

# ROTUS Air Motor

# IM-301 · IM-300

## OPERATION MANUAL

OM-K0359E 003

Thank you for purchasing ROTUS Air Motor " IM - 301 · IM - 300 ". The attachment and Air Line Kit (with lubricator) are required to drive this Air Motor. Read this and all the associated component Operation Manuals carefully before use. Always keep this Operation Manual in a place where a user can referred to for reference at any time.

### 1. CAUTIONS FOR HANDLING AND OPERATION

- Read these warnings and cautions carefully and only use in the manner intended.
- These warnings and cautions are intended to avoid potential hazards that could result in personal injury to the operator or damage to the device. These are classified as follows in accordance with the seriousness of the risk.

Class	Degree of Risk
<b>WARNING</b>	A safety hazard could result in bodily injury or damage to the device if the safety instructions are not properly 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 This product is designed for hand use. Never install this attachment or any hand tool on a machine such as a special purpose machine, NC lathe or mill.
- ② Do not touch the cutting tool while it is rotating. It is very dangerous.
- ③ Always wear safety glasses, dust mask and use a protective cover.

#### CAUTION

- ① Do not drop or hit this Air Motor, as shock can cause damage to the internal components.
- ② Before use, carefully read " Air Line Kit Operation Manuals " regarding the correct connection, operation and cautions when using the Air Line Kit.
- ③ When cleaning a Air Motor, stop the motor and remove dirt with a brush or a cloth. Do not blow compressed air into the Air Motor. Foreign particles or cutting chips may get into the ball bearings.
- ④ Stop operating immediately when abnormal rotation or any unusual vibrations are observed. Afterwards, please check the content of section " 7. TROUBLESHOOTING ".
- ⑤ When using ROTUS Air Motor, Air Line Kit (AL - H1207F or any other equal characteristics) is recommended for long lifetime.
- ⑥ Operating the Air Motor in low Lubricant conditions will cause low rotation speed, damage to the internal components and shorter life of the Air Motor.
- ⑦ Be sure to drain moisture and condensation from the Air Line Kit (filter regulator) regularly to avoid moisture being carried to the Air Motor. This may cause damage to the Air Motor.
- ⑧ Do not use or storage the supply connection hose, supply and exhaust air / oil hose in a bent state.
- ⑨ Prior to starting the day's work please check the following items: check the filter regulator for proper air pressure setting, check that filter is clean, and check that the lubricator has the proper amount etc.. Afterward start rotating slowly and increase speed gradually.
- ⑩ After installation, repair, initial operation, or long periods of non operation, please carry out break -in as follow. Start rotating slowly and over a short period of 15 - 20minutes, increase speed gradually until allowable maximum speed.
- ⑪ Do not disassemble, modify or attempt to repair the Air Motor. Additional damage will occur to the internal components. Service must be performed by NSK NAKANISHI or an authorized service center.
- ⑫ Securely connect the connection hose and supply air / oil hose to the motor Air Motor and Air Line Kit to avoid accidental disconnection during use.

### 2. FEATURE

- ① No heat is generated for long continuous use due to air driven operation.
  - ② Air consumption is 75 Nℓ /min and can be used with air compressor of 1HP (7.5kW).
  - ③ By mounting a silencer on the back exhaust air / oil hose, the quiet operation of air turbine is remarkably improved.
  - ④ Ring switch can be FWD./REV. turned to rotate the motor.
  - ⑤ AIR MOTOR (IM - 301) has a " free joint mechanism " which prevents a hose from being twisted.
  - ⑥ Clean air from tool can put away metal chips because Air Motor (IM - 300) has a chip air mechanism.
- \* IM - 300 is used with Attachment (IH - 300). IM - 300 can not be used with Attachments except IH - 300.

### 3. SPECIFICATIONS AND DIMENSIONS

#### 3 - 1 Specifications

Model	IM - 301	IM - 300
Maximum Motor Rotation Speed	30,000min <sup>-1</sup> (rpm) (at 0.4MPa (58psi) Air Pressure)	
Appropriate Air Pressure	0.3 - 0.45MPa (43.5 - 65.3psi)	
Air Consumption	75Nℓ /min (at 0.4MPa (58psi) Air Pressure)	
Supply and Exhaust Air / Oil Hose Dimensions (With Eraser)	Supply : I.D. φ3.7 mm x O.D. φ5.7 mm Length : 2 m Exhaust : I.D. φ5 mm x O.D. φ6.5 mm Length : 2 m	
Vibration Level	Less than 2.5m / s <sup>2</sup>	
Weight (Except hose)	130g	
Noise Level at 1m distance	Less than 85dB (A)	

	Temperature	Humidity	Atmospheric Pressure
Operation Environment	0 - 40°C	MAX.75% (No condensation)	800 - 1,060hPa
Transportation and Storage Environment	-10 - 50°C	10 - 85%	500 - 1,060hPa

#### Standard Accessories

- Supply and Exhaust Air / Oil Hose • 1pc.  
(IM - 301 : K - 206, IM - 300 : K - 207)
- Pin Wrench (K - 233) • 1pc.
- Nozzle (Only IM - 300) • 1pc.
- Silencer (K - 209) • 1pc.
- Operation Manual • 1set.

