



SERVICE MANUAL

For Ti-Max X series

1. Replacing the cartridge
2. Troubleshooting of the Head and Water Supply Circuit
3. Disassembling the Sheath Part



Parts List No.

X500L: A-168

X600L: A-168

X700L: A-168



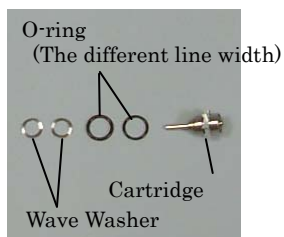
1. Replacing the cartridge

⚠ Caution

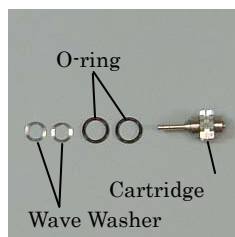
A clean environment is required when changing cartridges. Introduction of contaminants into the cartridge will cause premature bearing damage.

1-1. Cartridge

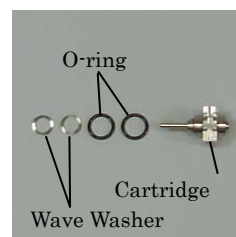
Prepare the cartridge that using type.



For Mini



For Standard

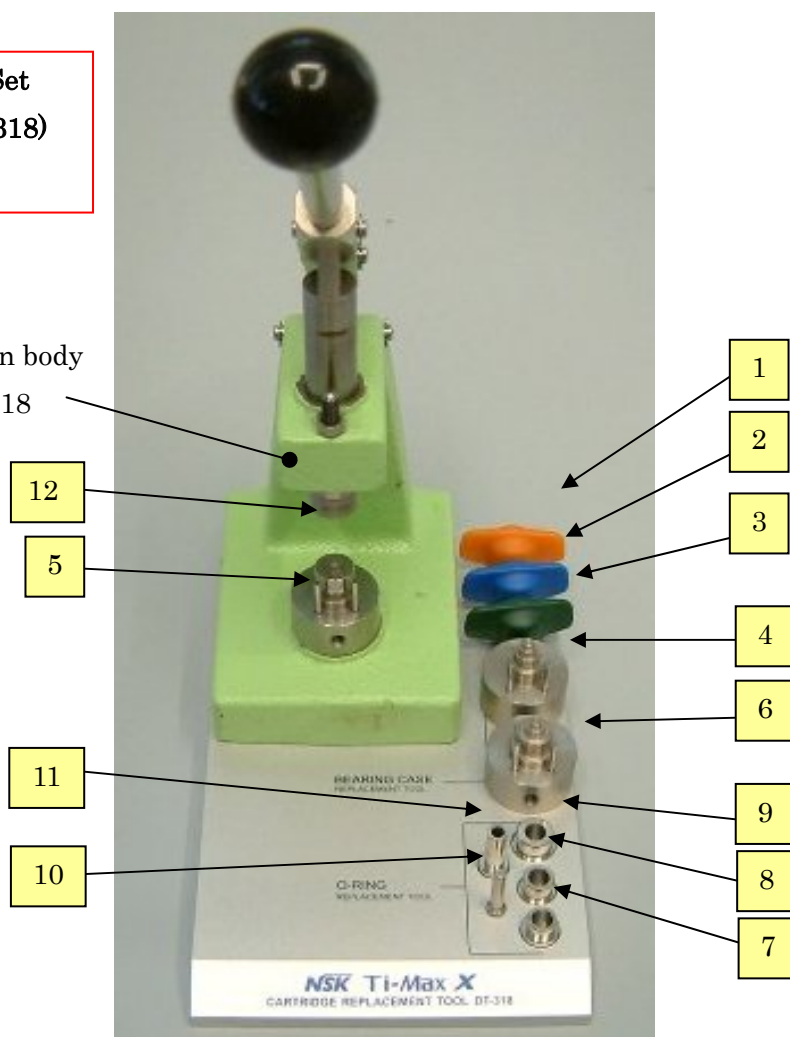


For Torque

1-2. Tools required

Jig Total Set
(#1-12, DT-318)
Y900-226

Jig main body
 DT-318





Orange head cap wrench for mini
(Z265-005)



Blue head cap wrench for standard
(Z265-004)



Green head cap wrench for torque
(Z265-003)



DT-295 Block for mini



DT-296 Block for standard



DT-297 Block for torque



DT-284 Guide for mini



DT-285 Guide for standard



DT-286 Guide for torque



DT-282 Guide axis



DT-283 Pusher



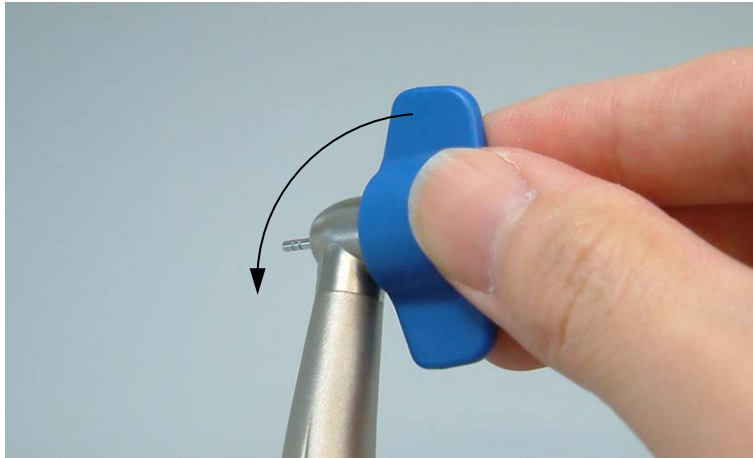
DT-327 Head cover

* Additional tools required : 1) Needle to remove internal O-ring
2) Pana Spray Plus

