

**OPERATION
MANUAL**

Please read this OPERATION MANUAL carefully before use, and file for future reference.

PAF-SU M4 / PAF-SU B2 / PAF-SU QD
PAF-TU M4 / PAF-TU B2 / PAF-TU QD
PAF-S M4 / PAF-S B2
PAF-T M4 / PAF-T B2

CE 0197 MADE IN JAPAN

OM-T0457E 001

1. User and Intended Use

User : Qualified Professionals

Indications for Use: This medical device is intended for converting compressed air supplied from a dental unit, etc. to rotational motion, thereby running the instrument such as a dental bur to cut and polish natural or artificial teeth during dental treatment.

2. Precautions for handling and operation

- Please read these precautions carefully and use only as intended or instructed.
- Safety instructions are intended to avoid potential hazards that could result in personal injury or damage to the device. Safety instructions are classified as follows in accordance with the seriousness of the risk.

Class	Degree of Risk
WARNING	Hazard that could result in serious injury or damage to the device if the safety instructions are not correctly followed.
ATTENTION	Hazard that could result in light or moderate injury or damage to the device if the safety instructions are not correctly followed.
NOTICE	General product specification information highlighted to avoid product malfunction and performance reduction.

WARNING

- **Depressing the Push Button while the handpiece is in rotation may lead to overheating, causing burn injuries or product failure. Avoid the push button to contact with any oral tissue.**
(PAF-SU M4/PAF-SU B2/PAF-SU QD/PAF-TU M4/PAF-TU B2/PAF-TU QD)

CAUTION

- Read this Operation Manual before use to fully understand the product functions and file for future reference.
- When operating the product always consider the safety of the patient.
- Users are responsible for the operational control, maintenance and continual inspection of this product.
- Do not attempt to disassemble the product nor tamper with the mechanism except as recommended by NSK in this Operation Manual.
- Do not allow any impact on to the product. Do not drop the product.
- Operators and all others in the area must wear eye protection and a mask when operating this handpiece.
- Should the product function abnormally, cease operation immediately and contact your Authorized NSK Dealer.
- Do not use high acid water or sterilizing solutions to wipe, immerse or clean the product.
- The products are delivered in a non-sterile condition and must be autoclaved prior to use.
- Perform regular function and maintenance checks.
- If the product is not used for a long period check it is functioning correctly before using on a patient.
- To avoid clinical downtime it is recommended that a spare be kept on hand in case of a breakdown during surgery.

3. Accessory List

No.	Part Name	Quantity	Remarks
1	Head Cap Wrench	1	PAX2-SU05
2	QD Spray Nozzle	1	Included in the package for PAF-SU QD/PAF-TU QD
3	Chuck Wrench	1	Included in the package for PAF-S M4/PAF-S B2/PAF-T M4/PAF-T B2

4. Setting of Air & Water Supply Pressure

Measure the supply pressure at the handpiece/hose connection point and set the pressure to the value specified on the specification table (Fig. 1).
For NSK Multi Gauge information refer to Option Parts List.

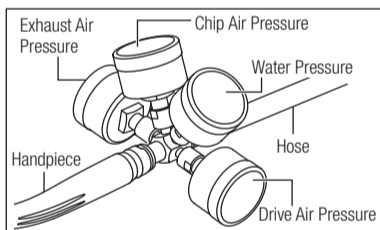


Fig. 1

WARNING

- **Do not exceed the optimum pressure specified on the specification table.**

CAUTION

- Do not use air contaminated by dust, moisture or oil.

5. Connection & Disconnection of the Handpiece

Refer to Operation Manuals of coupling and hose before connecting the handpiece.

PAF-SU M4/PAF-SU B2/PAF-TU M4/PAF-TU B2/PAF-S M4/PAF-S B2/PAF-T M4/PAF-T B2

5-1-1 Connection

- 1) Insert the handpiece correctly into the hose connector and tighten the hose nut (Fig. 2).
- 2) Make sure the handpiece is connected firmly to the hose.

