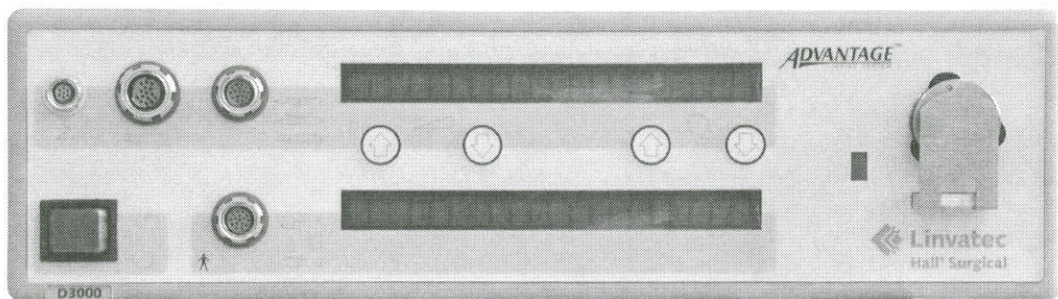


The Advantage™ Drive System Instruction Manual



**CONTROLLER
OPERATION**

A

**E9000™
HANDPIECES**

B

**MICROCHOICE®
HANDPIECES**

C

**SHAVER
HANDPIECES**

D

**POWERPRO™
HANDPIECES**

E

**MINI-DRIVER™
HANDPIECES**

F

 **Linvatec**
Hall® Surgical

1.0 INTRODUCTION

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1.0 INTRODUCTION

It is recommended that personnel study this manual before attempting to operate, clean or sterilize the Advantage™ Drive System. The safe and effective use of this equipment requires the understanding of and compliance with all warnings, cautionary notices and instructions marked on the product and included in this manual.

1.1 Intended Use



The Advantage Drive System combines the functionality of the APEX Drive System, the E9000™ System and the PRO2000 *PowerPro*™ System into one unit. The top portion of the controller is a combination handpiece-drive and low-flow irrigation pump that operates a variety of handpieces consisting of drills, shavers, and saws, in conjunction with assorted attachments to perform bone cutting, reaming and drilling, and soft tissue resection.

The irrigation pump and tubing sets provide a sterile fluid supply at the surgical site to the blades, burs and drill bits, to prevent clogging and provide lavage and cooling.


The bottom portion of the controller functions as a universal electric power source for an instrument system consisting of drills, shavers, saws and assorted modular attachments. The instruments perform bone cutting, reaming, drilling and driving screws, as well as soft tissue resection. This portion is designed for soft tissue resection, trauma procedures, total hip/knee arthroplasty, and ACLs.

The fields of application for the Advantage Drive System include Arthroscopic, Foot, Hand, Medial Sternotomy, Neurosurgical, Orthopedic, Otolaryngological, Plastic/Reconstructive and Spinal surgical procedures.

1.2 General Warnings and Cautions


1. This equipment is designed for use by medical professionals completely familiar with the required techniques and instructions for use of the equipment. **Read and follow all warning and caution notices and instructions marked on the product and included in this manual.**
2. The Advantage System's irrigation pump and tubing sets are contraindicated for distention.
3. Do not open the controller chassis, as this may void the warranty.  There are no user-serviceable parts inside. Removing the cover may introduce an electric shock hazard by exposing you to dangerously high voltages or other risks.
4. Eye protection is recommended when operating equipment. 
5. Use only associated Hall® Surgical and Linvatec attachments and accessories (saw blades, bits, etc.) as defined within the descriptions of each attachment.
6. Handle all equipment carefully. If any equipment is dropped or damaged in any way, return it immediately for service.
7. Prior to each use, perform the following:
 - Inspect all equipment for proper operation.
 - Ensure all attachments and accessories are correctly and completely attached to the handpiece.

- Perform the required Performance Tests for each associated handpiece prior to each use.

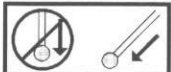
8. Handpieces are factory sealed. **Do not** disassemble or lubricate. 
9. Never operate the *MicroChoice*® Elite™ High Speed Drill (REF 5020-025) or Medium Speed (REF 5020-021) Drill without a bur and appropriate bur guard in place and the **collet locked**. Damage to the collet may result.
10. When operating shaver blades or burs in any Group 3 handpiece (reference "**Group 3 Handpieces**" on page 81) the shaver handpiece suction port valve **must** be in the open or ON position, and the shaver blade or bur **must** be within the distention fluid of the joint. Otherwise, damage to the blade hub or bur hub will result.
11. **Continually check** all handpieces and attachments for overheating. If overheating is sensed, immediately discontinue use and return equipment for service. Overheating of the bur, bit or blade may cause damage to the bur, bit or blade and may cause thermal necrosis.
12. Do not attach, insert or remove accessories or attachments while the handpiece is operating. **Place the handpiece safety switch, if equipped with one, to the appropriate safe position, prior to installation or removal of items.**
13. Do not stall handpieces, damage can occur.
14. Do not operate the E9010 High Speed Drill or *MicroChoice* Elite™ High Speed Drill (REF 5020-025) with the collet open. Damage will occur.

15. Do not handle the controller, handpieces or footswitch by the cord. Do not pull on the cord to remove it from the handpiece or controller.

16. Do not excessively bend or kink the instrument handpiece cord or power cord. Always inspect cords for signs of excessive wear or damage. **If wear or damage is found, discontinue use and replace immediately.**

17. Always inspect for bent, dull or damaged burs, blades or drill bits before each use. Do not attempt to straighten or sharpen. Do not use if damaged. After use, dispose of properly. 

18. Always use a bur of the proper length for the particular guard.

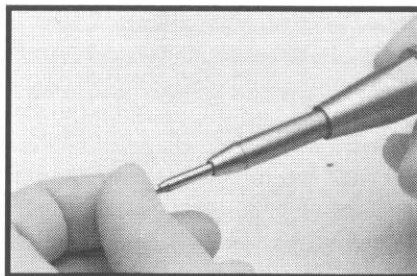
19. **Do not** use burs for plunge cutting. Damage or injury may occur. 

20. Bur and neuro guards should be checked frequently. Overheating can occur if bur guard bearings are worn or not kept clean. Perform the following steps to verify guards are in good operating condition.

NOTE: Bur and neuro guards are to be returned to the factory or a Linvatec authorized service facility for routine maintenance every six (6) months.


(a) Remove the guard from the handpiece and insert a bur into the nose of the guard.

(b) While holding the bur, spin the guard. The guard should spin freely around the bur shaft without resistance.



(c) Attach the guard and bur to the handpiece.

(d) Operate the handpiece for approximately 30 seconds. Stop the handpiece and carefully feel the end of the guard where the guard encases the shaft of the bur for overheating. If overheating is noticed, return guard for service.

21. Tubing sets and E9000 Disposable Irrigation Tips are one-time use only. Do not resterilize or reuse. After use, dispose of properly. 














22. All associated E9000 Tubing Sets are latex free. 

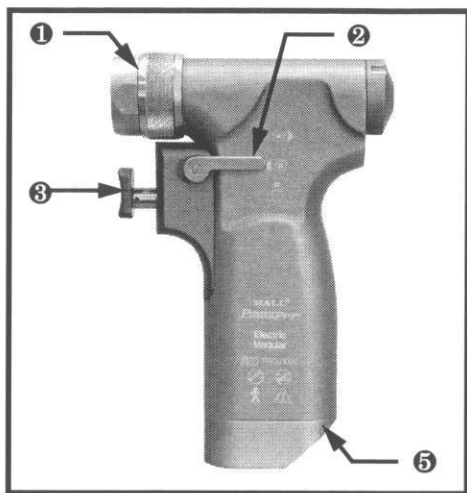
23. Ensure the optical cassette sensor next to the pump cassette mechanism is kept clean at all times.

24. Reaming attachments (red colored rings) for the *PowerPro* handpieces are not designed to be used in any screw, tap or oscillate drill modes.

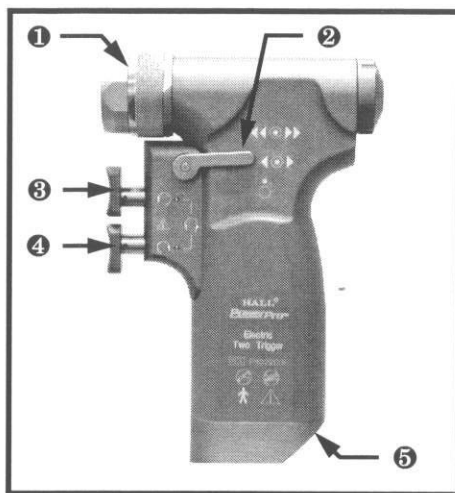
25. When using the *PowerPro* Modular or Two-Trigger Handpiece with any saw attachment (Sagittal Saw - PRO2043, Reciprocating Saw - PRO2045), do not operate in the oscillate mode. These handpieces should only be operated in the drill/ream mode when used with these attachments.
26. After each use, thoroughly clean the controller, handpieces, attachments and accessories (See “4.1 Cleaning and Sterilizing” on page 139).
27. Equipment grounding is vital to ensure safe operation. Plug the power cord into a properly earthed mains supply outlet whose voltage and frequency characteristics are compatible with those listed on the unit or in this manual. Do not use plug adapters or extension cords; such devices defeat the safety ground and could cause injury.
28. Do not use in the presence of flammable anesthetics, gases, disinfecting agents, cleaning solutions, or any material susceptible to ignition due to electrical sparking.
29. The service intervals, as listed in “Table 4: Maintenance Schedule” on page 135, are required to keep the handpieces at their optimum operating performance.

1.3 Symbol Definitions

| Controller Markings | |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
|  | Stand-by (ON/OFF) |
|  | Attention, consult accompanying documents |
|  | Warning - For continued protection against risk of fire, replace only with the same type and rating fuse |
|  | Mains Fuse |
|  | Type B equipment |
|  | Alternating Current |
|  | Protective earth ground |
|  | Footswitch Connection |
|  | E9000 Series Handpiece Connection |
|  | MicroChoice Drills and Saws Connection |
|  | MicroChoice, Advantage, and APEX Shaver Handpiece Connection |
|  | <i>PowerPro</i> Handpiece Connection |
|  | Speed (rpm) Selection |






***PowerPro* Electric Modular Handpiece
(PRO2100E)**



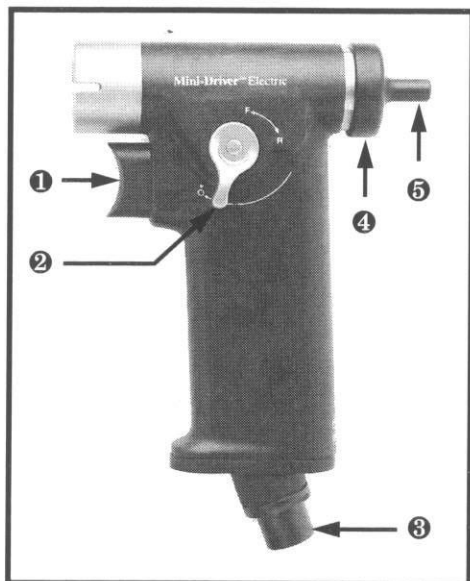
***PowerPro* Electric Two-Trigger Handpiece
(PRO2200E)**

1.5.4.3 ***PowerPro* Modular (PRO2100E) and Two-Trigger (PRO2200E) Electric Handpieces**

- ① **Attachment Collet-Lock** — Twist to release and remove attachments from the handpiece. It is not necessary to twist for insertion of attachment. Simply insert and push attachment to lock in place.
- ② **Thumb Lever** — Used to place the handpiece in the safe  or operating mode. Place in the safe position prior to connecting or removing any attachment or accessory and during non-use of the handpiece.
- ③ **Activation Trigger (*PowerPro* Modular)** Used to activate the handpiece. Depress when the thumb lever is in the forward  or reverse  position to operate.
- ④ **Bottom Activation Trigger (*PowerPro* Two-Trigger Handpiece Only)** — See “3.12 *PowerPro* Electric Two-Trigger Handpiece” on page 96 for detailed information on the functionality of this trigger.
- ⑤ **Handpiece Cord Receptacle** — The handpiece cord connects here to provide power to the handpiece. Uses the MC5056 or MC5057 Handpiece Cords.

1.5.5 GROUP 5 HANDPIECES

1.5.5.1 Mini-Driver Electric Handpiece (K500)



1 Activation Trigger — Used to activate the handpiece when the directional control lever is in either forward (F) or reverse (R).

2 Safety/Directional Control Lever — Used to place the handpiece in the safe/off position when connecting attachments or installing accessories. Also used to place the handpiece in an operating direction, either forward (F) or reverse (R).



3 Handpiece Cord Connector — The handpiece cord connects here to provide power to the handpiece. Uses the M334 Handpiece Cord.

4 Attachment Lock/Release Collet — Push inward to connect an attachment. Release to lock attachment in place.

5 Cannulation — Used to stabilize long wires or pins.

NOTE: The Mini-Driver Handpiece does not operate with the footswitch or integrated console pump.

The Mini-Driver Handpiece, combined with the many available attachments; reaming, drilling, wire and pin driving, and, with reciprocator and sagittal attachments can perform sawing applications. This handpiece is a versatile and all-purpose handpiece powerful enough to handle procedural requirements from a bunionectomy to an ACL procedure. The Mini-Driver handpiece will accept all the attachments listed on pages 122 through 131.


| | |
|---------------------|-------------------------------------------------------------------------------------------|
| | Irrigation (Flow) Control |
| | Adjustment to a maximum (Increase) |
| | Adjustment to a minimum (Decrease) |
| PRESET | Predetermined setting for irrigation flow using the E9010 Drill with the E9414 Tubing Set |
| RPM | Revolutions Per Minute |
| Max | Maximum Operating Speed |
| Min | Minimum Operating Speed |
| Footswitch Markings | |
| | Shaver Handpieces |
| | Directional Selection (Forward/Reverse/Oscillate) |
| | Variable Speed, ON/OFF |
| | MicroChoice or Hall Handpiece |
| | Forward Variable Speed |
| | Reverse Variable Speed |
| | Oscillate |













| Full-Function Handpiece Markings | |
|--------------------------------------------------------|------------------------------------------------------------------------------------------------|
| | On/Off non-mains control |
| | Increase Speed Button |
| | Decrease Speed Button |
| | Directional Selection Button (Forward/Reverse/Oscillate) |
| <i>PowerPro Handpiece Markings</i> | |
| | Indicates the safe or off position (only for a part of equipment) of the handpiece thumb lever |
| <i>PowerPro Modular Handpiece Specific Markings</i> | |
| | Indicates the forward position of the handpiece thumb lever |
| | Indicates the reverse position of the handpiece thumb lever |
| <i>PowerPro Oscillator Handpiece Specific Markings</i> | |
| | Indicates the on or run position (only for a part of equipment) of the handpiece thumb lever |




| <i>PowerPro</i> Two-Trigger Handpiece Specific Markings | |
|----------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| | Indicates the DRILL/REAM position of the handpiece thumb lever |
| | Indicates the SCREW position of the handpiece thumb lever |
| | Indicates the forward, or clockwise, direction of rotation of the handpiece trigger |
| | Indicates the reverse, or counterclockwise, direction of rotation of the handpiece trigger |
| | Indicates oscillate direction of the handpiece trigger |
| Mini-Driver™ Handpiece Specific Markings | |
| | Indicates the safe or off position (only for a part of equipment) of the handpiece safety switch |
| | Indicates the on or run position (only for a part of equipment) of the handpiece safety switch |
| F | Indicates on in the forward, or clockwise, direction of rotation |
| R | Indicates on in the reverse, or counterclockwise, direction of rotation |

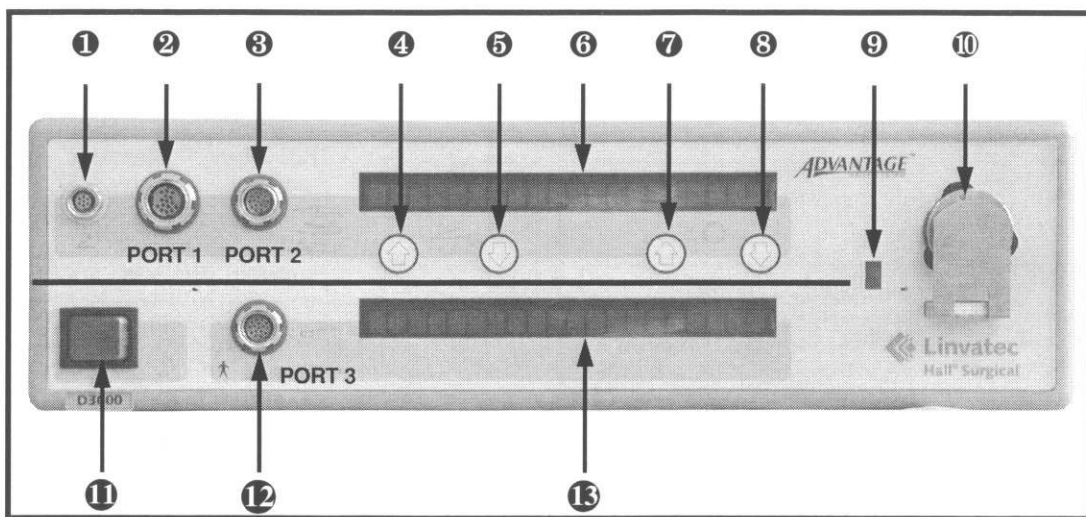
| | 1 min | Duty Cycle: 1 minute on. |
|------------------------|-------|-----------------------------------|
| | 3 min | Duty Cycle: 3 minutes off. |
| Miscellaneous Markings | | |
| | | Not to be used for plunge cutting |

| | |
|--|---------------------------------------------------------------------------------------|
| | Single Use Only |
| | Latex Free |
| | Eye Protection Required |
| | No user service recommended. Refer servicing to qualified Linvatec service personnel. |
| | Indicates product component should not be sterilized. |
| | Indicates product component should not be immersed in any type of fluid. |
| | Indicates handpiece should not be immersed in any type of fluid. |
| | Indicates product should not be oiled or lubricated. |
| | Lock |
| | Unlock |

| | |
|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
|  | Indicates the blade collet unlock position of the D9820 and D9824 Advantage Handpieces |
|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|



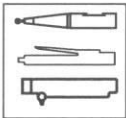
| Graphical Display Symbols | |
|------------------------------------------------------------------------------------|---------------------------------------------|
|  | Drill - forward direction |
|  | Drill - reverse direction |
|  | OscDrill - oscillate function |
|  | Tap - forward direction |
|  | Tap - reverse direction |
|  | Screw - forward direction |
|  | Screw - reverse direction |
|  | Irrigation message symbol |
|  | Saw operating symbol |
|  | Handpiece "Aspirate Mode" symbol |
|  | Handpiece in "safe" position |
|  | Handpiece "Motor Over-speed" message symbol |

| | |
|-----------------------------------------------------------------------------------|----------------------------------------------------------|
|  | Handpiece "Stalled" and "Maximum Torque" messages symbol |
|  | Handpiece "Magnetic Field" message symbol |
|  | Handpiece Service Required message |



1.4 System Indicators

1.4.1 Controller Front Panel (Top Portion)

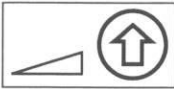
- ❶ **Footswitch Receptacle** — Accepts the footswitch cord connector. 
- ❷ **APEX® Handpiece Receptacle (Port 1 - See page 27)** — 
Directly accepts the handpiece cord connector of any APEX handpiece (REF C9820, C9824, C9828, C9840).
- ❸ **Handpiece Receptacle (Port 2 - See page 27)** — 
Directly accepts the handpiece cord connector of all Group 1 Handpieces (REF E9005, E9010, E9015), all Group 2 Handpieces (REF 5020-021, -022, -023, -024, -025, -026, -027), and most Group 3 Handpieces (REF D9820, MC9820, D9824, MC9828, and MC9840). However, with the addition of one of two handpiece adapters - the APEX Adapter


(REF E9320) or the Mini-Driver Adapter (REF K501) - this receptacle will also accept and operate the remainder of the Group 3 Handpieces (REF C9820, C9824, C9828, C9840) or the Mini-Driver Handpiece (REF K500). This receptacle is NOT designed to operate any Group 4 *PowerPro* Handpieces (REF PRO2100E, PRO2200E, PRO2300E).

