Angle Head (Fixed type)

AH,AHE

Instruction manual

NT TOOL CORPORATION

Thank you very much for purchasing our NT Angle Head.
This instruction manual provides the description of the correct usage and precautionary remarks on handling.
Please thoroughly read this manual and use the product in the correct manner.

Safety Instructions

To use the product correctly for your safety and to avoid hazardous conditions and property damages, this instruction manual provides various safety information and warning.

WARNING	Indicates hazardous conditions that, if not faithfully followed, could result in death or serious injury.
CAUTION	Indicates hazardous conditions that, if not faithfully followed, may result in injury or property damages.

WARNING

- Attach tools, collet, tapping chuck and tap adapter correctly.
  Failure to do so may cause drop or fly out of tools, collet, tapping chuck and tap adapter during machine operation, and may consequently result in injury.
- Mount angle head on the machine tool correctly.
  Follow the description in the instruction manual of the machine tool. Failure to do so may cause angle head drop or fly out during machine operation, and may consequently result in injury.
- Take necessary precautions against fire when using oil-gased cutting fluid, such as coolant mist, etc.
- If any trouble occurs, stop use immediately.
  Failure to do so may cause drop or fly out of tools, collets, tapping chuck and tap adapters during machine operation, and may consequently result in injury.
  If repair is necessary contact your local distributor.
- Do not disassemble or modify angle heads.
  Angle heads are designed to the specifications of the corresponding tools and machines. Disassembling or modification may result in tool damage or angle head failure.

CAUTION

- Do not touch tools with bare hands.
  When installing or removing your cutting tool or the collet, use a waste cloth or wear gloves.
- Do not touch the rotating tools or the angle head.
  When replacing a tool or attaching/removing a collet, make sure that it is stopped completely. Touching the rotating tool or angle head may trap your hand result in injury.
- Use a protective cover or wear goggles during cutting to avoid injury resulting from chip fly out.
- Do not touch tools or angle heads on completion of continuous operation.
  You may suffer burns because tools or angle heads are heated to high temperatures during operation.
- When performing side-through-coolant operation, do not approach or touch the tool tip.
  Fly out of the tool may result in injury.
- After side-through-coolant operation is complete, check the residual coolant pressure.
  If there is residual coolant pressure, the tool may fly out and couse injury during tool change or angle head clamp.
- Use our products.
  Use the NT angle heads, collets, tapping chuck and tap adapters. To avoid tool damage or failure, do not use different manufacturers' products.

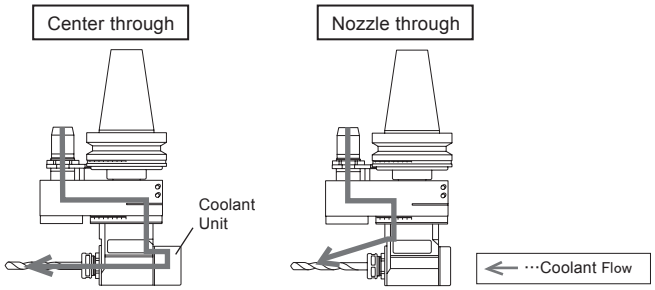
NOTE NT TOOL Corp. assumes no resuponsibility for any machine trouble while NT products are used. After workpieces are machined with our NT products, be sure to measure the accuracy.

Maintenance

- When angle heads are not used over a prolonged period, wipe them clean, dry and apply rust inhibitor.
  Water-soluble collant, rust, oil film, dust, etc. remaining on the angle heads may cause sticking and result in operation failure.
- If any trouble occurs, stop use immediately.
  Failure to do so may cause tool to drop or fly out during machine operation, and may consequently result in injury. If repair is necessary, contact your local distributor.

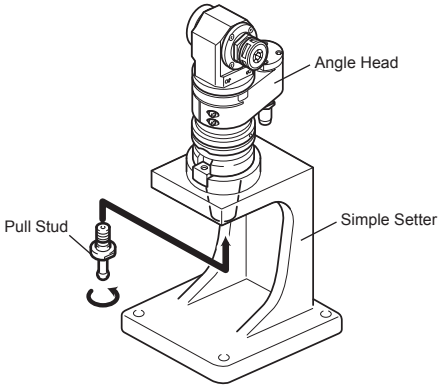
Operational Precautions

- **Run the spindle in reverse rotation.**
- Maximum rotational speed of machine should not exceed 3000min^{-1} (AH07・AHE11:6000min^{-1}).
- Both center through and nozzle through coolant feedings are possible with AH and AHE type angle heads through plunger.



