

NSP - 601 • NA45 - 400 NA45 - 230 • NA90 - 230

OPERATION MANUAL

Thank you for purchasing Air Grinders the "NSP - 601 • NA45 - 400 • NA45 - 230 • NA90 - 230". These Air Grinders are designed for rotating smoothly at ultra high-speed with extremely low bur run-out and vibration. The Air Line Kit are required to drive this Air Grinders. Read this and all the associated component Operation Manuals carefully before use. Always keep this Operation Manual in a place where a user can refer 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
WARNING	A safety hazard could result in bodily injury or damage to the device if the safety instructions are not properly followed.
CAUTION	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 Air Grinder is designed for hand use. Never install the Air Grinder or any hand tool on a machine such as a special purpose machine, NC lathe or mill.
- Do not exceed the "Maximum Motor Rotation Speed" (Refer to "6 - 1 Specifications").
- When sensing that the Air Grinder is overheated during operation, reduce the working force or the motor rotation speed, or stop the operation until the Air Grinder cools down before restarting.
- Do not touch the cutting tool while it is rotating. It is very dangerous.
- Wear safety glasses, dust mask, protective cover and use a hearing protection around the Air Grinder whenever the Air Grinder is rotating.
- When installing a cutting tool, tighten the collet correctly and check again the collet before use. Do not over-tighten the collet. This may cause damage to the spindle.
- Do not use the grindstone with axis of the outside diameter other than specification when you use the grindstone with axis by the Maximum Motor Rotational Speed. Please follow the outside diameter of grindstone with axis detailed in Table. 1.

Table. 1 Outside diameter of grindstone with axis (at the Max. Speed).

Model	Maximum Motor Rotation Speed	Outside diameter of Grindstone with axis
NSP - 601	60,000 min ⁻¹ (rpm)	Less than ϕ 8mm
NA45 - 400	40,000 min ⁻¹ (rpm)	Less than ϕ 15mm
NA45 - 230 • NA90 - 230	23,000 min ⁻¹ (rpm)	Less than ϕ 25mm

- Do not exceed 13mm of overhang for mounted grindstones as shown in Fig. 1. If the overhang must exceed 13mm, reduce the motor speed in accordance with Table. 2.
- Do not use bent, broken, chipped, out of round or sub-standard cutting tools as they may cause shatter or explode.
The cutting tool with cracked, bended may cause some injury to operator.
When using a new cutting tool, rotate it in a low speed and increase speed gradually for safety.
- Always operate cutting tools within the cutting tool manufacturer's recommended speed limits. Use of a cutting tool higher than the manufacturer's recommended speed limits could cause damage to the spindle and injury to the operator.
- Do not apply excessive force. This may cause cutting tool slippage, cutting tool damage, injury to the operator, loss of concentricity and precision.

Table. 2 Overhang and Speed

Overhang (mm)	Max. Speed (min ⁻¹) (rpm)
20	N x 0.5
25	N x 0.3
50	N x 0.1

* N = Max. Operating Speed with 13mm overhang.

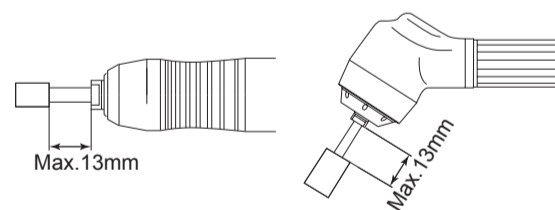


Fig. 1

CAUTION

- Be sure to use the NAKANISHI Air Line Kit AL - H1206 of one to one Air Grinder to avoid lower speed and short service life. If there is no lubrication system in your work place, inject the NAKANISHI Lubricating Oil with approx. 2 - 3 drops in every hour into the injection inlet on the body. Poor lubricating may cause the short service life, loss of precision and damage of the internal components of the Air Grinder.
- Do not drop or hit this Air Grinder, as shock can damage to the internal components.
- Before use, carefully read "Air Line Kit Operation Manuals" regarding the correct connection, operation and cautions when using the Air Line Kit.
- Be sure to drain moisture and condensation from the Air Line Kit (filter regulator) regularly to avoid moisture being carried to the Air Grinder. This may cause damage to the Air Grinder.
- Be sure to clean the collet, the spindle taper and threads before replacing the cutting tool. If ground particles or metal chips stick to the inside of spindle or the collet, damage to the collet or spindle can occur due to the loss of precision.
- When cleaning an Air Grinder, stop the Air Grinder and remove debris with a soft brush or a cloth. Do not blow air into the Air Grinder with compressed air as foreign particles or cutting debris may get into the ball bearing.
- Always clean the cutting tool shank before installing the cutting tool in the spindle.
- When sizing the correct collet size to the cutting tool shank diameter, a tolerance of +0 ~ -0.01mm is strongly recommended. A cutting tool shank within the +0 ~ -0.1mm range is mountable, however, this may cause poor concentricity and or insufficient cutting tool shank gripping force.