NOTES:

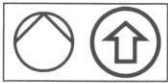
1. All cord receptacles and connectors are keyed to prevent incorrect insertion. Likewise, receptacles and connectors are color-coded to easily recognize where to connect each cord (footswitch receptacle and connector - yellow, handpiece receptacles and connectors - red or grey).
2. Only one handpiece can be connected at a time in either port of the top section. If a handpiece is connected while another handpiece is already connected, "HP SERVICE REQUIRED" will display. BOTH handpieces must be removed to clear the fault condition.


3. **PowerPro** handpieces are not recognized in Port 2 and will not operate. If a **PowerPro** handpiece is connected to Port 2, "INVALID HANDPIECE" will display.

4. **Speed Increase Button** -  Press to increase the handpiece speed for handpieces connected to Port 1 or Port 2.

5. **Speed Decrease Button** -  Press to decrease the handpiece speed for handpieces connected to Port 1 or Port 2.

6. **Top Display** — Displays handpiece speeds, irrigation flow rates, instructions, operating modes and error messages. Displays actual speed while the handpiece is operating, and the set speed when the handpiece is inactive. Flow rate, as a percentage, displays when the pump is enabled.


7. **Flow Increase Button** —  Press to increase the pump flow rate for handpieces connected to Port 1 or Port 2.


8. **Flow Decrease Button** —  Press to decrease the pump flow rate for handpieces connected to Port 1 or Port 2.

9. **Optical Sensor** — Senses whether or not a tubing set is connected.

10. **Tubing Cassette Receptacle** — Accepts the various tubing sets.

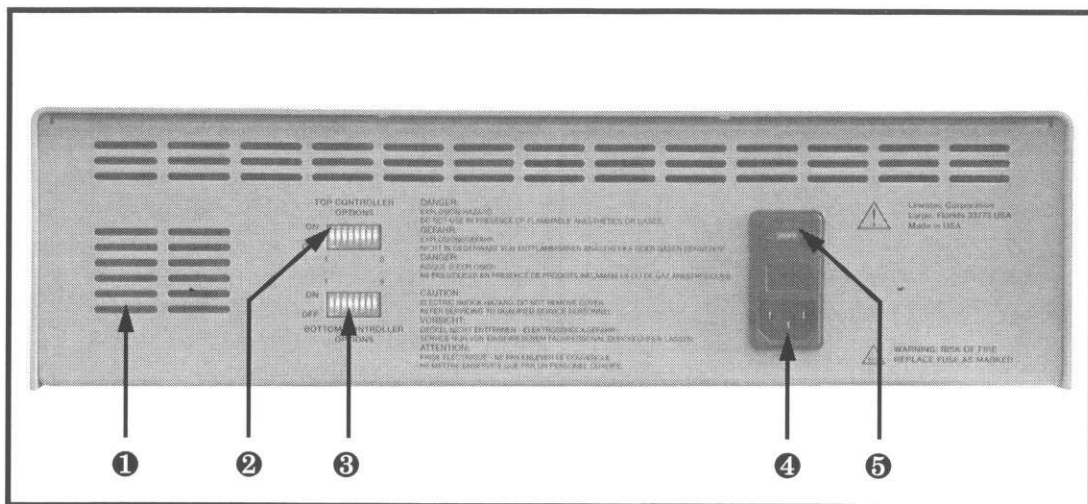
1.4.2 Controller Front Panel (Bottom Portion)

11. **Standby Power Switch** — To activate the controller, place this switch to the on position. To set the controller to stand-by mode, place this switch to the off position. 

12. **Handpiece Receptacle (Port 3 - See page 27)** —  Directly accepts all Group 4 **PowerPro** handpieces along with several other handpieces. With the addition of one of two handpiece adapters - Mini-Driver Adapter (REF K501) or APEX Adapter (REF E9320) - this receptacle will also accept and operate the Mini-Driver Handpiece (REF K500) or two of the four APEX handpieces (REF C9824 and C9828).

NOTE: Even though this handpiece receptacle (Port 3) will accept the connectors of the E9000 Series handpieces (E9005, E9010, E9015), the *MicroChoice* Low Speed Drill (5020-026), the *MicroChoice* Shaver Handpieces (MC9820, MC9840), and the Advantage Basic Shaver Handpiece (D9820), they cannot be activated in this port because a footswitch is required for activation and there is no footswitch port for the bottom portion of the console.

13. **Bottom Display** — Displays the following information in text or graphical format (Reference "2.1.3.7 Switch 5 (Bottom Portion Only) Display Mode Selection" on page 36); user/error messages, instructions, handpiece speeds, and operating modes. Displays the actual speed while the handpiece is operating and set speed when the handpiece is inactive.



1.4.3 Controller Back Panel

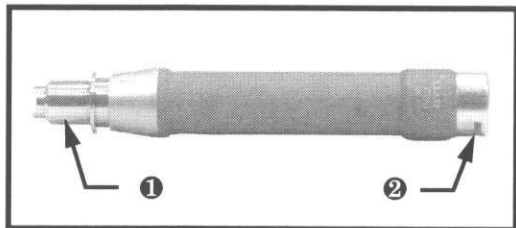
- ❶ **Speaker** — Used for the output of audible information.
- ❷ **“TOP CONTROLLER OPTIONS”**
Switches — Used to set specific controller functionality settings for the top portion of the controller; i.e., Day-to-Day Memory, Footswitch Operating Mode, Audio Mode, and Handpiece Oscillate Operating Mode (See “2.1.3 Controller Options Switches and Settings” on page 30).
- ❸ **“BOTTOM CONTROLLER OPTIONS”**
Switches — Used to set specific controller functionality settings for the bottom portion of the controller; i.e., Day-to-Day Memory, Handpiece Oscillate Operating Mode, Default or Swiss Handpiece Operating Mode, and Display Mode (See “2.1.3 Controller Options Switches and Settings” on page 30).

- ❹ **Mains Receptacle** — Accepts the supplied hospital grade power cable to provide AC power.
- ❺ **Voltage Selection Means** — Used to set the controller to the appropriate voltage source (See “4.4 Fuse Replacement and Voltage Selection Means” on page 151 for more information). **NOTE: Does not apply to the model D3000J controller.**

1.5 Handpieces

1.5.1 GROUP 1 HANDPIECES

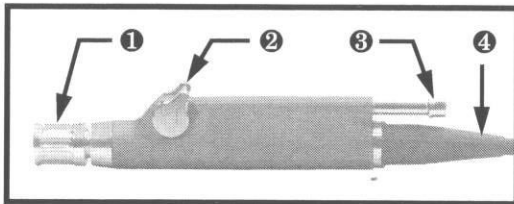
1.5.1.1 Cranial Perforator Drive Handpiece (E9015)



The E9015 Cranial Perforator Drive is used to operate clutch style cranial perforator cutters. It is equipped with a Hudson shank chuck. This handpiece can only be operated by the foot-switch.

- ❶ **Hudson Chuck**— Locks a perforator cutter into place.
- ❷ **Handpiece Cord Connector** — The handpiece cord connects here to provide power to the handpiece. Uses the MC5056 or MC5057 Handpiece Cords.

1.5.1.2 High Speed Shaver (E9005)

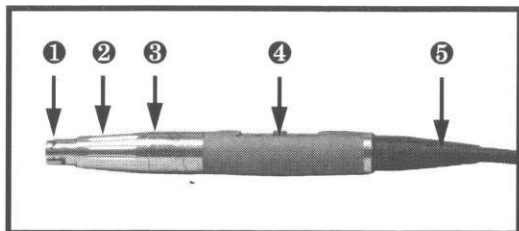


The E9005 High Speed Shaver Handpiece is a balanced, lightweight, sealed assembly designed to operate shaver blades and burs for resection of bone and soft tissue (Use only Series A, E, N, and appropriate C shaver blades and burs).

A maximum operating speed of 10,000 rpm in forward and reverse and 5,000 rpm in single-turn and multi-turn oscillate are attainable [See “2.1.3.6 Switch 4 - Oscillate Mode Selection (Shaver Handpieces Only)” on page 35]. This handpiece can only be operated by the foot-switch.

- ❶ **Locking Collet** — Provides simple and fast insertion and removal of a shaver blade or bur. The collet allows the shaver blade to be inserted in any position.
- ❷ **Suction Port Valve** — Manually controls suction flow.
- ❸ **Suction Port** — Connects to the suction line for aspiration.
- ❹ **Integrated Handpiece Cord** — Attaches the handpiece to the controller.

1.5.1.3 High Speed Drill (E9010)

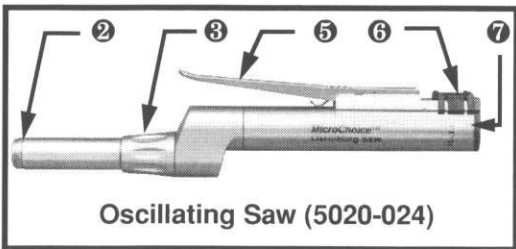
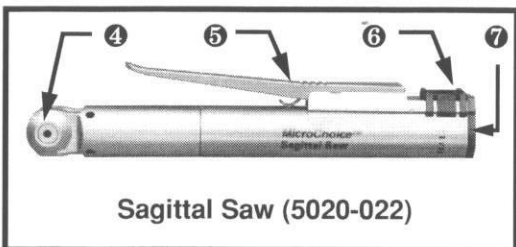
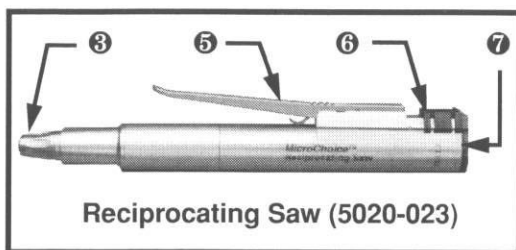
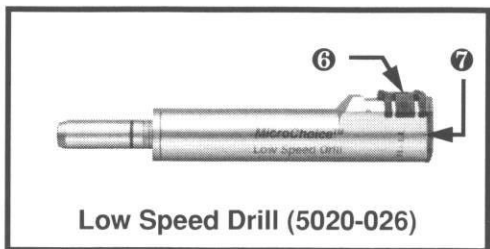
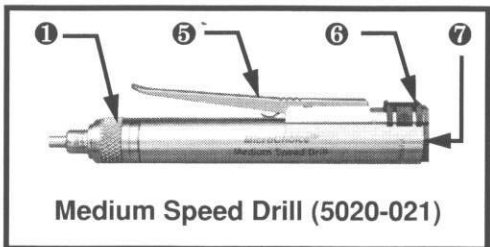
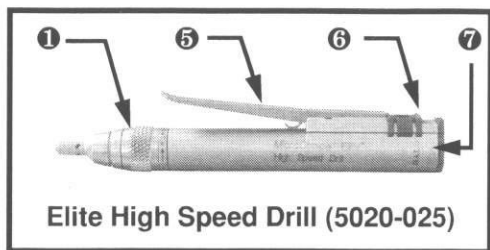


The E9010 High Speed Drill is designed for resection of bone. It incorporates an integral angling capability that allows the surgeon to change the angle between the main handpiece body and the bur guard from 0° to 20° without the use of a separate angle attachment.

The High Speed Drill is used in conjunction with the E9414, E9415 or E9415A Tubing Sets to provide cooling for the handpiece body. The E9415 or E9415A Tubing Set also provides irrigation to the surgical site. This handpiece can only be operated by the footswitch.

CAUTION: Cooling for the handpiece body is required at all times. When using the E9414 Tubing Set, the tubing line **MUST** be fully primed or the handpiece will overheat, which will cause damage to the handpiece (see “E9414 Tubing Set with Recirculation only:” on page 52 for information on priming the tubing set).

- ❶ **Guard Collet** — Accepts bur guards and neuro guards for various burs.
- ❷ **Keyless Chuck** — Twist the keyless chuck counterclockwise to open the collet to insert a bur. Twist clockwise to lock the bur in place.
- ❸ **Swivel Sleeve** — Twist to change the angle of the main handpiece body and the bur from 0° to 20°.
- ❹ **Tubing Set Cassette Holder** — Accepts the handpiece cassette of the tubing set.
- ❺ **Integrated Handpiece Cord** — Attaches the handpiece to the controller.



1.5.2 GROUP 2 HANDPIECES

1.5.2.1 *MicroChoice* Drills and Saws

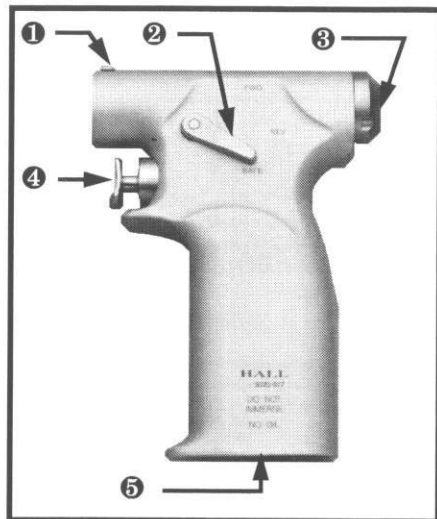
- ① **Bur Lock Collar** — Rotate to lock or unlock a bur.
- ② **Blade Collet** — Holds the blade in place.
- ③ **Blade Lock Collar** — Rotate to open or lock the blade collet.
- ④ **Collet Lock Mechanism** — Locks a blade into place.
- ⑤ **Activation Lever** — Depress to operate the handpiece. The activation lever can be

removed for leverless operation (Reference “3.5.4 Leverless Handpiece Operation” on page 72).

- ⑥ **Safe/Run Slide** — Place in the “SAFE” position prior to inserting or removing attachments and/or accessories (blades, bits, burs) and when the handpiece is not in use. Place in the “RUN” position to activate the handpiece.
- ⑦ **Handpiece Cord Connector** — The handpiece cord connects here to provide power to the handpiece. Uses the MC5056 or MC5057 Handpiece Cords.

NOTE: The Low Speed Drill can only be operated by the footswitch and will not operate on the bottom portion of the console.

1.5.2.2 *MicroChoice* Modular Handpiece (5020-027)



The *MicroChoice* Modular Handpiece is designed to be used as an all-purpose driver for reaming, drilling, wire and pin driving, and, with proper attachments will perform sawing applications. This handpiece is designed to accept all the attachments starting on page 73.

- ❶ **Attachment Slide-Lock** — Locks attachments in place. Slide in the direction of the arrow to remove attachment.
- ❷ **Thumb Lever** — Used to place the handpiece in the safe mode or an operating mode. Place in the “SAFE” position prior to connecting or removing any attachment or accessory and during non-use of the handpiece. Place in the “FWD” position to operate in the forward direction. Place in the “REV” position to operate in the reverse direction.

- ❸ **Wireguard Receptacle** — Insert a wire through this receptacle. Will also accept a wire guard accessory (REF 5053-123) to prevent long wires from bending.
- ❹ **Activation Trigger** — Used to activate the handpiece. Depress when the thumb lever is in the “FWD” or “REV” position.
- ❺ **Handpiece Cord Connector** — The handpiece cord connects here to provide power to the handpiece. Uses the MC5056 or MC5057 Handpiece Cords.

NOTE: The Modular Handpiece does not operate with the footswitch.