- In case center through coolant feeding is needed, be sure to use coolant unit (optional).
  For more details, refer to "Attaching and Removing the Coolant Unit".
- When coolant unit is in use, coolant must be fed without fail.
- Maximum coolant pressure should always be 2MPa and below.
- In case dedicated tapping chuck is in use, center through coolant feeding is not possible.
- Tighten all bolts securely.
- For end-milling, we recommend you to take a light cut.
- Stop spindle immediately if symptom such as tool spindle revolution failure, excessive heating (Room temperature + 30°C), etc. Please contact our distributor nearestyou or NT TOOL directly for consultation.
  NEVER attempt to repair spindle yourself : Repair by unqualified personnel may impair the safe operation of spindle.
- The plunger extension length of this product is set, when assembled, in accordance with the "A" dimension. DON'T adjust the plunger extension for yourselves.
  Angle head failure may result.
- Check allowable weight for ATC.
- Take a precaution for excessive heating.
  (Indication of excessive heating : Room temperature + 30°C)

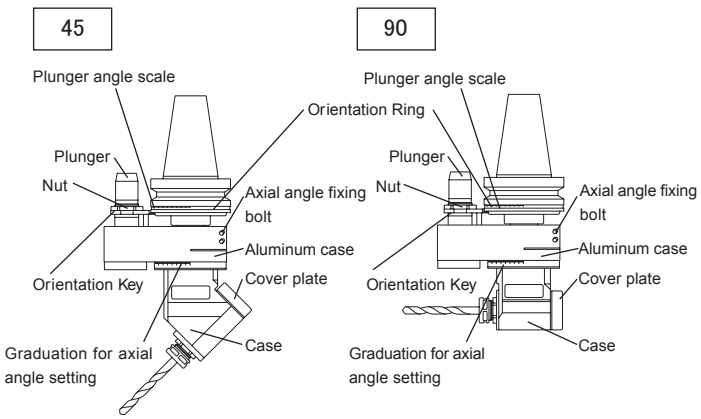
Attaching the Pull Stud



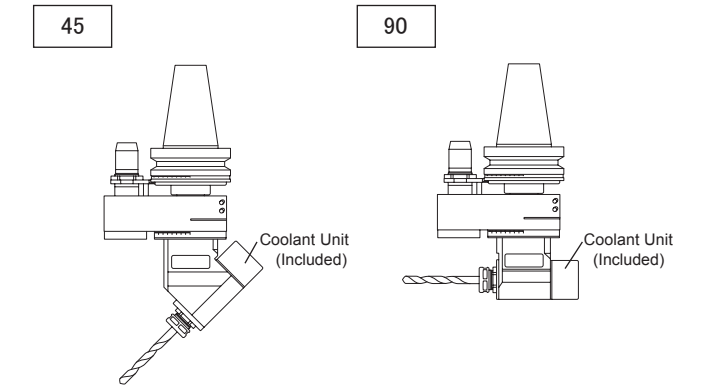
1. Firmly fix angle head to NT simple setter or a fixing jig.
2. Attach the pull stud to angle head.
   Choose a pull stud to match with the machine spindle.
   For details on attaching, refer to the Pull Stud instruction manual.

Parts

AH・AHE

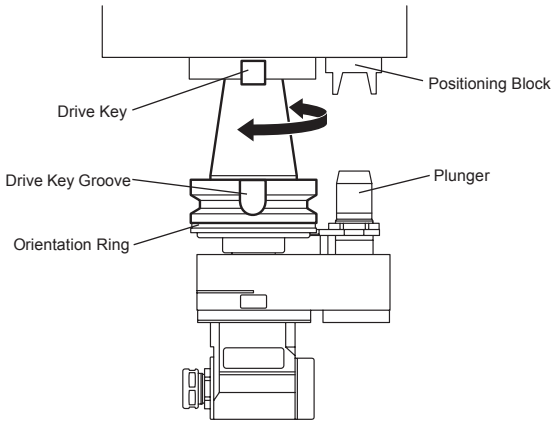


AH-OH・AHE-OH



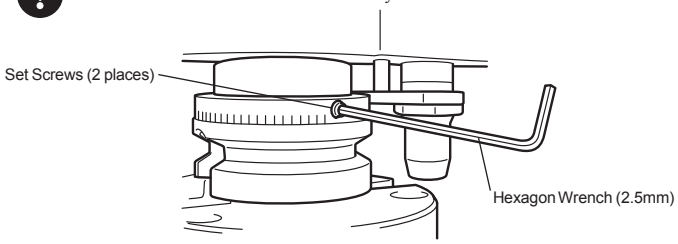
Adjusting the Plunger Angle

The drive key of the spindle of the machining center will fit into the drive key groove of the angle head and also the plunger will fit into the positioning block.



1. Firmly fix angle head to NT simple setter or a fixing jig.
2. Loosen the orientation ring set screws (2 places) with a hexagon wrench (2.5mm).

Do not draw out the screws. Otherwise they will be lost.

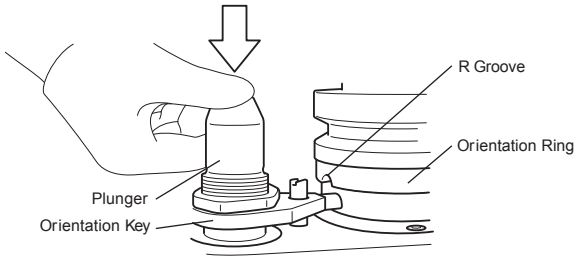


3. Clean the inner diameter taper portion of the spindle of the machining center and also the shank taper portion of the angle head.

If dust and oil adhere, the angle head may be dropped.

