

# **VELOPEX<sup>®</sup>**

## **AQUACUT QUATTRO**

# **Fluid Abrasion Unit**



## **Installation, Operation and Maintenance manual**

### **WARNING:**

**Do not connect to the air supply before  
reading this manual.**



**Machine serial number to be quoted  
on all correspondence**

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## TABLE OF SYMBOLS

SYMBOL	DESCRIPTION
	AIR SUPPLY 'OFF'
	AIR SUPPLY 'ON'
	SECONDARY GAS SUPPLY 'ON'
	POLISHING POWDER SELECT
	CUTTING POWDER SELECT
	POWDER FLOW VOLUME CONTROL
	CUTTING SPEED VOLUME CONTROL
	POWDER DUMP POT
	LIQUID SUPPLY POT
	INPUT POWER GUAGE A – 2 TO 3.5 BAR B – 4 TO 5 BAR C – 6 TO 7 BAR



## AIR SUPPLY REQUIREMENTS

Clean Dry Air to ISO 8573 class 1.4.1  
 Pressure between 5 BAR (72 psi) & 7 BAR (100 psi)  
 Maximum flow rate +70 l/min  
 4mm O/D Outlet Hose

# TECHNICAL DESCRIPTION

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## **READ THIS MANUAL FULLY BEFORE ATTEMPTING TO INSTALL OR USE THE AQUACUT QUATTRO MACHINE.**

The AQUACUT QUATTRO fluid abrasion unit is a twin dispenser system. This allows the user to select either Cutting or Polishing Powders instantly. The Dosing Chambers can be loaded with either 29 or 53 micron aluminium oxide for tooth reduction and fine granular sodium bicarbonate for tooth cleaning and polishing.

The AQUACUT QUATTRO is entirely pneumatic in operation and therefore the only supply needed to the machine is a clean, dry air supply of between 5 bar, (72 psi) and 7.5 bar, (109 psi) to **ISO 8571.1 class 1.4.1**. This can be the dental practice's existing air supply system, an independent compressor or bottled air/nitrogen.

**Secondary gas supply is not recommended at this time.**

It is essential that a high performance water removing filter and a shut-off valve are fitted in the supply line, (see section on recommended accessories).

The incoming air to the AQUACUT QUATTRO is internally regulated to 7.5 bar, (109 psi) max, for the pneumatic control system with and supply to the powder cartridge chambers to 5 bar, (72 psi).

The flow of clean dry air to the handpiece is initiated by depressing the foot switch roller down to the first index position. (Felt as 1<sup>st</sup> resistance point to downward movement).

The flow of clean air and fluid to the handpiece is initiated by depressing the foot switch roller down to the second index position. (Felt as 2<sup>nd</sup> resistance point to downward movement).

The flow of powder and fluid to the handpiece is initiated by depressing the foot switch roller fully down. Residual powder in the line to the handpiece is vented into a filtered exhaust collector inside the machine when the roller is allowed to return to the upper position.

The foot pedal actuates a purpose built pinch valve block within the Aquacut Quattro, which in turn controls the flow of the abrasive laden air.

The pinch valve tubes are easily changed on a routine basis in a few minutes without the use of special tools.

The abrasive powders are supplied in sealed, colour-coded single use cartridges that are calibrated to supply the correct range of flow rates for each powder.

The powder cartridges can be changed at any time by simply switching the Aquacut Quattro off, removing the lid from the dosing chamber, lifting out the powder cartridge and sliding in a new one after removing the two yellow sealing tabs. Replace the dosing chamber lid, switch on the supply and the unit is ready for use again.

When in use, the dosing chamber lids are held securely in place automatically and cannot be inadvertently removed while under pressure.

To undo a lid, the Aquacut Quattro must be switched off; this automatically vents the internal pressure from the complete unit. Residual powders in the lines are filtered into the exhaust collector.

Complete depressurisation of the machine takes about 20-30 seconds.

The Aquacut Quattro fluid runs in a parallel path to the handpiece tip, where it combines with the cutting medium. The fluid is drawn up the twin supply tube to the tip by the venturi effect of the particle air stream. At the tip the fluid is ejected as a conical spray over the outside of the particle stream and acts to contain the cutting medium within the cutting area. In this way the amount of airborne Aluminium Powder/Sodium Bicarbonate is significantly reduced.

## TECHNICAL DESCRIPTION Cont.....

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There are four controls available to the user, the Air/2<sup>nd</sup> supply selector; Cut/Polish Powder selector; Powder volume and Cutting/Polishing speed.

The air pressure, (Speed), at the handpiece can be adjusted over a variable range of 1 – 3.

The Powder volume can be adjusted over a variable range of 1 – 5.

The handpiece with fitted tungsten carbide tipped nozzles is easily removed from the air line for cleaning, sterilizing or replacement.

**WARNING: WHEN OPERATING THE AQUACUT QUATTRO, IT IS ESSENTIAL THAT A FILTERED HIGH SPEED INTRA-ORAL EVACUATION UNIT IS USED AT ALL TIMES. IT IS ALSO RECOMMENDED THAT A FILTERED EXTRA-ORAL EVACUATOR IS ALSO USED.**

The overall dimensions of the AQUACUT QUATTRO: -

Width	250mm [9.8 Inches]
Height	240mm [9.4 inches]
Depth	230mm (9.1 inches)
Nett weight	7.5kgs (16.5 lbs)

The AQUACUT QUATTRO is a class IIa medical device.

### **TYPICAL CUTTING PERFORMANCE THROUGH 1mm OF GLASS.**

0.5mm Dia nozzle, 29 micron aluminium oxide.

3 bar cutting pressure, Low vibrator pressure: 10 seconds.

7 bar cutting pressure, High vibrator pressure: 5 seconds.

0.6mm Dia nozzle, 53 micron aluminium oxide.

3 bar cutting pressure, Low vibrator pressure: 6 seconds.

7 bar cutting pressure, High vibrator pressure: 2 seconds.

0.8mm Dia nozzle, 53 micron aluminium oxide.

3 bar cutting pressure. Low vibrator pressure: 3 seconds

7 bar cutting pressure, High vibrator pressure: 1.5 seconds

### **ENVIRONMENTAL CONDITIONS FOR TRANSPORT AND STORAGE.**

The AQUACUT QUATTRO should be kept within the Temperature range -10°C and +40°C (14°F and 104°F) and below 80% humidity.

# INDICATIONS FOR USE AND WARNINGS

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## INDICATIONS FOR USE

Preparation for Pit and Fissure Sealants  
Removal of Composites for Restoration  
Cavity Preparation  
Cleaning, Polishing and Stain removal  
Etching

## WARNINGS

Do not turn on the air supply until you have read the complete manual, particularly the section headed 'Removing and Refitting the Dosing chamber lids' (see page 21), and have made sure that both Dosing Chamber Lids, (item 14 & 16), are correctly and fully engaged.

All powders supplied by Velopex are sterile until opened and containers are not reusable.

The foot pedal, (item 11), must be sited in such a place that it will not be operated by accident as this will cause a high pressure stream of abrasive powder to be emitted from the cutting nozzle, (item 31), in an uncontrolled and therefore dangerous manner.

Use only original Medivance consumable products, (powders etc), as other makes may damage or alter the performance of the Aquacut Quattro and make the machine dangerous.

Always ensure safety goggles and respiratory masks are worn by everyone in the area when setting up or using this equipment..

Always ensure the handpiece is under control and the nozzle is pointing in a safe direction.

Handpieces **MUST** be sterilised before first use and between patient treatments.  
Disposable feedline and tips are for one time use only. **Always** use a new feedline and tip with each patient.

## RECOMMENDED ACCESSORIES

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**WARNING: ALL REPLACEMENT PARTS AND CONSUMABLES MUST BE SOURCED FROM MEDIVANCE INSTRUMENTS TO ENSURE CORRECT AND SAFE FUNCTIONING OF THE AQUACUT - REFER TO PAGE 33 FOR DETAILS**

The following parts are available for the preparation of the Aquacut Quattro air supply

Breathing air filter unit	I/FIT 8200P
Shut off tap	I/FIT 820IP
Pressure regulator	I/FIT 8202P
Filter Regulator Tip	
6mm Hose	
4mm Hose	
6mm to 4mm Converter	
'Quick Release Fittings'	
Replacement Upper Cartridge for Breathing Air Filter	
Replacement Lower Cartridge for Breathing Air Filter	
Quick release Twin feed tube assembly	