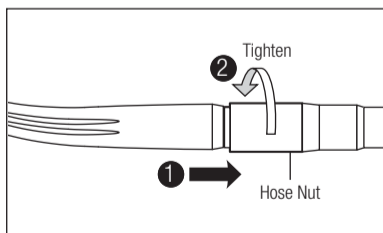


Fig. 2

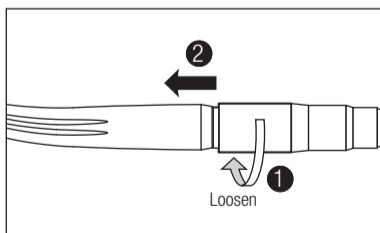


Fig. 3

PAF-SU QD/PAF-TU QD

5-2-1 Connection

- 1) Insert the coupling into the hose connector and tighten the hose nut (Fig. 4).
- 2) Insert the handpiece to the coupling while pulling back the retention lock ring of the coupling. Release the retention lock ring.
- 3) Make sure the handpiece is firmly connected to the coupling.

5-2-2 Disconnection

Pull back the Retention Lock Ring and remove the handpiece from the Coupling (Fig. 5).

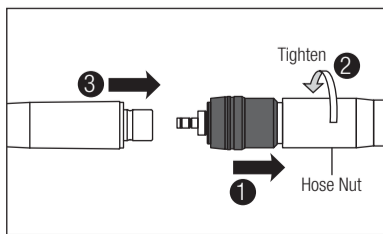


Fig. 4

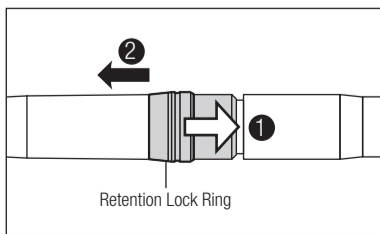


Fig. 5

CAUTION

- Do not operate the Retention Lock Ring while under drive air pressure. The high pressure may cause sudden release of the handpiece from the coupling.

6. Insertion & Removal of the Bur

PAF-SU M4/PAF-SU B2/PAF-SU QD/PAF-TU M4/PAF-TU B2/PAF-TU QD

6-1-1 To Insert the Bur

- 1) Insert the bur until it is correctly seated in place (Fig. 6).
- 2) Depress the Push Button and insert the bur into the chuck until it is secure then release the button.
- 3) Ensure that the bur is secure by gently pulling and pushing the bur WITHOUT depressing the Push Button.

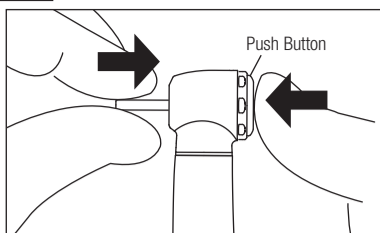


Fig. 6

6-1-2 To Remove the Bur

Depress the Push Button firmly and remove the bur.

NOTICE

- Grip the handpiece while placing your thumb tip on the Push button which makes it easier to depress the button.

PAF-S M4/PAF-S B2/PAF-T M4/PAF-T B2

6-2-1 To Insert the Bur

- 1) Pull back the knurled knob then mount the Chuck Wrench onto the handpiece head as shown in the Fig. 7.
- 2) Push the knob into the head then turn the knob about 1/4 turn counter clockwise.
- 3) Insert the bur into the chuck and turn the knob about 1/4 turn clockwise until it stops.
- 4) Remove the Chuck Wrench out of the head by pulling back the knurled knob and releasing the wrench.
- 5) Ensure that the bur is secure by gently pulling and pushing the bur.

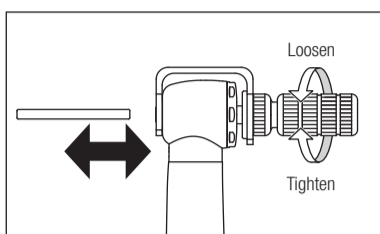


Fig. 7

6-2-2 To Remove the Bur

To remove the bur, follow the procedure 1) and 2) in "6-2-1 To Insert the Bur" stated above.