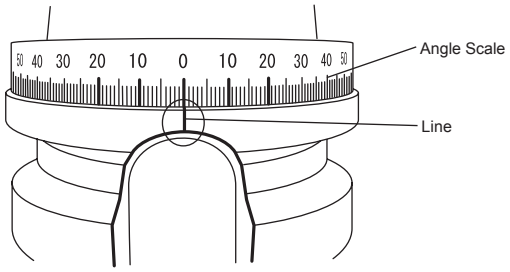
4. Fit the salient (height) portion of the orientation key into the R groove portion of the orientation ring.

Turn the orientation ring with the plunger pressed down until the orientation pin gets locked into the radius groove of the orientation ring.



5. Align the angle scale of the orientation ring with the correct angle to the line of the drive key groove.

The angle scale is just a guideline. So before attaching it to a machine, be sure to fine-adjust it and check whether it can be attached accurately or not.



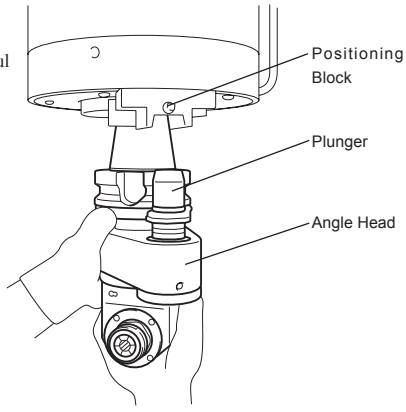
6. Initiate the MC spindle orientation so that the spindle may be oriented to the tool change position (ATC position).

If you fail to do so, the angle head may come out because of misalignment between the drive key and the positioning block.

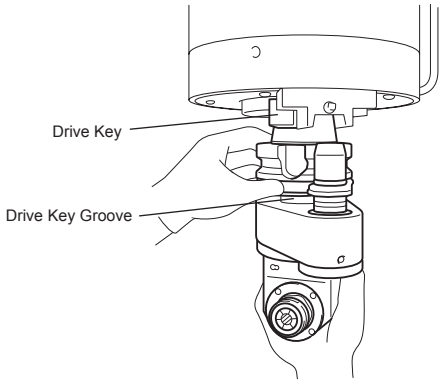
7. Fit the position of the plunger to the positon of the positioning block and then, insert the angle head to the spindle manually.

At this time, do not pull the pull stud.

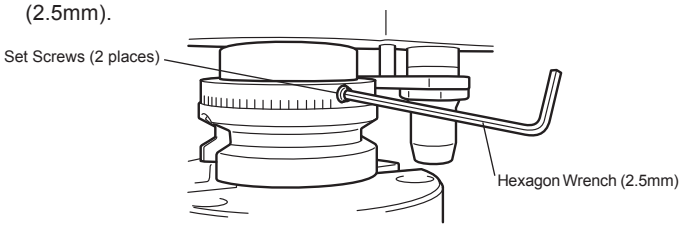
When attaching the angle head to the spindle, please be careful not to drop it.



8. Fine-adjust it by turning the flange portion manually in order that the drive key of the spindle may fit into the key groove of the angle head.



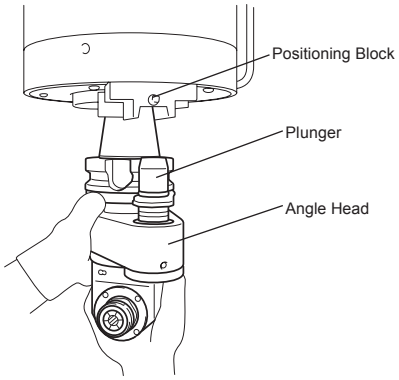
9. After adjustment, remove the angle head from the spindle, and tighten the orientation ring set screws (2 places) with a hexagon wrench (2.5mm).



10. Insert the angle head to the spindle manually once again.

! At this time, check whether the drive key groove fits smoothly or not, and also check whether the plunger may fits the positioning block properly or not.

! When attaching the angle head to the spindle, please be careful not to drop it.



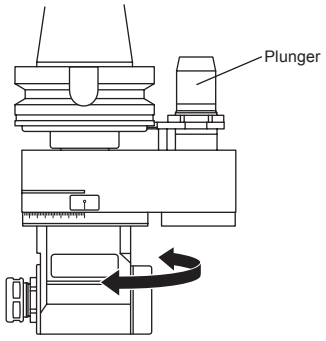
11. If the angle head is set properly, fix it to the machining center. Then check whether it is possible to replace it smoothly with ATC.

! Check allowable weight for ATC.

! Take a precaution for excessive heating.
(Indication of excessive heating : Room temperature + 30℃)

Adjusting Cutting Tool axis Angle

Adjust the cutting tool axis angle against the plunger axis.

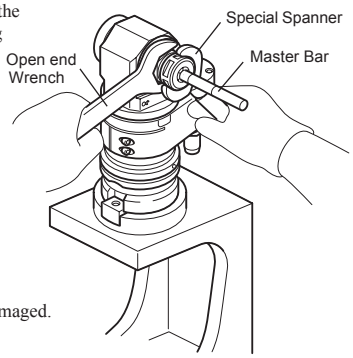


1. Firmly fix angle head to NT simple setter or a fixing jig.
2. Remove the cap nut from the angle head.
3. Install a master bar, which comes with angle head, into the angle head. Slightly tighten the nut by hand.