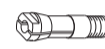
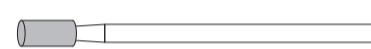
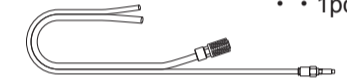






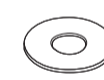

CAUTION

- Select suitable products or cutting tools for each application. Do not exceed the capabilities of the Air Grinder or cutting tools.
- Keep everything in order not to place the rag which could be caught near the Air Grinder.
- Stop operating immediately when abnormal rotation or unusual vibrations are observed. Immediately, please check the content of section "9.TROUBLESHOOTING".
- Always check if the tool, collet, connection hose and supply and exhaust air / oil hose for damaged before and after operating.
- If the collet show signs of wear or damage, replace it before a malfunction or additional damage occurs.
- 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 5 - 10 minutes, increase speed gradually until allowable maximum speed.
- Do not disassemble, modify or attempt to repair the Air Grinder. Additional damage will occur to the internal components. Service must be performed by NSK NAKANISHI or an authorized service center.
- When using this Air Grinder for mass production, please consider the purchase of an additional Air Grinder to be used as a back-up in case of emergency.
- Securely connect the compressor supply connection hose and the air / oil supply hose to the Air Line Kit and the Air Grinder to avoid accidental disconnection during use.

2. BASIC PACKAGE

When opening the package, check if it includes all items listed in "Table. 3 Packing List Contents". In the event of any shortage, please contact either NAKANISHI (see the "4. CONTACT US" section) or your local dealer.

Table. 3 Packing List Contents

Common		
Air Grinder • • 1pc. 	Collet ϕ 3.0mm (CHS - 3.0) or ϕ 3.175mm (CHS - 3.175) • • 1pc.* (For U.S. market ϕ 3.175mm (CHS - 3.175)) 	Mounted Point (42423) • • 1pc. (Excluding NSP - 601 ϕ 3.175 / NA45 - 230 ϕ 3.175) 
Supply Air / Oil Hose (with Filter Joint (FJ - 02)), Exhaust Air / Oil Hose (with Silencer (K - 208)) • • 1pc.* 	Wrench (8 x 5) • • 1pc. 	Bur Wrench (K - 212) NSP - 601 / NA45 - 400 • • 1pc. NA45 - 230 / NA90 - 230 • • 2pcs. 
Operation Manual • • 1set 		
NA45 - 230 / NA90 - 230		
Allen Wrench (1.5mm) • • 1pc. 	Grindstone Axis (NCH - 01) • • 1pc. 	Top Cut Grindstone (64836) (64837) • • 1pc. Each. 
Sandpaper Disk # 120 (64222), # 320 (64225) # 600 (64227) • • 2pcs. Each. 	Rubber Pad (64822) • • 1pc. 	

* The collet, supply air / oil hose and exhaust air / oil hose are attached to the Air Grinder.

3. WARRANTY

We provide a limited warranty for our products. We will repair or replace the products if the cause of failure is due to the following manufactures defects. Please contact us or your local distributor for details.

- Defect in manufacturing.
- Any shortage of components in the package.
- Where damaged components are found when initially opening the package.
(This shall not apply if the damage was caused by the negligence of a customer)

4. CONTACT US

For your safety and convenience when purchasing our products, we welcome your questions. If you have any questions about operation, maintenance and repair of the product, please contact us.