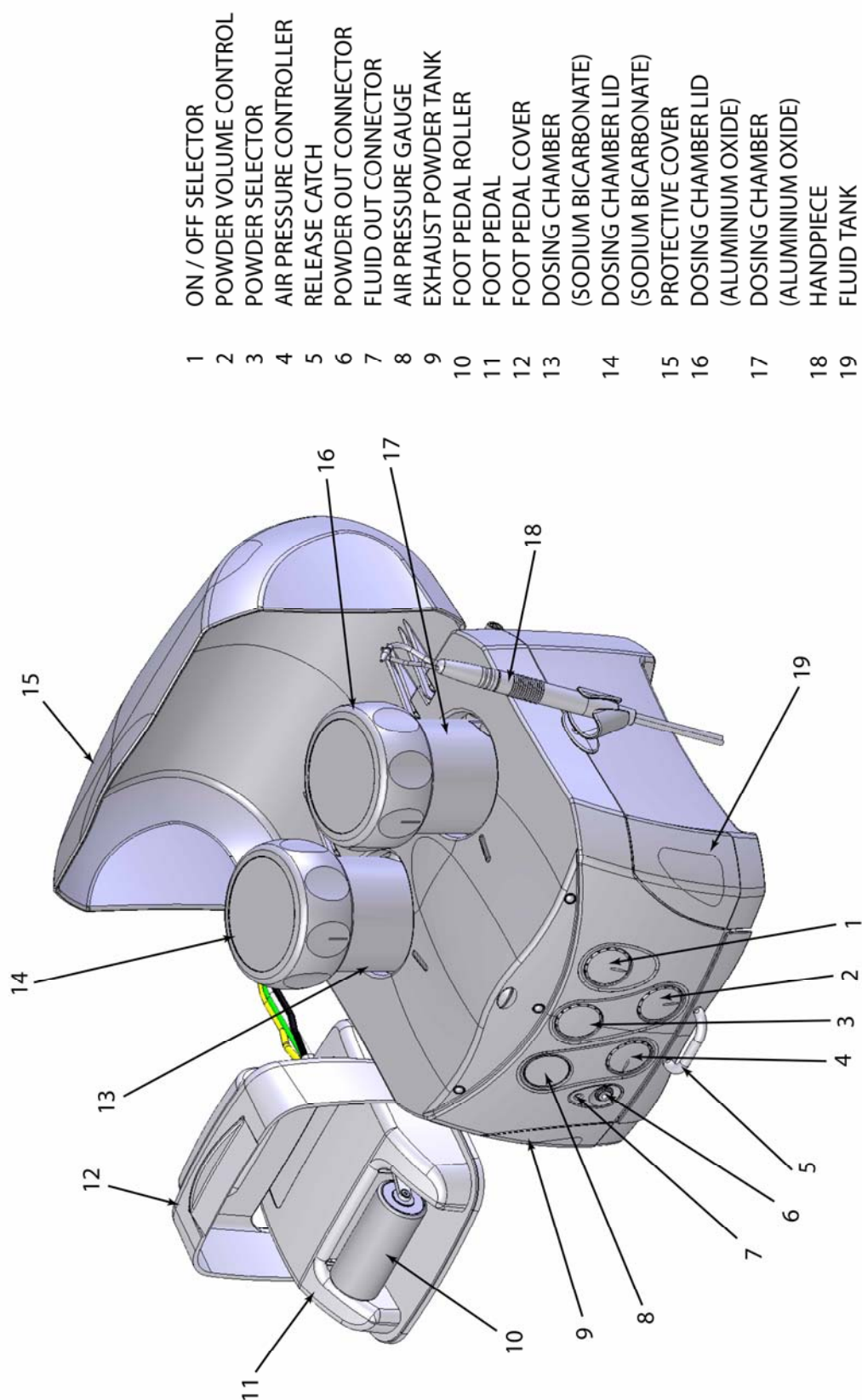
## CONTENTS OF THE PACKAGING

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1. 1 off Aquacut Quattro fluid abrasion unit.
2. 1 off Three position Foot pedal.
3. 1 off 0.6mm Handpiece (Colour Silver).
4. 1 off Quick release Twin feed tube assembly.
5. 2 off Cartridge of gamma irradiated aluminium oxide, 53 micron, (Red).
6. 2 off Cartridge of gamma irradiated aluminium oxide. 29 micron, (Blue).
7. 2 off Cartridge of gamma irradiated fine granular sodium bicarbonate (Clear).
8. 1 off Operation manual.
9. 1. off User manual.
10. 1 off Pack 5 Glass slides.
11. 1 off Nozzle cleaning wire.
12. 1 off 2 metre length 4mm air input hose.
13. 1 off 500ml Bottle fluid.
14. 1 off Pack 50 disposable feed line and tips.
15. 1 off Powder storage pot.
16. 1 off 20ml syringe for handpiece flushing.

Schnelle Entlassung Zwillingsfutterrohrversammlung

# EXTERNAL AQUACUT QUATTRO FEATURES



- 1 ON / OFF SELECTOR
- 2 POWDER VOLUME CONTROL
- 3 POWDER SELECTOR
- 4 AIR PRESSURE CONTROLLER
- 5 RELEASE CATCH
- 6 POWDER OUT CONNECTOR
- 7 FLUID OUT CONNECTOR
- 8 AIR PRESSURE GAUGE
- 9 EXHAUST POWDER TANK
- 10 FOOT PEDAL ROLLER
- 11 FOOT PEDAL
- 12 FOOT PEDAL COVER
- 13 DOSING CHAMBER (SODIUM BICARBONATE)
- 14 DOSING CHAMBER LID (SODIUM BICARBONATE)
- 15 PROTECTIVE COVER
- 16 DOSING CHAMBER LID (ALUMINIUM OXIDE)
- 17 DOSING CHAMBER (ALUMINIUM OXIDE)
- 18 HANDPIECE
- 19 FLUID TANK

**FIGURE 1**

# REAR VIEW OF AQUACUT QUATTRO

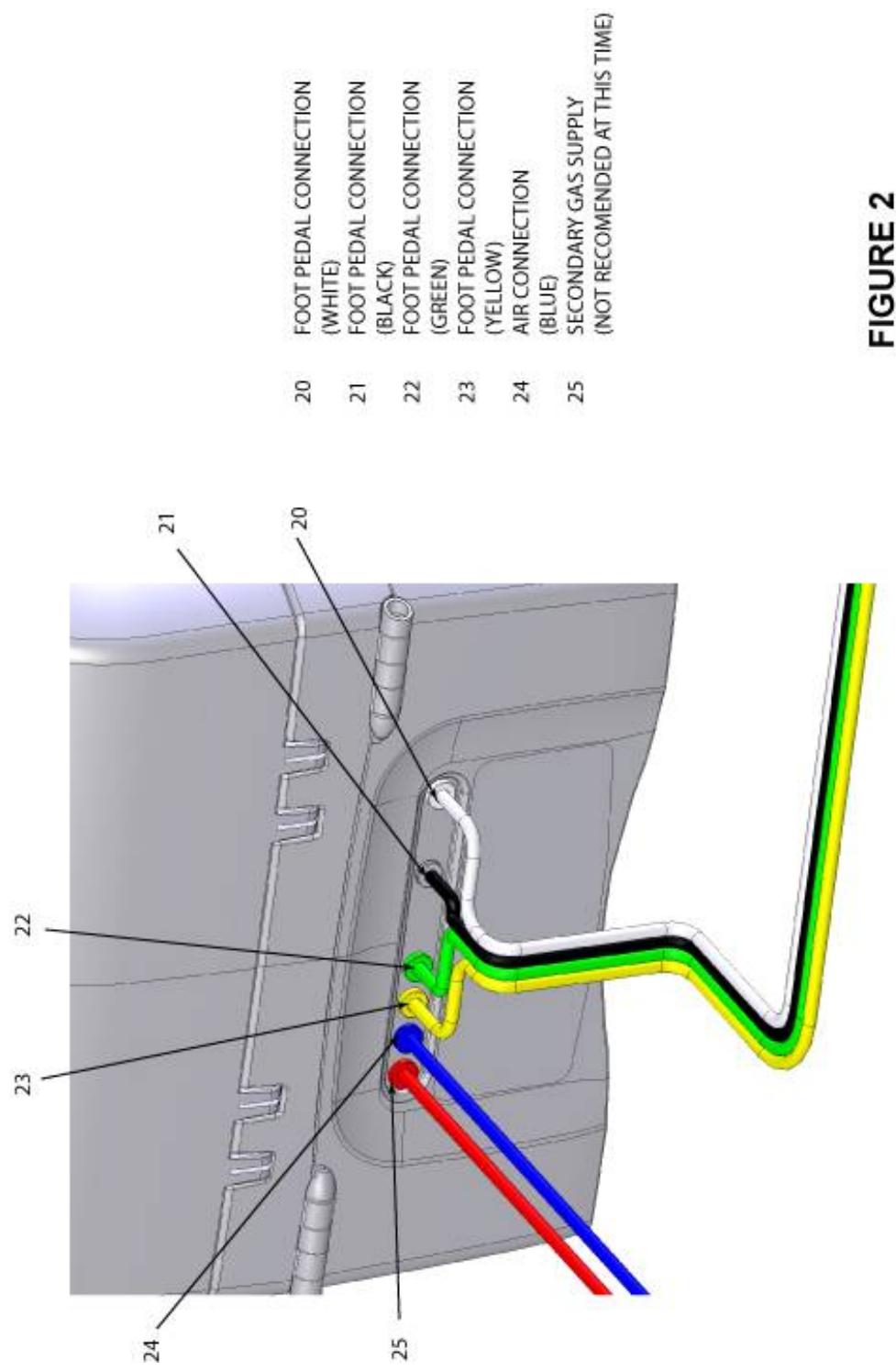
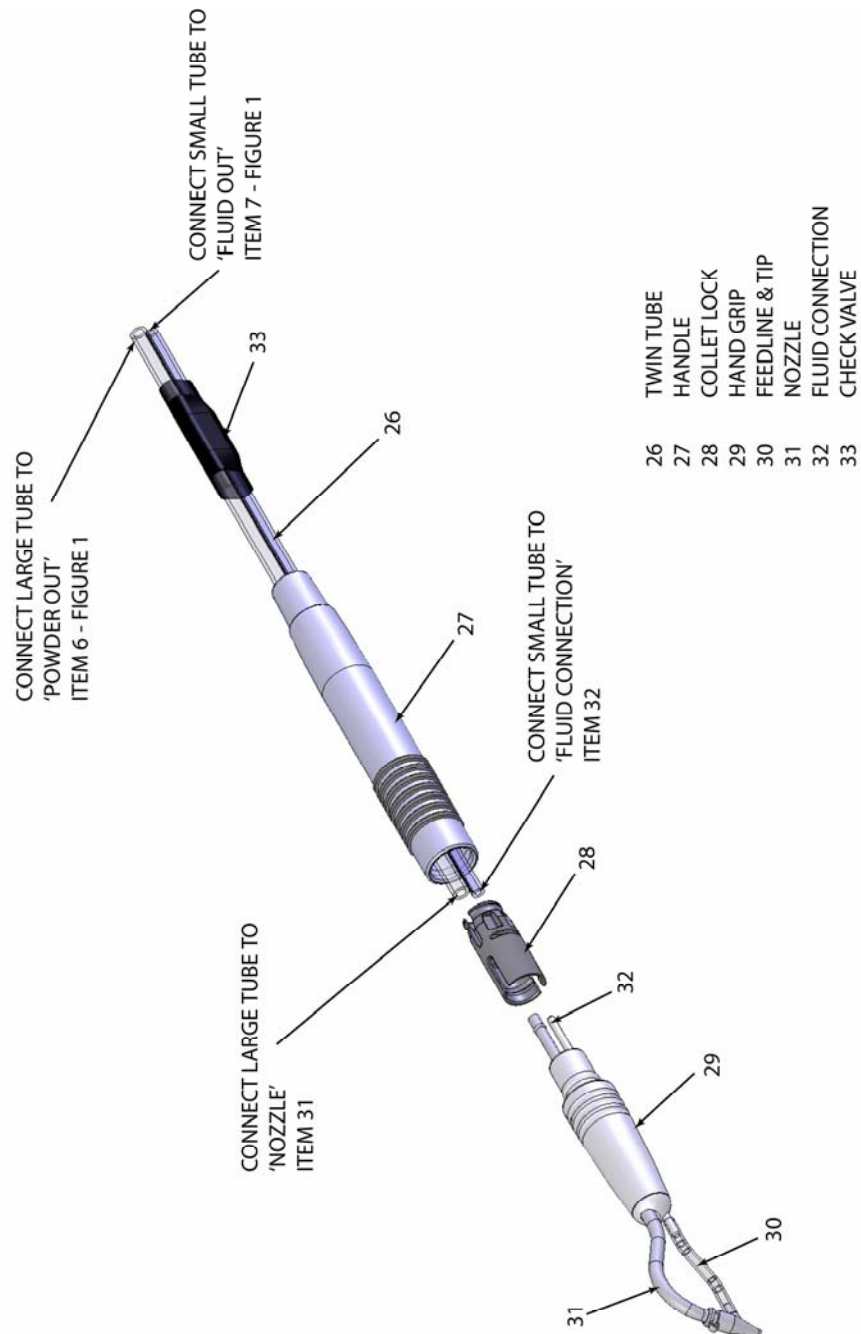