1.5.3 GROUP 3 HANDPIECES

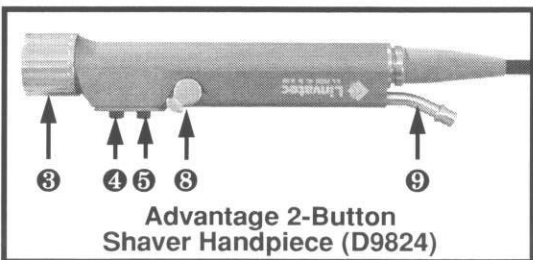
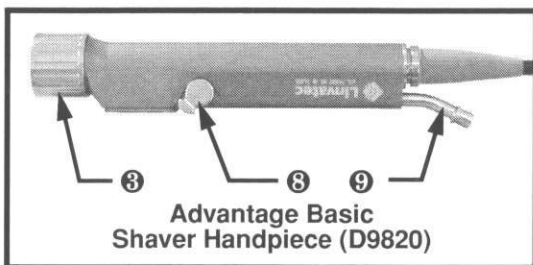
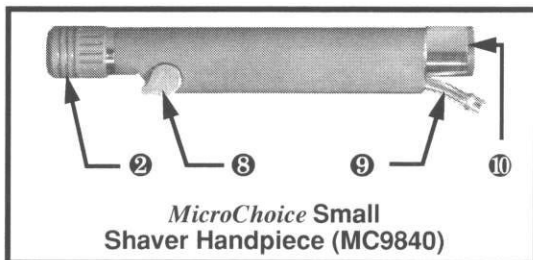
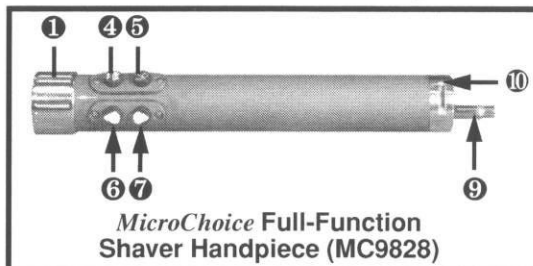
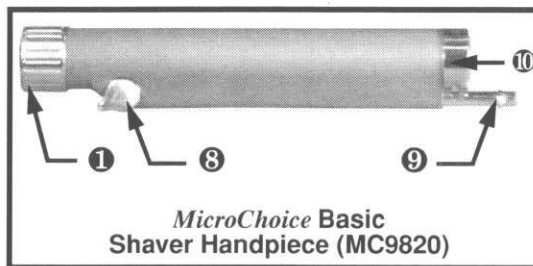
1.5.3.1 Shaver Handpieces

The Basic (REF MC9820, C9820, D9820), 2-Button (REF C9824, D9824), and Full-Function (REF MC9828, C9828) Shaver Handpieces are equipped with sensors that automatically select the proper speed range for the attached blade. A maximum operating speed of 6,000 rpm (10,000 rpm for the D9820 and D9824 Advantage Shavers) in Forward and Reverse and 1,500 rpm (2,500 rpm for the D9820 and D9824 Advantage Shavers) in single- and multi-turn oscillate are attainable.

The 2-Button Shaver Handpiece is equipped with ON/OFF and Forward/Reverse/Oscillate buttons for fingertip control. The Full-Function Shaver Handpieces, in addition to the ON/OFF and Forward/Reverse/Oscillate buttons, also have Speed Increase and Decrease buttons.

The Small Shaver Handpieces (MC9840, C9840) are designed to operate burs and shaver blades for resection of bone and soft tissue. They are equipped with a quick-connect, blade-locking collet that rotates 360° for cutter window positioning. A maximum operating speed of 5,000 rpm in forward and reverse and 2,500 rpm in single- and multi-turn oscillate are attainable.

For more information about oscillation instructions, see “2.1.3.6 Switch 4 - Oscillate Mode Selection (Shaver Handpieces Only)” on page 35.



- ❶ **Cutter Blade Locking Collet** — Accepts a cutter blade and locks it into place. Rotate the locking collet to the “UNLOCK” position and completely insert the blade hub. Rotate the locking collet to the “LOCK” position to securely lock the blade in place.

- ❷ **Cutter Blade Rotatable Locking Collet**
Provides simple and fast insertion and removal of the blade. Retract the locking collet towards the back of the handpiece and insert the blade hub. Release the locking collet and the blade is securely locked in place. Allows 360° positioning of the blade cutting window.

- ❸ **Cutter Blade Locking Collet** — Accepts a cutter blade. Simply insert the blade hub and push to lock into place. Remove by rotating the collet in the direction of the arrow and pulling out the blade.

- ❹ **Direction Select Button** — Press and release to select the direction of blade rotation between Forward, Reverse and Oscillate while the handpiece is operating or inactive.



Advantage and APEX Handpieces ONLY (REF D9824, C9824 and C9828) — The “Direction” and “ON/OFF” button function can be changed to increase and decrease speed, respectively. To change the function of the buttons, press and hold the Direction button when the handpiece is NOT operating. The audio will sound twice to indicate that the handpiece button function has changed. Press the Direction button to increase the handpiece speed. When no further speed change is requested, the audio will sound twice again indicating that the button function has returned to Direction control.

- ❺ **ON/OFF Button** — Press to turn the shaver handpiece motor on. Press again to turn off.



Advantage and APEX Handpieces ONLY (REF D9824, C9824 and C9828) — The “Direction” and “ON/OFF” button function can be changed to increase and decrease speed, respectively. To change the function of the buttons, press and hold the “Direction” button when the handpiece is NOT operating. The audio will sound twice to indicate that the handpiece button function has changed. Press the “ON/OFF” button to decrease the handpiece speed. When no further speed change is requested, the audio will sound twice again indicating that the button function has returned to On/Off control.

- ❻ **RPM Increase Button** — Press to increase the shaver handpiece speed.



- ❼ **RPM Decrease Button** — Press to decrease the handpiece speed.



- ❽ **Suction Port Valve** — Manually controls suction flow.

- ❾ **Suction Port** — Connects to the suction line for aspiration.

- ❿ **Handpiece Cord Connector** — The handpiece cord connects here to provide power to the handpiece. Uses the MC5056 or MC5057 Handpiece Cords.

1.5.4 GROUP 4 HANDPIECES

1.5.4.1 *PowerPro* Handpieces

NOTE: *PowerPro* Handpieces only operate from Port 3 in the bottom part of the console.

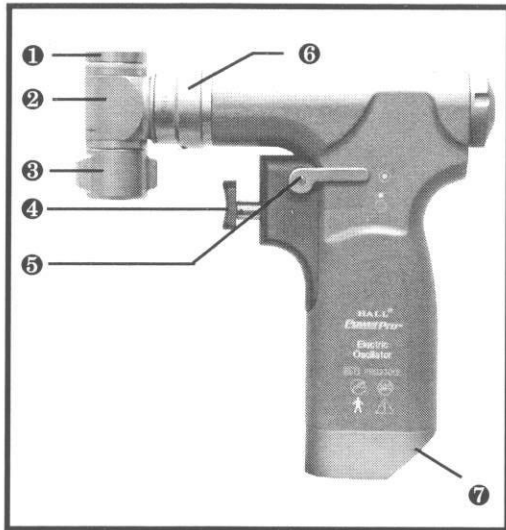
The *PowerPro* Electric Oscillator Handpiece (REF PRO2300E) is designed for transverse or longitudinal bone osteotomies, removal of the femoral head and neck, removal of the greater trochanter, resurfacing tibial plateau and the distal end of the femur such as required in total knee or total hip arthroplasties.


The *PowerPro* Modular (PRO2100E) and *PowerPro* Two-Trigger Electric (PRO2200E) Handpieces are designed to be used as all-purpose drivers for reaming, drilling, wire and pin driving, and, with proper attachments (reciprocator and sagittal only) will perform sawing applications. The *PowerPro* Two-Trigger Handpiece is also ideal for ACL and Trauma procedures.



The *PowerPro* Modular and *PowerPro* Two-Trigger Handpieces are designed to accept all the attachments listed on pages 106 and 118. All drilling, wire driving, and pin driving attachments operate at a variable speed of 0-750 rpm with 35 in. lbs. of torque. All reaming attachments (signified by the red colored ring on the attachment) will run at a variable speed of 0-250 rpm with 100 in. lbs. of torque. The reciprocating saw and sagittal saw attachments will run at a variable speed of 0-15,800 cycles per minute.

NOTE: *PowerPro* Handpieces do not operate with the footswitch or integrated console pump.

1.5.4.2 *PowerPro* Electric Oscillator Handpiece (PRO2300E)



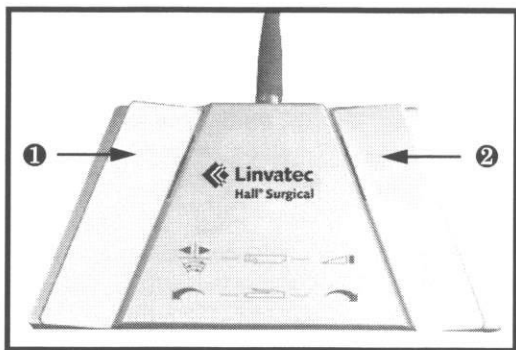
- ❶ **Blade Locking Collet** — Holds and locks the blade in place.
- ❷ **Rotating Head** — Rotates to any of 12 positions at 30° intervals for appropriate surgical access.
- ❸ **Blade Locking Knob** — Rotate to open or lock the blade locking collet to insert and lock the blade securely in place.
- ❹ **Activation Trigger** — Used to activate the handpiece. Depress when the thumb lever is in the “on”  position to operate the handpiece.

- ❺ **Thumb Lever** — Used to place the handpiece in the “on”  or safe  position. Place in the safe position prior to connecting or removing any attachment or accessory and during non-use. Place in the “on” position to activate the handpiece.
- ❻ **Head Locking Collar** — Retract to rotate the rotating head in any of 12 positions.
- ❼ **Handpiece Cord Receptacle** — The Handpiece Cord connects here to provide power to the handpiece. Uses the MC5056 or MC5057 Handpiece Cords.

1.6 Footswitches

NOTE: Either footswitch, the 2-Pedal or 3-Pedal, will only control handpieces being operated in Port 1 or Port 2 on the top portion of the console, excluding the Mini-Driver Handpiece (REF K500) and the *MicroChoice* Modular Handpiece (REF 5020-027).

1.6.1 Footswitch, 2-Pedal (5020-053)



When a handpiece is attached to the controller, the firmware senses the particular handpiece connected and programs the footswitch to operate accordingly.

NOTE: All handpieces can be set to operate in either the ON/OFF or Variable Speed mode by setting the specific “CONTROLLER OPTIONS” switch on the back of the controller [Reference “2.1.3.3 Switch 2 (Top Portion Only) - Footswitch Mode Selection” on page 33 for more information].

1.6.1.1 Operation with the E9005 High Speed Shaver and Group 3 Handpieces

- ❶ **Left Pedal** — Changes the handpiece operating direction between Forward, Reverse and Oscillate.
- ❷ **Right Pedal** — Activates the shaver handpiece in the selected direction.

1.6.1.2 Operation with the E9010 High Speed Drill and Group 2 Drills

- ❶ **Left Pedal** — Activates the handpiece in the Reverse direction.
- ❷ **Right Pedal** — Activates the handpiece in the Forward direction.

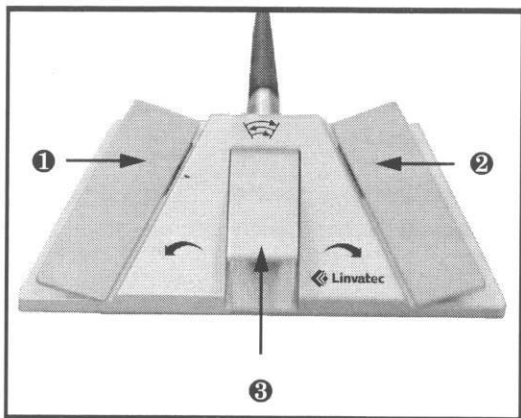
NOTE: There is no oscillate mode with these drills.

1.6.1.3 Operation with Group 2 Saws and E9015 Cranial Perforator Drive

NOTE: There is no direction selection or oscillate mode while using these handpieces.

- ❶ **Left Pedal** — Activates the handpiece.
- ❷ **Right Pedal** — Activates the handpiece.

1.6.2 Footswitch, 3-Pedal (C9863)



When operating shaver handpieces, drills or saws, this footswitch can be set to operate in one of two modes; either ON/OFF or Variable Speed mode (Reference “2.1.3.3 Switch 2 (Top Portion Only) - Footswitch Mode Selection” on page 33 for information about making this selection).

1.6.2.1 Operation with the E9005 High Speed Shaver and Group 3 Handpieces

- ❶ **Left Pedal** — Activates the shaver handpiece in the Reverse direction.
- ❷ **Right Pedal** — Activates the shaver handpiece in the Forward direction.
- ❸ **Center Pedal** — Activates the shaver handpiece in oscillate mode (There is no variation of speed when operating in oscillate mode, simply full ON or OFF).

1.6.2.2 Operation with the E9010 High Speed Drill and Group 2 Drills

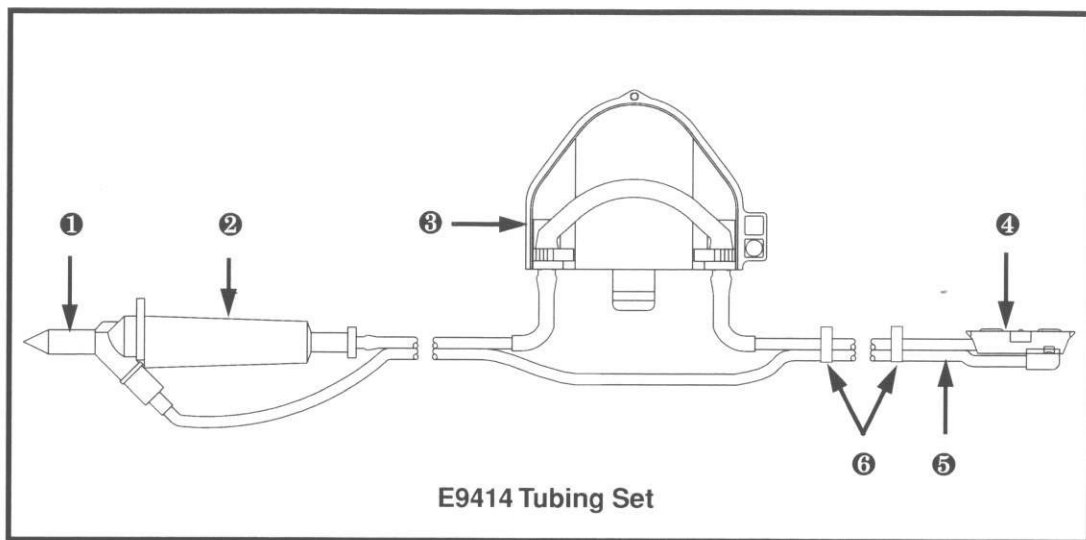


- ❶ **Left Pedal** — Activates the handpiece in the Reverse direction.
- ❷ **Right Pedal** — Activates the handpiece in the Forward direction.
- ❸ **Center Pedal** — This pedal is inoperative using these drills.

1.6.2.3 Operation with Group 2 Saws and E9015 Cranial Perforator Drive

NOTE: There is no direction selection or oscillate mode while using these handpieces.

- ❶ **Left Pedal** — Activates the handpiece.
- ❷ **Right Pedal** — Activates the handpiece.
- ❸ **Center Pedal** — This pedal is inoperative using these handpieces.



1.6.3 Tubing Sets

Five tubing sets are available for use with the D3000 Advantage System. Two are used with the E9010 High Speed Drill to provide handpiece cooling and/or surgical site irrigation. Two are used to provide irrigation for shaver blades. One is used for all Group 2 *MicroChoice* Drills and Saws, except the Modular Handpiece (5020-027)



Tubing sets are one-time use only. Properly dispose of tubing sets after use.

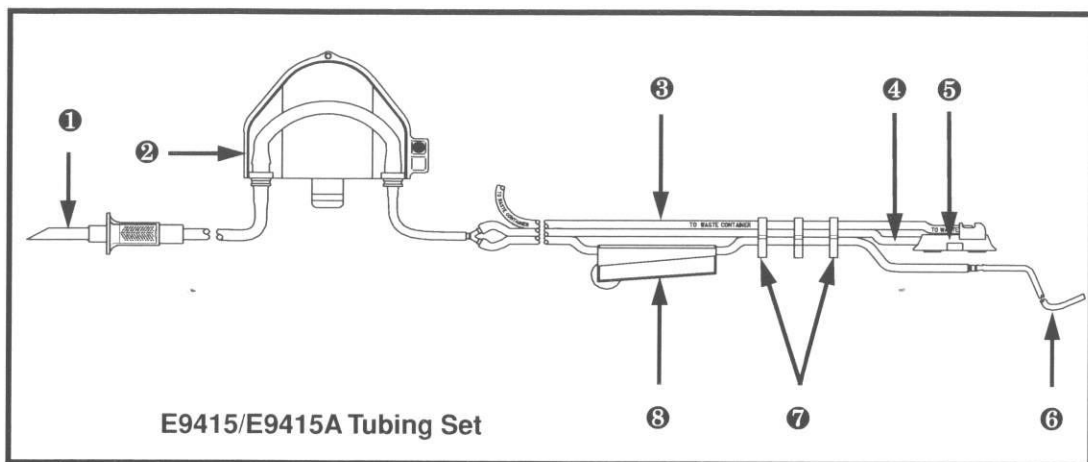


1.6.3.1 Tubing Set without Bur Irrigation (E9414) for use with the E9010 High Speed Drill

The E9414 Tubing Set is used in conjunction with the E9010 High Speed Drill only to provide cooling for the handpiece body.

Cooling for the handpiece body is required at all times and is obtained from a supply of sterile fluid (water or saline) that is pumped to the body of the handpiece.

- ① **Spike Line** — Connects to the fluid supply for fluid distribution to the surgical site.
- ② **Priming Chamber** — Used to prime the tubing line.
- ③ **Cassette** — Attaches to the peristaltic pump of the controller to aid in fluid delivery.
- ④ **Handpiece Cassette** — Connects to the handpiece body to supply fluid for handpiece cooling. Also redirects fluid for recirculation back to the fluid supply.
- ⑤ **Recirculating Line** — Routes the fluid back to the supply bag for recirculation.
- ⑥ **Handpiece Cord Clips** — Used to attach the tubing to the handpiece cord.



1.6.3.2 Tubing Set with Bur Irrigation (E9415/E9415A) for use with the E9010 High Speed Drill

The E9415/E9415A Tubing Set is used in conjunction with the E9010 High Speed Drill only. Its purpose is to provide cooling for the handpiece body and irrigation for the surgical site.