1-3. Disassembly procedure

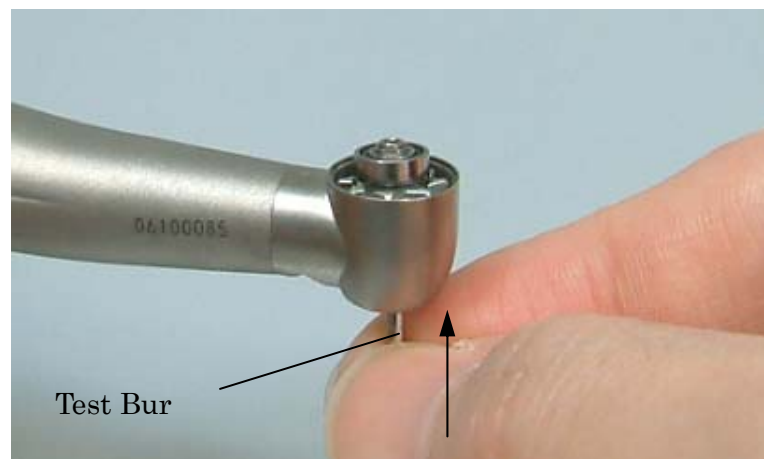
1-3-1. Install the turbine head on the test bur.

1-3-2. Fit the head cap wrench onto the head and remove the head cap by turning counterclockwise.

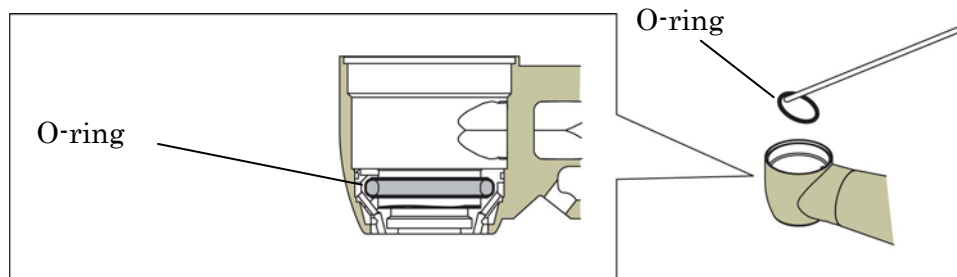


Mini : Orange Standard : Blue Torque : Green

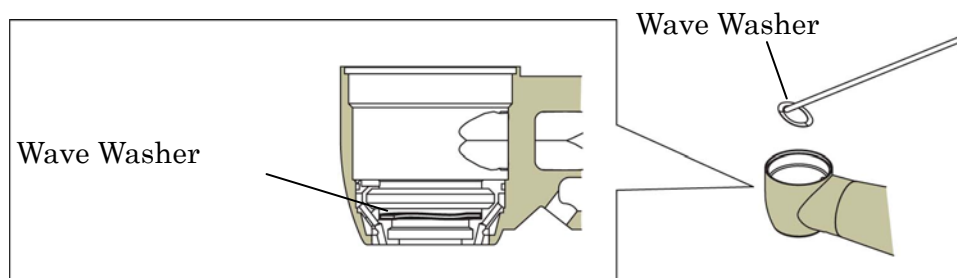
1-3-3. Remove the head cap, and remove the cartridge by pushing up on the test bur. The outer ring of the bearing may remain in the head if the bearing is badly worn. Carefully remove the outer ring without damaging the head housing.



1-3-4. Use the needle to remove the O-ring.



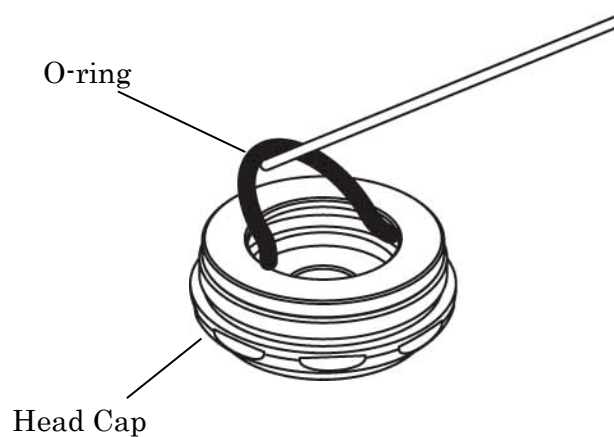
1-3-5. Remove the wave washer under the O-ring.



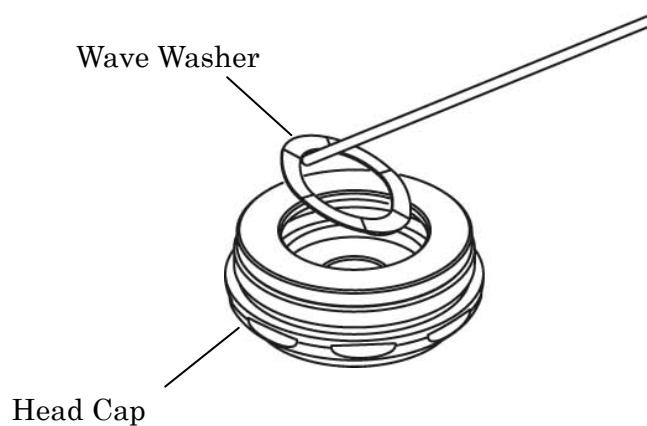
1-3-6. Clean the inside of the head by spraying Pana Spray Plus, if it's dirty. Extra oil should be wiped off with soft cloths, and spray the inside of the head with compressed air.



1-3-7. Use the needle to remove the O-ring in the head cap.



1-3-8. Remove the wave washer under the O-ring.