! In the case of AH07, the master bar must be installed in the Angle Head after it is fitted into the attached cap nut.

4. Tighten the portions of the angle head body that need tightening with a open end wrench. Tighten the cap nut of the master bar with a special spanner.

! When attaching or removing cap nut or master bar, two wrenches must be used. One is for holding tool spindle and the other is for tightening and loosening cap nut or master bar.



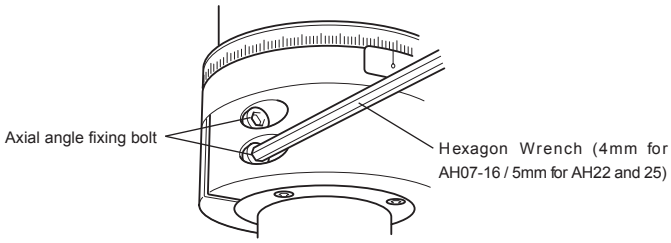
! Tighten the cap nut without holding the tool spindle part may result in poor accuracy or breakage of the angle head. ALWAYS uses two spanners, one on the cap nut and the other on the tool spindle.

! Do not use a conventional spanner, master bar or angle head may be damaged.

[Standard Tightening Torque Chart]

Holder Size	Open end Wrench Size	Special Spanner Size	Standard Tightening Torque
AH07	14mm (Commercially available)	S-0	10～15 N•m
AH09	S-1L	S-1L	30～35 N•m
AH16	S-4L	S-4L	40～45 N•m
AH22	S-5L	S-5L	55～60 N•m
AH25	HS-2.5-25	HS-2.5-25	70～80 N•m
AHE11	14mm (Commercially available)	S-0	10～15 N•m
AHE16	S-4L	FK0034	35～40 N•m
AHE20	S-4L	FK0034	40～45 N•m
AHE25	S-4L	HS-1-16	55～60 N•m
AHE32	S-5L	HS-2-20	65～70 N•m
AHE40	HS-2.5-25	HS-2.5-25	65～70 N•m

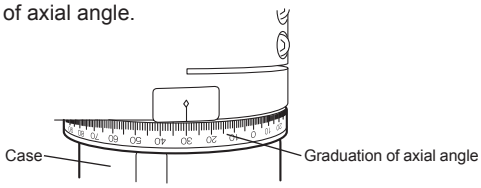
5. Loosen the axial angle fixing bolts (2pcs) with hexagon wrench (4mm for AH07-16 / 5mm for AH22 and 25).



6. Install Angle Head in the machine spindle by hand and pull it up with pull stud.

! When attaching the angle head to the spindle, please be careful not to drop it.

7. Turn the case by hand until the desired angle is reached, referring to the graduation of axial angle.

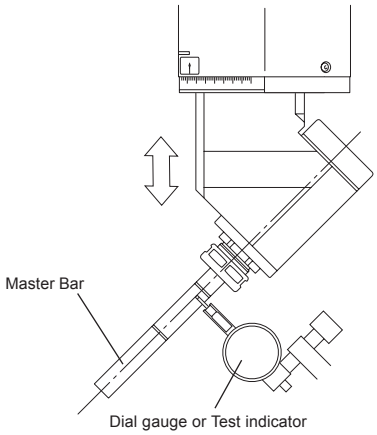


8. Set the probe of dial indicator at somewhere near the root of master bar.

! Measuring head of a dial gauge or a test indicator must be set at right angle to the Z-axis of the machine.

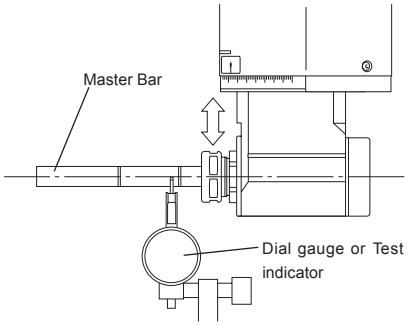
9. Move the machining center Z axis up and down and look for a highest point on the master bar radius.

AH45



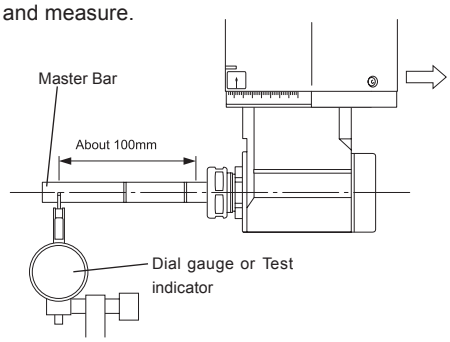
AH90

AHE90

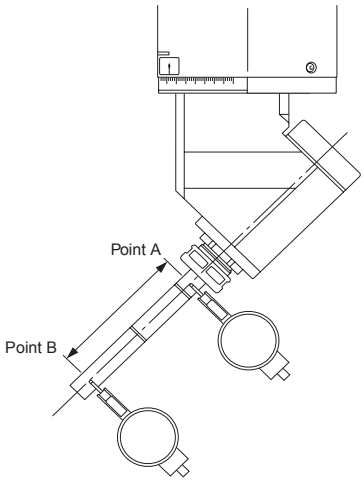


10.Set the dial gauge or test indicator to zero at the point where the needle deflected most.