Contact Us

- For U.S. Market

Company Name	: NSK America Corp.
Business Hours	: 8:00 to 17:00 (CST) (closed Saturday, Sunday and Public Holidays)
U.S. Toll Free No.	: +1 800 585 4675
Telephone No.	: +1 847 843 7664
Fax No.	: +1 847 843 7622
Website	: www.nskamericacorp.com
- For Other Markets

Company Name	: NAKANISHI INC. 
Business Hours	: 8:00 to 17:00 (JST) (closed Saturday, Sunday and Public Holidays)
Telephone No.	: +81 289 64 3520
e-mail	: webmaster-ie@nsk-nakanishi.co.jp

5. FEATURES

- No heat is generated for long continuous use due to air driven operation.
- By mounting a silencer on the back exhaust air / oil hose, the quiet operation of air turbine is remarkably improved.
- Air consumption is 165N ℓ / min and can be used with air compressor of 2HP (1.5 kW).
- Various sizes of collets are available CHS - 0.8mm - 3.175mm.

- NSP - 601 <Max. 60,000min⁻¹ (rpm)>
Straight type is designed for high speed precision grinding.



Fig. 2

- NA45 - 400 <Axis angle : 60° Max. 40,000min⁻¹ (rpm)>
Ideal for removing sharp edges at corners and surfaces difficult to reach with straight type.

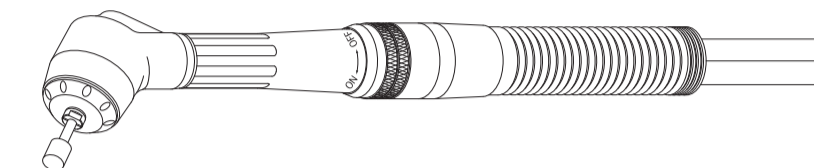


Fig. 3

- NA45 - 230 <Axis angle : 60° Max. 23,000min⁻¹ (rpm)>
Suitable for removing cutter marks, chamfering after end milling, and grinding wall surfaces. Collet is exchangeable. Stemmed grindstone are available.

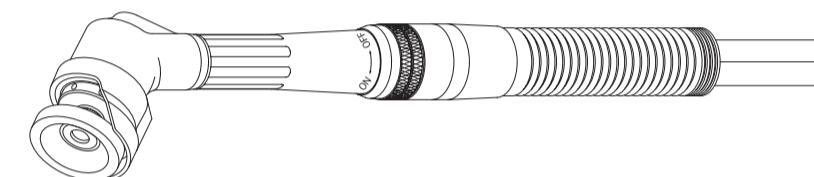


Fig. 4

- NA90 - 230 <Axis angle : 120° Max. 23,000min⁻¹ (rpm)>
Suitable for removing cutter marks, chamfering after end milling, and grinding wall surfaces. Collet is exchangeable. Stemmed grindstone are available.

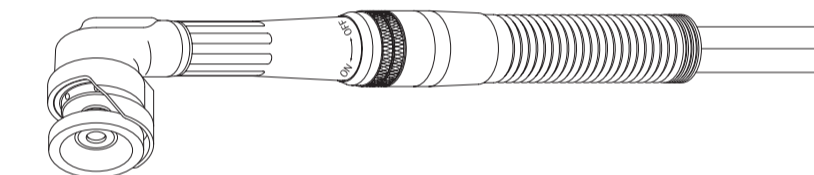


Fig. 5

6. SPECIFICATIONS AND DIMENSIONS

6 - 1 Specifications

Model	NSP - 601	NA45 - 400	NA45 - 230	NA90 - 230
Maximum Motor Rotation Speed	60,000 min ⁻¹ (rpm)	40,000 min ⁻¹ (rpm)	23,000 min ⁻¹ (rpm)	
Appropriate Air Pressure	0.4 - 0.6MPa (58 - 87psi)			
Air Consumption	165N ℓ / min (0.6MPa (87psi))			
Vibration Level	2.5m / s ²			
Noise Level at 1m distance	Less than 80dB (A)	Less than 75dB (A)	Less than 90dB (A)	Less than 95dB (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

<Option>

Collet (CHS - □□) ϕ 0.8mm - ϕ 3.0mm in 0.1mm increments and ϕ 2.35mm, ϕ 3.175mm

7. CHANGING THE CUTTING TOOL AND REPLACING THE COLLET

CAUTION

Do not tighten the collet without inserting a cutting tool or dummy bur, as this will damage the collet or spindle, causing difficulty in removing the collet.

