

90° Angle Attachment IC-300 · EIC-300 50° Angle Attachment KC-300 · EKC-300

OPERATION MANUAL

Thank you for purchasing the 90° / 50° Angle Attachment " IC - 300 · EIC - 300 · KC - 300 · EKC - 300 ". This Attachment is designed for polishing corners and internal surfaces and flat surfaces with rubber pad. The Emax EVOLution control unit and motor, Espert 500 control unit and motor, and ROTUS air motor and Air Line Kit are required to drive this Attachment. 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
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

- ① The Attachment is designed for hand use. Never install the Attachment or any hand tool on a machine such as a special purpose machine, NC lathe or mill.
- ② Do not exceed the " Maximum Allowable Motor Rotation Speed " (Refer to " 6 - 1 Specifications ").
- ③ When sensing that the Attachment and motor / reducer, are overheated during operation, reduce the working force or the motor rotation speed, or stop the operation until the Attachment cools down before restarting.
- ④ Do not touch the cutting tool while it is rotating. It is very dangerous.
- ⑤ Wear safety glasses, dust mask and use a protective cover around the Attachment whenever the Attachment is rotating.
- ⑥ 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.
- ⑦ Do not use grindstones with an outside diameter over $\phi 20\text{mm}$.
- ⑧ 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. 1.
- ⑨ 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.
- ⑩ 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.
- ⑪ Do not apply excessive force. This may cause cutting tool slippage, cutting tool damage, injury to the operator, loss of concentricity and precision.

Table. 1 Overhang and Speed

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

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

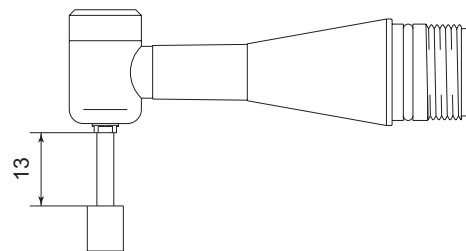


Fig. 1

CAUTION

- ① KC - 300 and EKC - 300 are rotates the opposite direction of motor runs so that be aware of this fact at the time of use.
- ② Do not drop or hit this Attachment, as shock can damage to the internal components.
- ③ 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.
- ④ When cleaning an Attachment, stop the Attachment and remove debris with a soft brush or a cloth. Do not blow air into the Attachment with compressed air as foreign particles or cutting debris may get into the ball bearing.
- ⑤ Always clean the cutting tool shank before installing the cutting tool in the spindle.
- ⑥ 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.
- ⑦ Select suitable products or cutting tools for each application. Do not exceed the capabilities of the Attachment or cutting tools.
- ⑧ Keep everything in order not to place the rag which could be caught near the Attachment.
- ⑨ Stop operating immediately when abnormal rotation or unusual vibrations are observed. Immediately, please check the content of section " 11. TROUBLESHOOTING ".
- ⑩ Always check if the cutting tool and collet are damaged before and after operating.
- ⑪ If the collet show signs of wear or damage, replace it before a malfunction or additional damage occurs.
- ⑫ No lubrication is required because grease impregnated ball bearings are used.
- ⑬ 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 Maximum Allowable Motor Rotation Speed.
- ⑭ Do not disassemble, modify or attempt to repair the Attachment. Additional damage will occur to the internal components. Service must be performed by NSK NAKANISHI or an authorized service center.
- ⑮ When using this Attachment for mass production, please consider the purchase of an additional Attachment to be used as a back-up in case of emergency.

2. BASIC PACKAGE

When opening the package, check if it includes all items listed in " Table. 2 Packing List Contents ". In the event of any shortage, please contact either NAKANISHI (see the " 4. CONTACT US " section) or your local dealer.