11.From this point, move the machining center spindle so that the probe of dial gauge or test indicator is repositioned about 100mm toward the end of the master bar and check the needle deflection of dial gauge or test indicator and measure.

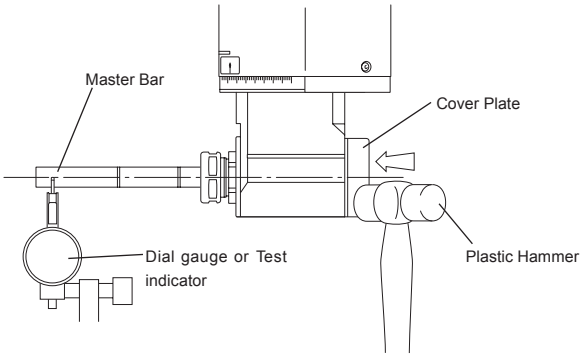


In the case of AH45, both point A and B must be measured with a dial gauge or a test indicator.



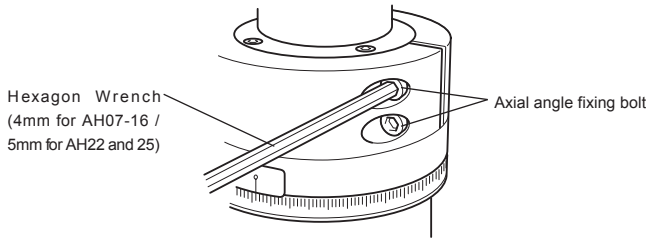
12.When the needle deflection of dial gauge or test indicator is ±1 degrees (±0.03mm) or less, angle adjustment is complete.

When the needle deflection of dial gauge or test indicator is more than ±1 degrees (±0.03mm), re-adjust the need deflection so that it may be brought into the tolerance band by tapping the cover plate with a plastic hammer.



13.When the adjustment is finished, loosen the cap nut and remove the master bar after securely tightening axial angle fixing bolts (2pcs) with hexagon wrench (4mm for AH07-16 and 5mm for AH22 and 25).

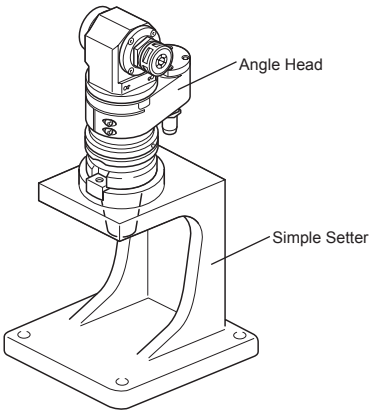
Make sure that the angle setting bolts are securely tightened. (Approximate tightening torpue : 3N･m for AH07-16 / 5.2N･m for AH22 and 25)



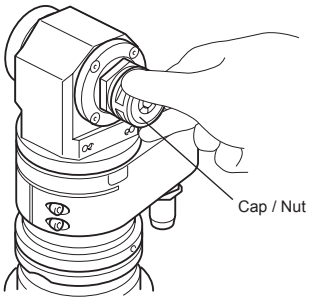
Attaching and Removing the Cutting Tool

● Attaching and removing drill / end-mill

1. Firmly fix angle head to NT simple setter or a fixing jig.



2. Remove the cap nut from the angle head.



3. Choose a collet (sold separately) to match with the tool shank.
   For AH type angle heads, please select FDC collet.
   For AHE type, please select ER collet.

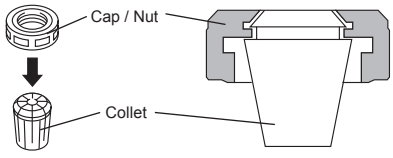
In case center through coolant feeding is needed, be sure to use our coolant collet (type FDC-OH or FDC-C).

4. Clean the tool shank, collet and inner diameter taper portions of the angle head with a waste cloth.

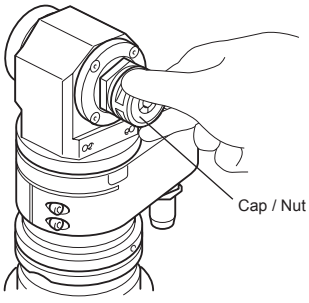
If dust or oil remains on the tool shank, collet or inner taper area of angle head, the cutting tool may not turn or may come out of spindle.

Do not touch tools with bare hands. When attaching or removing your cutting tool or the collet, use a waste cloth or wear gloves.

5. Attach the collet to the cap nut.
   Placing a collet on a table, put a cap nut on it, pressing straight down. Check that the inner groove of the nut firmly fits into the outer groove of the collet.



6. Attach that cap nut to the angle head.
   Slightly tighten the cap nut by hand.

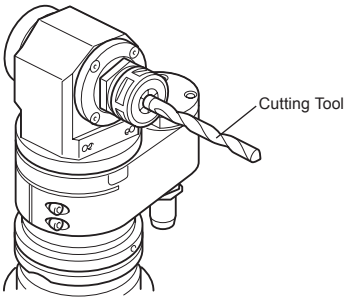


7. Insert a cutting tool into collet.

Insert cutter shank into angle head spindle by over the length of collet internal diameter. Do not clamp the cutter's edge with collet.