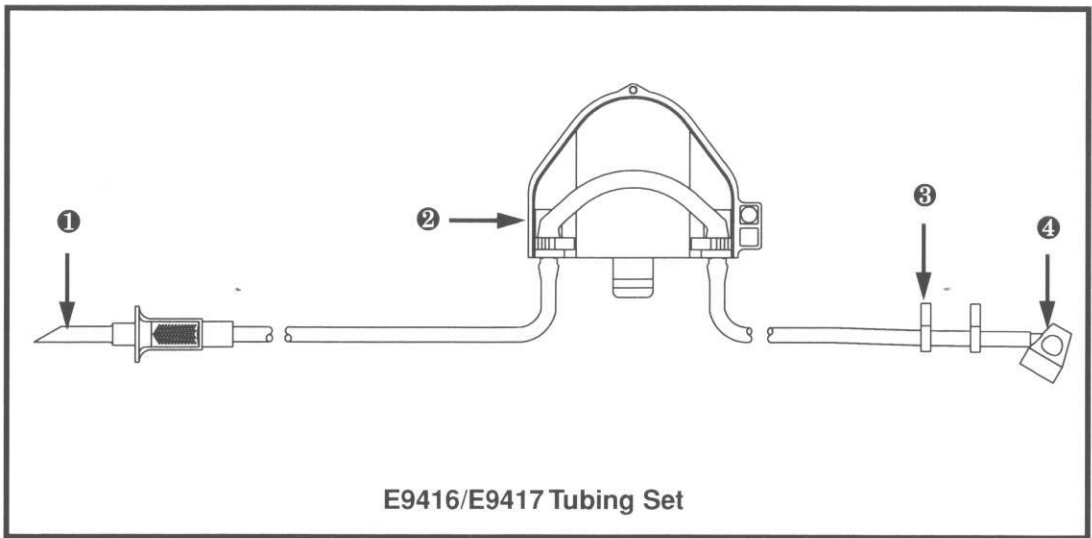
The E9415A Tubing Set is identical to the E9415 Tubing Set except that the E9415A Tubing Set has an affixed irrigation tip that will attach to any of the bur guards of the E9010 High Speed Drill.

Cooling for the handpiece body is required at all times and is pumped from a supply of sterile fluid (water or saline) to the handpiece body.

A common fluid supply is used for cooling and lavage, however, separate fluid lines are incorporated in the tubing set to avoid mixing the cooling fluid with the lavage fluid.

- ① **Spike Line** — Connects to the fluid supply for fluid distribution to the surgical site.
- ② **Cassette** — Attaches to the peristaltic pump of the controller for fluid delivery.

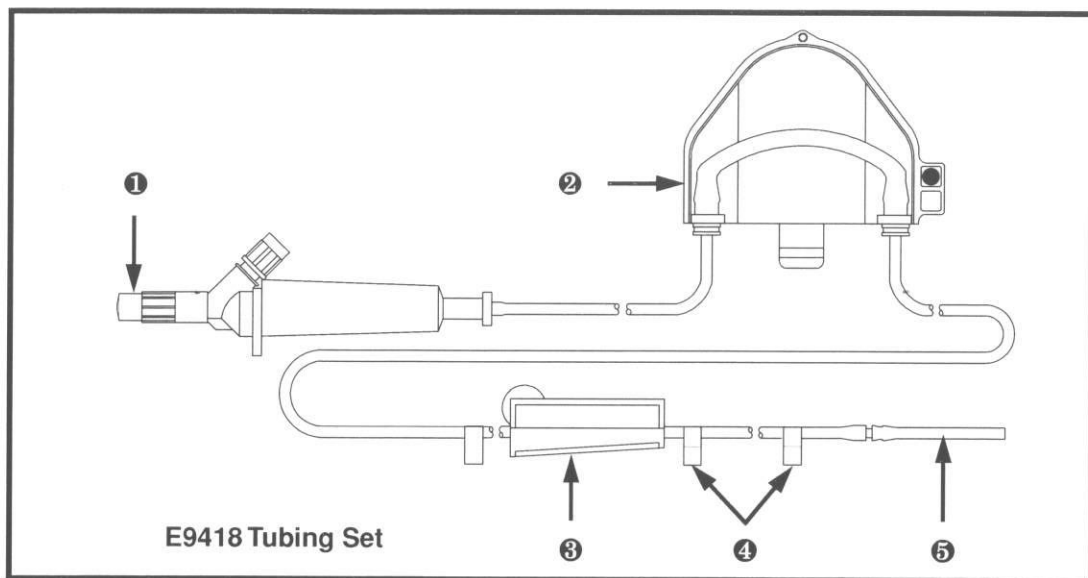
- ③ **Discharge Line** — Routes the handpiece cooling fluid to the discharge bucket.
- ④ **Circulation Line** — Routes the fluid to the handpiece cassette where it is used for cooling the handpiece.
- ⑤ **Handpiece Cassette** — Connects to the handpiece body to supply fluid for handpiece cooling. Also redirects fluid to the discharge line.
- ⑥ **Irrigation Line (E9415)** — Routes the fluid to the bur tip for irrigation of the surgical site. Requires an irrigation tip (reference “E9000 Irrigation Tips for Use with E9415 Tubing Set” on page 172).
- ⑥ **Irrigation Line (E9415A)** — Routes fluid through an affixed irrigation tip for irrigation of the surgical site.
- ⑦ **Handpiece Cord Clips** — Used to attach the tubing to the handpiece cord.
- ⑧ **Roller Clamp** — Used to adjust the fluid flow to the surgical site.



1.6.3.3 Tubing Sets (E9416 and E9417) for use with 4.2 mm and 3.7 mm Shaver Blades

The E9416 (4.2 mm) and E9417 (3.7 mm) Tubing Sets are used to provide irrigation to irrigated shaver blades and burs.

- 1 Spike Line** — Connects to the fluid supply for fluid distribution to the surgical site.
- 2 Cassette** — Attaches to the peristaltic pump of the controller to aid in fluid delivery.
- 3 Handpiece Cord Clips** — Used to attach the tubing to the handpiece cord.
- 4 Irrigator Tip** — Attaches to the blade hub to allow fluid distribution to the surgical site.



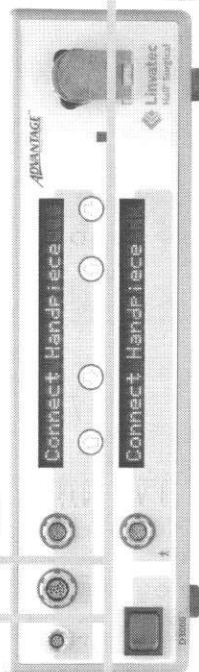
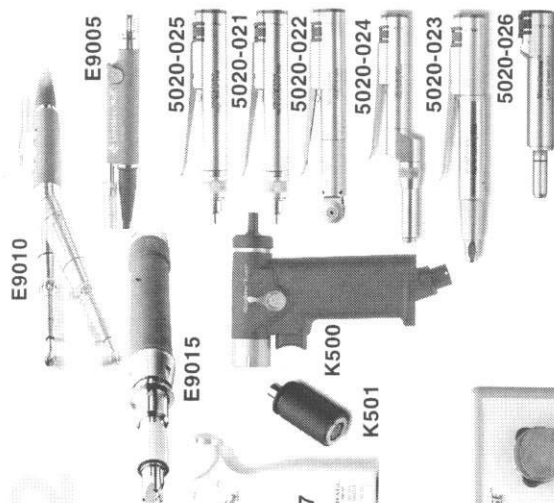
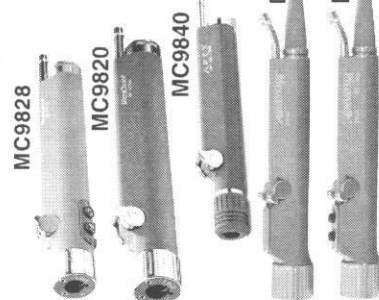
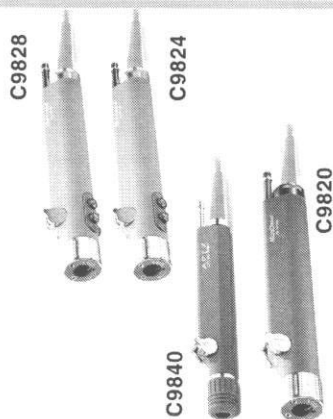
1.6.3.4 Tubing Set (E9418) for use with Group 2 *MicroChoice* Drills and Saws

The E9418 Tubing Set is used to provide irrigation for blades, bits and burs while using any of the *MicroChoice* Group 2 Drills or Saws (excludes the *MicroChoice* Modular Handpiece, REF 5020-027).

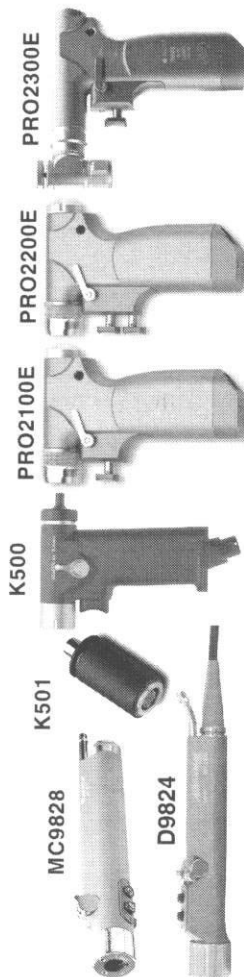
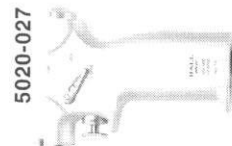
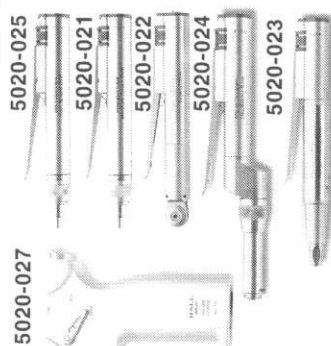
- ❶ **Spike Line** — Connects to the fluid supply for fluid distribution to the surgical site.
- ❷ **Cassette** — Attaches to the peristaltic pump of the controller to aid in fluid delivery.
- ❸ **Roller Clamp** — Used to adjust the fluid flow to the surgical site.
- ❹ **Handpiece Cord Clips** — Used to attach the tubing to the handpiece cord.

- ❺ **Irrigator Tip** — Accepts various irrigation tips (See “6.2 Handpieces, Attachments and Accessories” on page 170) for the Group 2 *MicroChoice* drills and saws for fluid distribution to the surgical site.

PORT 1



PORT 2

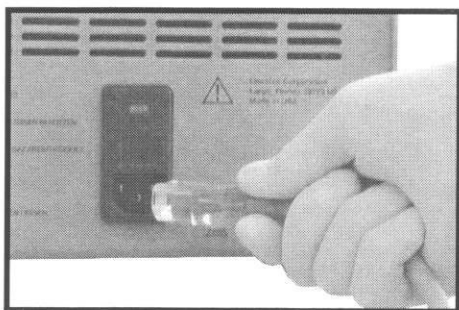


PORT 3

2.0 SYSTEM INSTALLATION and OPERATION

2.1 Installation and Setup

1. Plug the power cord into the controller receptacle and a properly earthed mains supply outlet (i.e., receptacle marked "Hospital Grade" or "Hospital Only").

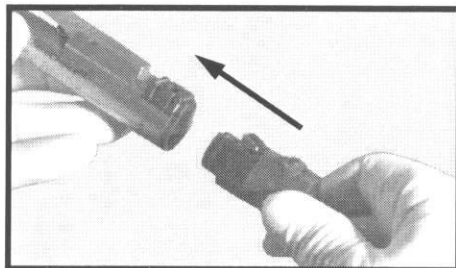


2. If using irrigation, a fluid bag hanger rod (REF 5040-180) is available to mount directly to the top of the console. This hanger rod will hold a one liter fluid bag. To attach the hanger rod:
 - (a) Remove the Linvatec sticker from the top of the console.
 - (b) Insert the threaded portion of the hanger rod into the hole. Turn clockwise until approximately 1/2" (12 mm) of the rod is threaded into the hole.
 - (c) Secure the hanger rod in place by tightening the knurled lock nut.
3. Hang the fluid bag on the arm of the hanger rod.

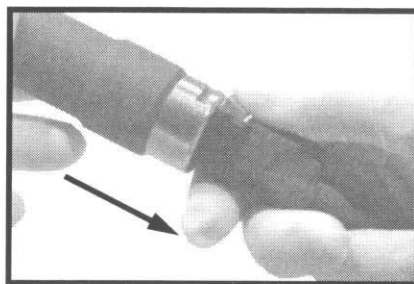
2.1.1 Handpiece Cord Installation

NOTE: Steps 1 and 2 apply to all handpieces with a detachable cord EXCEPT the K500 Mini-Driver Handpiece.

1. To attach the handpiece cord:
 - (a) Insert the handpiece cord into the cord receptacle of the handpiece. Push together until fully seated.



2. To remove the handpiece cord:
 - (a) Press the latch and remove the cord from the handpiece.




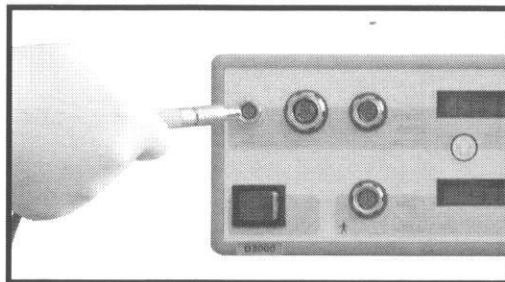
NOTE: Step 3 applies ONLY to the K500 Mini-Driver Handpiece.

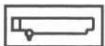
3. To attach the M334 handpiece cord to the K500 Mini-Driver Handpiece:
 - (a) Grasp the handle of the handpiece and align the dot located on the handpiece cord with the dot located on the base of the handpiece cord connector.
 - (b) Insert the handpiece cord into the handpiece cord connector. Push together until the cord and handpiece are fully seated.

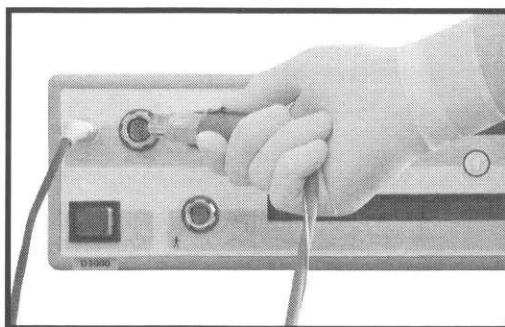


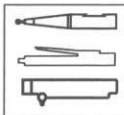
2.1.2 Footswitch and Handpiece to Controller Installation

1. If using a footswitch, position the red dot on the footswitch cord connector upward and insert it into the footswitch receptacle. 



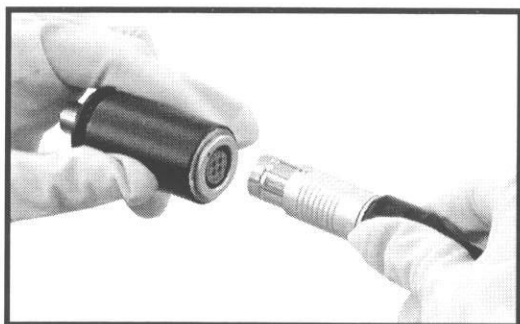
2. If using an APEX handpiece with an attached cord (REF C9820, C9824, C9828 or C9840) plug the handpiece cord connector directly into the APEX receptacle (Port 1) on the top portion of the console. 



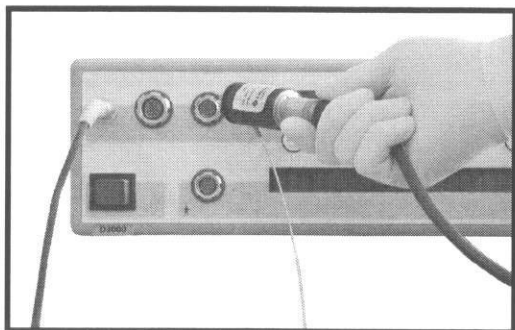
3. To connect any other handpiece, except the K500 Mini-Driver Handpiece or *PowerPro* handpieces, plug the cord connector directly into the Port 2 receptacle on the top portion of the console. 

NOTE: Only one handpiece can be connected to the top portion of the console at a time in its designated port, either Port 1 or Port 2 (Reference Port designation drawing on page 27). If a handpiece is connected to a top port while another handpiece is already connected, “HP SERVICE REQUIRED” will display. BOTH handpieces must be removed to clear the fault condition.

4. To connect the K500 Mini-Driver Handpiece to either Port 2 or 3, the K501 Mini-Adapter must be used.
 - (a) Plug the cord connector of the K500 Mini-Driver Handpiece into the female end of the K501 Mini-Adapter.

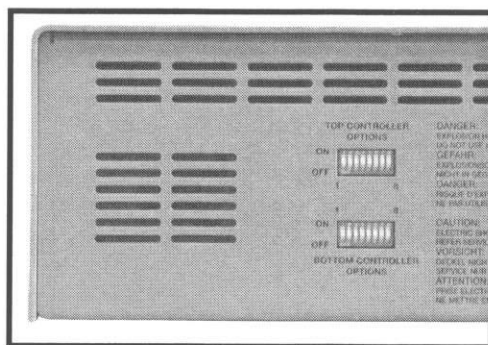


- (b) With the red dot on the male end of the K501 Mini-Adapter facing upward, insert it into either the Port 2 or Port 3 receptacle.



2.1.3 Controller Options Switches and Settings

Before turning on the controller, set the “TOP and BOTTOM CONTROLLER OPTIONS” switches to the desired operating position. See pages 31 through 36 for an explanation of each switch function, how to set them, and their factory default settings.



NOTE: When viewing the switches, the operative position is determined by the indented portion of each switch. The related photo indicates all switches are currently set to the “OFF” position.

2.1.3.1 Controller Options Switch Settings

The Advantage System “CONTROLLER OPTIONS” switches allow the user to set several operating parameters. All switch settings are initially set to “OFF” when shipped from the factory and function as follows in this position:

Top DIP Switch Settings

- Switch 1: Selects “Day-to-Day” Memory. Factory set to Memory off (See page 32).
- Switch 2: Selects the footswitch mode of operation - Variable Speed or ON/OFF mode. Factory set to Variable Speed mode (See page 33).
- Switch 3: Selects whether Audio is on or off. Factory set to off (See page 34).
- Switch 4: Selects the Handpiece Oscillation setting, Single- or Multi-turn oscillation mode. Factory set to Single-turn oscillate mode (See page 34).
- Switch 5 - 8: No application.