FIGURE 2

# HANDPIECE



**FIGURE 3**

# **HANDPIECE TIP REPLACEMENT AND STERILISATION**

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## REPLACEMENT OF DISPOSABLE TIP



1. FOLD OVER THE LOCKING TAB AS SHOWN ABOVE



2. PUSH THE TIP ONTO THE NOZZLE UNTIL FIRMLY ENGAGED



3. ROTATE THE TIP SO THAT THE FEED TUBE IS POSITIONED CENTRALLY TO THE HANDPIECE. PUSH THE TUBE ON TO THE CONNECTOR.

### IMPORTANT

1. DISPOSABLE TIPS ARE FOR ONE TIME USE ONLY.
2. WHEN FITTING A NEW TIP ENSURE THAT IT IS FIRMLY ENGAGED ON THE CUTTING NOZZLE AS ILLUSTRATED.
3. READ AND FOLLOW THE QUATTRO OPERATION MANUAL.

### DISCARD THE TIP AFTER USE

### WARNING

THESE TIPS ARE DESIGNED FOR USE WITH THE MEDIVANCE QUATTRO. ATTEMPTS TO USE THEM WITH ANY OTHER MICRO ABRASION MACHINES COULD BE HAZARDOUS.

## STERILISING OF HANDPIECE



REMOVE THE DISPOSABLE TIP (AS SHOWN)



HANDPIECE



INNER COLLET

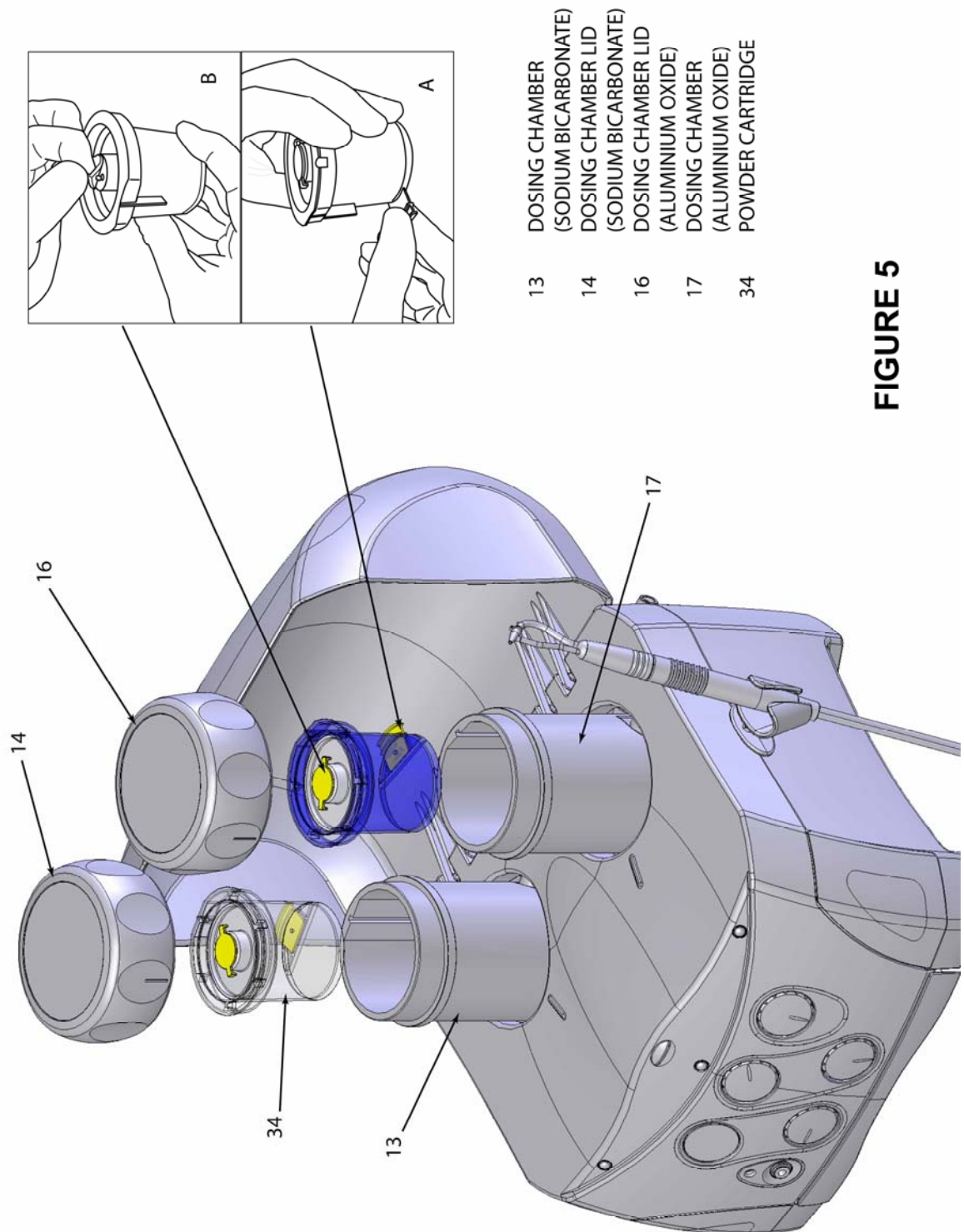


HANDLE

SEPARATE HANDPIECE AS SHOWN AND PLACE IN STERILISER. THE PLASTIC PARTS SHOULD BE REPLACED AFTER 20 CYCLES. THE CUTTING TIPS/ HANDPIECE SHOULD BE REPLACED WHEN THE CUTTING EFFICIENCY IS IMPAIRED.