Do not clamp the cutter's edge with collet.

Do not touch tools with bare hands. When attaching or removing your cutting tool or the collet, use a waste cloth or wear gloves.

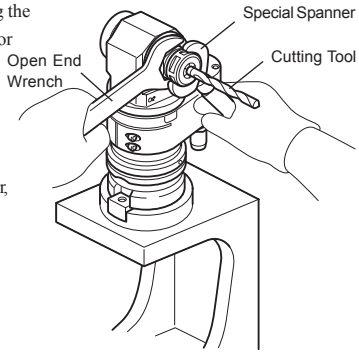


8. Grip the tool spindle of the angle head body that need tightening with a open end wrench. Tighten the nut with a special spanner (sold separately). (See the Standard Tightening Torque Chart.)

Tightening the nut without holding the tool spindle part may result in poor accuracy of the angle head. ALWAYS uses two spanners, one on the nut and the other on the tool spindle.

Do not use a conventional spanner, nut, collet or angle head may be damaged.

For your safety, make the tighten nut (loosening) slowly.



[Standard Tightening Torque Chart]

Holder Size	Open end Wrench Size	Special Spanner Size	Standard Tightening Torque
AH07	14mm(Commercially available)	S-0	10～15 N•m
AH09	S-1L	S-1L	30～35 N•m
AH16	S-4L	S-4L	40～45 N•m
AH22	S-5L	S-5L	55～60 N•m
AH25	HS-2.5-25	HS-2.5-25	70～80 N•m
AHE11	14mm(Commercially available)	S-0	10～15 N•m
AHE16	S-4L	FK0034	35～40 N•m
AHE20	S-4L	FK0034	40～45 N•m
AHE25	S-4L	HS-1-16	55～60 N•m
AHE32	S-5L	HS-2-20	65～70 N•m
AHE40	HS-2.5-25	HS-2.5-25	65～70 N•m

9. Remove your cutting tool by following this procedure reverse order.

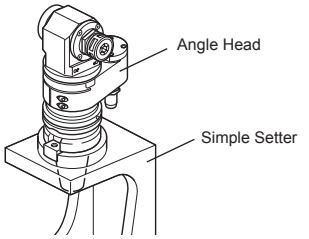
●Attaching and removing tap

Tapping chucks and tap adapters are optionally available. Choose appropriate tapping chuck and tap adapter for Angle Head size and tap size.

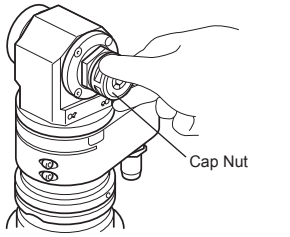
Before attaching the tap adapter, use a waste cloth to clean the mounting section. If dust or oil remains on the mounting section, the tap adapter may be unfastened.

See the Tap Adapter manual for cutter mounting and removal procedures.

1. Firmly fix angle head to NT simple setter or a fixing jig.



2. Remove the cap nut from the angle head.

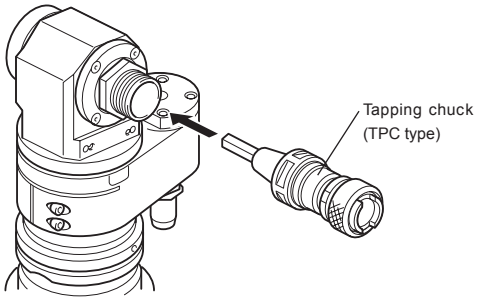


3. Choose right tapping chuck (optional) for Angle Head and tap adapter in use.

Special tapping chuck is required for AHE type angle head.
Please contact our distributor nearest you or NT TOOL directory.

Angle head type	Tapping chuck type	Tap adapter type
AH1690、AH1645	TPC16-1	WE1、WEN1B
AH2290	TPC22-1	WE1、WEN1B
	TPC22-2	WE2、WEN2B

4. Align the hexagonal salient of tapping chuck (TPC) with hexagonal concave portion of Angle Head to install the tapping chuck (TPC).
Tighten the tapping chuck (TPC) by hand.

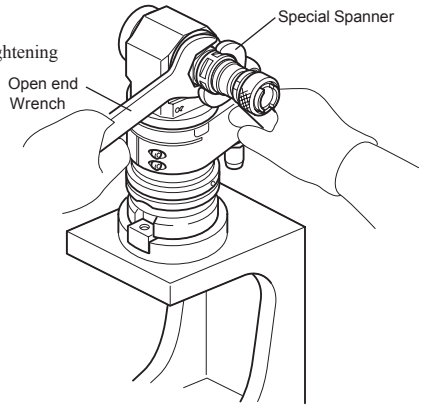


5. Tighten the portions of the angle head body that need tightening with a open end wrench. Tighten the tapping chuck (TPC type) with a special spanner (sold separately). (See the Standard Tightening Torque Chart.)

Be sure to use two wrenches. One for Angle Head shank and the other for tapping chuck (TPC). If tapping chuck only is tightened, Angle Head's accuracy may be deteriorated.