Bottom DIP Switch Settings

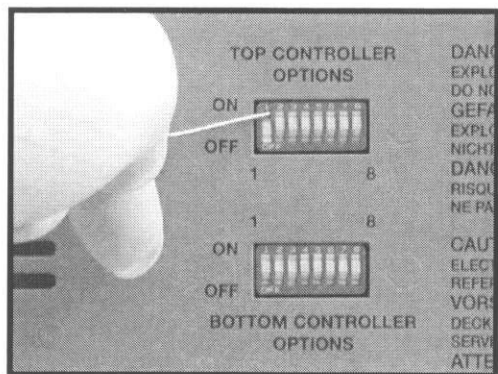
- Switch 1: Selects “Day-to-Day” Memory. Factory set to Memory off (See page 32).
- Switch 2: Not active.
- Switch 3: Selects the Handpiece Operating Mode - Default or Swiss mode (*PowerPro* Electric Two-Trigger Handpiece only). Factory set to Default Mode (See page 34).
- Switch 4: Selects the Handpiece Oscillation Setting, Single- or Multi-turn oscillation mode (shaver handpieces only). Factory set to Single-turn oscillate mode (See page 34).
- Switch 5: Selects the Display Mode - Text (English) or Graphical mode. Factory set to Text Mode (See page 34).
- Switch 6 - 8: No application.

2.1.3.2 Switch 1 - "Day-to-Day" Memory Storage Operation

The Advantage Controller has the capability of "Day-to-Day" memory storage. "Day-to-Day" memory storage retains handpiece settings between controller uses (even if the controller power is turned off) and is only available when "CONTROLLER OPTIONS" switch number 1 is set to the "ON" position.

Selection of "Day-to-Day" memory bypasses the controller start-up (default) settings. "Day-to-Day" memory can be achieved at any time by following steps 1 through 3 below.

1. Ensure controller power is off.
2. Place the "TOP CONTROLLER OPTIONS" and/or "BOTTOM CONTROLLER OPTIONS" switch 1 to the "ON" position, depending upon which part of the controller will be used.



3. Turn the controller on and utilize the system.

The last handpiece setting (including irrigation flow rate - Top Portion Only) will be the initial setting when the controller is turned on again. If no change(s) was made, the initial or default setting for that handpiece(s) will be retained.

NOTE: If "CONTROLLER OPTIONS" switch 1 is moved to "OFF" while the controller is on, the initial handpiece settings revert to the default settings when the controller power is turned off and then on again. See page 132 for handpiece default settings.

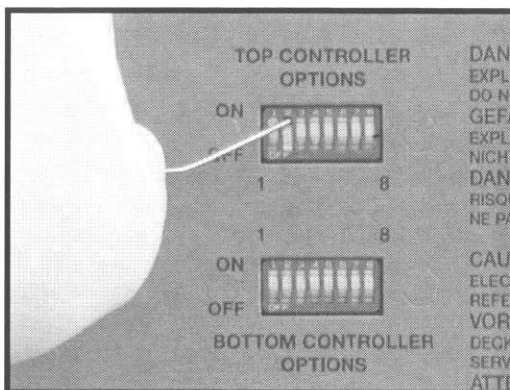
2.1.3.3 Switch 2 (Top Portion Only) - Footswitch Mode Selection

NOTE: This switch applies only to the top portion of the controller (Port 1 and Port 2) since there is no footswitch associated with the bottom portion of the controller. Switch 2 in the bottom row of switches is inactive.

The position of this particular “TOP CONTROLLER OPTIONS” switch determines the operating mode of the footswitch, either Variable Speed mode or ON/OFF mode.

1. When the footswitch operates in Variable Speed mode, depressing the appropriate pedal for the handpiece in use varies the speed proportionally to the amount of pressure applied, up to the maximum speed setting.
 - (a) To set the controller for the footswitch to operate in Variable Speed mode, place “TOP CONTROLLER OPTIONS” switch 2 to the “OFF” position.
2. When the footswitch operates in ON/OFF mode, depressing the appropriate pedal for the handpiece in use rotates the blade at the set speed, regardless of the amount of pressure applied. Therefore, when the appropriate pedal is depressed, the handpiece is on; when released, the handpiece is off.

- (a) To set the controller for the footswitch to operate in the ON/OFF mode, place the “TOP CONTROLLER OPTIONS” switch 2 to the “ON” position.



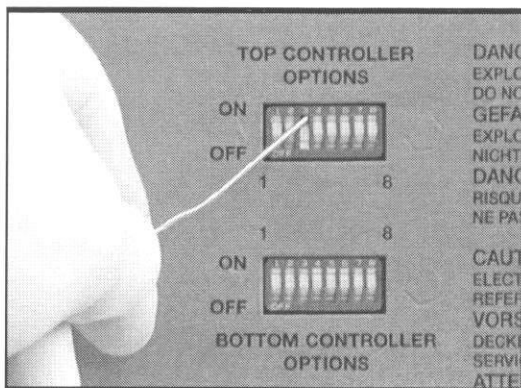
2.1.3.4 Switch 3 (Top Portion Only) - Audio Selection

The Audio Selection allows the user to turn the audio on or off.

NOTE: The audio selection is inoperative when using a saw (Reciprocating - 5020-023, Sagittal - 5020-022, or Oscillating - 5020-024), Modular Handpiece (5020-027), Mini-Driver Handpiece (K500) or the Cranial Perforator Drive Handpiece (E9015).

When audio is set to "ON", forward, reverse and oscillate will be pronounced whenever the direction is changed with the footswitch [See "2.1.6 Footswitch Operation (Top Portion Only)" on page 39], a 2-Button handpiece (REF C9824 or D9824), or a Full-Function handpiece (MC9828 or C9828).

1. To set audio on, place "TOP CONTROLLER OPTIONS" switch 3 to the "ON" position.



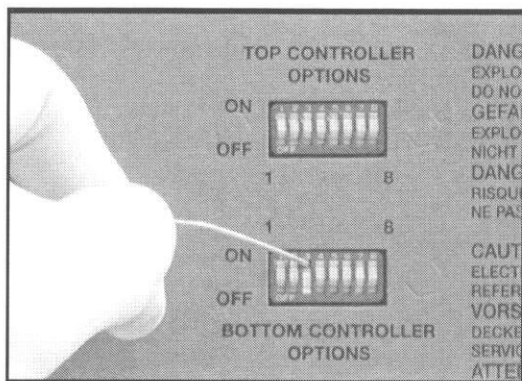
2. To set audio off, place "TOP CONTROLLER OPTIONS" switch 3 to the "OFF" position.

2.1.3.5 Switch 3 (Bottom Portion Only) Handpiece Operating Mode Selection (*PowerPro* Electric Two-Trigger Handpiece Only)

NOTE: The controller is shipped from the factory set to Default mode.

The Handpiece Operating Mode Selection allows the user to switch the functionality of the *PowerPro* Electric Two-Trigger Handpiece (PRO2200E) between the Default mode of operation (See "3.12.1 Default Mode of Operation" on page 96) and the Swiss mode of operation (See "3.12.2 Swiss Mode of Operation" on page 100).

1. To set the controller to operate the *PowerPro* Two-Trigger handpiece in the Default Mode of operation, place "BOTTOM CONTROLLER OPTIONS" switch 3 to the "OFF" position.
2. To set the controller to operate the *PowerPro* Two-Trigger handpiece in the Swiss Mode of operation, place "BOTTOM CONTROLLER OPTIONS" switch 3 to the "ON" position.



2.1.3.6 Switch 4 - Oscillate Mode Selection (Shaver Handpieces Only)

The position of this “CONTROLLER OPTIONS” switch determines the mode of operation, either single- or multi-turn oscillate mode, of the *MicroChoice* Shaver Handpieces, APEX Shaver Handpieces, E9005 High Speed Shaver, and the Advantage Shaver Handpieces (D9820 and D9824).

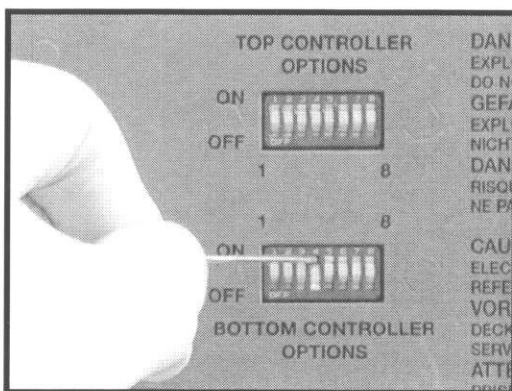
When using the 2-Pedal Footswitch (REF 5020-053), the oscillation mode must first be selected using the left foot-switch pedal [Reference “**2.1.6 Footswitch Operation (Top Portion Only)**” on page 39]. If using the Full-Function Shaver Handpieces (REF MC9828 and C9828), the APEX 2-Button Handpiece (REF C9824), or the Advantage 2-Button Shaver Handpiece (REF D9824), selection can also be made by pressing the hand-piece direction select button.



1. When the controller is set to operate in single-turn oscillate mode, depressing the right pedal on the 2-Pedal Footswitch (REF 5020-053) or the center pedal on the 3-Pedal Footswitch (REF C9863) causes the blade to rotate approximately one revolution in one direction, then in the opposite direction.
2. To set the controller to single-turn oscillate mode, place the “TOP CONTROLLER OPTIONS” and/or “BOTTOM CONTROLLER OPTIONS” switch 4 to the “OFF” position, depending upon which part of the controller will be used.

3. When the controller is set to operate in multi-turn oscillate mode, depressing the right pedal on the 2-Pedal Footswitch (REF 5020-053) or the center pedal on the 3-Pedal Footswitch (REF C9863) causes the blade to rotate several times in one direction, then several times in the opposite direction. The number of turns in each direction is proportional to the oscillating speed.

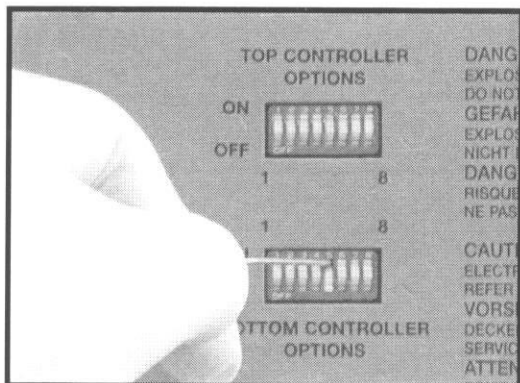
- (a) To set the controller to multi-turn oscillate mode, place the “TOP CONTROLLER OPTIONS” and/or “BOTTOM CONTROLLER OPTIONS” switch 4 to the “ON” position, depending upon which part of the controller will be used.



2.1.3.7 Switch 5 (Bottom Portion Only) Display Mode Selection

The position of this "BOTTOM CONTROLLER OPTIONS" switch determines how information is displayed on the controller, either text or symbols.

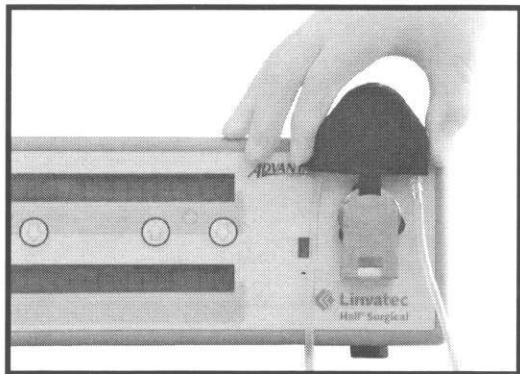
1. When the controller is set to display information in text mode, all information is displayed in English text.
 - (a) To set the controller to Text mode, place "BOTTOM CONTROLLER OPTIONS" switch 5 to the "OFF" position.
2. When the controller is set to display information in Graphics mode, all information is displayed with symbols.
 - (a) To set the controller to Graphics mode, place "BOTTOM CONTROLLER OPTIONS" switch 5 to the "ON" position.



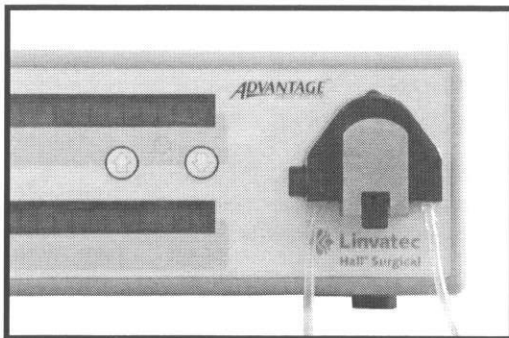
2.1.4 Tubing Set Cassette Installation

If using irrigation (required when using the E9010 High Speed Drill) use surgical aseptic technique to attach the tubing set as follows:

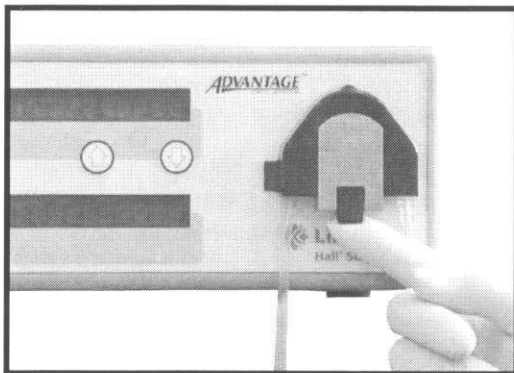
1. **Circulating Nurse** - Open the tubing package. Present the package contents to the Scrub Nurse.
2. **Scrub Nurse** - Remove the tubing set from its sterile package.
3. Pass the cassette and bag spike out of the sterile field.
4. **Circulating Nurse** - Position the cassette over the pump rotor on the controller with the tubing facing down and the **black tab** behind the metal plate.



5. Slide the cassette down until it snaps into place.



6. Remove the cap from the bag spike. Connect the spike to a sterile fluid source.
7. To remove the cassette, pull out on the black tab at the bottom of the cassette.



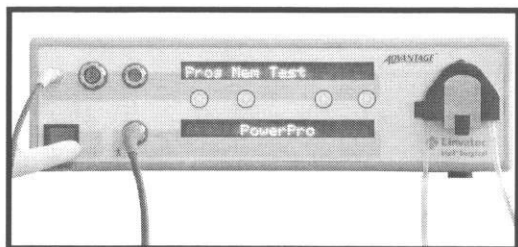
8. After use, dispose of tubing set properly.



2.1.5 Controller Operation

After all the desired settings have been made to the “CONTROLLER OPTIONS” switches, and the tubing set is attached, if using irrigation (top portion only) turn on the controller.

1. Depress the standby power switch on the front of the console to the ON position to activate the controller.



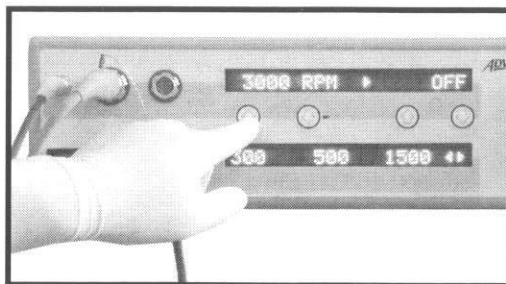
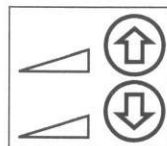
- Each display will show the current operating software version. A self-diagnostic test will be performed and the top display will indicate “Prog Mem Test”.
- When the test is concluded, the controller will sense the attached handpiece and display, either in text form or graphical form, the operating mode, operating speed and/or direction setting, depending upon the handpiece that is attached and which portion of the controller the handpiece is attached to.

Without any user input selections, handpieces will initially operate at their default setting. Desired speed and irrigation settings can be stored in memory by following the instructions in “2.1.3.2 Switch 1 - “Day-to-Day” Memory Storage Operation” on page 32.

2. To adjust the handpiece speed using the console buttons (Top Portion Only):



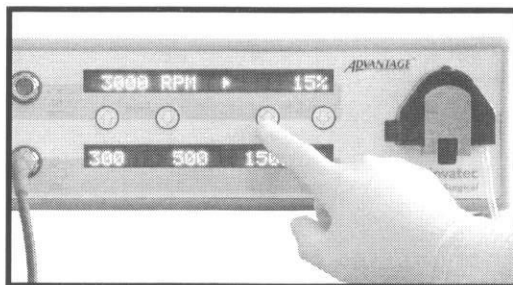
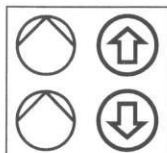
- (a) Press the speed increase or decrease button on the front panel.



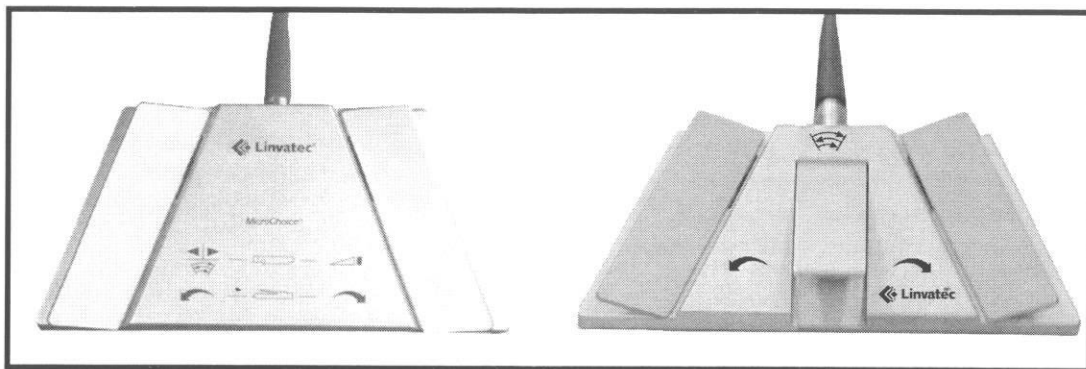
3. To adjust speed settings with the handpiece cord button, where applicable, reference “3.6.5 Group 2 Handpiece Cord Button Operation” on page 79 or “3.10 Group 3 Handpiece Cord Button Operation” on page 88.
4. To adjust the irrigation flow rate (Top Portion Only):



- (a) Press the flow increase or decrease button on the front panel.