CAUTION

- Always insert the bur all the way into the chuck.
- Remove the bur only after the handpiece has completely stopped rotating.
- Always keep the bur shank clean. Entry of debris into the chuck, via the bur shank, could cause bur rotation slip and also prevent the bur from being securely located in the chuck.
- Do not exceed the bur speed recommended by the bur manufacturer.
- Do not exceed maximum bur length recommended by the handpiece manufacturer.
- Do not apply excess pressure to the bur as it may break or bend or become difficult to remove.
- DO NOT use burs with problems listed below as the bur may break, seize up or disengage from the chuck.
 - Bent, deformed, anisomerous (worn), rusted, broken, deficient bur.
 - Bur which is cracked on the edge or axis.
 - Non-ISO standard, or tampered bur.

7. Check before treatment

Check that the Head Cap is firmly tightened. Also check for handpiece vibration, noise and overheating. If any abnormalities are found do not use the handpiece and contact your Authorized NSK Dealer.

8. Maintenance

After each patient maintain the product as follows. Lack of maintenance could cause premature failure or overheating of the handpiece.

CAUTION

- Do not use the following fluids to wipe, immerse or clean the product; strong/super acid water, strong acid/alkaline chemicals, chlorine-containing solutions, solvents such as benzine or thinner.

8-1 Preparation

- 1) Wear eye protection, a mask and gloves to avoid infection.
- 2) Remove the bur.
- 3) Disconnect the handpiece from the hose/coupling.

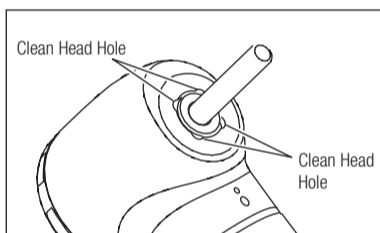


Fig. 8

8-2 Cleaning handpieces with the NSK Clean-Head System

After the treatment of each patient, clean the Clean Head.

- 1) Remove dirt and debris from the Clean Head Holes (Fig. 8).
- 2) Half fill a cup with clean water.
- 3) Rotate the handpiece and immerse half of the handpiece head in the cup of water (Fig. 9).
- 4) Rotate then stop intermittently the handpiece 3 times for 2 to 3 seconds each time.
- 5) Wipe the handpiece dry.

* If the dirt could not be removed from the hole, clean it by brush.

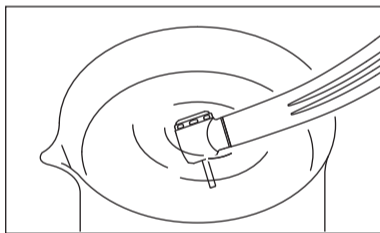


Fig. 9

8-3 Cleaning

Manual Cleaning (External Surface)

- 1) Remove debris on the handpiece surface using a brush under running water (at 38°C or less). DO NOT use a wire brush.
- 2) Wipe off moisture on the surface using an absorbent cloth.

CAUTION

- If water enters the handpiece, using an air syringe, blow air into the rear of the handpiece to remove the internal water.

Automatic Cleaning (External and Internal Surfaces)

Use a thermo-disinfector in accordance with ISO 15883 (EN ISO 15883). Refer to the thermo-disinfector manual.

CAUTION

- After washing with Thermo-Disinfector and prior to lubrication, dry the product until all internal moisture is thoroughly removed. Thermo-Disinfector moisture remaining inside the product could reduce the effect of lubrication and could cause corrosion inside of the product.
- Always use a PH neutral detergent when washing the product in a thermo disinfector.
- To clean the product never use any solvent such as benzine or thinner.