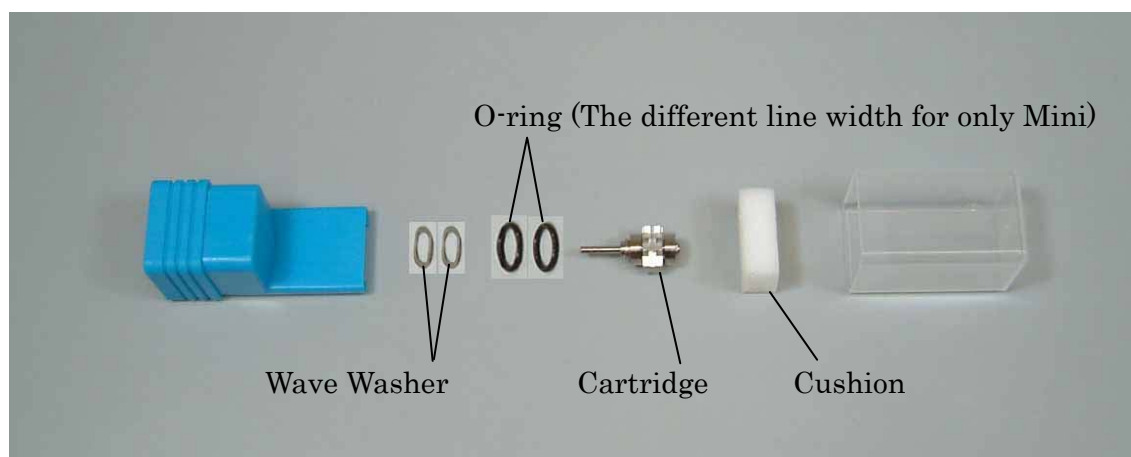


1-3-9. Clean the inside of the head cap with Pana Spray Plus as well as the head, if it's dirty.
(See 1-3. Disassembly procedure ⑥)

1-4. Assembling the new cartridge

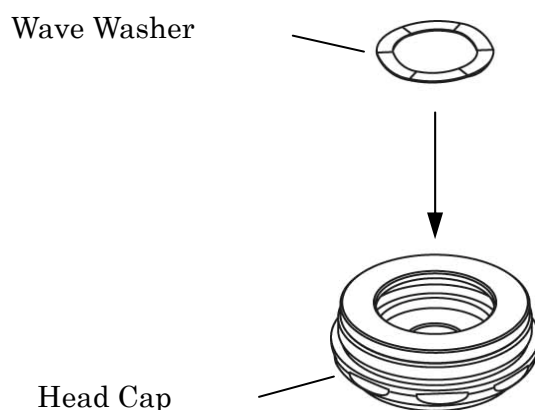
⚠ Caution

Below is information regarding how the cartridge should be supplied, this is not information regarding how the cartridge should be installed.

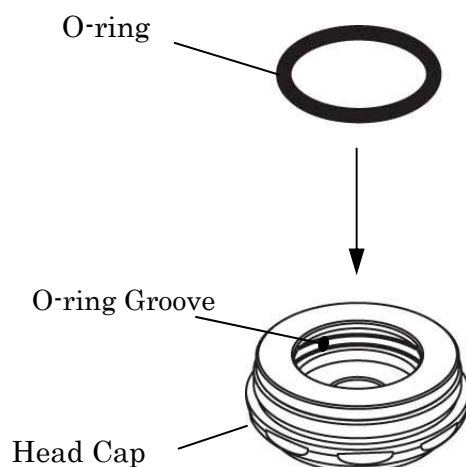


- Please make sure to use the new wave washer and O-ring packed with the new cartridge. The O-ring and wave washer should never be reused. These should be discarded.
- Two different-size O-rings (thick O-ring and thin O-ring) are packed with the cartridge for Mini. The same-size O-rings are packed with the other cartridges.

1-4-1. Set the wave washer in the head cap. Direction doesn't matter.



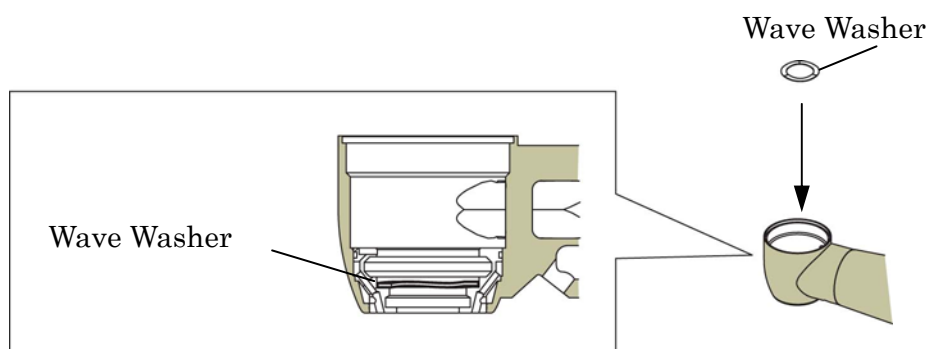
1-4-2. Install the new O-ring in the head cap. Apply a small amount of turbine oil to the O-ring before installation. Needles should never be used for installation.