#### 3 - 2 Outside View

- ① IM - 301 (360° Free Joint Type)

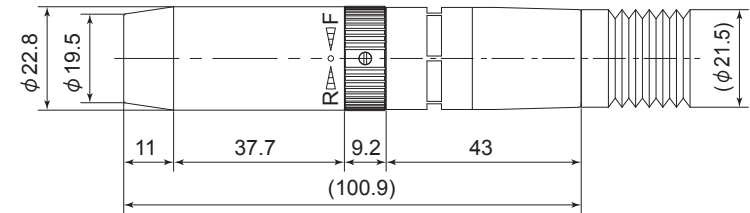


Fig. 1

- ② IM - 300 (Chip Air Type)

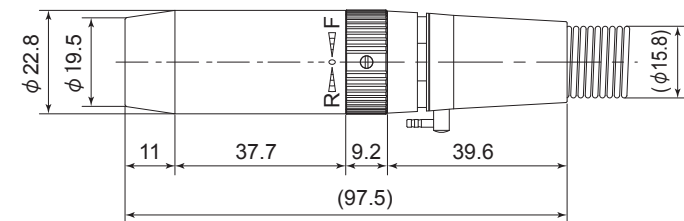


Fig. 2

### 4. CONNECTION OF THE AIR MOTOR TO THE ATTACHMENT

#### CAUTION

Make sure your hands and all interlocking parts of the attachment and Air Motor are clean before connecting the Air Motor to the attachment. This is critical to prevent contaminants from entering the Air Motor or attachment.

Align the thread on the front end of the Air Motor and the rear of the attachment, and turn the attachment clockwise. If the drive shaft of the Air Motor does not engage properly to the drive dog on the attachment, it may only turn approximately two threads before stopping. DO NOT FORCE THEM TOGETHER. Loosen the attachment from the Air Motor, rotate the attachment shaft by hand then re-try. The drive shaft and the drive dog must be fully engaged. When fully engaged, secure the Air Motor and attachment using the provided wrench. (Fig. 3)

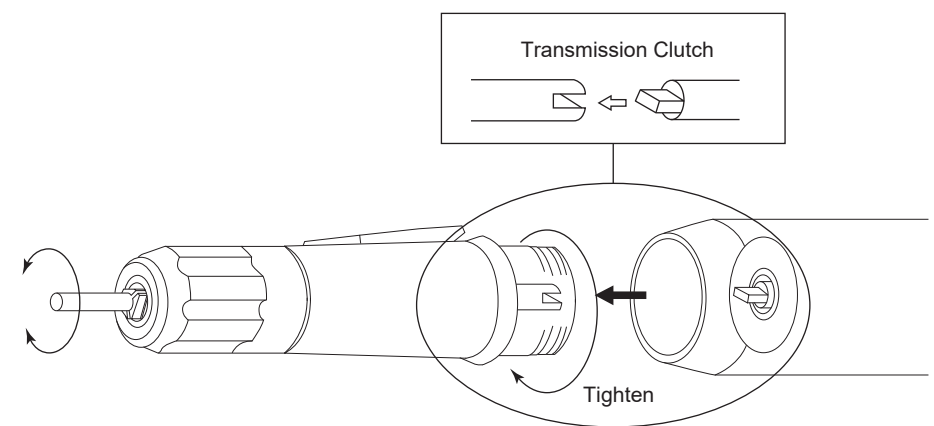


Fig. 3

### 5. CONNECTION OF THE AIR LINE KIT

#### 5 - 1 Connection of the Air Motor

#### CAUTION

Make sure to turn the compressed air supply to the Air Line Kit OFF, before replacing the Lubricating Oil or draining the water in Lubricating Oil.