NOTE: If using the E9414 Tubing Set with the E9010 High Speed Drill, the flow rate cannot be changed. The display will show “PRESET” for the flow rate.



2.1.6 Footswitch Operation (Top Portion Only)

WARNING: To avoid unintentional handpiece activation, unplug the footswitch when using a levered handpiece, or a 2-Button or Full-Function Shaver Handpiece. When the footswitch is attached to the controller it will remain active.

NOTES:

1. Either footswitch, 2-Pedal or 3-Pedal, will control handpieces being operated only in Port 1 or Port 2 on the top portion of the console, excluding the *MicroChoice* Modular Handpiece (REF 5020-027) and the Mini-Driver Handpiece (REF K500).
2. The handpiece and footswitch operate on a first come, first served basis. If the handpiece is activated with the footswitch, the handpiece activation lever or button is inoperative until the footswitch pedal is released, and vice versa.
3. *PowerPro* Handpieces, the *MicroChoice* Modular Handpiece and the Mini-Driver Handpiece will not operate with the footswitch.


When a handpiece is attached to the controller, the firmware senses the type of handpiece connected and programs the footswitch to operate accordingly.

1. Either footswitch (REF 5020-053 or C9863) will operate in one of two modes, either Variable Speed mode or ON/OFF mode, when used with any handpiece except *PowerPro* Handpieces, the Mini-Driver Handpiece (REF K500) and the *MicroChoice* Modular Handpiece (REF 5020-027). For information regarding setting the Footswitch Mode Selection, see “2.1.3.3 Switch 2 (Top Portion Only) - Footswitch Mode Selection” on page 33.
 - (a) When operating in Variable Speed mode, the speed varies within predetermined limits by the amount of pressure applied to the appropriate pedal. The blade speed min/max range is determined by the shaver handpiece and cutter blade in use (Reference “2.1.5 Controller Operation” on page 38 or “3.6.5 Group 2 Handpiece Cord Button Operation” on page 79 or “3.10 Group 3 Handpiece Cord Button Operation” on page 88 for information to change operating speeds).


- (b) When operating in ON/OFF mode, the handpiece motor is either ON (pedal depressed) or OFF (pedal released). The motor rotates at a fixed rate regardless of the amount of pressure applied to the pedal (Reference “**2.1.5 Controller Operation**” on page 38, “**3.6.5 Group 2 Handpiece Cord Button Operation**” on page 79 or “**3.10 Group 3 Handpiece Cord Button Operation**” on page 88 for information to change operating speeds).

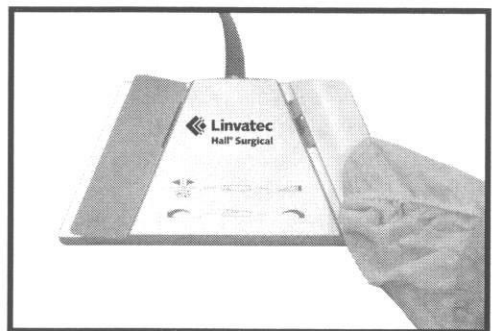
2.1.6.1 Operation of the 2-Pedal Footswitch (REF 5020-053)

Operation of the footswitch when using the following handpieces (C9820, MC9820, C9824, C9828, MC9828, C9840, MC9840, E9005, D9820, and D9824):

1. Set the desired direction (forward, reverse or oscillate) by pressing the left footswitch pedal. The upper controller display will indicate the direction change and a beep will sound every time the pedal is pressed. 




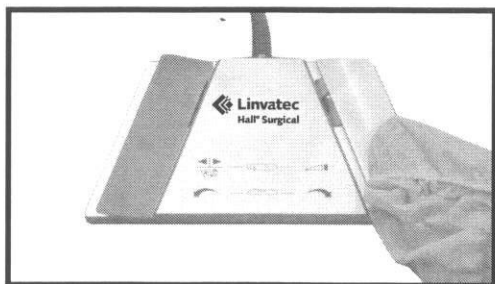
2. To operate the handpiece, depress the right footswitch pedal. The operating speed and direction arrow will display on the top display of the controller. 




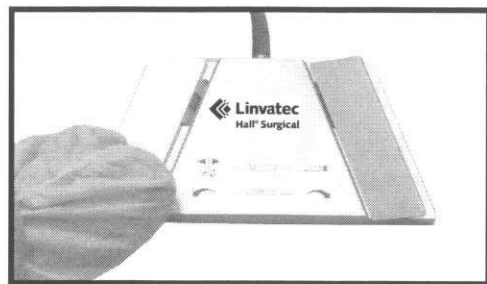
3. If irrigation is being utilized, fluid flow will begin when the right pedal is depressed.

Operation of the footswitch when using a *MicroChoice Elite High Speed* (REF 5020-025), *Medium Speed* (REF 5020-021), or *Low Speed* (5020-026) Drill and the *E9010 High Speed Drill*:

1. Depress the right pedal to activate the handpiece in the forward direction. 



2. Depress the left pedal to activate the handpiece in the reverse direction. A brief audible beeping tone will indicate reverse direction when the handpiece is initially activated. 




Operation of the footswitch when using a *MicroChoice Sagittal Saw* (REF 5020-022), *Reciprocating Saw* (REF 5020-023), *Oscillator Handpiece* (REF 5020-025), or *E9015 Cranial Perforator Drive*:

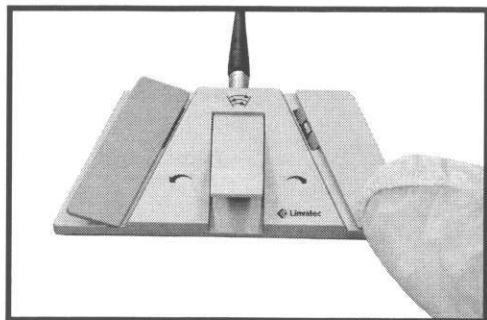
1. Depress either the left or right pedal to activate the handpiece.


NOTE: There is no oscillate or reverse mode for these handpieces.

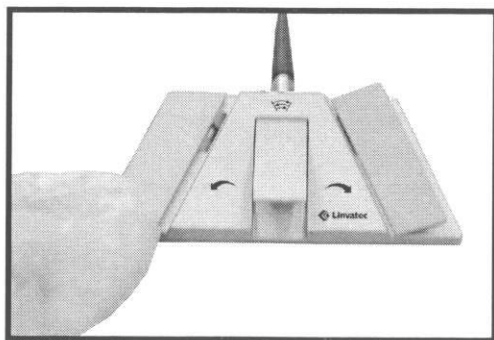
2.1.6.2 Operation of the 3-Pedal Footswitch (REF C9863)


Operation of the footswitch when using the following handpieces (C9820, MC9820, C9824, C9828, MC9828, C9840, MC9840, E9005, D9820, and D9824):

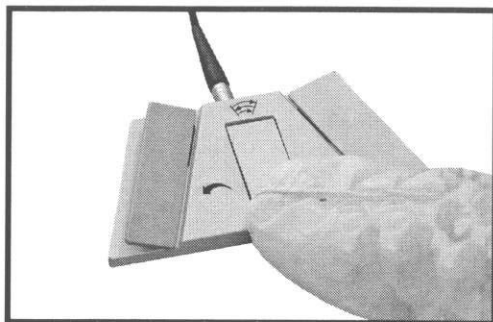
1. Depress the right pedal to activate the handpiece in the forward direction. 



2. Depress the left pedal to activate the handpiece in the reverse direction. A brief audible beeping tone will indicate reverse direction when the handpiece is initially activated. 



3. Depress the center pedal to activate the handpiece in oscillate mode. 




4. If irrigation is being utilized, fluid flow will begin when either the left or right pedal is depressed.

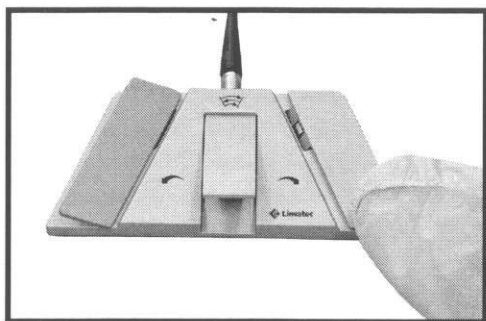
Operation of the footswitch when using a *MicroChoice* Sagittal Saw (REF 5020-022), Reciprocating Saw (REF 5020-023), Oscillator Handpiece (REF 5020-025), or E9015 Cranial Perforator Drive:


NOTE: There is no oscillate or reverse mode for these handpieces.

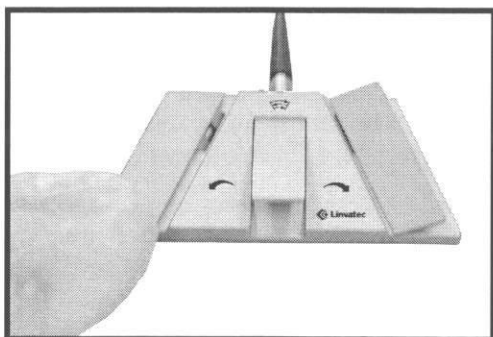
1. Depress either the left or right pedal to activate the handpiece.
2. The center pedal is inoperative using these handpieces.

Operation of the footswitch when using a *MicroChoice Elite High Speed* (REF 5020-025), *Medium Speed* (REF 5020-021), or *Low Speed* (5020-026) Drill and the *E9010 High Speed Drill*:

1. Depress the right pedal to activate the handpiece in the forward direction. 



2. Depress the left pedal to activate the handpiece in the reverse direction. A brief audible beeping tone will indicate reverse direction when the handpiece is initially activated. 



3. The center pedal is inoperative using these handpieces.

3.0 HANDPIECE OPERATION

CAUTION: When operating shaver blades or burs in any Group 3 handpiece (reference “Group 3 Handpieces” on page 81) the shaver handpiece suction port valve must be in the open or ON position, and the shaver blade or bur must be within the distention fluid of the joint. Otherwise, damage to the blade hub or bur hub will result.

WARNING: When not in use and prior to connecting or removing attachments and accessories, always place the handpiece in its safe, or off position, if applicable.

NOTES:

4. If a levered handpiece (REF 5020-021, -022, -023, -024, -025) is placed on a magnetic drape, the controller may display “MAGNETIC FIELD”. The handpiece will be inoperable until the magnet and handpiece are separated. Once separated, the controller will reset after three (3) seconds.

If a levered handpiece is being used in Port 3, and switch 5 on the bottom portion of the controller is set to Graphical Display mode, the controller will display:



5. Operation of a drill (REF 5020-021, -025, -026, E9010) without a bur locked in place is considered a failure mode. If the handpiece is activated for several seconds without a bur in place, the controller will display “STALL, CHECK BUR LOCK”. Operation cannot be initiated until a bur is locked in place and at least five (5) sec-

onds have elapsed without the footswitch or handpiece activation lever (REF 5020-021, -025, -026 only) being depressed.

If the handpiece is being used in Port 3 (excludes the E9010 Drill), and switch 5 on the bottom portion of the controller is set to Graphical Display mode, the controller will display:



6. If the “STALL, CHECK BUR LOCK” message displays upon initial activation of the E9010 High Speed Drill while a bur is locked in place, this may indicate that the drill was not cleaned correctly and the bearings are locked due to debris build-up. To correct the problem, perform the following:
 - (a) Disconnect the handpiece from the controller.
 - (b) Rotate the bur in the handpiece with your fingers until the bur spins freely.
 - (c) If the message still displays when the handpiece is activated with the footswitch, return the handpiece and bur guard to Linvatec for service.
7. The handpiece cord may be disconnected from one handpiece and connected to another handpiece, if applicable, without turning off the controller.
8. Handpieces are inoperable if the activation lever or trigger is depressed while connecting the handpiece cord.
9. The *MicroChoice* Modular Handpiece (REF 5020-027), Mini-Driver Handpiece (K500), or any of the *PowerPro* handpieces will not operate by the footswitch.

Group 1 Handpieces

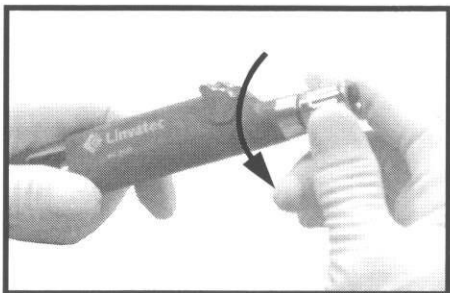
NOTES:

1. Group 1 handpieces consist of the High Speed Shaver (REF E9005), High Speed Drill (REF E9010), and Cranial Perforator Drive (REF E9015).
2. Group 1 handpieces will operate only in Port 2 (Top Portion of Console).

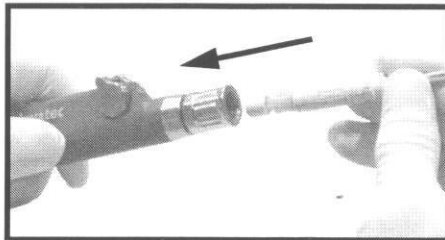
3.1 High Speed Shaver (E9005) Operation

NOTE: If irrigation is being utilized, the E9416 (4.2 mm) or E9417 (3.7 mm) Tubing Set must be used.

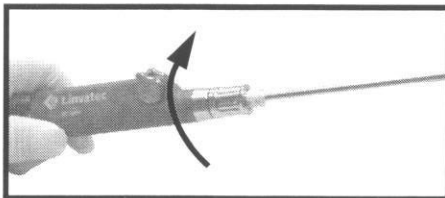
1. To insert a shaver blade or bur:
 - (a) Open the collet by turning the locking collet counterclockwise as viewed from the collet end of the handpiece.



- (b) Insert a shaver blade or bur until the shaft is completely seated.



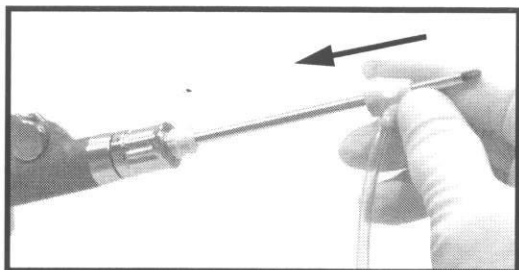
- (c) If using a shaver blade, rotate the shaver blade until the cutting window is in the desired position.
- (d) Secure the shaver blade or bur by turning the locking collet clockwise.



- (e) Pull on the shaver blade or bur to ensure it is locked in place.
- (f) To remove the shaver blade or bur, open the locking collet by turning it counterclockwise as viewed from the collet end of the handpiece. Pull the shaver blade or bur out.

2. If irrigation is being used, attach the tubing to the shaver blade and handpiece.

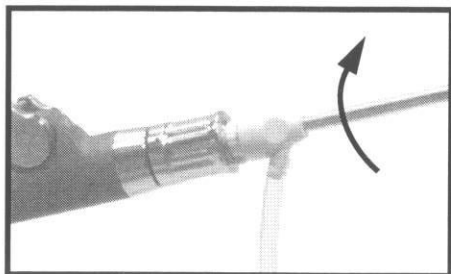
- (a) Slide the tubing set irrigation collar over the distal end of the shaver blade toward the shaver blade hub.



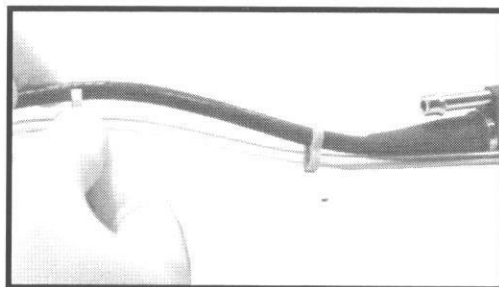
NOTE: Prior to bending the shaver blade, the irrigator collar must be installed. See blade insert sheet for blade bending information.

WARNING: If operating the E9005 Shaver in the oscillate mode between 2500 and 5000 rpm, and with a shaver blade in the bent position, you **MUST** use either the E9416 or E9417 Irrigation Tubing Set and irrigation **MUST** be set to 100%.

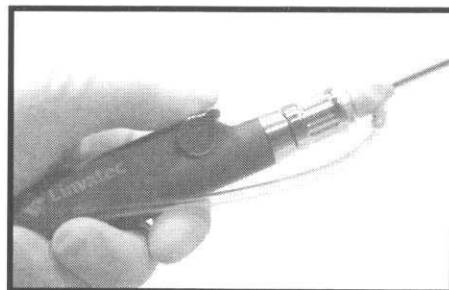
- (b) Slide the inner recesses of the collar completely over the two hub-ears on the shaver blade hub.
 - (c) Turn the irrigation collar clockwise (approximately 90°) and securely lock it into place.



- (d) Snap the handpiece cord clips onto the handpiece cable to secure the tubing.



3. For best resection performance, completely open the handpiece suction port valve by positioning it towards the front of the handpiece.



3.2 High Speed Drill (E9010) Operation

CAUTIONS:

1. Do not operate the handpiece with the collet open. Damage will occur.
2. This handpiece must be operated with either the E9414 or E9415/E9415A Tubing Set. The handpiece will not operate without a tubing set connected.
3. Cooling for the handpiece body is required at all times. When using the E9414 Tubing Set, the tubing line **MUST** be fully primed or the handpiece will overheat, causing damage to the handpiece (see “E9414 Tubing Set with Recirculation only:” on page 52 for information on priming the tubing set).
4. When using the E9010 Drill to cut bone during a craniotomy procedure, let the bur do the cutting. Excessive pressure is not needed. Ensure the bur is perpendicular with the cutting surface. Do not angle the cutting tool or attempt to force or saw with the bur into the bone. Doing so may cause the handpiece to stall and the controller will display “STALL, CHECK BUR LOCK”. To reactivate the handpiece, release the footswitch for a few seconds to reset the controller.
5. Ensure the bur is not in contact with the cutting surface before activating the drill. Doing so will not allow the drill to attain the speed required for efficient cutting.