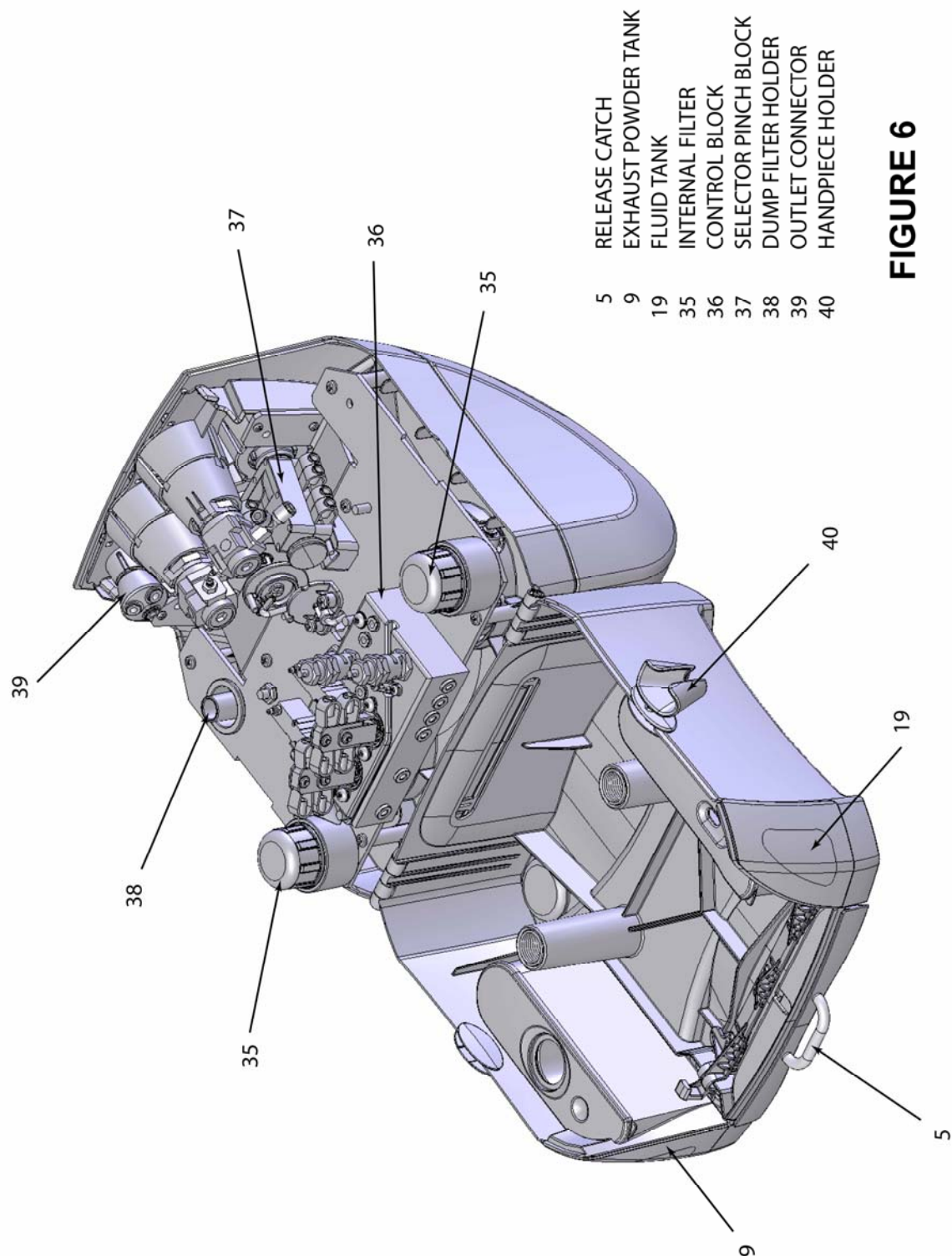
FIGURE 4

# DOSING CHAMBER POWDER CARTRIDGE REPLACEMENT



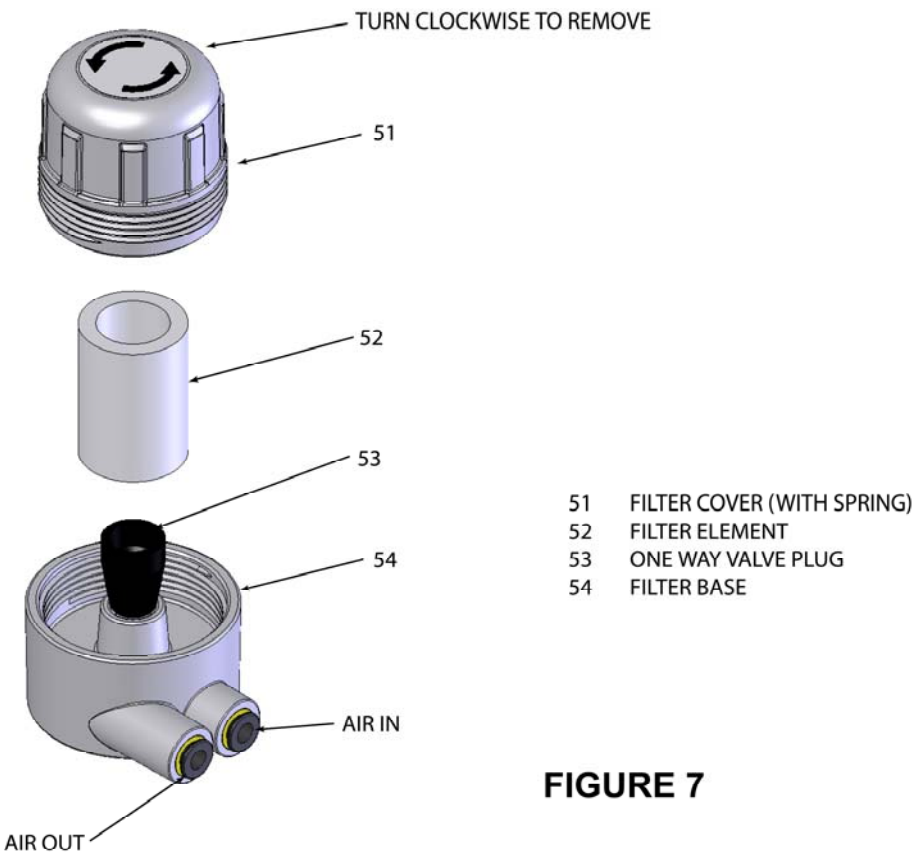
**FIGURE 5**

# INTERNAL VIEW OF AQUACUT QUATTRO



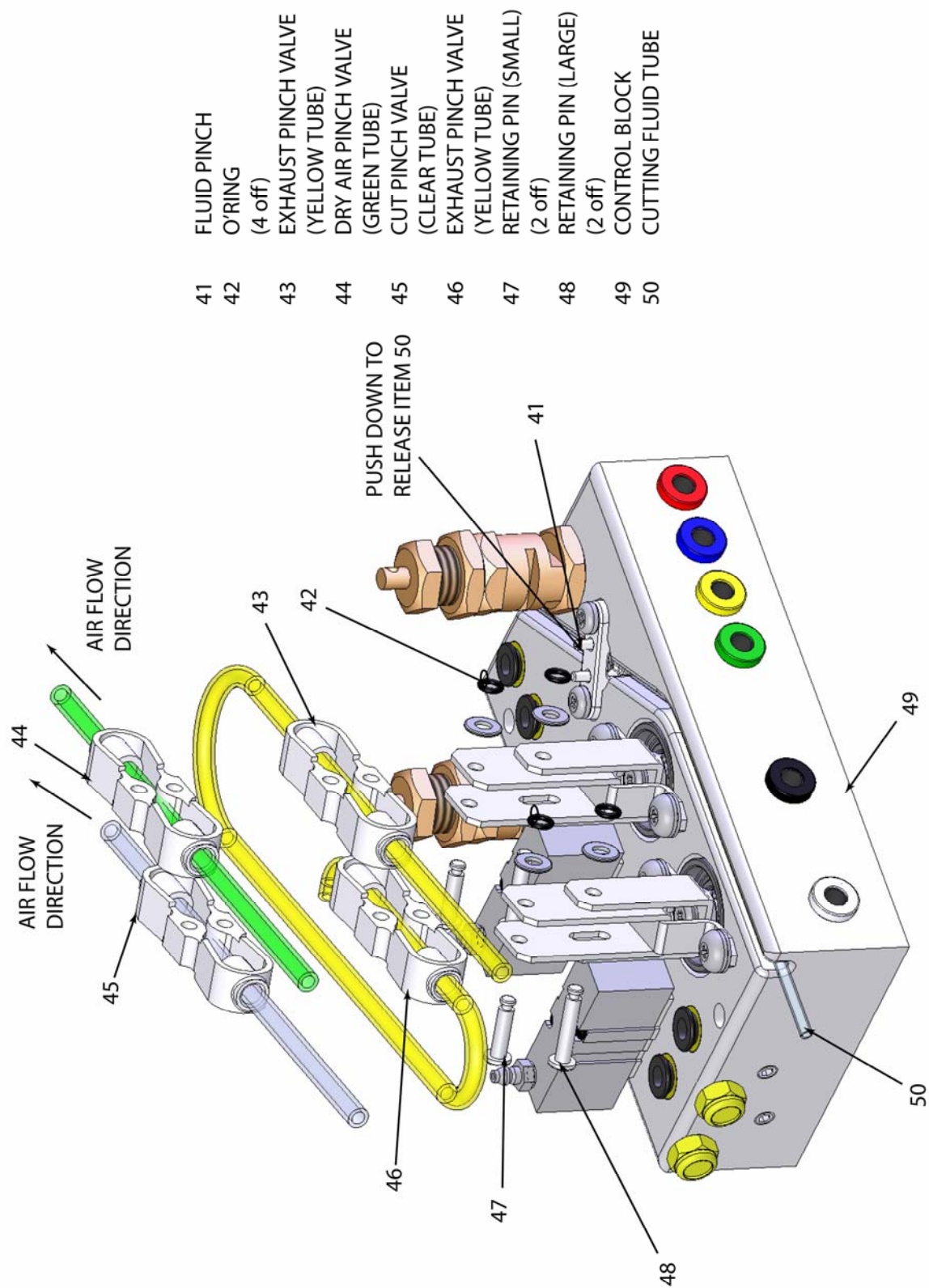
# INTERNAL FILTER ASSEMBLY

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**FIGURE 7**

# CONTROL BLOCK



**FIGURE 8**

## SITING THE AQUACUT QUATTRO

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Familiarise yourself with the layout of the AQUACUT QUATTRO by referring to the illustrations within this manual.