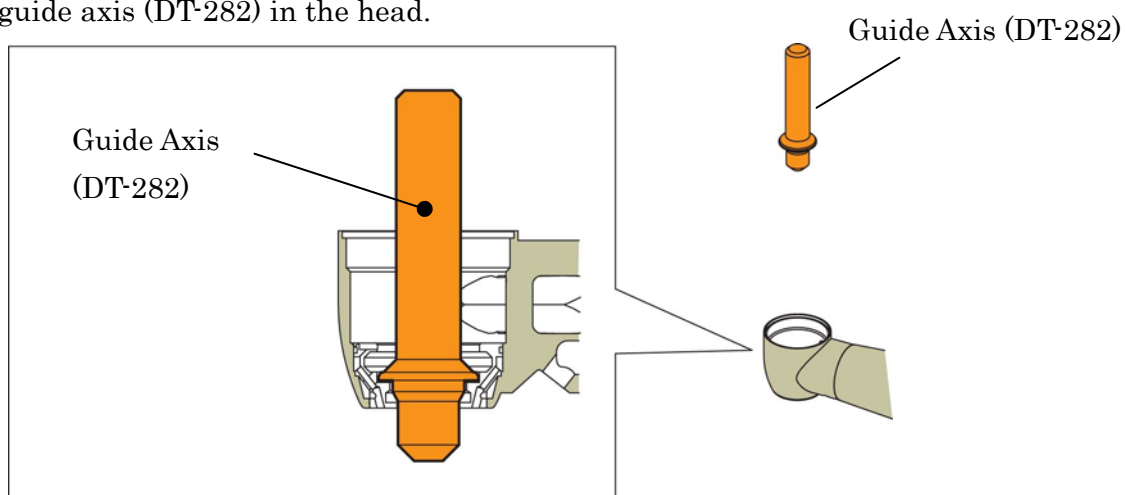
Caution

Install the thick O-ring for Mini type.

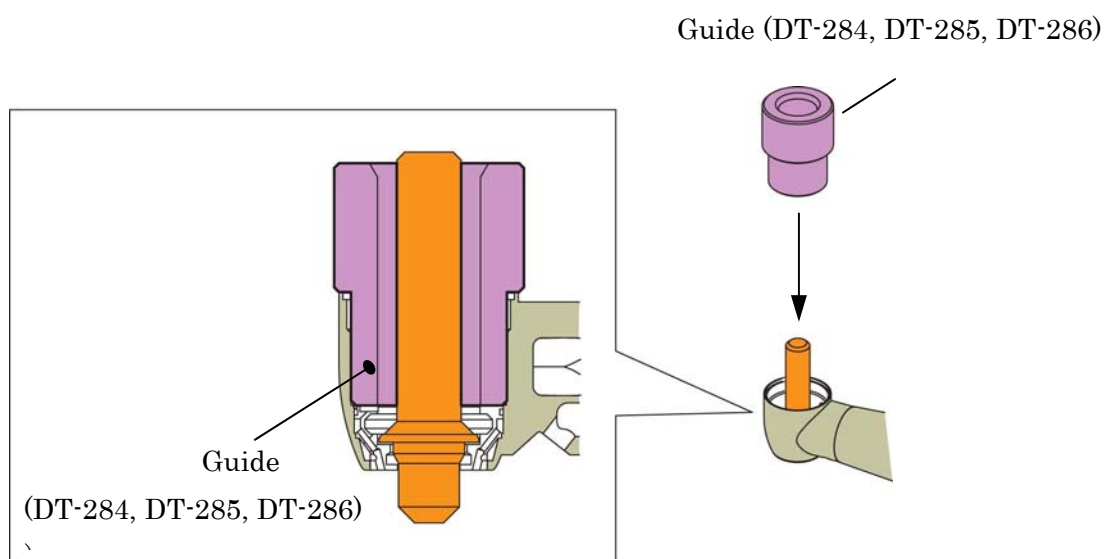
1-4-3. Set the wave washer at the bottom and inside of the head.



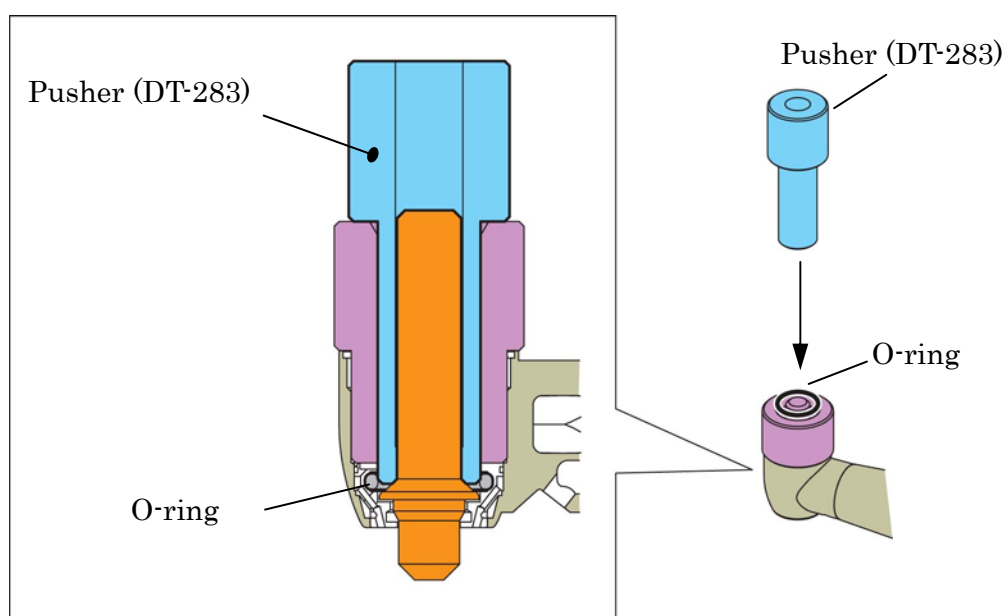
1-4-4. Insert the guide axis (DT-282) in the head.



1-4-5. Insert the guide fitted into the head (any of these three, DT-284, DT-285, DT-286) in DT-282.



1-4-6. Apply a small amount of turbine oil to the O-ring, and set it on the hole in the guide, press the O-ring from above using Pusher (DT-283).