8-4 Disinfection

Manual Disinfection (External Surface)

Wipe the surface with cloth soaked in disinfectant solution such as alcohol.

Automatic Disinfection (External and Internal Surfaces)

Use a thermo-disinfector in accordance with ISO 15883 (EN ISO 15883). Refer to the thermo-disinfector manual.

8-5 Lubrication

NSK PANA SPRAY Plus/PANA SPRAY

PAF-SU M4/PAF-SU B2/PAF-TU M4/PAF-TU B2/PAF-S M4/PAF-S B2/PAF-T M4/PAF-T B2

Apply NSK PANA SPRAY Plus/PANA SPRAY every time after each use and/or before autoclaving.

- 1) Remove the handpiece from the hose.
- 2) Remove the bur from the handpiece.
- 3) Mount the Tip Nozzle into the spray can port (Fig. 10).
- 4) Insert the Tip Nozzle into the Drive Air Port of the handpiece (Fig. 11). Hold the handpiece and spray for approximately 2-3 seconds. Apply lubricant until it expels from the handpiece head for at least 2 seconds.

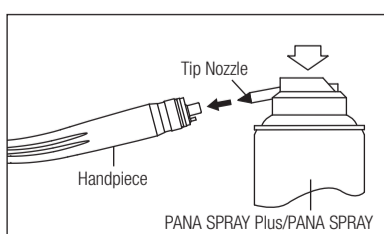


Fig. 10

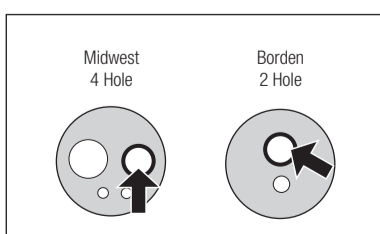


Fig. 11

Apply NSK PANA SPRAY Plus/PANA SPRAY every time after each use and/or before autoclaving.

- 1) Remove the handpiece from the coupling.
- 2) Remove the bur from the handpiece.
- 3) Insert the Spray Nozzle into the Spray Port nozzle on the can.
- 4) Insert the Spray Nozzle in rear of the handpiece. Hold the handpiece and spray for approximately 2-3 seconds. Apply lubricant until it expels from the handpiece head for at least 2 seconds (Fig. 12).

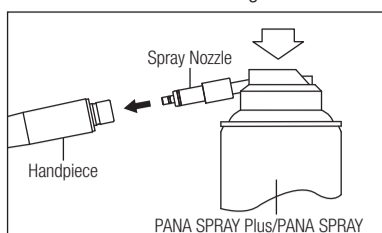


Fig. 12

CAUTION

- When applying spray be sure to hold the handpiece firmly to prevent the handpiece from slipping out of the hand due to the spray pressure.
- Hold the spray can upright.

Chuck cleaning

Clean the Push Button chuck once a week.

- 1) Mount the Tip Nozzle into the spray can port.
- 2) Lubricate the chuck directly through the bur insertion hole (Fig. 13).
- 3) Lubricate the handpiece by using NSK PANA SPRAY Plus/PANA SPRAY (Fig. 10,12) or NSK automatic handpiece cleaning and lubrication system.

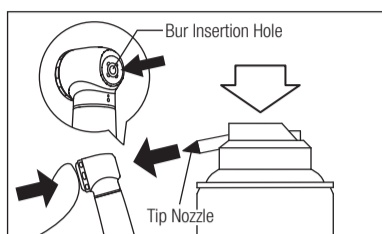


Fig. 13

CAUTION

- If the chuck is not regularly cleaned the chuck grip may be weakened and the bur may be accidentally released while in operation.

NSK automatic handpiece cleaning and lubrication system

When using NSK automatic handpiece cleaning and lubrication system, refer to the system instructions.

8-6 Sterilization

Sterilize the product by autoclave sterilization. Remove the bur after each patient and sterilize as noted below.