7 - 1 NSP - 601

- Changing the Cutting tool
 - Align the hole on the head and spindle, and insert the bur wrench.
 - Place the 5mm wrench on the collet and turn counterclockwise to open the collet and remove the cutting tool.
 - Insert the new cutting tool and place the wrench 5mm on the collet, turn the collet clockwise and tighten (Do Not force the wrench or over tighten the collet as this can damage the collet).

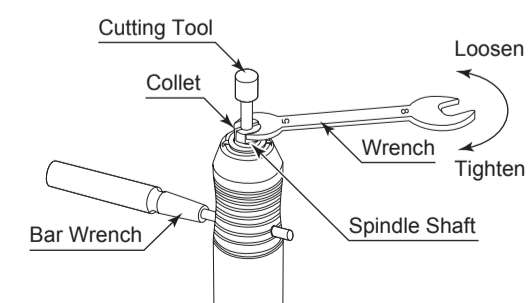


Fig. 6

(2) Replacing the Collet

- Remove the cutting tool according to content of section " 7 - 1 (1) Changing the Cutting Tool " procedure above.
- Insert the bur wrench and turn the collet counterclockwise by hand and remove.
- Insert the new collet, turn the collet clockwise and tighten by hand.

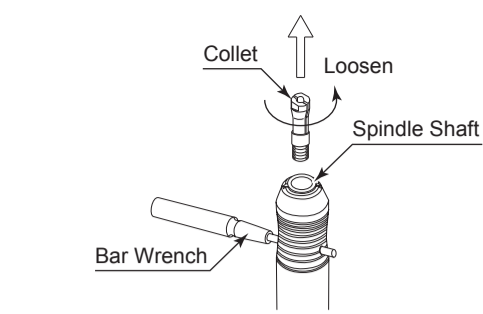


Fig. 7

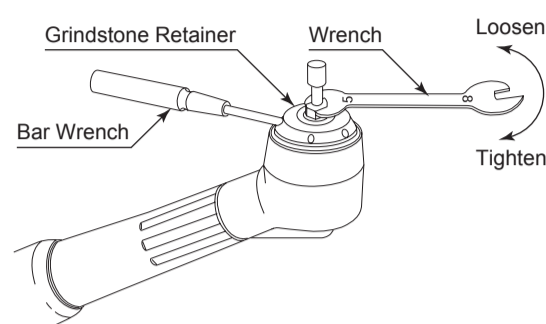


Fig. 8

7 - 2 NA45 - 400

(1) Changing the Cutting tool

- Insert the bur wrench to the hole on the grindstone retainer.
- Place the 5mm wrench on the collet and turn counterclockwise to open the collet and remove the cutting tool.
- Insert the new cutting tool and place the wrench 5mm on the collet, turn the collet clockwise and tighten (Do Not force the wrench or over tighten the collet as this can damage the collet).

(2) Replacing the Collet

- Remove the cutting tool according to content of section " 7 - 2 (1) Changing the Cutting Tool " procedure above.
- Insert the bur wrench and turn the collet counterclockwise by hand and remove.
- Insert the new collet into the spindle and tighten slightly by hand.

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(1) Changing the Grindstone or Rubber Pad

- Align the holes on the head cover and grindstone retainer, and insert the bar wrench.
- Turn the grindstone or rubber pad counterclockwise to remove.
- Screw in the new grindstone or rubber pad and tighten by hand.

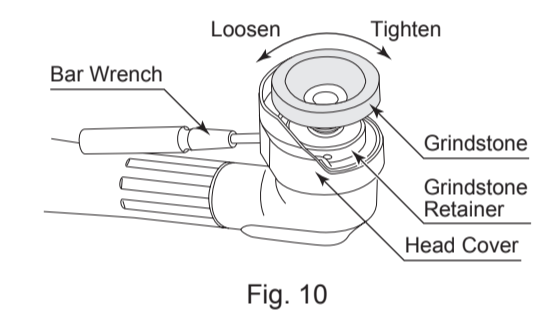


Fig. 10

(2) Replacing the Head Cover

- Insert the allen wrench 1.5mm to the hexagon socket screw of the head cover, and turn the allen wrench 1.5mm counterclockwise and loosen.
- Remove the head cover by rotating and pulling gently by hand.
- When mounting the head cover, align the convex part on the inside of the head cover to the concave part of the head and turn the allen wrench clockwise and tighten the hexagon socket screw.