Use designated wrenches only. Otherwise, tapping chuck (TPC) or Angle Head may be broken.

For your safety, make the tightening (loosening) slowly.



[Standard Tightening Torque Chart]

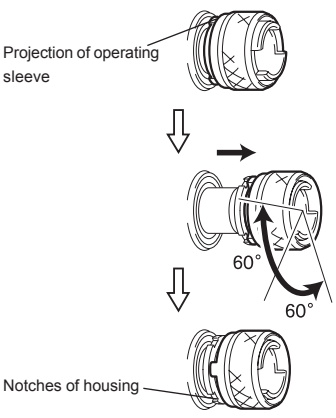
Holder Size	Open end Wrench Size	Special Spanner Size	Standard Tightening Torque
AH16	S-4L	S-4L	40～45 N•m
AH22	S-5L	S-5L	55～60 N•m

6. Choose appropriate tap adapter (optional) for the tapping chuck in use and for tap size in use.

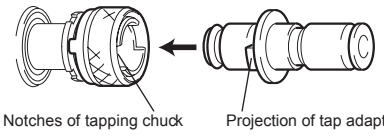
7. Clean the tap adapter and the tap adapter mounting section using a waste cloth.

If dust or oil remains on the tap adapter or the mounting section, the tap adapter may be unfastened.

8. Pull the operating sleeve until its projections are disengaged from the cuts of the housing. Turn the operating sleeve 60° (to the midpoint between the cuts).

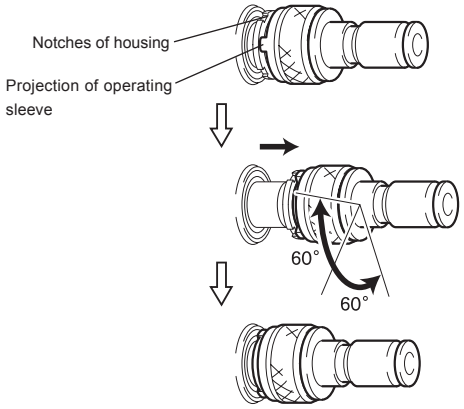


9. Fit the projections of the tap adapter to the notches of the tapping chuck mounting section, and insert the tap adapter.



10. Turn the operating sleeve while pulling it, and fit the projections of the operating sleeve to the cuts of the housing.

Check that the tap adapter is fixed to the mounting section.



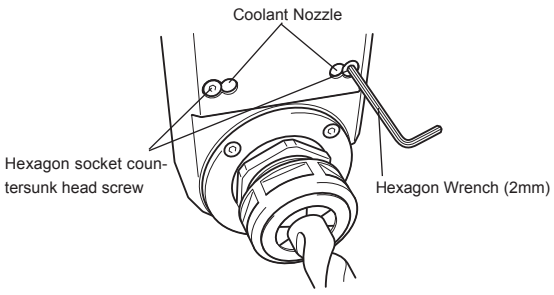
11. See the Tap Adapter manual for cutter mounting procedures.

12. Remove your cutting tool by following this procedure reverse order.

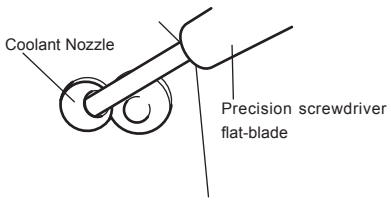
Adjusting the Coolant Nozzle Angle

This procedure is for adjusting the direction of coolant nozzle holes so that coolant is properly supplied to cutting edges.

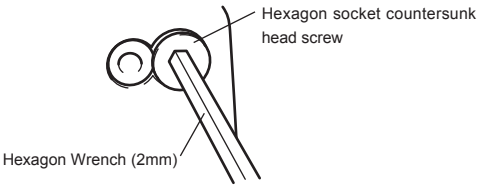
1. Remove hexagon socket head bolt beside coolant nozzles (2pcs) with hexagon wrench (2mm).



2. Adjust the direction of coolant nozzle hole with precsion screw driver.



3. When the direction of coolant nozzle hole is determined, tighten hexagon socket head bolts (2pcs) with hexagon wrench (2mm).



Attaching and Removing the Coolant Unit

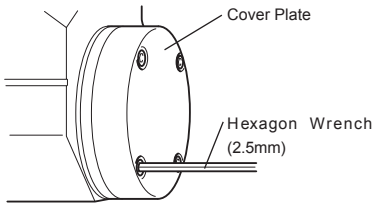
In case center through coolant feeding is needed for Angle Head (type AH, AHE), attach coolant unit (optional) by following the procedures below.

Coolant unit is included in Angle Head type AH-OH as a standard accessory.

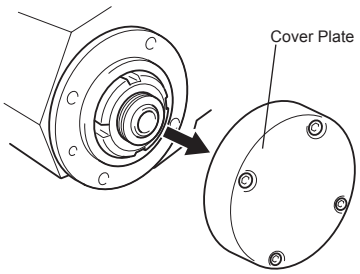
1. Prepare appropriate coolant unit (optional) for the Angle Head in use.