- 1) Insert into an autoclave pouch. Seal the pouch.
- 2) Autoclavable under the conditions below.
Autoclave for more than 20 min. at 121°C, or 15 min. at 132°C, or 3 min. at 134°C.
- 3) The handpiece should remain in the autoclave pouch until required for use.

CAUTION

- Do not autoclave the product with other instruments even when it is in a pouch. This is to prevent possible discoloration and damage to the product from chemical residue on other instruments.
- Keep the product in suitable atmospheric pressure, temperature, humidity, ventilation, and sunlight. The air should be free from dust, salt and sulphur.
- Immediately after use, the product should be cleaned, lubricated and sterilized. If blood remains on the external or internal surfaces it can become clotted and cause rust.
- Do not heat or cool the product too quickly. Rapid change in temperature could cause damage to the product.
- To avoid product failure, do not use a sterilizer that exceeds a cycle temperature of 138°C, including the dry cycle. In some sterilizers, the chamber temperature may exceed 138°C. Contact the sterilizer manufacturer for detailed information about cycle temperatures.
- Autoclave sterilization is recommended for the product. The validity of other sterilization methods is not confirmed.
- Do not touch the product immediately after autoclaving as it will be very hot and must remain in a sterile condition.

NOTICE

- NSK recommends Class B sterilizers as stated in EN13060.

9. Replacing the Cartridge

- 1) Insert a test bur.
 - 2) Locate the correct wrench tool on the head cap then turn the wrench counter clockwise to loosen the cap. Remove the cap.
 - 3) Use the bur to gently lever the entire cartridge out from the head.
 - 4) Clean the head interior with NSK PANA SPRAY Plus/PANA SPRAY.
 - 5) Wipe the NSK PANA SPRAY Plus/PANA SPRAY oil over the head interior.
 - 6) Insert the new cartridge into the head by aligning the pin on the cartridge with the slot on the head (Fig. 14).
 - 7) Tighten the head cap with the correct head cap wrench.
- * Refer to Spare Parts List to identify the correct cartridge.

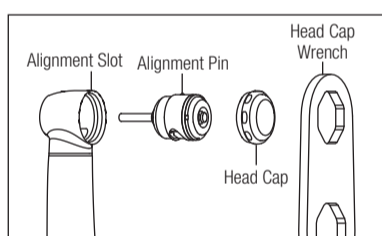


Fig. 14

CAUTION

- Use only a genuine NSK cartridge.
- If another cartridge is used NSK cannot guarantee performance and the handpiece warranty would become invalid.
- Always first finger tighten the head cap then secure firmly with the head cap wrench.
- NSK never recommends the disassembly and repair of any NSK cartridge. There is NO EXCEPTION. In such a case a handpiece may perform abnormally (abnormal noise or abnormal vibration). Damage, failure or accidents are outside of our guarantee.

10. Replacing the O-rings (QD Coupling)

Replace the O-rings if water is present in the exhaust air line. This is an indication of possible water leakage within the coupling. ALWAYS change the complete set of O-rings.

- 1) Gently remove each O-ring by hand (Fig. 15).
 - 2) Insert the complete set of new O-rings in the correct grooves.
- * Refer to Spare Parts List to identify the correct parts.

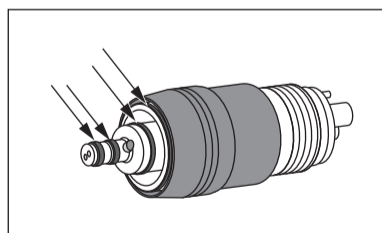


Fig. 15

CAUTION

- Do not force the new replacement O-ring with excessive pressure.
- When inserting new O-rings, make sure they are inserted in the correct grooves.

11. Replacing the Non-Retraction Valve (QD Coupling)

A water Non-Retraction Valve is integrated in the Coupling Joint, which shuts off the water retraction directly at the handpiece head to prevent fluids infiltrating the water line. If water is beginning to leak from the handpiece, replace the non-retraction valve.