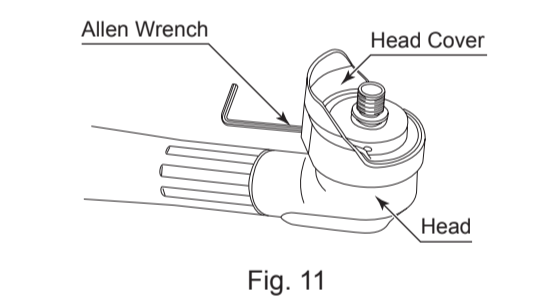


Fig. 11

(3) Replacing to the Collet from the Grindstone Axis

- Align the holes on the head cover and grindstone retainer, and insert the bar wrench.
- Insert another bar wrench into the hole on the grindstone axis and turn it counterclockwise to remove the grindstone axis.
- Insert the collet into the spindle and tighten slightly by hand.

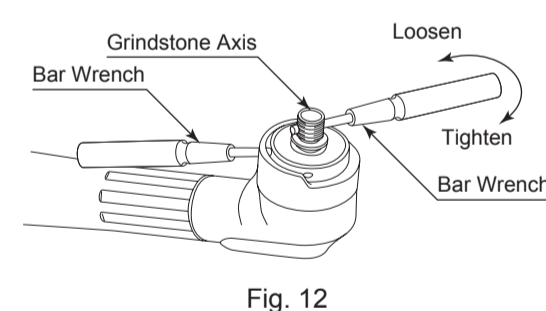


Fig. 12

(4) Mounting the Cutting Tool

- Mount the collet according to content of section " 7 - 3 (3) Replacing to the Collet from the Grindstone Axis " procedure above and insert the cutting tool into the collet.
- While holding the provided bar wrench, place the wrench 5 mm on the collet and turn clockwise to tighten the cutting tool (Do Not force the wrench or over tighten the collet as this can damage the collet).

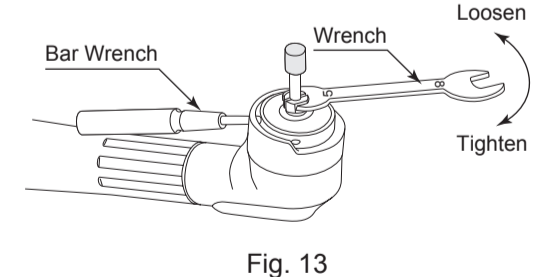


Fig. 13

(5) Examples of cutting tool combinations

When using rubber pads, only operates the Air Grinder at low speed. Rotating adhesive felt disks or sandpaper disks at high speeds can cause the rubber pad to deform and explode. Carefully check the specifications of the cutting tools prior to operation and NEVER exceed the maximum rotating speed recommended by the cutting tool or abrasive manufacturer.

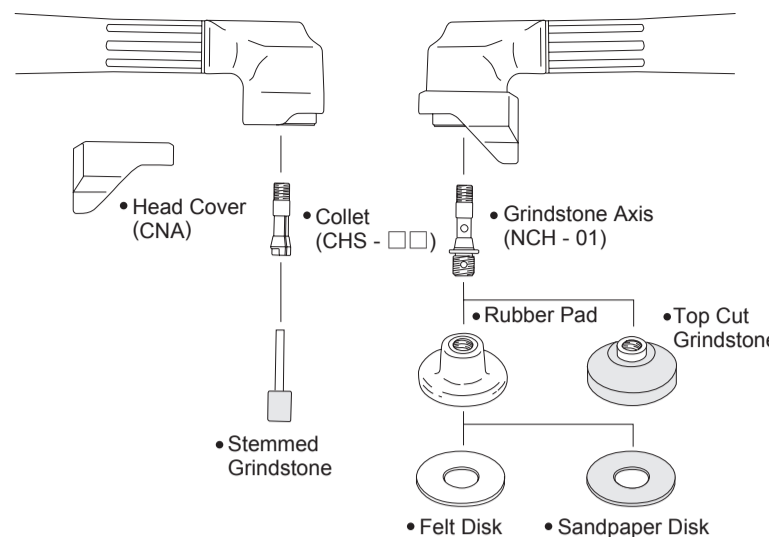


Fig. 14

8. OPERATION AND CONNECTING TO THE AIR LINE KIT

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.