The machine is designed to be used on a rigid table top or on a purpose built dental cart with the controls in easy reach of the Dentist.

Do not place the machine close to the edge or allow overhanging of the table top.

**NOTE:** Consideration must be given to the fact that the AQUACUT QUATTRO uses light vibration to dispense the abrasive powder and any lack of rigidity of the table or work surface will adversely affect the maximum flow rate of the powder.

Site the foot pedal, (item 11), within easy reach of the Dentist and route the hose to the rear of the machine.

## MACHINE INSTALLATION

---

Before proceeding to install the Aquacut Quattro, ensure the air supply is available and meets the site requirements detailed on page 2 and in the section Technical Description on page 3.

**Always ensure safety goggles are worn by everyone in the area when setting up or using this equipment.**

**Always ensure the handpiece is under control and the nozzle is pointing in a safe direction.**

**Do not turn on the air supply until you have read the complete manual, particularly the section headed 'Removing and Refitting the Dosing Chamber Lids', and made sure that both lids, (item 14 & 16), are correctly and fully engaged.**

To prevent unnecessary use of powder, only fit the powder cartridges when required.

Refer to Figures 1; 2; 3; 4; 5 & 6 during the installation process.

1. Remove the machine from the box and place it onto the working surface.
2. Connect the foot valve to the back of the machine by pushing each coloured tube fully into the four corresponding colour coded connectors, (items 20 - 25). (To disconnect, first push the coloured connector collet inwards and hold, then push the tube inwards and then pull out).
3. Connect the 4mm Blue supply line from the air supply outlet to the air inlet of the machine, (item 24).
4. Red supply line connection for Secondary Gas supply outlet to the machine, (item 25). **(NOT RECOMMENDED AT THIS TIME).**
5. By pressing lightly down on the top of the machine, pull the Release Catch, (item 5), and allow the front of the machine to open. Slide out the Fluid Tank, (item 19), from the machine and fill with Cutting Fluid. Replace the Tank Lid and slide back into position. Press down on top of the machine until the Release Catch operates to hold the front of the machine down securely.
6. Unpack the Quick Connect Twin Tube Line, (item 26). Connect one end, (marked with a black sleeve), to the outlets of the machine, (item 6 & 7),
7. Unpack and connect a 0.6mm nozzle Handpiece to the other end of the twin tube. Slide the handle, (item 27), onto the twin tube, (item 26) then firmly push the two tubes onto the Hand Grip, (item 29), until they are fully located. Then slide the handle back onto the Hand Grip until it 'clicks' into position.

Handpiece sizes are as follows: - Blue = 0.5mm (Optional extra)  
Silver = 0.6mm (Supplied)  
Gold = 0.8mm (Optional extra)

**NOTE: - The nozzle, (item 31), and Hand Grip, (item 29), are permanently connected and should not be separated. To change the nozzle cutting sizes simply change the complete handpiece.**

8. Assemble a replaceable feed line and tip, (item 30), to the nozzle ensuring that it is firmly pressed on and square, (see Figure 4). Push the tube into the Handpiece connector underneath the nozzle.
9. Check the Dosing Chamber Lids, (item 14 & 16), are correctly fitted. See page 21.
10. **Wear safety goggles.** Turn on the air supply to the machine, (item 1), by selecting the appropriate gas setting, (I = Air; II = Secondary gas – not recommended at this time). Rotate the 2 lower rotary control knobs from high to low setting, then set the speed control to 1, (centre position) and the Powder control to 2, (centre position).

## MACHINE INSTALLATION.....Cont

11. Pick up the Handpiece and pointing nozzle into a safe/suitable place, (sink/bin/aspirator etc). Press down onto the **WASH** position of the foot pedal to operate the machine. Check after a few seconds that fluid is being drawn up the fluid tube. Continue to operate until the fluid sprays a fine mist from the nozzle.
12. Release the **DRY** position of the foot pedal to check that air continues but fluid stops.
13. Press the foot pedal fully down, (**CUT**), to check that the vibrators work and fluid flows. (Rotate the Powder Selector Switch, (item 3), to check that the other pot vibrates).
14. Mode of operation for the foot control is as follows: -

CUT	- Fully Down Position	- Vibration-Powder- Fluid
WASH	- Middle Position	- Fluid- Clean air
DRY	- Upper Position	- Dry clean air
15. Switch off the machine using the rotary Off switch, (item 1).
16. **Wait** – The machine will take approximately 20 SECONDS to depressurise before the Dosing Chamber Lids can be unscrewed and removed.
17. The following instructions cover the insertion of a new powder cartridge into a dosing chamber for the first time. On any subsequent occasion refer to the section headed REMOVING AND INSERTING A POWDER CARTRIDGE.
18. ENSURE THE APPROPRIATE POWDER IS INSERTED INTO THE CORRECT CHAMBER AS FOLLOWS:

<u>Powder Type</u>	<u>Colour Code</u>	<u>Position</u>
SODIUM BICARBONATE	WHITE	LEFT HAND
ALUMINIUM OXIDE (29 or 53 micron)	RED/BLUE	RIGHT HAND
19. Refer to Figure 5. Take a Clear, (white- sodium bicarbonate) powder cartridge for insertion into the **Left Hand Chamber**. Remove the lower yellow draw tab 'A'. Position the cartridge over the dosing chamber, (item 13), ensuring that the flat on the cartridge matches the dosing chamber. Insert the cartridge ensuring the rib slides down the slot inside the Dosing Chamber. The upper flange should rest on the top face of the chamber. Remove the upper yellow top seal 'B'. **Replace the dosing chamber lid tightly. The black marker line should face forward.**
20. Repeat the procedure to insert the required cutting powder in the Right Hand Chamber, (Item 17), Red/Blue.
21. Aim the handpiece into the aspirator and turn on the Air Supply to position I, (item 1). Press the foot pedal to 'CUT' position and check the machine is operating and powder is flowing. Recheck the three Foot pedal operation modes, (see 14 above).
22. Test;- Aim the handpiece at about 25-30mm from a piece of tissue paper and press 'CUT' on foot pedal. Check that a ring of white powder inside an outer ring of fluid can be seen. This is best carried out in a sink area to help contain the powder.
23. A secondary Gas supply is connected, (**NOT RECOMMENDED AT THIS TIME**), select II, (item 1) and repeat the test in 22 above.
24. The machine is now set up for use. Turn off machine. Remove handpiece.

# PREPARING TO USE THE AQUACUT QUATTRO FOR THE FIRST TIME

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**Use only original Medivance consumable products, (i.e. powders etc), as other makes may damage or alter the performance of the Aquacut Quattro and make the machine dangerous.**

**Refer to the USER MANUAL for guidance in selecting the correct powders.**

**The Handpieces (item 18) are supplied clean but not sterilised. It is therefore essential that they are sterilised before use and between every patient.**

**Refer to the following sections when preparing the Aquacut Quattro for first time use:-**

**STERILISING THE HANDPIECE- PAGE 22**

**REMOVING AND REPLACING A HANDPIECE- PAGE 22**

**REMOVING AND REFITTING THE DOSING CHAMBER LIDS- PAGE 21**

**REMOVING AND INSERTING A POWDER CARTRIDGE- PAGE 21**

**Proceed as follows:-**

Check the machine is switched OFF, (item 1).

The handpieces, (which are supplied with the cutting nozzles permanently attached), are designed to be repeatedly autoclaved for their sterilisation.

Refer to the section headed **STERILISING THE HANDPIECE** in this manual before use on patients.

Fit the required size of handpiece to the Twin Feed Tube, (item 26).

Refer to the USER MANUAL for guidance in selecting the correct nozzle.

Fit the disposable feed line and tip, (item 30), to the handpiece nozzle.

Fit the required Powder cartridges into the dosing chambers.

Refer to the USER MANUAL for guidance in selecting the correct powder for a particular procedure.

Fill the Cutting Fluid Tank, (item 19).

For the next two settings the AQUACUT QUATTRO will need to be switched on at the on/off switch, (item 1).

The pressure of the abrasive laden air that will flow from the nozzle can be set by turning the air pressure control, (item 4), on the front panel and observing the gauge, (item 8).

The air pressure options are:

Area 1 - low energy, gentle action

TO

Area 3 - high energy, very fast cutting.

Refer to the USER MANUAL for guidance in selecting the correct air pressure settings.

The amount of powder entrained in the air flow can be set by turning the flow control, (item 2).

The abrasive content options are:

1 - Low powder content, slow cutting/cleaning,

TO

5 - High powder content, very fast cutting/cleaning.

Refer to the USER MANUAL for guidance in selecting the correct abrasive content.

# PREPARING TO USE THE AQUACUT QUATTRO FOR THE FIRST TIME

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## FLUID SYSTEM

The amount of fluid delivered to the cutting nozzle is factory preset. The flow rate is controlled automatically depending on the selected nozzle size and air pressures.

When re-filling the Fluid Tank, the smaller tube of the twin assembly will need to be purged of any air that may have entered the system.

To achieve this turn the powder setting to 1, (item 2), this will prevent unnecessary powder being expelled from the handpiece. Point the handpiece in a safe direction, (i.e. the inlet of the evacuation unit), and press the foot pedal 'WASH' centre position. The machine will expel air from the handpiece and purge the fluid through the line.

The procedure is complete when a continuous fine mist sprays from the nozzle and no air pockets can be seen in the smaller tube.

Reset the pressure on the powder setting, (item 2).