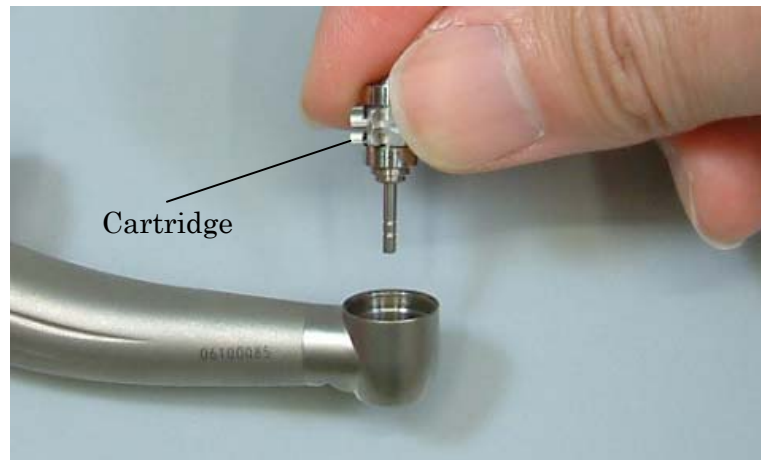
Caution

Install the thin O-ring for Mini type.

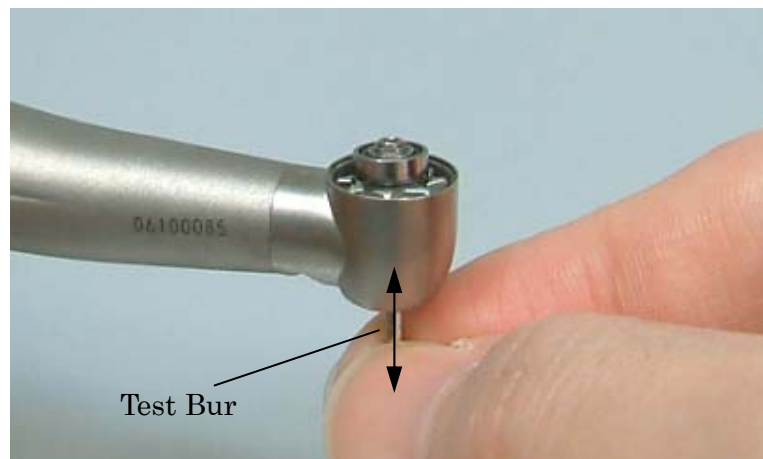
1-4-7. Remove the pusher, the guide and the guide axis.

(When the guide axis is removed, the guide axes are caught the O-ring slightly.)

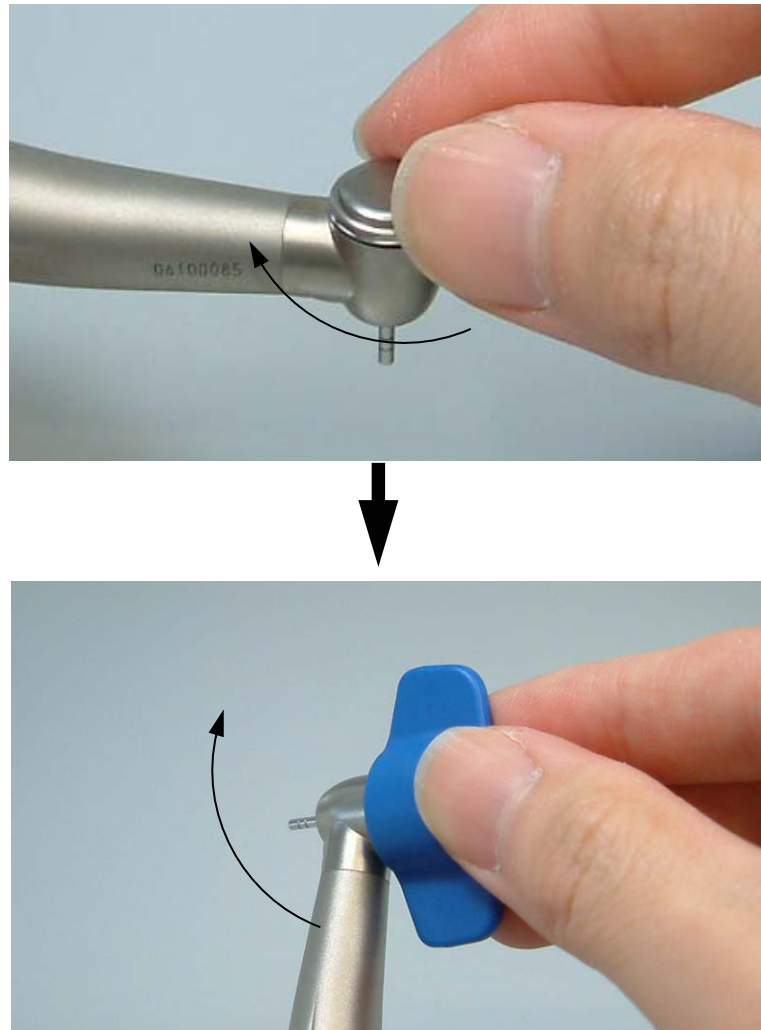
1-4-8. Install the cartridge in the head by inserting it vertically.



1-4-9. Confirm if the wave washer works by pushing and pulling the test bur holding the tip of it with fingers. Remove the cartridge and check the condition of the O-ring and the wave washer in case of no feeling of the spring.



1-4-10. Install the head cap. First, screw it with fingers until it stops, then fasten it with the head cap wrench fitted into the head until it's fixed firmly.



1-4-11. Finally, check if the rotation speed and the noise are normal by spinning it after lubricating and installing it to the joint, then send it back to users.