- Connect the Filter Joint of the Air Grinder to the Secondary Joint (φ6 One-Touch Joint) on the Air Line Kit (Fig. 15 ①).
- Place exhaust air / oil hose with silencer into an empty container (Fig. 15 ②) (Exhaust outlet air and oil from the Silencer).

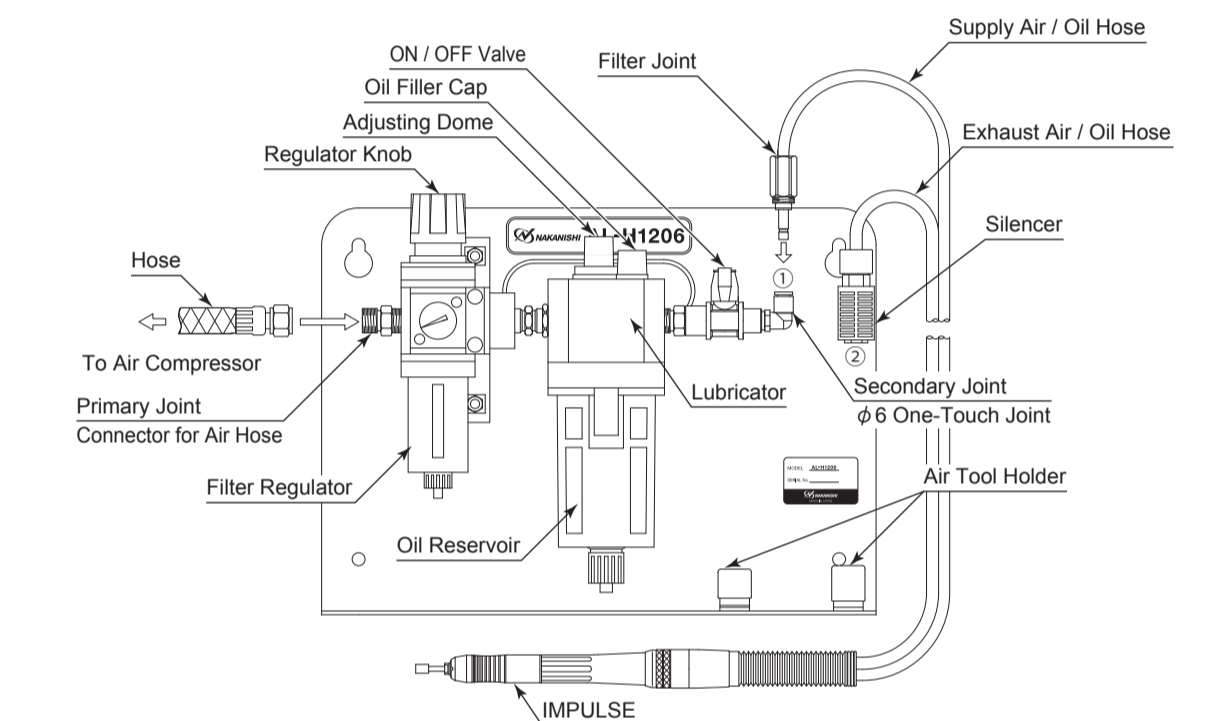


Fig. 15 Connecting to the Air Line Kit " AL - H1206 " (Option)

CAUTIONS IN USING AIR LINE KIT

- When connecting the Compressor and Air Line Kit, recommended install the air filter or air dryer to between Compressor and Air Line Kit in order to supply clean dry air to the Air Grinder. Using compressed air containing excessive moisture could result in malfunction or failure of the Air Grinder. If excessive moisture or condensation are found in Filter Regulator Bowl, it will be necessary to install a dryer and larger air 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.