WARNINGS:

1. Ensure the fluid bag is spiked, otherwise, damage or injury may result.
2. Use only Ultrapower® Series 7021 burs, and Series E4xxx, E5xxx, E6xxx and E8xxx burs.

NOTES:

1. If the handpiece is connected to the controller without the appropriate tubing set installed, the controller will display “INSTALL CASSETTE” “REF E9414 or E9415”.
2. If using the E9414 Tubing Set (without irrigation) with the E9010 High Speed Drill, the flow rate cannot be changed. The display will show “PRESET” for the flow rate.
3. When using the E9415/E9415A Tubing Set with the E9010 High Speed Drill, the flow rate defaults to 50% and is adjustable between 40% and 100%. The flow rate cannot be shut off.
4. There is no oscillate mode for this handpiece.

3.2.1 Preoperative Functional Test for the E9010 High Speed Drill

Prior to operating the E9010 High Speed Drill, perform the following preoperative checks to verify proper functioning. Any operating difficulties should be reported to your Sales Representative or Linvatec Customer Service.

WARNING: Use of a drill not functioning properly can result in injury to the patient or medical personnel.

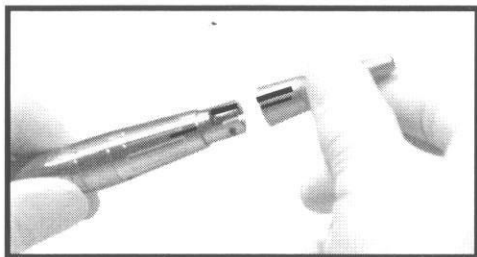
1. Before operation of the drill, check for:
 - any loose or missing parts
 - any physical damage
 - movable parts that do not move freely
2. Performance Testing:
 - (a) Assemble the appropriate guard, accessory, and/or tubing set according to the instructions on pages 49 through 55.
Warning: Ensure that the guard and bur are properly installed, otherwise injury to the patient or medical personnel can result.
 - (b) Operate the drill at 60,000 rpm for 30 seconds in the straight position according to operating instructions contained on pages 38 through 43 and monitor for any of the following:
 - excessive noise
 - excessive vibration
 - the drill or bur guard being hot to the touch during the test procedure or during surgical use

- the drill not operating up to its maximum preset speed (verify the maximum preset operating speed by fully depressing the appropriate footswitch pedal. Verify that the maximum speed is displayed on the console).

3.2.2 Bur Guard Attachment

1. To attach the bur guard:

- (a) Align the etch mark on the guard with the etch mark on the handpiece guard collet.

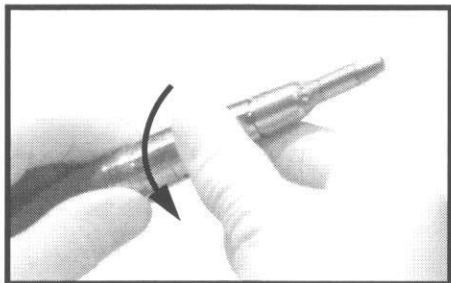


- (b) Looking at the nose of the handpiece, hold the swivel sleeve and push the guard completely inward. Twist clockwise and release. The guard is now locked into place.

2. Select the proper bur for the guard being used.

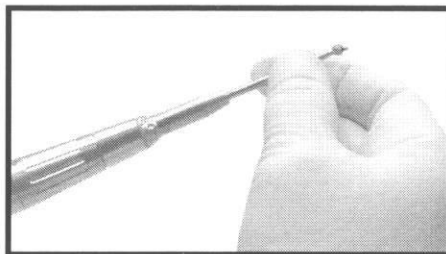
3. To install the bur:

- (a) Rotate the keyless chuck counterclockwise until the collet screws are aligned with the “unlock” icon.



- (b) Completely insert the bur. The safety line on the bur shank, if marked, must be hidden by the guard.

WARNING: Ensure the safe-line mark on the bur, where indicated, is not showing. Damage or injury may result.



- (c) Rotate the keyless chuck clockwise until the collet screws are aligned with the “lock” icon.



- (d) Pull on the bur to ensure it is locked in place.

4. To remove the bur:

- (a) Rotate the keyless chuck counterclockwise until the collet screws are aligned with the “unlock” icon.



- (b) Pull the bur out of the collet.

5. To remove the guard:

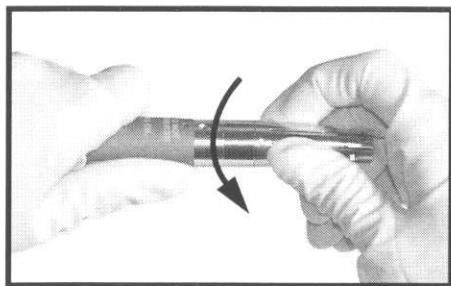
- (a) Push the guard inward. Twist the guard counterclockwise and remove.

3.2.3 Neuro Guard Attachment

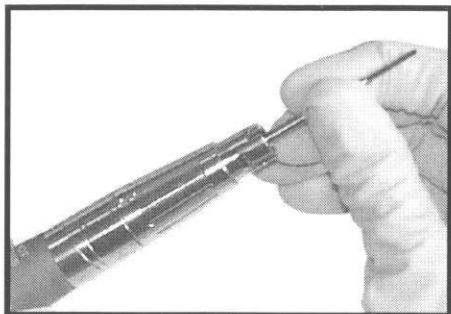
When using a neuro guard and bur, the bur is inserted before the guard.

1. To install the bur:

- (a) Select the proper bur for the guard being used.
- (b) Rotate the keyless chuck counterclockwise until the collet screws are aligned with the “unlock” icon.



- (c) Completely insert the bur.

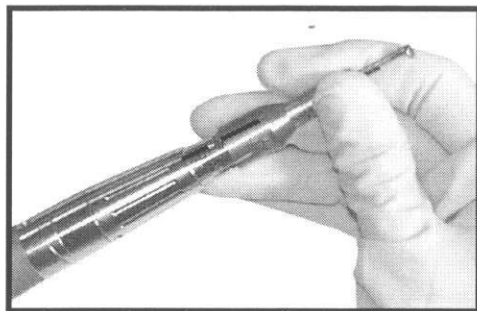


- (d) Rotate the keyless chuck clockwise until the collet screws are aligned with the “lock” icon.
- (e) Pull on the bur to ensure it is locked in place.



2. To attach a neuro guard:

- (a) Select the appropriate guard for the bur being used.
- (b) Align the etch mark on the guard with the etch mark on the handpiece guard collet.



- (c) Looking at the nose of the handpiece, hold the swivel sleeve and push the guard completely inward. Twist clockwise and release. The guard is now locked into place.

NOTE: Installing the locking collar on the E9010 Drill when using a neuro guard helps keep the handpiece in the straight position.

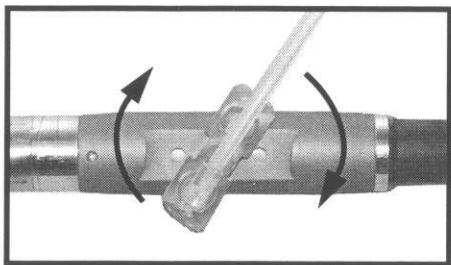
3. To remove the bur and guard, the guard must be removed first:

- (a) Remove the guard by pushing the guard inward, twisting the guard counterclockwise and removing it.
- (b) Remove the bur by rotating the keyless chuck counterclockwise until the collet screws are aligned with the “unlock” icon. Remove the bur.

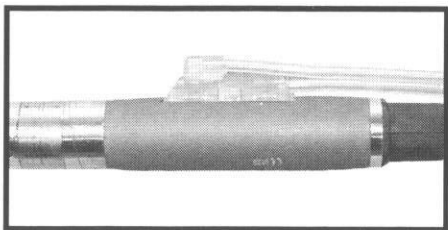


3.2.4 Tubing Set Line Attachment

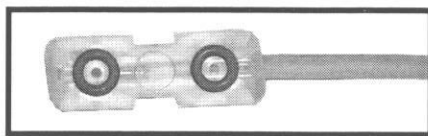
1. Attach the black cassette of the tubing set to the controller (reference “**2.1.4 Tubing Set Cassette Installation**” on page 37).
2. Spike the fluid bag.
3. Prior to connecting the plastic handpiece cassette of the tubing set, lubricate the O-Rings with sterile fluid.
4. Place the plastic handpiece cassette onto the nub within the cassette holder opening on top of the handpiece.



5. Twist the plastic handpiece cassette clockwise until it is aligned with the handpiece body. No downward pressure is needed while turning.



6. If leakage occurs at the tubing's plastic handpiece cassette/handpiece interface while operating the handpiece, perform the following to alleviate the leakage:
 - (a) Remove the tubing's plastic handpiece cassette from the handpiece by reversing steps 4 and 5.
 - (b) Inspect the O-Rings to ensure they are seated properly within the handpiece cassette.



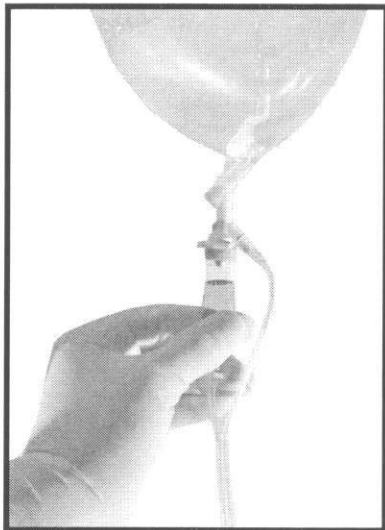
- (c) If no problems exist, reinstall the handpiece cassette in the handpiece by following steps 4 and 5.
- (d) If leakage still occurs, replace the tubing set.

E9414 Tubing Set with Recirculation only:

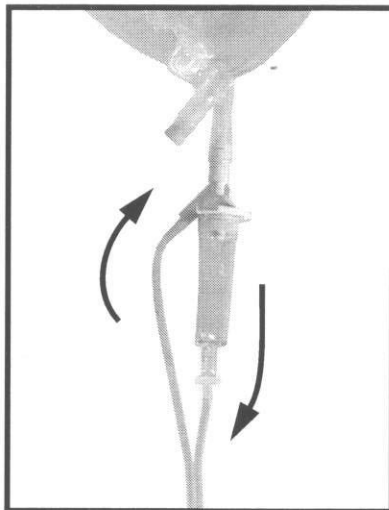
CAUTION: When using the E9414 Tubing Set, the tubing line **MUST** be fully primed (no air in line) or the handpiece will overheat, which will cause damage to the handpiece.

1. Prime the tubing by doing the following:

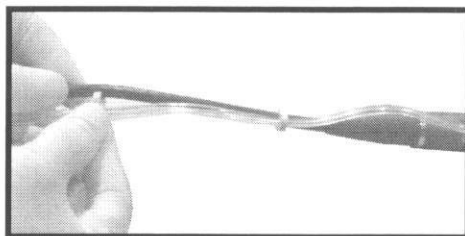
- (a) Squeeze the priming chamber.



- (b) While continuously squeezing the priming chamber, operate the drill at low speed until fluid completely fills the tubing and is recirculated back into the fluid bag. Ensure fluid remains in the priming chamber during use.

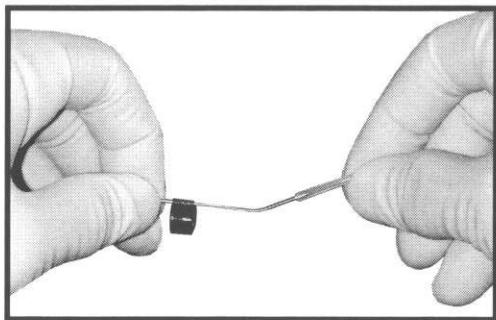


2. Snap the handpiece cord clips onto the handpiece cable to secure the tubing.



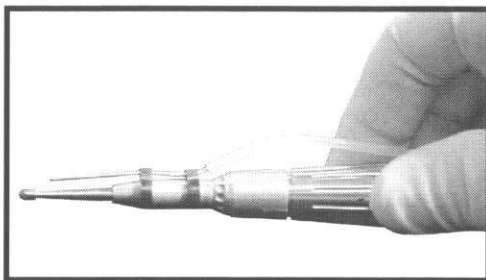
E9415 Tubing Set with Irrigation only:

1. Place the Discharge Line, marked "TO WASTE CONTAINER" into the discharge bucket. The discharge line must be peeled away (separated) from the rest of the tubing in order to be placed into the discharge bucket.
2. Attach the Irrigation Line to the appropriate irrigation tip for the bur in use:
 - (a) Remove the plastic protectors from both ends of the irrigation tip.
 - (b) Insert the angled end (shorter end) of the irrigation tip securely into the tubing line.

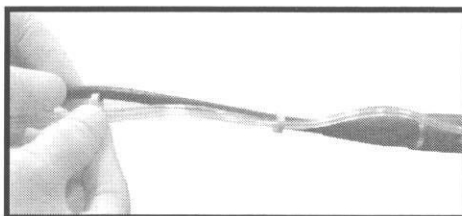


3. Connect the irrigation tip to the bur guard:
 - (a) Ensure the shorter end of the irrigation tip is pointing upward.
 - (b) Position the tubing clips to the desired position. **Note: The rear clip has an integrated rib that will snap into the rear groove of the bur guard.**

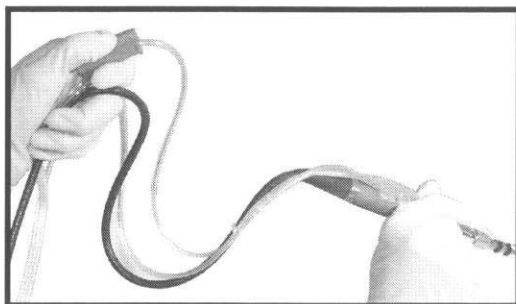
- (c) Snap the tubing clips onto the bur guard.



- (d) The irrigation tip may be bent to the desired angle for desired fluid dispensing.
4. Snap the handpiece cord clips onto the handpiece cable to secure the tubing.



5. To adjust fluid flow to the operative site between 40% and 100%, use the console Flow Increase or Decrease buttons.
6. To adjust fluid flow to the operative site below 40%, use the roller clamp.



E9415A Tubing Set with Integrated Irrigation Tip:

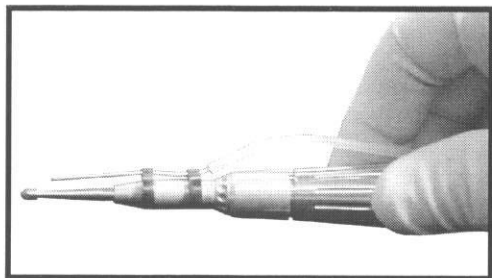
NOTE: The integrated irrigation tip of this tubing set will attach to all the associated bur guards for the E9010 High Speed Drill.

1. Place the Discharge Line, marked "TO WASTE CONTAINER" into the discharge bucket. The discharge line must be peeled away (separated) from the rest of the tubing in order to be placed into the discharge bucket.

2. Position the irrigation tip to the desired position prior to attaching the clips to the bur guard.

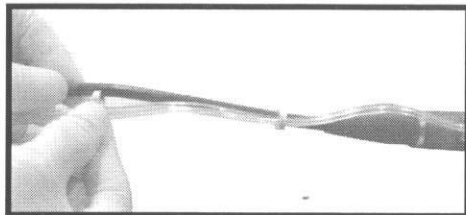
3. Position the tubing clips to the desired position and snap them onto the bur guard.

Note: The rear clip has an integrated rib that will snap into the rear groove of the bur guard.



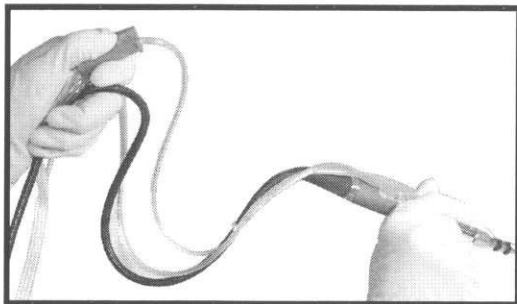
4. The irrigation tip may be bent to the desired angle for desired fluid dispensing.

5. Snap the handpiece cord clips onto the handpiece cable to secure the tubing.



6. To adjust fluid flow to the operative site between 40% and 100%, use the console Flow Increase or Decrease buttons.

7. To adjust fluid flow to the operative site below 40%, use the roller clamp.



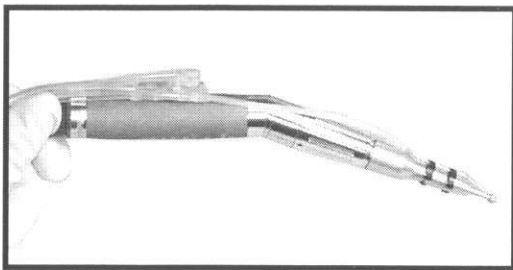
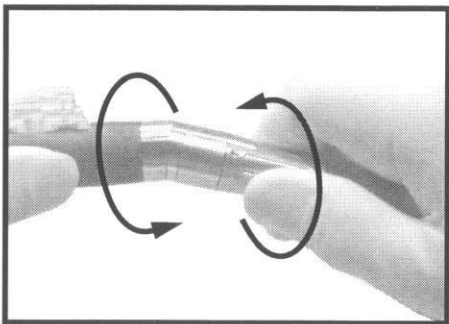
3.2.5 Handpiece Adjustment

The E9010 High Speed Drill can be adjusted to a 20° angle, without the use of a separate attachment, for access to hard to reach areas.

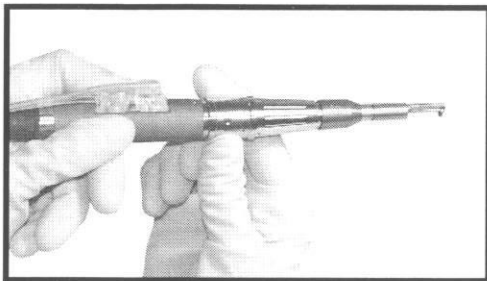
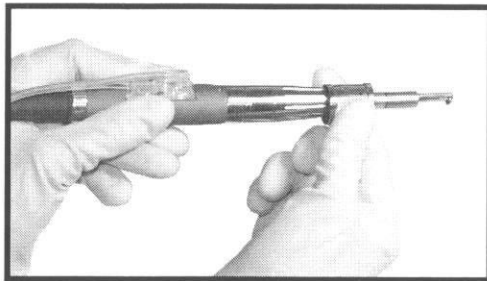
CAUTION: The handpiece should only be operated in the 0° or 20° position, not at any other angle. Damage to the handpiece will occur.