Angle Head (Fixed type)	Coolant unit type
AH07, AHE1190	AH070H
AH09, AHE1690	AH090H
AH16, AHE2090, AHE2590	AH160H
AH22, AHE3290	AH220H
AH25, AHE4090	AH250H

2. Remove hexagon socket head bolts (4pcs) in the cover plate with hexagon wrench (2.5mm).

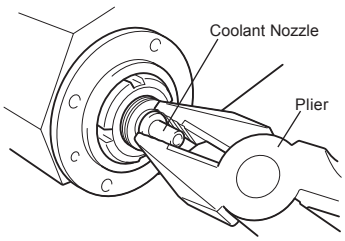


3. Remove the cover plate.

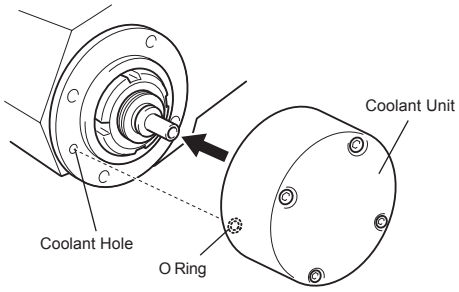


4. Coolant nozzles must be fixed into the body with plier or wrench (8mm width).

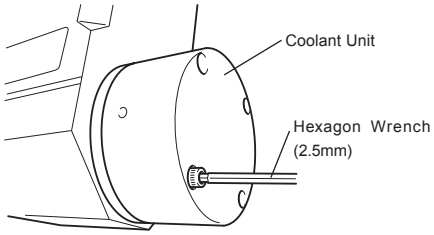
Coolant nozzle has left-hand thread.



5. O-ring location in thecoolant unit and coolant hole in the body must put in the same location and coupled.



6. Tighten hexagon socket head bolts (4pcs) with hexagon wrench (2.5mm).



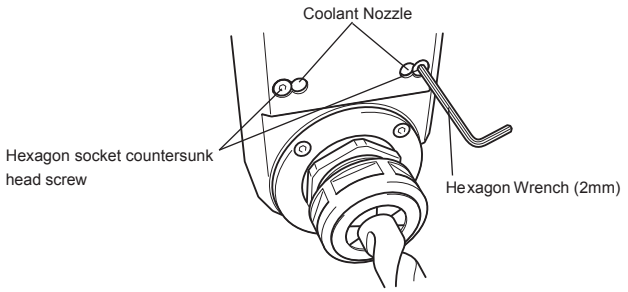
7. Remove your coolant unit by following this procedure reverse order.

Attaching and Removing the Coolant Stopper

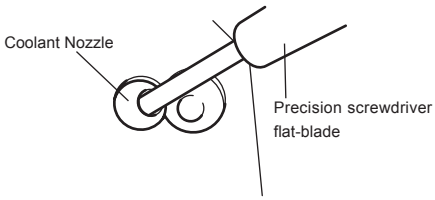
When internal coolant feeding is needed, this procedure is implemented. Without this procedure, necessary coolant pressure may not be obtained.

Coolant Stoppers are included in the coolant unit. Angle Head (type AH-OH) includes the coolant stoppers as standard accessories.

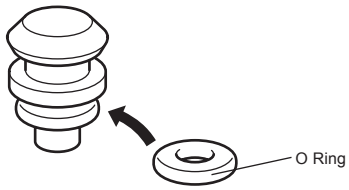
1. Remove hexagon socket head bolt beside coolant nozzles (2pcs) with hexagon wrench (2mm).



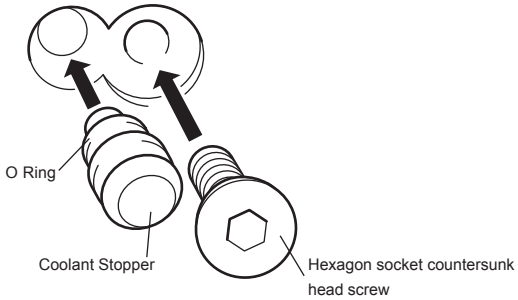
2. Remove coolant nozzles (2pcs) with precision screw driver etc.



3. Fit O-ring into the coolant stopper.

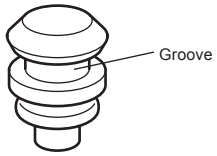


4. Insert the coolant stoppers (2pcs) into the holes where coolant nozzles have been removed.



5. Tighten hexagon socket head bolt inserted beside the stoppper with hexagon wrench (2mm).
6. Remove your coolant stopper by following this procedure reversely.

When removing the coolant stopper, pull it out with precise screw driver hooked in the groove of the coolant stopper.



Test Run

DO NOT start with high spindle speeds. Start with low speed to warn up the spindle for a minute or two, then step up speed to the operating speed.
Approximate rotational speed for test run ··· 1000rpm

How to keep tools in good condition

- After using the tool for 1,000 hours in total, grease should be changed. Please contact our distributor nearest you or NT TOOL
- Stop spindle immediately if symptom such as tool spindle revolution failure, excessive heating (Room temperature + 30°C), etc. Please contact our distributor nearest you or NT TOOL directly for consultation.

NEVER attempt to repair spindle yourself : Repair by unqualified personnel may impair the safe operation of spindle.

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- For technical question, contact us by technomail.
- Our engineers are always happy to answer you.

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