We recommend that the Fluid Tank is checked and re-filled daily as a matter of surgery procedure to prevent running out of fluid whilst working. Depending on usage this may also be carried out at the beginning of the afternoon session.

**The feed line and tip are for one time use only. To prevent cross contamination always use a new disposable feedline and tip, (item 30), with every patient. Always flush the fluid through the tube system for 20 seconds before initial use and at the start of every day.**

## REMOVING AND REFITTING THE DOSING CHAMBER LIDS

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Ensure that the AQUACUT QUATTRO is turned off, at the on/off selector (item 1).

**WARNING: ALWAYS MAKE SURE THAT THE NOZZLE (item 31) IS AIMED INTO THE INLET OF YOUR EVACUATION UNIT AND THE EVACUATION UNIT IS TURNED ON WHILE THE AQUACUT IS BEING TURNED OFF OR ON. WAIT UNTIL THE AIR HAS BEEN EXHAUSTED FROM THE MACHINE BEFORE REMOVING THE DOSING CHAMBER LIDS. THE MACHINE WILL TAKE ABOUT 30 SECONDS TO DEPRESSURISE WHEN TURNED OFF.**

To remove the lids (item 14/16), unscrew anticlockwise for  $\frac{2}{3}$  of a turn at which point you will feel the pressure seal release. Then unscrew a further 1 turn and lift off. This extra 1 turn is a safety feature which allows any pressure retained in the dosing chamber to exhaust to air while the lid is still safely engaged.

To refit the lid, place back on top of the dosing chamber (item 13/17) and screw clockwise until the seal is felt engaging with the top of the chamber. Continue to screw until the lid comes against a 'stop', this is indicated when the line engraved on the skirt of the lid is facing to the front of the machine.

**ALWAYS ENSURE THE CORRECT COLOUR CODED LID IS FITTED TO THE CORRESPONDING CHAMBER AS FOLLOWS: -**

<b>White</b>	<b>Left Hand Lid</b>	<b>Cleaning Powders</b>
<b>Red or Blue</b>	<b>Right Hand Lid</b>	<b>Cutting Powders</b>

## REMOVING AND INSERTING A POWDER CARTRIDGE

---

**WARNING: ONLY USE ORIGINAL MEDIVANCE POWDERS WHICH ARE SEALED IN NEW CONTAINERS. OTHER POWDERS COULD ALTER THE PERFORMANCE OF THE AQUACUT QUATTRO AND MAKE THE MACHINE DANGEROUS.**

To remove a previously used powder cartridge, put a steady hand on top of the AQUACUT QUATTRO outer cabinet and gently lift the cartridge out of the dosing chamber.

If the powder cartridge is not empty and is going to be used again later, replace it carefully into the plastic storage pot supplied with the product.

Refer to Figure 5. To fit a new powder cartridge, take a new powder cartridge of the required grade and remove the lower yellow draw tab (A).

Position the powder container over the dosing chamber, (item 13/17), ensuring that the flat on the powder cartridge's skirt is in line with the flat inside the dosing chamber.

Insert the cartridge into the dosing chamber so that the rib on the cartridge slides down the slot inside the dosing chamber. The powder cartridge will slide fully down until its top flange rests on the top face of the dosing chamber.

If the powder cartridge will not go fully down, remove and check that the rib on the powder cartridge skirt slides down the slot in the flat inside the dosing chamber, and try again.

Peel off the upper yellow sealing tab (B).

Finally, refit the dosing chamber lid.

**ALWAYS ENSURE THE CORRECT COLOUR-CODED LID IS FITTED TO THE CORRESPONDING CHAMBER AS FOLLOWS: -**

<b>White</b>	<b>Left Hand Lid</b>	<b>Cleaning Powders</b>
<b>Red or Blue</b>	<b>Right Hand Lid</b>	<b>Cutting Powders</b>

## STERILIZING THE HANDPIECE

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The handpiece has been designed for reprocessing using a steam sterilizer.

The handpieces are supplied clean but not sterile, therefore it is **essential** that they are sterilized before first being used and between patients.

Before sterilizing, the handpieces should be thoroughly washed in mild soapy water, cleaned and rinsed to remove any debris. An ultrasonic cleaning bath can also be used.

To ensure satisfactory steam penetration during sterilization, it is important to check that the two channels through the handpiece are clear and unblocked. To test this, fill the special syringe supplied with clean water and, by holding the end firmly against each channel in turn, squirt water through the handpiece and check for flow from the nozzles.

If the nozzle is blocked use the cleaning wire supplied to remove the debris.

The syringe should also be used for general flushing and cleaning of the handpiece channels.

### **THE HANDPIECE MUST BE STERILIZED BETWEEN USES TO THE FOLLOWING CONDITIONS:—**

Minimum 134°C, (273°F) at 2 bar for 3.5 minutes. This will ensure that a Sterility Assurance Level (SAL), of  $1 \times 10^{-6}$  is achieved.

A suitable sterilization pouch should be used to maintain sterility and used in accordance with the manufacturer's instructions.

## REMOVING AND REPLACING A HANDPIECE

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**WARNING: Do not use a handpiece if the hole in the tip of the nozzle is worn to the outer edge or if the swan neck tube is perforated by the abrasive.**

**WARNING: Use only handpieces supplied by Medivance Instruments as other makes may damage or alter performance and make the machine dangerous.**

Refer to Figures 3 & 4

To remove the disposable feed line and tip, (item 30), pull the feedline off the lower handle connector. Pull the plastic tip off the cutting nozzle.

To remove the handpiece, (item 18), from the Twin Tube, (item 26), pull the Hand Grip (item 29), and Handle (item 27), apart. Pull the Twin Tube out of the Collet Lock (item 28), until the two parts come free.

To fit a new handpiece, slide the handle (item 27), onto the twin tube (item 26) then firmly push the two tubes onto the Hand Grip (item 29), until they are fully located. Then slide the handle back onto the Hand Grip until it 'clicks' into position.

To fit the disposable feed line and tip (item 30), first fold over the 'O' ring locking tab of the plastic tip and push squarely onto the Hand Grip (item 29), until firmly engaged.

Rotate the tip so that the feed line is positioned centrally underneath the nozzle.

Finally, push the feed line onto the connector.

**The feed line and tip are for one time use only. To prevent cross contamination always use a new disposable feedline and tip (item 30), with each patient. Always flush the fluid through the tube system for 20 seconds before initial use and at the start of every day.**

# USING THE AQUACUT QUATTRO

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**ATTENTION-** Please read all the following important **warnings** before using the Aquacut Quattro:

Only qualified dentists and dental hygienists should use the Aquacut Quattro on patients, after reading this manual fully.

Before using the Aquacut Quattro, the person operating the unit, any assistants, the patient and anyone else in the room **must** wear eye protection to BS EN 166 IF 4/5 and, except for the patient, they must all wear respiratory masks to EN 149 FF2S.

The disposable tip and feed tube are for one time use only and must be changed for each patient.

The handpiece must always be autoclaved (sterilised) between patients.

Patients who are on restricted sodium diets or have respiratory problems should consult their physicians before having treatment with Aquacut Quattro.

Aquacut Quattro may cause soft tissue damage, including inflammation and bleeding, and creation of an air embolism.

Aquacut may cause hard tissue damage including etching or abrasion of enamel or exposed root surfaces of the teeth.

When switching powders, (**especially** from Aluminium Oxide to Sodium Bicarbonate), the powder line must be purged by pressing the 'CUT' (bottom) position of the foot pedal for 10 seconds minimum. Aim the handpiece nozzle into the aspirator system to contain the powder.

Before operating the Aquacut Quattro you must be in full control of the handpiece, (item 18) and be pointing the nozzle (item 31), in a safe direction.

In the following circumstances the powder lines and handpiece must be purged of any previously used powder.

- a) each time the AQUACUT QUATTRO is switched on;
- b) each time a new cartridge of abrasive powder is loaded into the dosing chamber;
- c) each time a cartridge of abrasive powder is replaced with another grade, even if the replacement powder cartridge has been used before;
- d) each time a cartridge of abrasive powder is replaced with the same grade even if the replacement powder cartridge has been used before;
- e) each time you change between the two dosing chambers using the powder selector control (item 3) on the front panel;
- f) each time the air pressure is adjusted, (item 4) on the front panel;
- g) each time the abrasive powder flow is adjusted, (item 2) on the front panel;
- h) each time a handpiece is replaced.

To purge the feed tube and handpiece of any previously used powder and charge with the new powder, hold the handpiece and direct the nozzle into the inlet of the evacuation unit which must be turned on.

Now press the 'CUT' (bottom) position of the foot pedal (item 11), for 10 seconds minimum and observe the flow of abrasive powder as it is emitted from the nozzle. This will not only charge the feed tube and handpiece with the new abrasive powder and flush out any previous powder, it will also allow you to see how the powder will look as it comes out of the nozzle.

