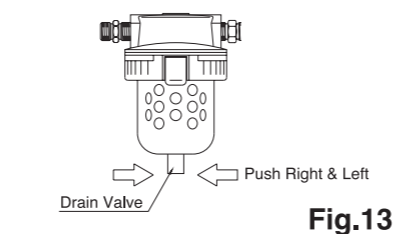


Fig.13

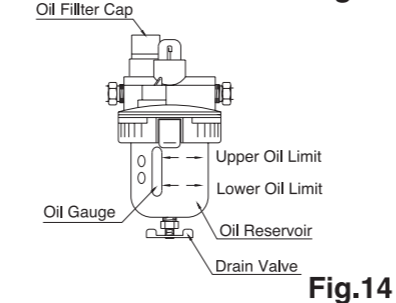


Fig.14

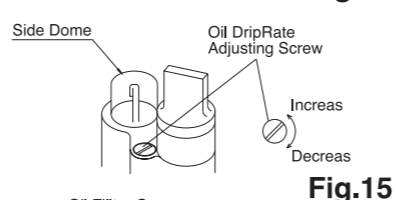


Fig.15

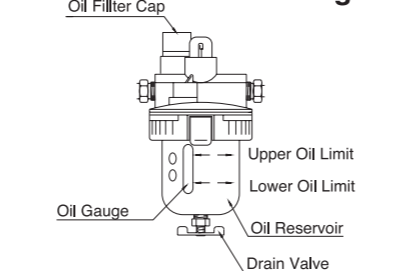


Fig.16

### 5 Oil

Liquid paraffin ISO VG15 is recommended.

## 10 Grease Injection (Only For AMS-20)

To upgrade the life of the reducer, inject grease at every time 100-200 hours according to the following procedure. Inject grease to avoid the components of the spindle or to prevent from heat generation and inner grease deterioration.

### Injection

- Stop the Air Supply. (Never rotate the motor spindle)
- Set the grease gun (purchase separately) to the grease nipple of the Motor Spindle.

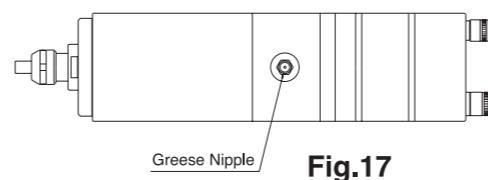


Fig.17

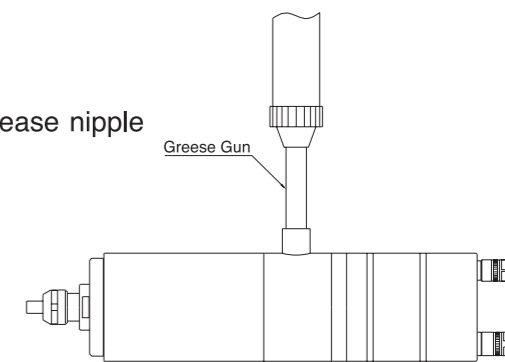


Fig.18

- Inject grease about 1cc. Use grease for gear or molybdenum grease.

### CAUTION

Too much grease generates high heat, make sure to only supply the volume of grease as specified.

- Detach the grease gun from the Motor Spindle.
- Rotate the reducer between the motor and the spindle gradually, start from the lower speed, and slowly increase.

## 11 Caution in handling tools

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

### CAUTION

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

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

- Do not exceed 13mm overhang for mounted grindstones. In case overhang must exceed 13mm reduce the motor speed in accordance with Fig.19.
- Do not use tools with bent or broken shanks, cracks or excessive runout.
- Dress the grindstone prior to use.
- 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.
- 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.
- 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.
- Do not drop or hit spindle.

Table 3. 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

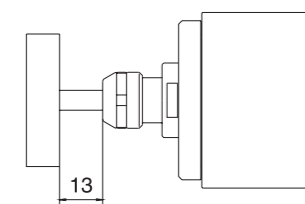


Fig.19

## 12 Troubleshooting

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

Trouble	Cause	Inspect / Corrective Action
Motor speed decrease	Bad hose connection	Check the connection part and retighten the thread.
	Damage to Hose	Replace hose
	Poor air flow and air pressure	Check if the air circuit is damaged
	Low or No Lubricant	Check lubricator for proper lubricant level. Set lubricant drip rate from 30 to 40 drops/min. Remove air supply lubricant directly into the hose. If using a non-NAKANISHI lubricator, adjust lubricant drip rate from 1 to 3 drips.
	Lubricator inclined or upside down	Inclined or upside down lubricator will flood spindle with lubricant.
	Over filled lubricator	Drain lubricant from Reservoir to within indicated levels. Excess lubricant will flood spindle.
Does not rotate	Lubricator set to drip more than 40 drops per minute.	Excessive lubricant drip rate causes resistance on ball bearings and slows down the speed. Set oil drip rate properly.
	Water in Lubricant Reservoir	Drain water from Lubricant Reservoir, and replace with clean lubricant.
	Water in Air Filter	Drain water from air filter.
Tool Slippage	Air Pressure Regulator turned to low pressure.	Set proper air pressure.
	Air flow does not reach the spindle.	Check source of compressed air. Air hoses not connected properly. Check air hoses for cracks, kinks, or disconnection.
	Damage to the motor	Return for service.
Noise or vibration during rotation	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.
	Ball bearing is worn Cutting tool is bent	Send to NAKANISHI Repairs. Replace cutting tool.
Noise or vibration during rotation	Ball bearing is worn	Send to NAKANISHI Repairs.
	Contaminants inside the ball bearing Bent tool	Change the tool.

※Specifications may be changed without notice.

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