- (1) Connect the Filter Joint of the Air Motor to the Secondary Joint ( φ 6 One - Touch Joint) on the Air Line Kit. (Fig. 4 ①)
- (2) Place " Exhaust Air Silencer / Oil Hose " into an empty container (Fig. 4 ②). (Exhaust outlet air and oil from the Silencer.)  
\* If using the ROTUS Air Motor " IM - 300 ", insert the Chip Air Hose to the Chip Air Adjusting Valve on the Control Valve (Fig. 4 ③).

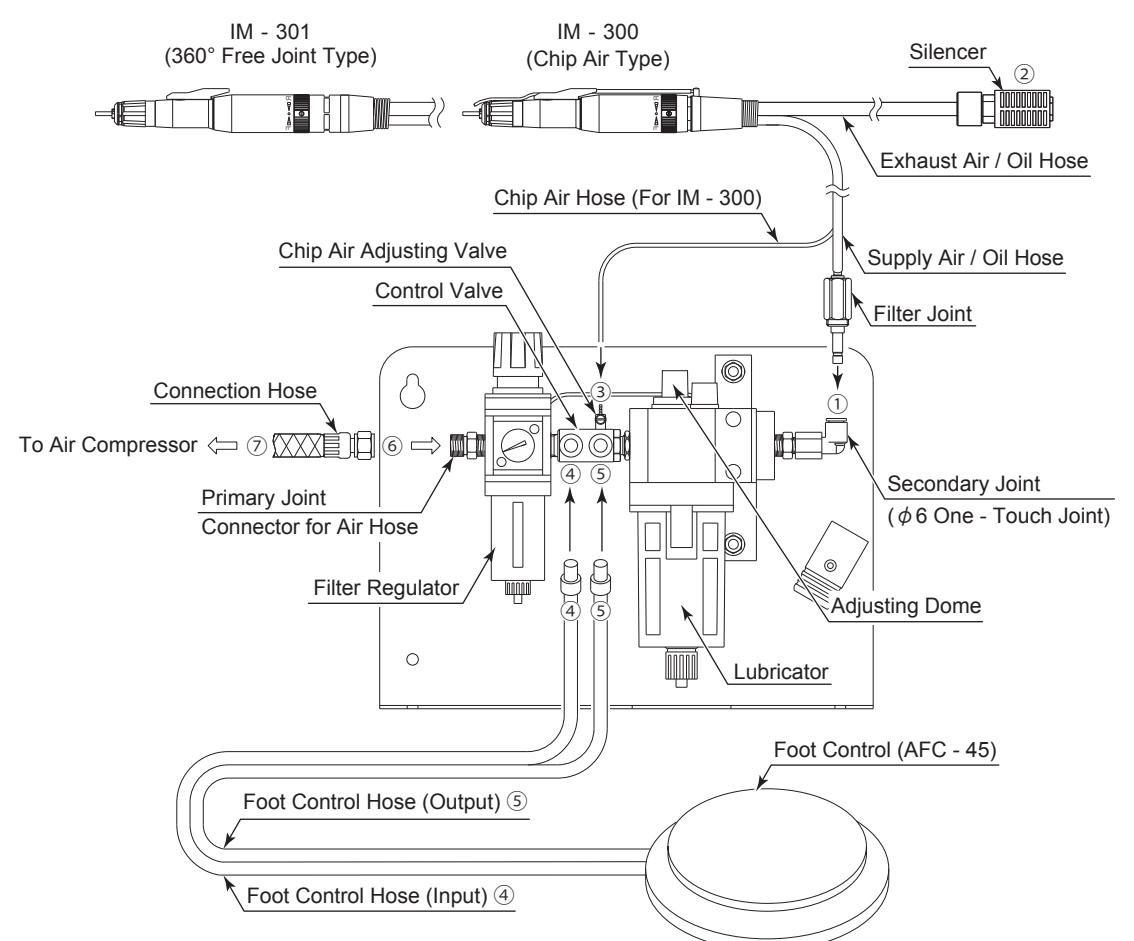


Fig. 4 Connection of Air Line Kit " AL - H1207F (Sold Separately) "

#### 5 - 2 Foot Control Hose Connection (Sold Separately)

#### CAUTION

If the " Foot Control Hose (Input / Output) " is connected to the wrong position, airflow adjustment will not be possible.

- (1) Insert the Foot Control Hose (Input) ④ to the One - Touch Joint ④ of the Control Valve (Fig. 4).
- (2) Insert the Foot Control Hose (Output) ⑤ to the One - Touch Joint ⑤ of the Control Valve (Fig. 4).