- 1) Remove the Coupling Joint from the hose.
 - 2) Remove the back-end Gasket.
 - 3) Pull and remove the water tube, and replace the Non-Retraction Valve (Fig. 16).
 - 4) Insert the new Non-Retraction Valve securely and remount the back-end Gasket.
- * Refer to Spare Parts List to identify the correct parts.

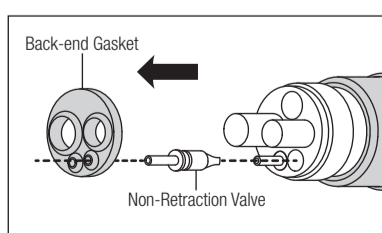


Fig. 16

12. Periodical Maintenance Checks

Perform periodical maintenance checks every three months, referring to the check sheet below. If any abnormalities are found, contact your Authorized NSK Dealer.

Points to check	Details
Head cap is loose	Tighten firmly using the correct head cap wrench.
Rotation	Rotate the handpiece and check for abnormalities such as abnormal rotation, vibration, noise and overheating.
Coolant Water	Operate the handpiece and check that the coolant water is flowing through the spray port.

13. Specifications

Model	PAF-SU M4	PAF-SU B2	PAF-SU QD
Hose Connection Type	ISO 9168 Type 2 (Midwest 4 hole)	ISO 9168 Type 1 (Borden 2 hole)	QD Coupling
Rotation Speed	350,000 - 450,000 min ⁻¹		300,000 - 400,000 min ⁻¹
Bur Type	ISO 1797-1 Ø1.59 - 1.60mm Standard Bur		
Chuck Type	Push Button Chuck		
Chucking Length	10.2mm		
Max. Bur Length	21mm		
Max. Working Part Diameter	Ø2mm		
Drive Air Pressure	0.20 - 0.25MPa (2.0 - 2.5kgf/cm ²)		
Pressure Regulating Valve	Installed		-
Air Consumption	≤55 NL/min (0.25MPa)		
Water Pressure	0.05 - 0.20MPa (0.5 - 2.0kgf/cm ²)		
Chip Air Pressure	0.15 - 0.25MPa (1.5 - 2.5kgf/cm ²)	-	0.15 - 0.25MPa (1.5 - 2.5kgf/cm ²)
Use Environment	Temperature: 0 - 40°C (No Condensation), Humidity: 30 - 75%		
Transportation and Store Environment	Temperature: -10 - 50 °C, Humidity: 10 - 85%, Atmospheric Pressure: 500 - 1,060hPa		

Model	PAF-TU M4	PAF-TU B2	PAF-TU QD
Hose Connection Type	ISO 9168 Type 2 (Midwest 4 hole)	ISO 9168 Type 1 (Borden 2 hole)	QD Coupling
Rotation Speed	310,000 - 410,000 min ⁻¹		290,000 - 390,000 min ⁻¹
Bur Type	ISO 1797-1 Ø1.59 - 1.60mm Standard Bur		
Chuck Type	Push Button Chuck		
Chucking Length	10.2mm		
Max. Bur Length	21mm		
Max. Working Part Diameter	Ø2mm		
Drive Air Pressure	0.20 - 0.25MPa (2.0 - 2.5kgf/cm ²)		
Pressure Regulating Valve	Installed		-
Air Consumption	≤55 NL/min (0.25MPa)		
Water Pressure	0.05 - 0.20MPa (0.5 - 2.0kgf/cm ²)		
Chip Air Pressure	0.15 - 0.25MPa (1.5 - 2.5kgf/cm ²)	-	0.15 - 0.25MPa (1.5 - 2.5kgf/cm ²)
Use Environment	Temperature: 0 - 40°C (No Condensation), Humidity: 30 - 75%		
Transportation and Store Environment	Temperature: -10 - 50 °C, Humidity: 10 - 85%, Atmospheric Pressure: 500 - 1,060hPa		