Table. 2 Packing List Contents

Attachment · · · 1pc.	Collet Wrench (K - 231) · · · 1pc.	Wrench (20 x 24) · · · 1pc.*1

Pin Wrench (K - 233) · · · 1pc.*2 	Collet $\phi 3.0\text{mm}$ (CHC - 3.0) or $\phi 3.175\text{mm}$ (CHC - 3.175) · · · 1pc.*3 	Operation Manual · · · 1set
Rubber Pad $\phi 10\text{mm}$ (64101) · · · 1pc. 	Rubber Pad $\phi 20\text{mm}$ (64102) · · · 1pc. 	Rubber Pad $\phi 30\text{mm}$ (64103) · · · 1pc.
Sandpaper Disk #180 (64203) , #600 (64207) · · · 5pcs. Each. 	Sandpaper Disk #180 (64213) , #600 (64217) · · · 5pcs. Each. 	Sandpaper Disk #180 (64223) , #600 (64227) · · · 5pcs. Each.
For Rubber Pad $\phi 10\text{mm}$ (64101)	For Rubber Pad $\phi 20\text{mm}$ (64102)	For Rubber Pad $\phi 30\text{mm}$ (64103)

- *1 The Wrench (20 x 24) is standard accessories of the EIC - 300 and EKC - 300.
- *2 The Pin Wrench (K - 233) is standard accessories of the IC - 300 and KC - 300.
- *3 The collet is attached to the Attachment.

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.

- ① Defect in manufacturing.
- ② Any shortage of components in the package.
- ③ 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.
	Industrial Div.
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

- ① This Attachment is capable of various type of polishing, grinding, lapping, etc. by using the specialized tool.
- ② This Attachment is capable of various type of quick polishing, grinding, etc. of flat surface or edge face by using the variety disk.

6. SPECIFICATIONS AND DIMENSIONS

6 - 1 Specifications

Model	IC - 300	KC - 300	EIC - 300	EKC - 300
Reduction Ratio	3 / 4			
Maximum Allowable Motor Rotation Speed	Less than 30,000min ⁻¹ (rpm)			
Maximum Motor Rotation Speed at the Cutting Tool	Less than 22,500min ⁻¹ (rpm)			
Applicable Motor	Emax EVOLution Motor (ENK - 410S · ENK - 250T) ROTUS Air Motor (IM - 300 · IM - 301)		Espert 500 Motor (ENK - 500C · ENK - 500T)	
Weight	45g		54g	
Vibration Level	Less than 2.5m / s ²			
Noise Level at 1m distance	Less than 70dB (A)			

* KC - 300 and EKC - 300 are rotate the opposite direction of motor runs so that be aware of this fact at time of use.

	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 (CHC - □□)	$\phi 1.6\text{mm}$, $\phi 2.35\text{mm}$, $\phi 3.0\text{mm}$, $\phi 3.175\text{mm}$
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WARNING

- Do not exceed the " Maximum Allowable Motor Rotation Speed ".
- When sensing that the Attachment and motor / reducer, are overheated during operation, reduce the working force or the motor rotation speed, or stop the operation until the Attachment cools down before restarting.