## FIRST STEPS TO MASTERING THE AQUACUT QUATTRO

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**NOTE: Should the Aquacut Quattro cease to operate correctly, or its performance deteriorate, or it becomes difficult to control, refer to the trouble shooting guide at the back of this manual.**

**WARNING: If the Aquacut Quattro is dropped or otherwise damaged, it must not be used until a service engineer has inspected the unit.**

**WARNING: The feed line and tip are for one time use only. To prevent cross contamination, always use a new feed line and tip (item 30), with each patient.**

**WARNING: For this section it is important to use high speed evacuation close to the cutting nozzle (item 31), while following the procedures below. All persons in the area must wear eye protection to BS 166 1F 4/5 and respiratory masks to EN149 FFP2S.**

**Aquacut Quattro tips are designed for use only with the Medivance Aquacut Quattro. Attempts to use with any other micro abrasion machines could be hazardous. When fitting a new tip, ensure that it is firmly engaged on the cutting nozzle.**

**In most cases wear on the plastic tip should last long enough for one treatment. However, in the case of prolonged treatment the fluid flow through the nozzle may reduce and become uncontrolled. If this occurs, replace with a second tip.**

In the pack that comes with the machine are some 1mm thick glass microscope slides that show a close similarity in hardness to tooth enamel. Cutting through these slides with various combinations of abrasive powder grade, air pressure, abrasive flow and nozzle diameter will give you a graphic display of the speed of penetration and the size and shape of the cuts that are available before you progress to cutting teeth.

Refer to the USER MANUAL and read it thoroughly before proceeding to cut the glass slides or extracted teeth.

To start, choose settings that cover a typical procedure that you would want to use on a patient.

**NOTE: Confirm the grade of the powder selected, by observing the colour of the powder container in the selected dosing chamber.**

Red = 53 micron aluminium oxide.

Blue = 29 micron aluminium oxide.

Clear/White = Sodium Bicarbonate.

**Handpiece sizes are as follows: -**

Blue = 0.5mm (Optional extra)

Silver = 0.6mm (Supplied)

Gold = 0.8mm (Optional extra)

With the Aquacut turned on and all the settings made, switch on your aspirator and hold the glass slide in front of its inlet tube.

# FIRST STEPS TO MASTERING THE AQUACUT QUATTRO

## cont.....

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Hold the handpiece with the cutting nozzle, (item 31) facing the glass slide and 1.5mm from its surface.

Press the foot switch to operate the Aquacut Quattro.

The foot switch has three control positions depending on the area that is pressed. The modes of operation are as follows:-

<u>Position</u>	<u>Operation</u>	<u>Action</u>
Fully down	Fluid cutting	Powder and fluid are supplied from the handpiece
Middle	Wash	Clean air and fluid are supplied from the handpiece
Upper	Dry	Clean dry air is supplied from the handpiece

Practise moving your foot through the cut/wash/dry positions, so that you gain confidence and experience with the way the foot switch operates.

It is important to observe how the abrasive rebounds from the cut surface. Practice moving the aspirator inlet tube as the handpiece moves so that waste materials are efficiently collected.

**Important: -** The inside mouth area is much more enclosed than the open work surface. The result is in a greatly reduced spread of abrasive material in the normal working area.

Try cuts of about 2 seconds duration and observe the results. Repeat the cut with the nozzle at varying angles to the surface of the glass slide until you feel confident that you can predict the results and aspirate effectively.

Move the cutting tip backwards and forwards over the area to be cut to examine various cutting methods and results. Practise using all three cutting media to evaluate the differing performance and results.

The next step is to practise cutting into an extracted tooth. In the same way modify the various settings in the light of the results you achieved on the glass slides, until you are satisfied with the results.

Finally, refer to the USER MANUAL - read it thoroughly again before selecting the various settings suggested for the procedure you wish to perform and before using the AQUACUT QUATTRO on a patient for the first time.

**WARNING: Special consideration must be given to the use of the Aquacut Quattro on patients who have:**

- 1. RESPIRATORY DIFFICULTIES**
- 2. ASTHMA**
- 3. A COLD**
- 4. BLOCKED NASAL PASSAGES**
- 5. RESTRICTED SODIUM DIET**
- 6. ANY OTHER MEDICAL PROBLEM THAT MAY PREVENT THE PATIENT FROM BREATHING THROUGH THE NOSE.**

**ANY PATIENT SUFFERING FROM ANY OF THE ABOVE CONDITIONS SHOULD CONTACT THEIR PHYSICIAN BEFORE HAVING TREATMENT WITH AQUACUT QUATTRO.**

# MAINTENANCE OF THE AQUACUT QUATTRO

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**WARNING: - Always make sure that the nozzle (item 31), is aimed into the inlet of your evacuation unit and the evacuation unit is turned on while the Aquacut Quattro is being turned 'on' (I or II) or 'off' (O), at the selector switch (item 1).**

**Wait until the air has been exhausted from the machine before carrying out any cleaning or maintenance on the machine.**

**Always ensure safety goggles are worn by everyone in the area when setting up, testing or using this equipment.**

**Always ensure the handpiece is under control and the nozzle is pointing in a safe direction.**

## **ANNUAL SERVICE AND SAFETY CHECK.**

For the continuing safe and reliable functioning of the AQUACUT QUATTRO it is recommended that you contact your supplier or Medivance Instruments and book an annual service and safety check.

Ensure the twin tube assembly is replaced annually or when damaged.

This will take only a short time and ensure the continued integrity of your AQUACUT QUATTRO.

## **CLEANING THE AQUACUT QUATTRO.**

Keep the casing, the dosing chambers, (item 13/17) and their lids (item 14/16) clean with a pure water dampened cloth, taking care not to allow any liquid to get inside the machine. Use **only mild soapy water** for cleaning the case and dosing chambers.

The inside of the dosing chambers, lids and the powder cartridges must be kept dry at all times.

## **INSPECTION OF THE DOSING CHAMBERS.**

**WARNING: under no circumstances must any other cleaning agent, including surface wipes containing alcohol, come into contact with the case or the dosing chambers.**

**The dosing chambers are polycarbonate pressure vessels and must be inspected for any visible damage each time a new container of abrasive powder is loaded into them.**

**If any damage is evident the Aquacut Quattro should not be used until a Medivance approved service engineer has inspected the machine.**

## **EMPTYING AND CLEANING THE FILTERED EXHAUST COLLECTOR.**

At the beginning of each day it is necessary to empty the powder exhaust tank (item 9) and clean the filter (item 38).

Press lightly down on the top of the machine, pull the Release Catch (item 5), and allow the front of the machine to open. Supporting the machine, pivot the upper part of the machine fully over and until the cover (item 15), rests on the work surface and the inside is presented as shown in figure 6. Slide the Powder Tank (item 9), out of position, remove the lid and empty the contents into a waste bin. DO NOT RE-USE as the powder is contaminated with cutting/polishing. Replace the tank lid and slide back into position.

Remove the filter pad from the filter, (item 38), shake to clean and refit.

Refill the Fluid Tank.

Pivot over the top of the machine and press down until the Release Catch (item 5), operates to hold the front of the machine down securely.

# MAINTENANCE OF THE AQUACUT QUATTRO cont.....

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## **HANDPIECE.**

### **Cleaning**

**Handpieces must be cleaned and STERILIZED before first use and between every patient. See the separate section STERILIZING THE HANDPIECE on page 22.**

### **Blockages**

If the abrasive powder ceases to flow from the nozzle (item 31) while cutting is in progress, the nozzle may have become blocked with abrasive particles.

Release the foot pedal (item 11), as soon as a blockage is suspected to minimise the amount of powder collecting behind the nozzle.

Aim the nozzle (item 30), into the inlet of your evacuation unit and make sure the evacuation unit is turned on while you turn the AQUACUT 'off' at the on/off selector, (item 1).

Wait for the air to be exhausted from the machine (about 20 seconds) before proceeding.

Now remove the handpiece and clear the blockage by inserting a length of 0.35mm wire (supplied) through the nozzle from the tip. Stubborn blockages may be loosened by immersion in an ultrasonic cleaning bath.

### **Inspection**

Regularly inspect the cutting nozzle and handpiece for excessive wear or damage.

Do not use a handpiece if the hole in the tip of the nozzle is worn to the outer edge or if the swan neck tube is perforated by the abrasive.

## **TWIN TUBE ASSEMBLY**

### **Cleaning**

The Twin Tube Assembly (item 26), must not be autoclaved.

Wash the Twin Tube Assembly in mild soapy water and rinse thoroughly. Allow to dry completely before use.

Always purge the tubes with Powder and Fluid thoroughly before use.

### **Inspection**

Ensure the Twin Tubes are in good condition and fit together correctly with the Handpiece.

Test the Check Valve (item 33) is functioning. The valve prevents fluid being forced back down the tube during use.

Check 1 - With the twin tube filled with fluid, disconnect the tube at the Fluid Out connection, (item 7). Hold the handpiece up vertically and check that the fluid in the tube does not drip from the disconnected end. Reconnect the tube.

Check 2 - With the machine in the 'ready to use' condition, press the '**Wash**' control on the foot pedal and gently press the plastic tip on the end of the nozzle down onto a flat surface (e.g. a glass slide). The fluid should be prevented from blowing back down the fluid line past the handpiece. The joint between the plastic tip and feedline may also disconnect.

Replace the whole Twin Tube Assembly if any faults are found.

# MAINTENANCE OF THE AQUACUT QUATTRO cont.....

## REPLACING THE ABRASIVE TUBE ASSEMBLY AND INTERNAL FILTERS.

The Aquacut Quattro uses a system of pinched tubes (items 43, 44, 45 & 46), to control the abrasive powders supplying the handpiece. Over time, these wear and should be replaced every 12 months.

If the Aquacut Quattro exhibits an audible air leak from inside the machine and performance falls below standard, it is possible that one of these abrasive tubes has split near one of the pinch valves.

The Aquacut Quattro also has 2 internal air filters (items 35), that protect critical components. These should be visually inspected at the same time and if necessary replaced.

The Aquacut Quattro has been designed so that these tubes and filters can be easily replaced without the need for specialist tools. The procedure should take no longer than 15 minutes.

