Power Scaling Helpful Hints

I. Handpiece

A. Hold the handpiece vertically with the power on and press on the foot control to allow water to overflow out of the handpiece. This allows water to flow over the stacks and maintain consistent performance of the insert. All of the air will be expelled from the handpiece. Trapped air can cause the handpiece to exceed a comfortable operator temperature.

B. Magnetostrictive technology – A low voltage magnetic signal causes tip movement. The handpiece contains coils that activate the inserts, causing them to vibrate. Inserts are easily interchangeable with magneto technology. Water flows over and through the stacks, preheating the water to a comfortable temperature, and then flows to the insert tip. The water at the tip is used to lavage away debris and endotoxins and to cool the tooth to tip interface that is present when using ultrasonic scalers.

C. Wrap the handpiece cable around the forearm or hook it inside the pinkie finger of the hand you instrument with to prevent wrist fatigue. The Cavitron Sterimate Handpiece with Swivel assists in controlling cable drag and hand fatigue as it rotates 360 degrees. The cable is a soft silicone-based material that easily drapes. This material is wiping disinfectable.

II. Parts of an Insert System

A. Stack – the stacks are the energy source for the insert. For peak performance, the stacks should be straight. Any bending of the stacks may interfere with the performance of the insert. The inserts, especially the stacks, should be treated as a fine grade surgical instrument.

When the insert is in proper working order, it will fit easily and freely into the handpiece. The stacks actually move by elongation and contraction on a horizontal plane, like stretching an elastic band. Contrary to common misconception, they do not move like an accordion. The elongation and contraction creates a uniform movement.

The stacks have the date, tip style (TFI, FSI, & SLI) and frequency (30K™/25K) stamped on them. The date code denotes the year first, then the month of manufacturing.

B. Connecting Body – The connecting body connects the energy source (stack) to the insert tip.

C. “O”-ring – The rubber O-ring stops the flow of water from coming outside the handpiece and directs the water toward the tip. As you bleed the handpiece to expel air, water will overflow out of the handpiece, which will wet the O-ring. Water is the only form of lubrication required for O-ring maintenance. Never use petroleum products on the O-ring, as petroleum will break down the rubber. Do not use any chemicals on the O-rings, it will cause them to dry and crack.

For timely maintenance, keep a supply of O-rings in the office. Black O-rings are for all TFI® (Thru Flow®) and FSI® (Focused Spray®) Inserts, including the FSI SLI inserts. Green O-rings are for the Classic “P” Inserts, SLI® (Slimeline®) Inserts, and the Cavitron™ Jet Insert nozzles.
D. Insert tip – the tip is the working end of the insert. With magneto technology, you can work with all surfaces of the insert. Take caution to never use the point of any type of ultrasonic insert, as it may cause gouging of the tooth surface.

E. 30K vs. 25K – Ordering the Proper Insert

1. Frequency - Cavitron™ Units operate at a frequency of 30,000 cycles per second, that is 30K, or 25,000 cycles per second, 25K.

2. There are 3 easy ways to tell what insert you need to order.

   a. Color Coding: Inserts are color coded. The TFI are black (30K) and gray (25K). The FSI inserts are dark blue (30K) and light blue (25K). The Bellisima™ inserts are all FSI and 30K™. The Bellisima™ are dark purple for large diameter inserts, FSI 31,000 and 1,000. The Bellissima™ FSI-SLI (Slimeline®) series of insert are pink in color.

   b. Grip Label: Inserts with plastic, such as the TFI® of FSI® inserts, are labeled with 25K or 30K™.

   c. Stack Strength: The longer stacks, greater than 3.5 inches, are the 25K and the shorter stacks are 30K™. The inserts are not interchangeable for the same system.

III. Insert Selection

A. TFI® Inserts are designed for supragingival, moderate to heavy debris removal. They can be used for subgingival removal, if the tissue is retractive.

B. FSI® Inserts, such as the FSI® 10, 100, and 1000, are also for supragingival, moderate to heavy debris removal. These inserts also offer greater visibility with less water, because of the focused water delivery and enhanced power. The clinician will spend less time clearing the mouth and mouth mirror. With the focused water spray, aerosols are decreased.

C. SLI™ inserts are 40% thinner than the standard inserts, and are available with an external water lube. These inserts are also available in the new FSI SLI® style with the focused internal water delivery. The Slimline® inserts are designed for light to moderate debris removal, or fine root debridement. The SLI® 10S (straight) is often referred to by clinicians as “universal.” This is somewhat misleading, in that this straight insert is designed for pockets that are 4mm or less. It can be used on every surface. Adaptation of the SLI® 10S to the root surfaces of greater than 4mm pockets is not suitable due to the straight design not fitting against the curved tooth surfaces of concavities and furcations of periodontally involved root surfaces. This is why the Slimline® SLI 10L (left) and the Slimline® SLI 10R (right) inserts were designed. The contra-angle and curved tip inserts allow access and adaptation to deep pockets and furcations areas. In addition, the Slimline® series provides greater tactile sense.