6 - 2 Outside View

① IC - 300

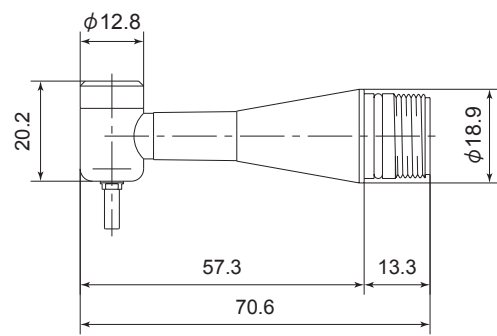


Fig. 2

② EIC - 300

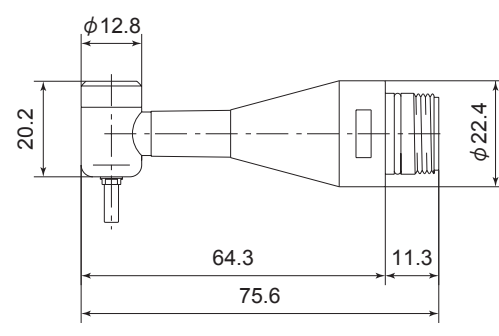


Fig. 3

③ KC - 300

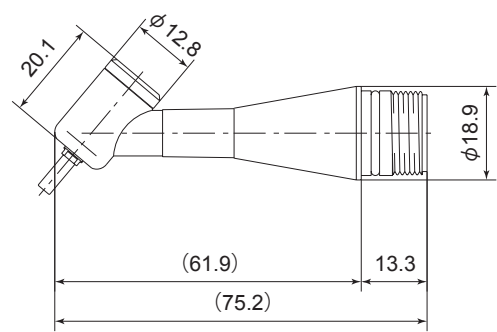


Fig. 4

④ EKC - 300

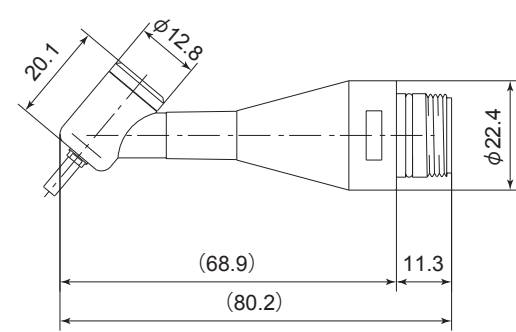


Fig. 5

7. CONNECTION OF THE ATTACHMENT TO THE MOTOR

CAUTION

Make sure your hands and all interlocking parts of the motor and the Attachment are clean before connecting the Attachment to the motor. This is critical in preventing contaminants from entering the Attachment or the motor.

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

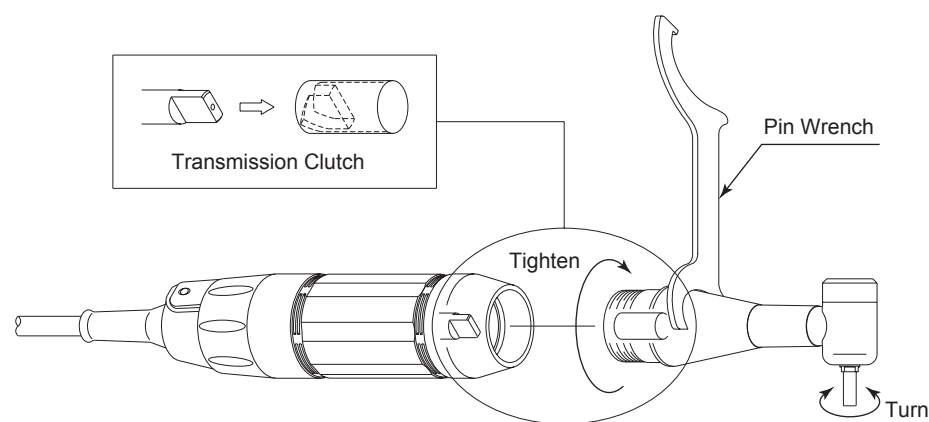


Fig. 6 IC - 300 / KC - 300 to the motor

Table. 3

Connected Attachment	IC - 300 / KC - 300	EIC - 300 / EKC - 300
Wrench to use	Pin Wrench (K - 233)	Wrench (20 x 24)

8. CHANGING THE CUTTING TOOL

CAUTION

Do not tighten the collet without inserting a cutting tool or dummy bur, as this will result in damage to the collet.

RECOMMENDATION

Please set the cutting tools to minimize the overhang amount. 13mm is the maximum amount of overhang to maintain high accuracy and safety.

- Insert the rear of the Attachment Head into the Collet Wrench.
- Lightly hold the Collet Wrench and Attachment with fingers. Place the Wrench (4mm) to the collet, slowly turn the wrench (4mm) counterclockwise to secure.
- Turn the wrench (4mm) counterclockwise to loosen the collet with remove the cutting tool.
 - * The cutting tool cannot be removed by turning the collet with the wrench, unless the collet is secured to the Collet Wrench.
 - In this case, repeat procedure ① - ② to secure the collet to the Collet Wrench.
- When mounting the cutting tool, turn the wrench (4mm) clockwise to tighten the collet after securing the collet to the Collet Wrench, then secure the cutting tool.