For spare parts you will need to specify the machine Serial Number shown on the technical label on the back of the machine.

You will need both a medium size flat and a cross head screwdriver.

**WARNING: Turn off the air supply at the wall outlet and disconnect the air and Secondary Gas supply inlet connections, (item 24 & 25), at the rear of the machine before attempting any maintenance.**

The abrasive tubes are connected inside the machine using collet lock fittings.

To disconnect the tube from this type of fitting proceed as follows and refer to the diagram opposite.

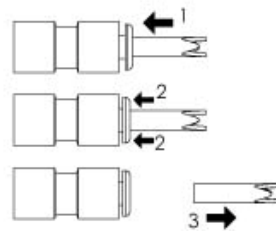
1. Push and hold the tube towards the fitting.
2. Push in and hold the fitting collar.
3. Pull the tube out of the fitting.

To reassemble, simply push the tube firmly into the fitting.

**To replace the pinch tubes proceed as follows:-**

Refer to Figure 8.

1. Press lightly down on the top of the machine, pull the Release Catch (item 5), and allow the front of the machine to open. Supporting the machine, pivot the upper part of the machine fully over and until the cover, (item 15), rests on the work surface and the inside is presented as shown in figure 6.
2. Locate the Pinch Block (item 49) and Pinch valves (items 42, 43, 44, & 45).
3. Notice that each pinch valve and tube end is colour-coded showing the corresponding position and location of the parts. Ensure that the new replacement parts have similar colour coding before proceeding.



## MAINTENANCE OF THE AQUACUT QUATTRO cont.....

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4. Remove the 4 small retaining 'O-rings (item 42).
5. Slide out the 4 retaining pins (item 47 & 48). Note that the 2 lower pins are longer.
6. The Pinch Valves are now able to be removed from their seating.
7. Disconnect the ends of the tube and discard 4 old pinch valves and tubes.
8. Matching the colour codes, refit the Pinch valves into their respective seating positions and replace the Retaining Pins and 'O' rings.
9. Push the tube ends into their correct positions.

DOUBLE CHECK that the correct coloured tubing connects to the correct Pinch Cylinders and Dosing Chamber Pot(s). Incorrectly fitted tubing will cause the machine to malfunction and could cause the wrong powder to be used at the Handpiece.

Check the condition of the Internal Air Filters (item 35). If they appear heavily soiled or wet, these should also be replaced. Proceed referring to Figure 7.

- a) Remove the cover by rotating CLOCKWISE (item 51).
- b) Remove the old Filter Element and discard.
- c) Refit a new Filter Element (item 52).
- d) Tighten the cover by rotating ANTI-CLOCKWISE, (ensure the Valve Plug is correctly fitted).

10. Pivot over the top of the machine and press down until the Release Catch (item 5), operates to hold the front of the machine down securely.

It is important that the machine is now tested to ensure that the piping of the machine has been carried out correctly.

To Test, proceed as follows:-

- a) Place **one cartridge only** of Powder into the White (Sodium Bicarbonate), chamber. (Ensure the Red/Blue Dosing Chamber is **empty**).
- b) **Wear Safety Goggles**. Switch the machine 'on' and check for air leaks.
- c) Using the Selector Switch (item 3), switch (select), the White Dosing Chamber and press 'Cut' on the Foot Pedal while aiming the nozzle at a piece of tissue paper at a distance of about 25mm (1 inch). This is best carried out in a sink area to help contain the powder.
- d) Check that a central ring of white powder inside an outer ring of fluid can be seen.
- e) Next press 'WASH' on the Foot Pedal while aiming the nozzle at a piece of tissue paper at a distance of about 25mm (1 inch).
- f) This time you should observe a ring of fluid with **no** powder.
- g) Switch to the Red/Blue Dosing Chamber, (purge the line for 10 seconds to clear any residual powder).
- h) Press 'CUT' while aiming the nozzle at a piece of tissue paper at a distance of about 25mm (1 inch).
- i) This time you should observe a ring of fluid with **no** powder. (There is no powder cartridge in the selected Dosing Chamber).

## MAINTENANCE OF THE AQUACUT QUATTRO cont.....

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- j) Turn the machine off and move the powder cartridge so that the Red/Blue (cutting powder) Dosing Chamber has powder loaded and the White Dosing Chamber is **empty**.
- k) Switch the machine 'on'.
- l) Using the Selector Switch (item 3), switch (select) the Red/Blue Dosing Chamber and press 'Cut' on the Foot Pedal while aiming the nozzle at a piece of tissue paper from a distance of about 25mm (1 inch).
- m) Check that a central ring of white powder inside an outer ring of fluid can be seen.
- n) Next press 'WASH' on the Foot Pedal while aiming the nozzle at a piece of tissue paper at a distance of about 25mm (1 inch).
- o) This time you should observe a ring of fluid with **no** powder.
- p) Switch to the White Dosing Chamber, (purge the line for 10 seconds to clear any residual powder).
- q) Press 'CUT' while aiming the nozzle at a piece of tissue paper at a distance of about 25mm (1 inch).
- r) This time you should observe a ring of fluid with **no** powder. (There is no powder cartridge in the selected Dosing Chamber).
- s) Finally add a Powder Cartridge to the White (Sodium Bicarbonate) Dosing Chamber and check that the CUT: WASH: DRY functions of the machine work satisfactorily when each Chamber is selected.

Switch off the machine and fit the required Powders into the Dosing Chambers.  
The machine is now ready for use.

# TROUBLESHOOTING

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Symptom:

The unit does not operate when foot pedal is depressed.

Action:

1. Ensure that the compressed air supply is at the specified pressure, is connected and turned on.
2. Ensure that the unit is switched on and that the air pressure and powder flow controls are set to a minimum of '1' on both of the settings. This should ensure that the unit will start correctly.
3. Check that the foot pedal hoses have been correctly connected to the back of the machine.
4. Ensure that the dosing chamber lids have been fully engaged. Incorrect fitting will result in a significant leakage of air from the dosing chamber. To remedy, turn the unit off and carefully wipe the inner Lid seal and Dosing Chamber sealing face. Fully screw down the lids so that the black line on the Lids points directly forwards.
5. Check that the pneumatic system has not been contaminated by wet compressed air. Should this have occurred it will be necessary to change the airline filters, clean or replace the airline and acquire the services of a Medivance trained engineer to assess the damage to the Aquacut Quattro unit.

Symptom:

The vibrator does not operate when the foot pedal is depressed.

Action:

1. Ensure that the compressed air supply is at the specified pressure, is connected and turned on.
2. Check that the foot pedal is connected correctly and that its free movement is not prevented by its position or some foreign body.
3. Check that the pneumatic system has not been contaminated by wet compressed air. Should this have occurred it will be necessary to change the airline filters, clean or replace the airline and acquire the services of an engineer to assess the damage to the Aquacut Quattro unit.

Symptom:

No air flow through the nozzle.

Action:

1. Ensure that the compressed air supply is at the specified pressure, is connected and turned on.
2. Ensure that the air pressure regulator is not set at too low a value - a minimum setting of '1' should give a detectable air flow.
3. Check that the nozzle is not blocked. If blocked remove the handpiece and clear the blockage with a cleaning wire.

## **TROUBLESHOOTING cont.....**

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Symptom:

Irregular flow or no flow of cutting fluid to the tip.

Action:

1. Worn feed line and tip. In most cases the wear on the plastic tip should last long enough for a patient treatment. Prolonged treatment may result in premature wear which may result in reduced or uncontrolled flow. Replace with a second tip.
2. Ensure the plastic tip is firmly engaged on the cutting nozzle.
3. Check the fluid tank is not empty and the tube in the tank is fully submerged.
4. Blockage in the supply line. Check the clear twin tube for evidence of material blocking the tube.
5. Leaking joint, air bubbles in the feed pipe indicates that air is seeping into a joint. The leaking point can be identified from the spot where the air appears. Check the joint and replace part.

NOTE: IF THE FAULT CANNOT BE LOCATED AND REPAIRED BY REFERRING TO THIS TROUBLESHOOTING GUIDE IT WILL BE NECESSARY TO ACQUIRE THE SERVICES OF A MEDIVANCE TRAINED ENGINEER FOR A MORE THOROUGH DIAGNOSIS.

## CONSUMABLE ITEMS AND SPARE PARTS

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### Description

### Part No

#### Consumables

4 off Containers of sodium bicarbonate	I/PDR 8015F
4 off Containers of aluminium oxide - 29 micron	I/PDR 8025F
4 off Containers of aluminium oxide - 53 micron	I/PDR 8035F
1 off Pack 500ml Fluid Bottles	I/PAC 8202F
Glass slides for cutting practice	I/MIC 0010P
50 pack Feed line and Tips A2	I/ASS 8007M

#### Spare Parts

0.4mm Handpiece - Green	I/ASS 8189A
0.5mm Handpiece - Blue	I/ASS 8190A
0.6mm Handpiece – Silver	I/ASS 8191A
0.8mm Handpiece – Gold	I/ASS 8192A
Exhaust Powder Tank and Lid	I/ASS 8193A
Fluid Tank and Lid	I/ASS 8194A
Dosing chamber lid assembly	I/ASS 8195A
Foot pedal complete with hose	I/ASS 8196A
Nozzle cleaning wire	I/FIT 8073P
Powder Storage Jar	I/ASS 8197A
Flushing Syringe 20ml	I/FIT 8101P
Internal Filter Elements 2 off	I/FIT 8198P
Internal Filter Assy 2 off	I/ASS 8198A
Twin tube	

**NOTES**

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