Measured air pressure 0.3 MPa

Head	Rotation Speed (min ⁻¹)	Noise
Mini	Over 390,000	The same and high pitched noise.
Standard	Over 380,000	The same and high pitched noise.
Torque	Over 300,000	The same and high pitched noise.

2. Troubleshooting of the Head and Water Supply Circuit

2-1. Tools required

As well as Replacing the cartridge (See 1-2. Tools required)

2-2. Disassembly procedure

2-2-1. Detach Head-cap, Cartridge, O-ring and Wave-Washer according to the Service Manual for Cartridge change. (See 1-3. Disassembly process)

2-2-2. Attach a Block (DT-288, DT-289, DT290) fitted into the head to be repaired to DT-318.

2-2-3. Set the Head Cover to Block.



Caution

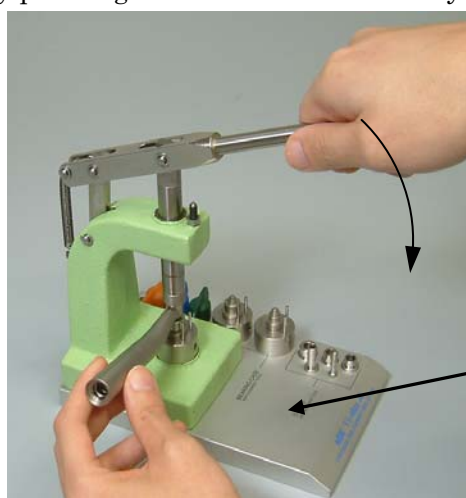
When the following work is done without above-mentioned working, the Turbine is damaged. Certainly, Set the Head Cover to Block.



Head Cover (DT-327)

Block

2-2-4. Set Air Turbine to DT-318 by facing down the bur of the turbine, and remove the Bearing Case in front by pressing the handle down slowly.

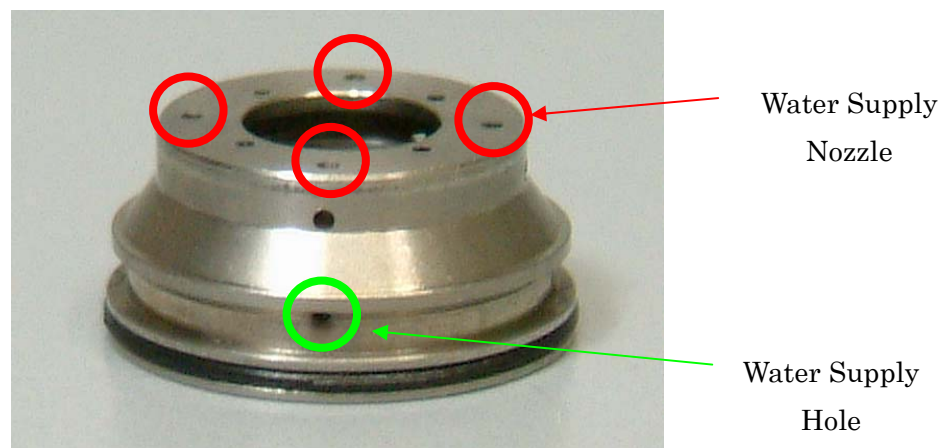
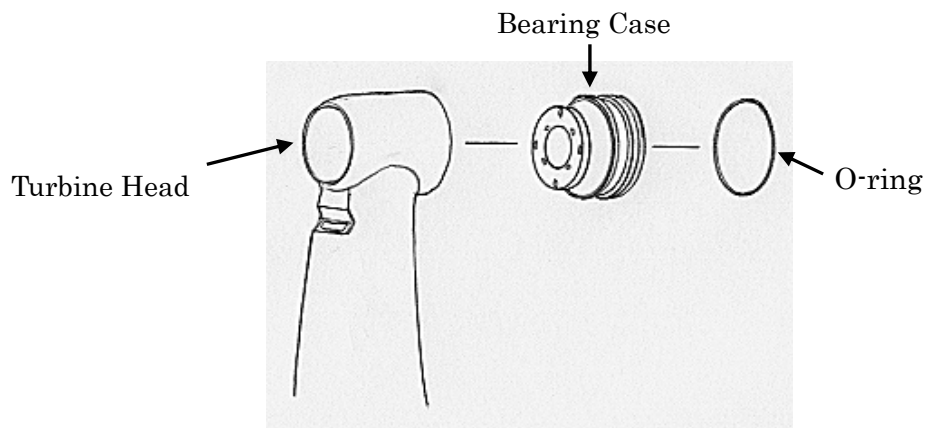


DT-318



Turbine close-up

2-2-5. Clean up 4 water supply nozzles on the Bearing Case. You can take ultrasonic cleaning process on only these parts. Make sure to change the O-ring, which is attached to the Bearing Case to prevent leakage of water, to new O-ring, when removing the Bearing Case.

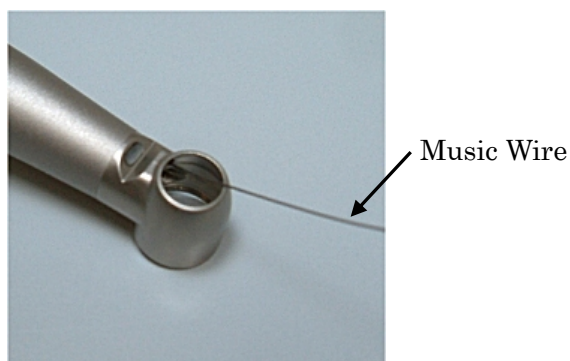


Bearing Case Close-up

2-2-6. Check if the water supply is sufficient, after connecting the turbine to the hose without Bearing Case.