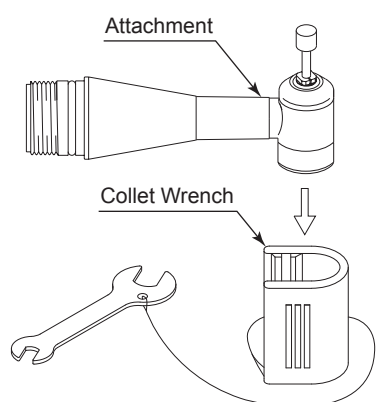


Fig. 7

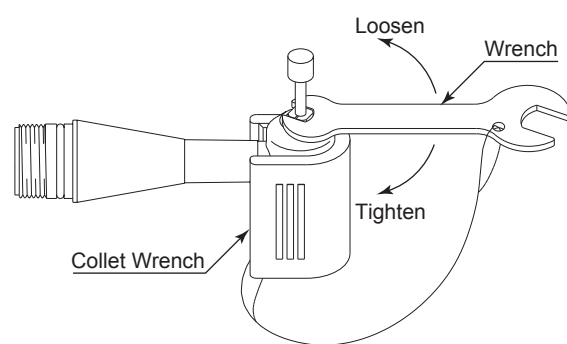


Fig. 8

9. REPLACING THE COLLET

- Remove the cutting tool as detailed in Section " 8. CHANGING THE CUTTING TOOL " procedure and remove cutting tool, rotate the collet counterclockwise with fingers until the collet is disconnected. Remove the collet.
- Insert the new collet into the spindle and turning it clockwise.

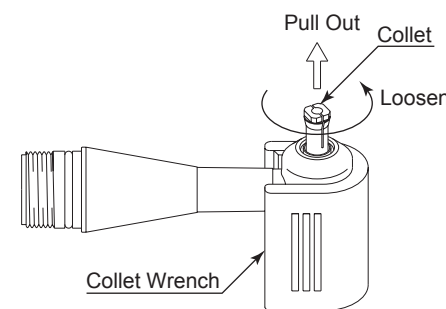


Fig. 9

10. HOW TO USE THE REDUCER AND THE EXTENSION JOINT

<Reducer>

WARNING

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.

CAUTION

The Rubber Pads or Felt Disks are cutting tools to be used in low rotation. Be sure to mount the reducer to the Attachment when using the Rubber Pads or Felt Disks.

Table. 4

Connected Attachment	IC - 300 / KC - 300	EIC - 300 / EKC - 300
Applicable Reducer	RG - 01 RG - 02	ERG - 01B

<Extension Joint>

This is a extension joint to be connected between a motor and an Attachment (IC - 300 / KC - 300) to extend the total length of the Attachment.

- * The extension joint (CN - 01) cannot be used in mounting to the Attachment (EIC - 300 / EKC - 300).

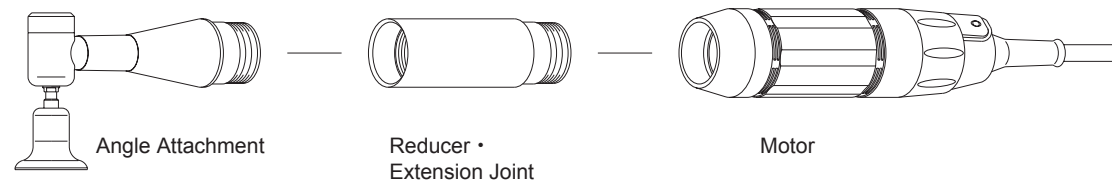


Fig. 10

11. TROUBLESHOOTING

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

Trouble	Cause	Inspection / Corrective Action
Attachment does not rotate or rotate smoothly.	The spindle ball bearings have been damaged.	Replace the ball bearings. (Return to NAKANISHI dealer service.)
	The motor has been damaged.	Replace the motor. (Return to NAKANISHI dealer service.)
Overheating during rotation.	Cutting debris has contaminated the ball bearing, and the ball bearings are damaged.	Replace the ball bearings. (Return to NAKANISHI dealer service.)
Abnormal vibration or noise during rotation.	The cutting tool shank is bent.	Replace the cutting tool.
	Cutting debris has contaminated the ball bearings.	Replace the ball bearings. (Return to NAKANISHI dealer service.)
	The spindle ball bearings have been damaged.	
Cutting tool slippage.	Collet is not correctly installed.	Check and clean the collet. Reinstall the collet and re-tighten. Check the accuracy.
	The collet is worn.	Replace the collet.
High run-out.	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.	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.)

In case of using a brushless motor, refer to the Emax EVOLution Control Unit Operation Manuals.

In case of using an air motor, refer to the ROTUS air motor and the Air Line Kit Operation Manuals.

12. DISPOSAL OF THE ATTACHMENT

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