Model	PAF-S M4	PAF-S B2	PAF-T M4	PAF-T B2
Hose Connection Type	ISO 9168 Type 2 (Midwest 4 hole)	ISO 9168 Type 1 (Borden 2 hole)	ISO 9168 Type 2 (Midwest 4 hole)	ISO 9168 Type 1 (Borden 2 hole)
Rotation Speed	350,000 - 450,000 min ⁻¹		310,000 - 410,000 min ⁻¹	
Bur Type	ISO 1797-1 Ø1.59 - 1.60mm Standard Bur			
Chuck Type	Screw Type/Wrench			
Chucking Length	10.2mm			
Max. Bur Length	21mm			
Max. Working Part Diameter	Ø2mm			
Drive Air Pressure	0.20 - 0.25MPa (2.0 - 2.5kgf/cm ²)			
Pressure Regulating Valve	Installed			
Air Consumption	≤55 NL/min (0.25MPa)			
Water Pressure	0.05 - 0.20MPa (0.5 - 2.0kgf/cm ²)			
Chip Air Pressure	0.15 - 0.25MPa (1.5 - 2.5kgf/cm ²)	-	0.15 - 0.25MPa (1.5 - 2.5kgf/cm ²)	-
Use Environment	Temperature: 0 - 40°C (No Condensation), Humidity: 30 - 75%			
Transportation and Store Environment	Temperature: -10 - 50 °C, Humidity: 10 - 85%, Atmospheric Pressure: 500 - 1,060hPa			

14. Symbol



This product is Autoclavable up to Max.135°C.



This product can be washed via Thermo Disinfectant.



Conforms to CE European Directive of "Medical device directive 93/42/EEC".



Manufacturer.



Authorized representative in the European community.

15. Warranty

NSK products are warranted against manufacturing errors and defects in materials. NSK reserves the right to analyze and determine the cause of any problem. Warranty is voided should the product be not used correctly or for the intended purpose or has been tampered with by unqualified personnel or has had non NSK parts installed. Replacement parts are available for seven years beyond discontinuation of the model.

16. Option Parts List

Model	Order Code	Compatible Product
MG-4H Multi Gauge	Z109400	PAF-SU M4/PAF-SU QD/PAF-TU M4/PAF-TU QD/PAF-S M4/PAF-T M4
MG-2/3H Multi Gauge	Z109200	PAF-SU B2/PAF-TU B2/PAF-S B2/PAF-T B2

17. Spare Parts List

Model	Order Code	Compatible Product	Remarks
PAX2-SU03	P1190	PAF-SU M4/PAF-SU B2/PAF-SU QD	Cartridge
PAX2R-S03	T1040	PAF-S M4/PAF-S B2	Cartridge
PAX2-TU03	P1216	PAF-TU M4/PAF-TU B2/PAF-TU QD	Cartridge
PAX2R-T03	T1066	PAF-T M4/PAF-T B2	Cartridge
PAX2-SU04	P1190050	PAF-SU M4/PAF-SU B2/PAF-SU QD	Head Cap
PAX2R-S04	T1040050	PAF-S M4/PAF-S B2	Head Cap
PAX2-TU04	P1216050	PAF-TU M4/PAF-TU B2/PAF-TU QD	Head Cap
PAX2R-T04	T1066050	PAF-T M4/PAF-T B2	Head Cap
PAX2-SU05	P1190765	-	Head Cap Wrench
Chuck Wrench	T100702	-	-
QD O-ring Set	Y900592	QD Coupling	-
Non-Retraction Valve	P401054	QD Coupling	-
QD Spray Nozzle	Z096090	PAF-SU QD/PAF-TU QD	-

18. Disposing product

In order to avoid the health risks of operators handling the disposal of medical equipment, as well as the risks of environmental contamination caused thereof, a surgeon or a dentist is required to confirm the equipment is sterile. Ask specialist firms who are licensed to dispose of specially controlled industrial wastes, to dispose the product for you.

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