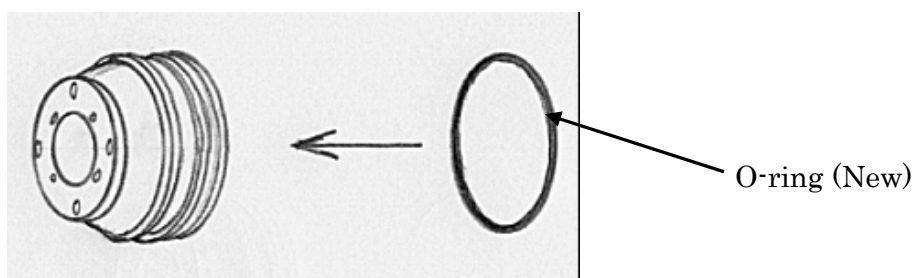


2-2-7. If you feel water supply is insufficient, clean the nozzles with Music Wire.

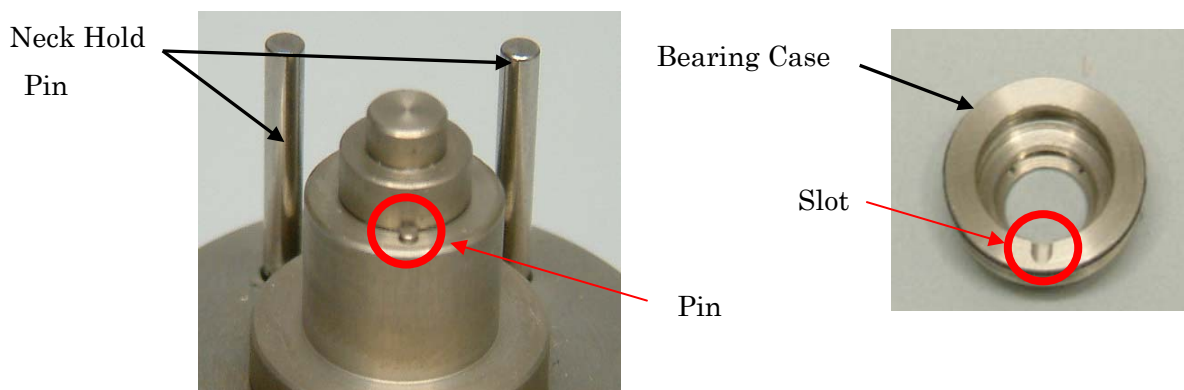


2-2-8. If the clogging is still not solved, detach the body from here by referring to the Service Manual.

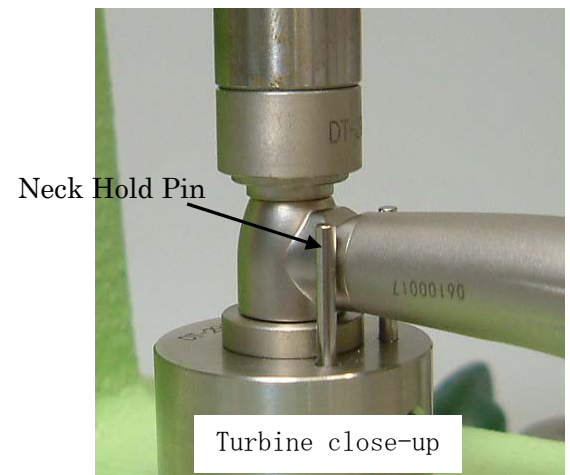
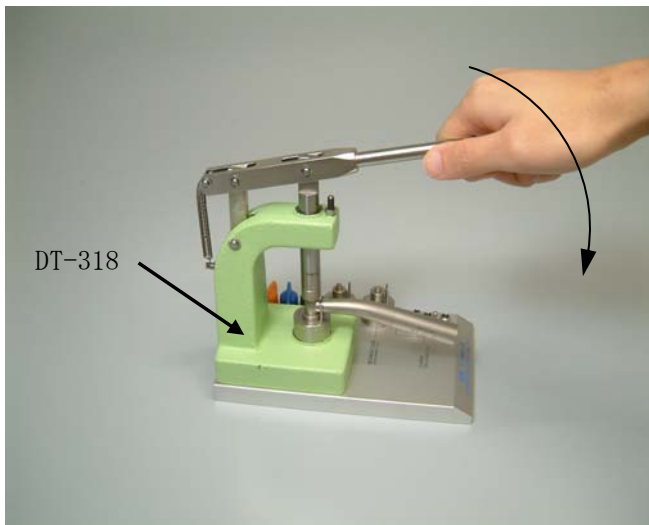
2-2-9. If the clogging is solved, attach a new O-ring to the Bearing Case to assemble them.



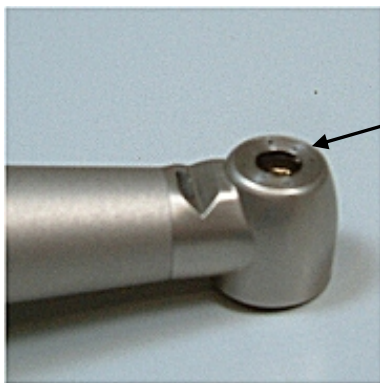
2-2-10. Set the Bearing Case to the block for heads attached to DT-287(any of these three DT-288, DT-289, DT290) with the water hole up. Connect a slot on opposite side of the water hole on Bearing Case to the pins on the Block.



2-2-11. Cover the head from above and set the turbine to DT-318 by placing the neck between neck hold pins. Press the handle of DT-318 down slowly like pressing the head vertically.



2-2-12. Press the Bearing Case into the head until the height of the Bearing Case reaches the head level.



The height of the Bearing case and the head should be the same.