D. Slimlines® are available in the original external water delivery and the Focused Spray® internal water delivery. The FSI SLI® (Focused Slimline) major innovation combines a thin insert and focused water delivery to give access, adaptation, and lavage.
IV. SLI® Adaptation

A. The Slimeline® SLI 10S (straight) is designed for use in 4 mm and less of pocket depth. It is used for deplaquing therapy during periodontal maintenance appointments and is effective in tight contacts. If this insert is used in deeper pockets or furcations, the tendency is to direct the point toward the root increasing the risk of causing gouging and resultant hypersensitivity.

B. The Slimeline® SLI 10L and SLI 10R (left and right) designs were developed to treat areas of the root that are not easily accessible for instrumentation due to periodontal destruction. The curved left and right inserts will adapt to the indentations of the concavities on the root surface without damaging hard or soft tissue. One adaptation is to use the convex back portion of the insert against the tooth. Make sure the terminal shank or working end is parallel to the long axis of the tooth. Direct the point away from the tooth and towards the tissue. (Note: this is opposite of hand instrument principles.) With this technique you will gain maximum coverage of the root. You will not damage hard tissue, because you are using the back, rather than the point. You will not damage soft tissue, because the specific angle on the insert keeps the instrument adapted to the tooth.

V. Power Settings

A. Power, as is pertains to the dial setting on your unit, is the length of the stroke.

B. When the power is set at medium to high, you will have a wider stroke. This is exactly what you want when you have heavy debris removal. For removal of heavy calculus, you want to use a wider of larger diameter insert such as the TFI® of FSI® 10, 100, or 1000 and a more powerful stroke.

C. When you are doing fine root work, you want a smaller, shorter stroke to achieve periodontal debridement. For this purpose, you would want to use the FSI Slimeline® series on a low power setting.

D. Not all inserts are used at the same power setting. The basic rule of thumb is, “the thinner the insert tip, the lower the power setting.”

VI. Insert Care Maintenance

A. Do not put inserts into cold sterilization or spray with disinfectants. This will reduce the efficiency and shorten the life of the insert.

B. Recommended procedures for cleaning the insert are the same as hand instruments. Recommendations are to limit hand contact with contaminated instruments; therefore, using a cassette for ultrasonic cleaning, is safer.

C. All inserts must be sterilized. The insert should be bagged or placed in a cassette during sterilization. When using bags, be certain they are all paper or a combination of paper and plastic. All plastic pouches build up too much heat and may damage the insert. When using paper and plastic combination pouches, place the bag in the autoclave with the paper side up, as this allows the heat to escape.
Cavitron® Terms

POWER SCALING & AIR POLISHING SYSTEMS

Ultrasonics: Devices operating at frequencies above the audible range. In dentistry this includes systems in the 18 to 50 kHz (18,000 to 15,000 cycles per second) range.

Magnetostrictive Ultrasonics: A method of creating mechanical movement using a low voltage magnetic signal. The handpiece contains coils that activate the interchangeable inserts, causing them to vibrate.


Sonics: Devices operating in the audible range. Current sonic units operate at 3 to 8 KHz (3,000 to 8,000 cycles per second).

Air Polishing: A controlled stream of sodium bicarbonate or aluminum trihydroxide is used for therapeutic and cosmetic purposes in the removal of stain, biofilm, and soft debris. Also used for prophylaxis of orthodontic patients, and preparation for sealants second bonding.

FREQUENCY

Frequency: The number of times per second the insert tip moves back and forth during one cycle.

Cycle: One complete linear or elliptical stroke path.

Kilohertz (kHz): Equal to 1000 hertz, or 1000 cycles per second (cps).

Optimum Frequency: Range between 18 kHz and 32 kHz is above the audible frequency. It is within a range to allow greater patient comfort and maximum life of the insert.

Active Tip Area: Affected by frequency. In the 25 to 30 kHz range, the active tip area is approximately 4.3mm. In the 40 to 50 kHz range, the active tip area is generally less than 2.4mm.

TUNING

Auto Tuning: The tip frequency is controlled automatically by the internal system of the Cavitron unit.

Manual Tuning: The tip frequency is adjusted using the tuning knob. This term is often mistaken for power.

POWER

Power: The electrical energy in the handpiece used to generate the movement of the insert. Increasing the power increases the distance the insert moves (stroke) without changing the frequency.

Stroke: The maximum distance the insert tip moves during one cycle. The power knob adjusts the stroke.

Amplitude: Equal to one half the stroke.

Load: The resistance on the insert when placed against deposit on the tooth surface.
**Clinical Power:** The ability to remove deposits under load. The stroke frequency and type of motion, elliptical or linear, and the angulation of the motion against the tooth surface are factors that determine clinical power.

**ULTRASONIC EFFECTS**

**Acoustics:** Energy associated with sound waves.

**Acoustic Streaming:** Unidirectional fluid caused by ultrasonic waves. Acoustic streaming occurs at lower acoustic pressures than cavitation.

**Acoustic Turbulence:** Tip stroke causes coolant to accelerate, producing an intensified swirling effect which disrupts the bacteria matrix, biofilm. This effect is increased as the power knob is adjusted to higher power settings.

**Cavitation:** The formation of bubbles in liquids by rapid changes such as those induced by ultrasound. When bubbles implode, they produce shock waves in the liquid.