### 5 - 3 Hose Connection Diagram

- (1) Connect the Connection Hose (Air Line Kit's Standard Accessory) to the Primary Joint of the Air Line Kit. (Fig. 4 ⑥)
- (2) Connect the other side of the Connection Hose (Air Line Kit's Standard Accessory) to the compressor. (Fig. 4 ⑦)

### 5 - 4 Operation

#### ⚠ CAUTIONS IN USING AIR LINE KIT

- When connecting the Compressor and Air Line Kit, recommended install the filter or air dryer to between Compressor and Air Line Kit in order to supply clean dry air to the Air Motor. Using compressed air containing excessive moisture could result in malfunction or failure of the Air Motor. If excessive moisture or condensation are found in Filter Regulator Bowl, it will be necessary to install a dryer and larger Filter on the Primary Joint side of the Air Line Kit to prevent and remove excessive moisture.
- Connect the input air supply connection hose and supply air / oil hose securely to avoid accidental disconnection during use. Input air pressure should never exceed 1.0MPa (145psi). Air pressure exceeding 1.0MPa (145psi) may cause the supply connection hose and or air / oil hose supply to rupture.
- Make sure operation air pressure is less than 1.0MPa (145psi) before connecting the input supply connection hose and air / oil supply hose. If operation air pressure is exceeds 1.0MPa (145psi), injury to the operator may occur by accidental disconnection before or during use.
- Before use, carefully read " Air Line Kit Operation Manuals " regarding the correct connection, operation and cautions when using the Air Line Kit.

- (1) Supply air pressure to the Air Line Kit.
- (2) Supply air from the air compressor and turn the Regulator Knob to set air pressure between 0.3 - 0.45 MPa (43.5 - 65.3psi).
- (3) Motor will be rotated by turning the Ring Switch of Air Motor toward ( " F : FWD." or " R : REV." ) in Fig.5 and stepping on Foot Control.

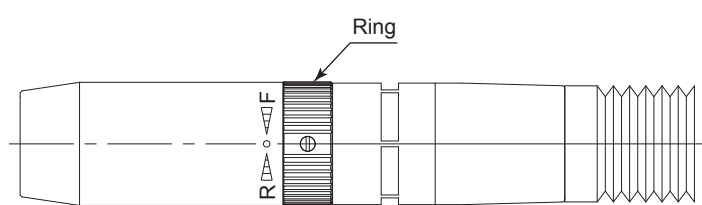


Fig. 5

- (4) Turn the Control Valve and adjust the Chip Air when connected to an " IM - 300 " ROTUS Air Motor. Turn the Groove on the Adjusting Screw of Control Valve (Chip Air) using a precision screwdriver to adjust the airflow.

Horizontal Position : Minimum Airflow  
Vertical Position : Maximum Airflow

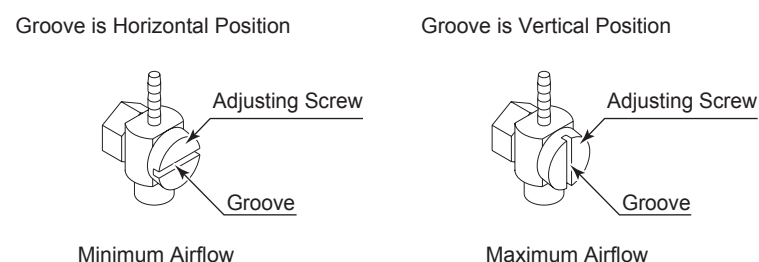


Fig. 6

- (5) Press the Foot Control to start Air Motor rotation.
  - (6) Adjust the Oil Drip Rate to the recommended volume which is 1 to 3 drops / min. (Commercially Air Line Kit is same Oil Drip Rate). (If using the " AL - 0306 " Air Line Kit, adjust the proper Oil Drip Rate to 30 - 40 drops / min).
- \* Refer to the Operation Manual of the Air Line Kit for detailed information.

Lubricating Oil  
Use ISO VG15 Liquid Paraffin (Shell Ondina Oil #15) in the Air Line Kit lubricator bowl.  
(For U.S.A. specification, use Chevron Superla #9).

Model
• Lubricating Oil (K - 211) 70cc
• Lubricating Oil (K - 202) 1ℓ

### 5 - 5 Stop the Air Motor

#### ⚠ WARNING

When stopping the Air Motor, release all the pressure from the supply air / oil hose by rotating the Air Motor with the F / R Ring Switch. If the Ring Switch is not in the right position, the air cannot be removed. Failure to do this may cause damage to the supply air / oil hose.

- (1) Take your foot off the Foot Control. (When using a commercial Air Line Kit, stop the air supply with the ON / OFF Valve.)
- (2) Remove all the pressure from the supply air / oil hose with the F / R Ring Switch.