- Remove the Oil Filter Cap. Put the Lubricating Oil* to the Lubricator (Oil Reservoir).
- * Lubricating Oil : Air Line Kit standard accessories.
- Supply air from the air compressor and open the ON / OFF Valve. Turn the Regulator Knob and adjust air pressure to between 0.4 - 0.6MPa (58 - 87psi) (Clockwise direction : Air pressure is increased).
- To adjust the rotation speed by turn the ON / OFF Ring of the Air Grinder (Fig. 16).

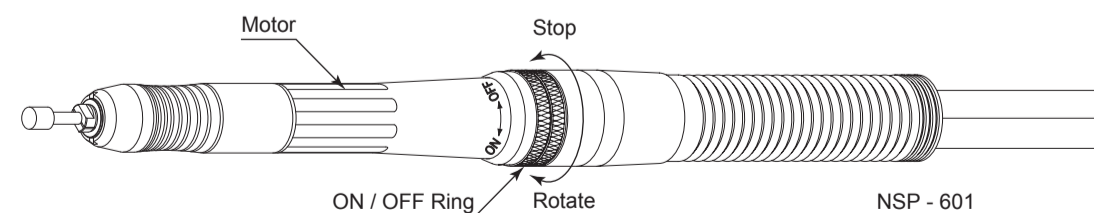


Fig. 16

- To stop rotation of the Air Grinder, turn the ON / OFF ring to the OFF position. If the Air Grinder will not be used for more than one minute, close the ON / OFF Valve on the Air Line Kit and turn the ON / OFF ring until ON position to exhaust the remaining air from the air line.
- * Refer to the Air Line Kit Operation Manual.

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) 1 ℓ

9. TROUBLESHOOTING

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

Trouble	Cause	Inspection / Corrective Action
Air Grinder does not rotate or rotate smoothly.	Air flow does not reach the spindle.	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 ball bearings have been damaged.	Replace the ball bearings. (Return to NAKANISHI dealer service.)
	The motor has been damaged by for no Lubricating Oil.	Repair 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.
No Lubricating Oil.	Low Lubricating Oil.	Check lubricator for proper lubricant level. Set the Oil Drip Rate from 1 to 3 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 Grinder. 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 speed and motor speed decrease.	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.	Lubricator inclined or upside down.	Inclined or upside down lubricator will flood spindle with Lubricating Oil.
	Over filled lubricator.	Drain the Lubricating Oil from Reservoir to meet indicated levels. Excess lubricant will flood spindle. → Draining the Lubricating Oil until upper limit below by opening the Drain Valve.
Abnormal vibration or noise during rotation.	Cutting debris has contaminated the ball bearing, and the ball bearings are damaged.	Replace the ball bearings. (Return to NAKANISHI dealer service.)
	Cutting debris has contaminated the ball bearings.	Replace the ball bearings. (Return to NAKANISHI dealer service.)
Cutting tool slippage.	The spindle ball bearings have been damaged.	Replace the ball bearings. (Return to NAKANISHI dealer service.)
	Collet is not correctly installed.	Check and clean the collet. Reinstall the collet and re-tighten. Check the accuracy.
High run-out.	The collet is worn.	Replace the collet.
	Cutting tool is bent.	Replace the cutting tool.
	Collet is not correctly installed.	Secure the collet correctly.
	The collet is worn.	Replace the collet.
	Inside of the spindle is worn.	Replace the spindle shaft. (Return to NAKANISHI dealer service.)
Contaminants inside the collet or the spindle.	Contaminants inside the collet or the spindle.	Clean the collet and the inside of the taper and spindle.
	The spindle ball bearings have been damaged.	Replace the ball bearings. (Return to NAKANISHI dealer service.)

10. DISPOSAL OF THE AIR GRINDER

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

NAKANISHI INC. 700 Shimohinata, Kanuma Tochigi 322-8666 Japan www.nakanishi-inc.com	NSK America Corp. 1800 Global Parkway Hoffman Estates IL 60192, USA www.nskamericacorp.com	NSK Europe GmbH Elly-Beinhorn-Strasse 8 65760 Eschborn Germany	NSK United Kingdom Ltd. UK Authorised Representative Office 4, Gateway 1000 Arlington Business Park, Whittle Way Stevenage, SG1 2FP, UK
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