2-2-13. Assemble the wave washer, the O-ring, the Cartridge and the head cap according to the Service Manual for Cartridge change.(See 1-4. Assembling the new cartridge)

3. Disassembling the Sheath Part

3-1. TOOLS REQUIRED



T-2 (Pliers)



Emery Cloth



Tweezers



DT-299



T-3 (Pliers)

3-2. DISASSEMBLY PROCEDURE

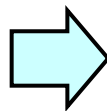
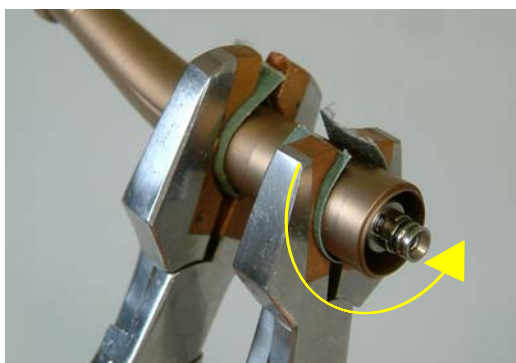
Caution

Disassemble on a tray not to lose the parts.

Replace the O-ring if any damages are found during disassembling.

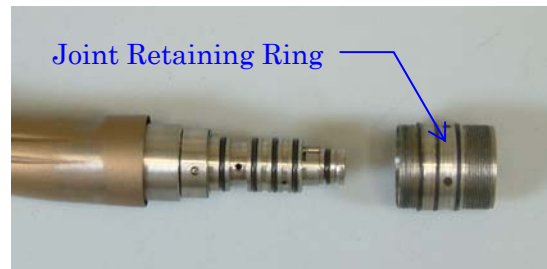
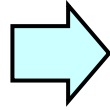
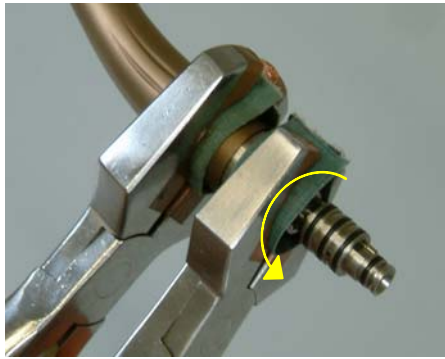
3-2-1. Removal of Joint Cover

Protect the Joint Cover and the Sheath with emery cloth, and turn counterclockwise with T-2 to detach the Joint Cover.



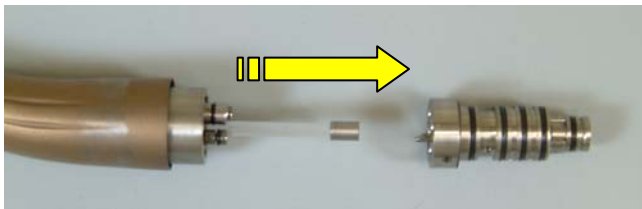
3-2-2. Removal of Joint Retaining Ring

Protect the Joint Retaining Ring and the Sheath with emery cloth, and turn counterclockwise with T-2 to detach the Joint Retaining Ring.



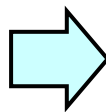
3-2-3. Removal of Positioning Sleeve

Pull out the Positioning Sleeve.

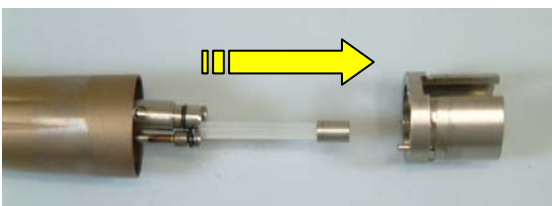


3-2-3. Removal of Positioning Sleeve

Unscrew the Head Retaining Nut by using DT-299.

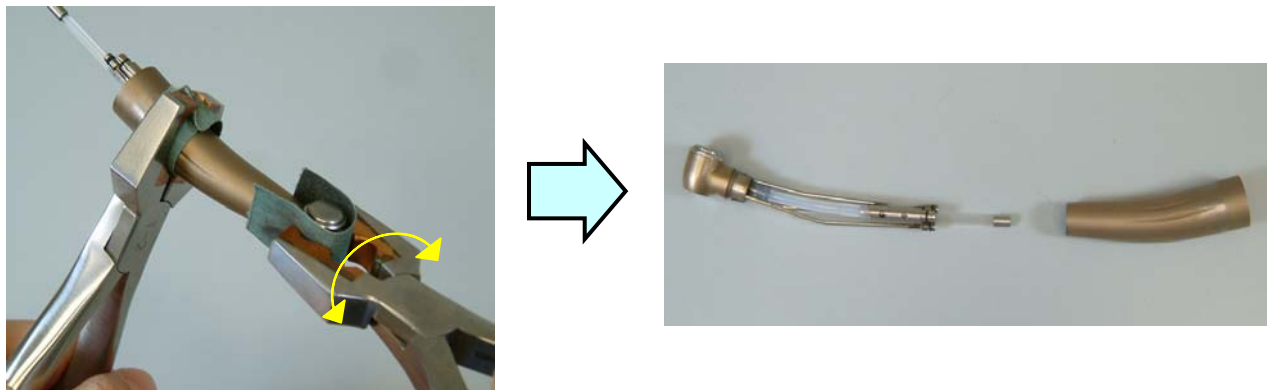


Pull out the Positioning Sleeve.



3-2-4. Removal of Sheath

Protect the Sheath and the Head part with emery cloth, and twist the Head part from side to side by using T-2 and T-3 to detach the Head part.



Please refer to the parts list for the more detailed disassembly.

Reverse the procedure for disassembly, when assembling.

NSK

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