### 6. Connection of Nozzle

When " Lever Type Attachment (IH - 300) " and " ROTUS Air Motor (IM - 300) ", are used together, a chip air can be used when nozzle is attached.

- ① Put off a ring attached with IH - 300 toward the edge, enlarging the divided part of the ring.

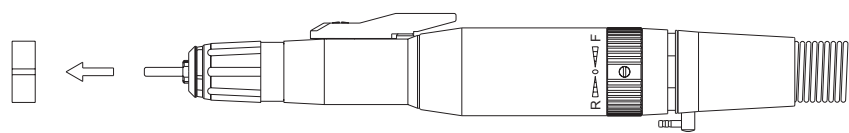


Fig. 7

- ② Insert a ring part of nozzle from the edge of IH - 300.

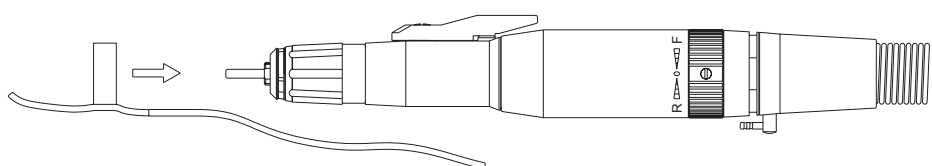


Fig. 8

- ③ Insert a tube of nozzle into a pipe.

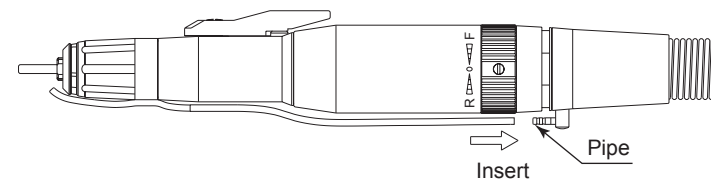


Fig. 9

### 7. TROUBLESHOOTING

If a problem or concern occur, please check the following items prior to consulting your dealer.

Trouble	Cause	Inspection / Corrective Action
Air Motor does not rotate or rotate smoothly.	Air flow does not reach the Air Motor.	Check if input supply connection hose or air / oil supply hose is broken, bent or disconnected. Check connection of the input supply connection and air / oil supply hoses. Check the compressor power supply and the air compressor output. Check the Regulator and set to the correct air pressure. Check all connections input supply and air / oil supply hose.
	The spindles ball bearings have been damaged.	Replace the ball bearings. (Return to NAKANISHI dealer service.)
	The motor has been damaged by for no Lubricating Oil	Replace the motor. (Return to NAKANISHI dealer service.)
Motor speed decrease.	The connection hose or air / oil supply hose have been damaged.	Replace the input supply and or air / oil supply hoses.
	Poor connection of input supply or air / oil supply hose.	Check all threaded joints and re-tighten if necessary.
	Low air pressure.	Check the Compressor, Air Circuit, and Regulator.
	Low Lubricating Oil.	Check lubricator for proper lubricant level. Set the Oil Drip Rate from 1 to 3 drops /min. * If using the " AL - 0306 " Air Line Kit, adjust the proper Oil Drip Rate to 30 - 40 drops / min.
	No Lubricating Oil.	Clean inside of the motor use the Lubricating Oil. Removing the Filter Joint from Air Line Kit, supply a small amount of Lubricating Oil directly into the Filter Joint. Afterwards, supply air pressure and rotate the Air Motor. Flush dirt in the motor and repeatedly do this work about three times. When the improvement is not seen, return to NAKANISHI dealer service.
Unequal motor rotation.	Water, dirt and debris are collected in the Filter Regulator.	Drain water, dirt and debris from the Filter Regulator Bowl.
	Water in Lubricating Oil reservoir.	Drain water from Lubricating Oil reservoir and replace with clean Lubricating Oil.
Overheating during rotation.	Excessive Oil Drip Rate flooding the bearings.	Oil drip rate exceeds the recommended amount. Adjust for the proper Oil Drip Rate.
	Over filled lubricator. (Air Line Kit " AL - 0306 " only.)	Drain the Lubricating Oil from Reservoir to meet indicated levels. Excess lubricant will flood spindle.
Abnormal vibration or noise during rotation.	Cutting debris has contaminated the ball bearings, and the ball bearings are damaged.	Replace the ball bearings. (Return to NAKANISHI dealer service.)
	Cutting debris has contaminated the ball bearing.	
	The spindles ball bearings have been damaged.	

### 8. DISPOSAL OF THE AIR MOTOR

When disposal of an Air Motor is necessary, follow the instructions from your local government agency for proper disposal of industrial components.