NOTE: Unless the angled position is needed, or when aggressive cutting is required, it is recommended that the E9010 High Speed Drill be operated in the straight position for optimal operation and cooling. Use of the E9012 Locking Collar will ensure the drill stays in the straight position (the locking collar is optional).

1. To adjust the angle of the handpiece:
 - (a) Grasp the main handpiece body and the keyless chuck.
 - (b) Viewing the handpiece from the guard collet, twist the keyless chuck clockwise while twisting the main body in the opposite direction until they click into place.



2. If using the E9010 High Speed Drill with a Neuro Guard, a locking collar (REF E9012) should be used to keep the handpiece from rotating out of the 0° position and into the 20° position.
3. To attach the locking collar, simply slide the locking collar over the nose of the drill as far as it will go.



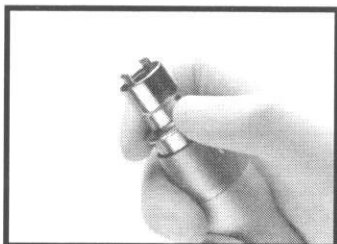
NOTE: Before cleaning the handpiece, remove the locking collar.

3.3 Cranial Perforator Drive (E9015) Operation

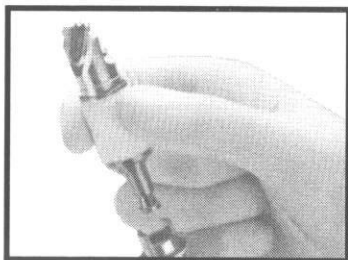
NOTES:

1. The handpiece cord button and all front panel buttons are disabled when using the E9015 Cranial Perforator Drive.
2. There is no oscillate or reverse mode for this handpiece.
3. The Cranial Perforator Drive only operates in the forward direction up to 800 rpm.
4. The Cranial Perforator Drive accepts Hudson shank accessories.

1. To insert a perforator cutter:
 - (a) Slide the chuck sleeve towards the back of the handpiece.



- (b) Insert the perforator cutter into the chuck until it is fully seated.



- (c) Release the chuck sleeve to lock the perforator cutter in place.
 - (d) Pull on the perforator cutter to ensure it is securely locked in place.
2. To activate the handpiece, depress either the left or right footswitch pedal.

Group 2 Handpieces

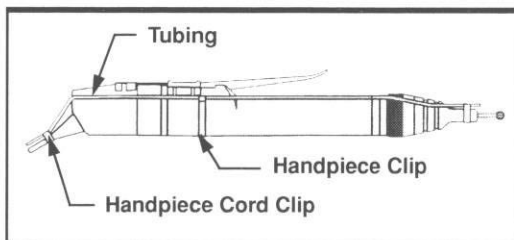
NOTES:

1. Group 2 handpieces consist of the *MicroChoice* levered and non-levered Drills (REF 5020-021, -025, -026), Saws (REF 5020-022, -023, -024), and Modular Handpiece (REF 5020-027).
2. Group 2 handpieces will operate in either Port 2 (Top Portion of Console) or Port 3 (Bottom Portion of Console) and function identically in either port.
3. The Low Speed Drill (REF 5020-026) will not operate in Port 3 (Bottom portion of console).
4. The *MicroChoice* Modular Handpiece (REF 5020-027) will not operate by a footswitch.

3.4 *MicroChoice* Drills

3.4.1 Tubing Set Attachment for *MicroChoice* Handpieces

1. To attach the irrigation tubing to the *MicroChoice* handpieces:
 - (a) Securely press the tubing into the slot of the irrigation handpiece clip (REF 5040-130).
 - (b) Attach the clip to the back of the handpiece.



- (c) Snap the handpiece cord clips onto the handpiece cable to secure the tubing.
2. There are several irrigation tip configurations that allow irrigation with a specific handpiece (See “6.2 Handpieces, Attachments and Accessories” on page 170). Attach the appropriate irrigation tip to the tubing and the handpiece.

3.4.2 Preoperative Functional Test for the *MicroChoice Elite High Speed Drill*

Prior to operating the *MicroChoice Elite High Speed Drill* (5020-025), perform the following preoperative tests to verify proper functioning. Any operating difficulties should be reported to your Sales Representative or Linvatec Customer Service.

1. Before operating the drill, check for:

- any loose or missing parts
- any physical damage
- movable parts that do not move freely

2. Performance Testing:

- (a) Assemble the appropriate guard and bur according to the instructions on pages 59 through 64. **Warning:** **Ensure that the guard and bur are properly installed, otherwise injury to the patient or medical personnel can result.**
- (b) Operate the drill at 100,000 rpm for one minute according to operating instructions contained on pages 38 through 43. Monitor the drill for any of the following:
- excessive noise
 - excessive vibration
 - the drill or bur guard are hot to the touch during the test procedure or during surgical use

- the drill does not operate up to its maximum preset speed (verify the maximum preset operating speed by fully depressing the drill activation lever or appropriate footswitch pedal and verifying that the maximum speed is displayed on the console).

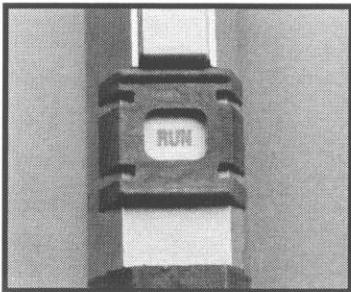
3.4.3 Elite High Speed (5020-025) and Medium Speed Drill (5020-021) Attachments and Accessories

CAUTION: Do not operate the *MicroChoice* Elite High Speed or Medium Speed Drills without the proper bur guard attached and the collet locked. Damage may result.

1. Prior to connecting any attachment or accessory, or while the handpiece is not in use, place the “SAFE/RUN” Slide in the “SAFE” position.



2. To attach bur guards, attachments and burs reference information on pages 60 to 64.
3. To operate the handpiece after the guard and bur are attached:
 - (a) Place the “SAFE/RUN” Slide in the “RUN” position. The controller will display the handpiece I.D. and its maximum (default) operating speed.



Without any user input selections, each handpiece will initially operate at its default setting. Desired mode, direction, and speed settings can be stored in memory by following the instructions in **Switch 1 - “Day-to-Day” Memory Storage Operation** on page 32.

- (b) Depress the Activation Lever or the preferred footswitch pedal.

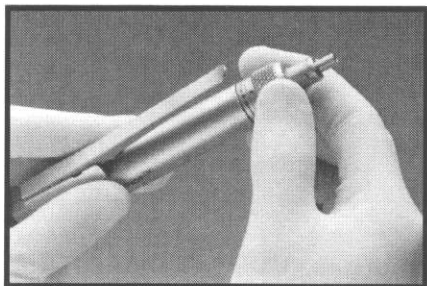
NOTE: If operating these handpieces in Port 3, there is no footswitch capability.

4. To change operating speeds, reference **“2.1.5 Controller Operation”** on page 38 if operating from Port 2, or **“3.6.5.1 Button Operation Using the Elite High Speed Drill, Medium Speed Drill, Saws and Modular Handpiece”** on page 79.

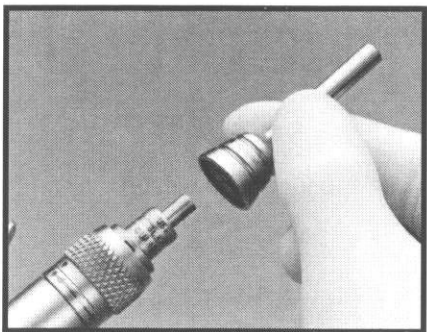
3.4.3.1 Medium (5020-060), Long (5020-061) and Extra-Long (5020-062) Bur Guards

NOTE: Use only Hall Medium 5091 Series Burs with the Medium Bur Guard, Long 5092 Series Burs with the Long Bur Guard, and Extra-Long 5093 Series Burs with the Extra-Long Bur Guard.

1. To fasten a bur guard and bur to the handpiece:
 - (a) Rotate the handpiece bur lock collar counterclockwise to the "OPEN" position.



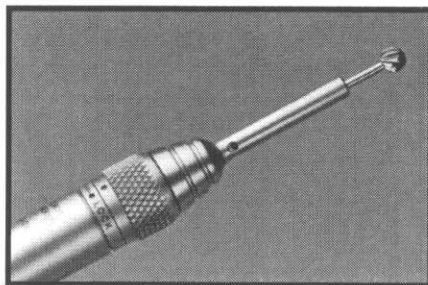
- (b) Slide the appropriate bur guard over the end of the drill. Ensure it is completely seated.



- (c) Insert the bur to the safe-line or until the bur seats completely.

WARNING: Ensure the safe-line mark on the bur is not showing. Damage or injury may result.

- (d) Rotate the handpiece bur lock collar clockwise until the indicator dots are aligned in the "LOCK" position to lock the bur into place.



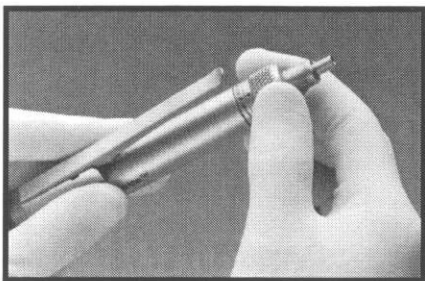
- (e) Pull on the bur to ensure it is locked in place.

2. To remove the bur and guard:
 - (a) Twist the bur lock collar counterclockwise to the "OPEN" position and remove the bur and guard.

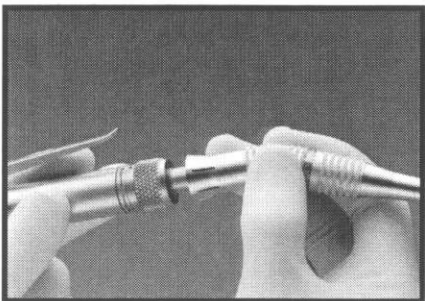
3.4.3.2 20° Angle (5020-063) and Extra-Long 20° Angle (5020-064) Attachments

NOTE: Use only Hall Long 5092 Series Burs with the 20° Angle Attachment and only Hall Extra-long 5093 Series Burs with the 20° Extra-Long Attachment.

1. To fasten the attachment to the handpiece:
 - (a) Rotate the handpiece bur lock collar counterclockwise to the "OPEN" position.



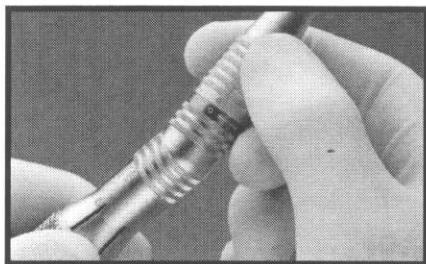
- (b) Slide the appropriate angle attachment completely over the end of the drill. Ensure it is seated completely.



- (c) Rotate the handpiece bur lock collar clockwise until the indicator dots are aligned in the "LOCK" position to lock the attachment in place.

2. To insert a bur:

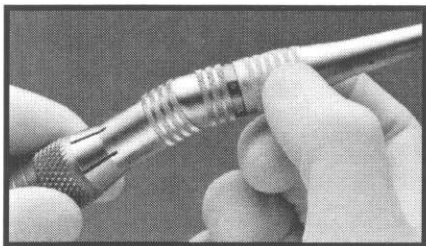
- (a) Rotate the attachment bur lock collar to the "OPEN" position.



- (b) Insert the bur to the safe line or until the bur seats completely.

WARNING: Ensure the safe-line mark on the bur is not showing. Damage or injury may result.

- (c) Rotate the attachment bur lock collar until the indicator dots are aligned in the "LOCK" position to lock the bur into place.



- (d) Pull on the bur to ensure it is locked in place.

3. To remove the bur:

- (a) Rotate the attachment bur lock collar to the "OPEN" position, remove the bur.

4. To remove the guard:

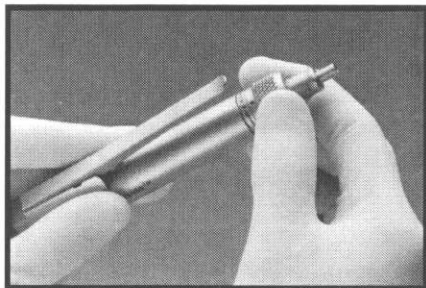
- (a) Rotate the handpiece bur lock collar to the "OPEN" position, remove guard.

3.4.3.3 70° Contra Angle with Surgical Head (5020-065), 70° Contra Angle with Dental Head (5020-069), and 90° Angle (5020-066) Attachments

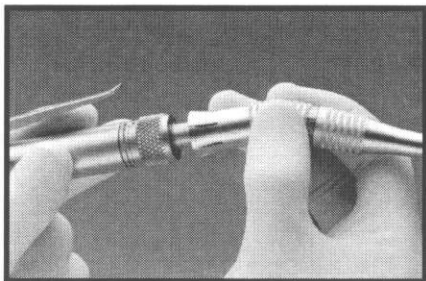
NOTE: Use only Hall Short 5090 Series and Extra-Short 5089 Series Burs with the 70° Contra-Angle Attachment and the 90° Angle Attachment.

1. To fasten the attachment to the handpiece:

- (a) Rotate the handpiece bur lock collar counterclockwise to the “OPEN” position.



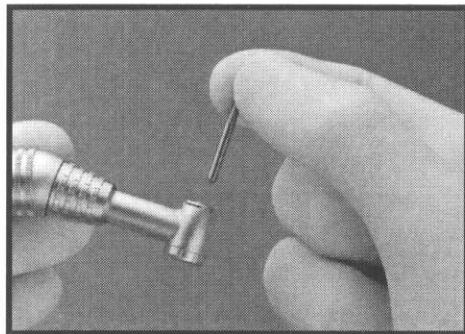
- (b) Slide the appropriate angle attachment over the end of the drill. Ensure it is completely seated.



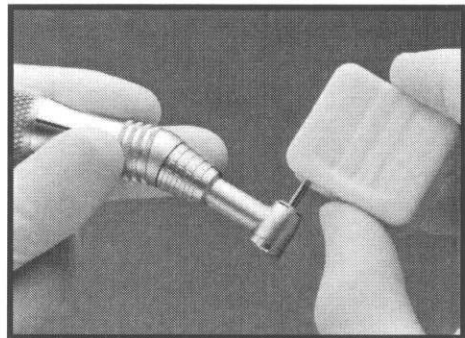
- (c) Rotate the handpiece bur lock collar clockwise until the indicator dots are aligned in the “LOCK” position to lock the attachment in place.

2. To insert a bur:

- (a) Place the bur in the opening on the attachment.



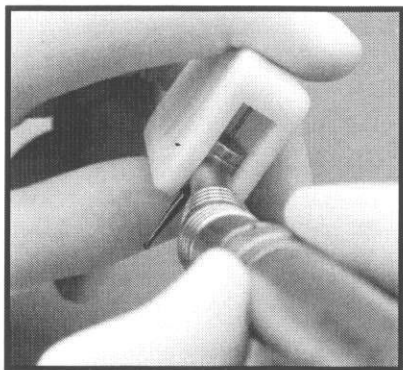
- (b) Use the grooved side of the bur changer (REF 1375-003) to press the bur firmly in place.



CAUTION: After cleaning and prior to each sterilization, the angled attachments (5020-063, -064, -065, -066, and -069) must be lubricated to ensure proper performance. Reference “4.1.4 Attachment Lubricating Instructions” on page 143.

3. To remove the bur:

- (a) Place the bur changer in the opening at the rear of the attachment.



- (b) Press firmly on the bur changer to push the bur out.

4. To remove the attachment:

- (c) Rotate the handpiece bur lock collar to the "OPEN" position and remove the guard.

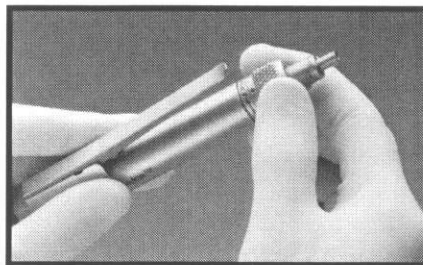
70° Contra Angle (REF 5020-069) with Dental Head Attachment

The 70° Contra-Angle with Dental Head attachment uses friction grip burs only - size 1/16" or 1.58 mm in diameter. Friction grip burs of this diameter are not marketed by Linvatec. They are available through dental supply dealers.

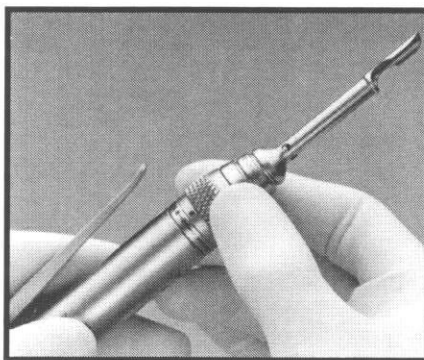
3.4.3.4 Tissue Retractor Bur Guard (5020-068)

1. To fasten the attachment to the handpiece:

- (a) Rotate the handpiece bur lock collar counterclockwise to the "OPEN" position.



- (b) Slide the guard over the end of the drill. Ensure it is completely seated.



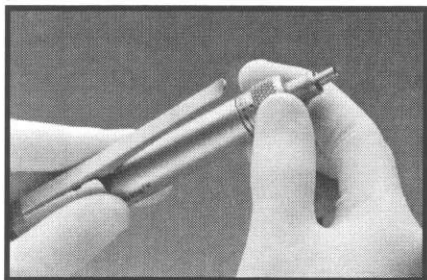
- 2. Insert the bur through the tip of the bur guard and into the handpiece collet. (Any 5092 series bur with a head diameter of 4mm or less. The recommended bur is 5092-136, Long Oval Cutting Bur).
- 3. Rotate the handpiece bur lock collar clockwise until the indicator dots are aligned in the "LOCK" position to lock the bur into place.

3.4.3.5 Laminectomy Bur Guard (5020-067)

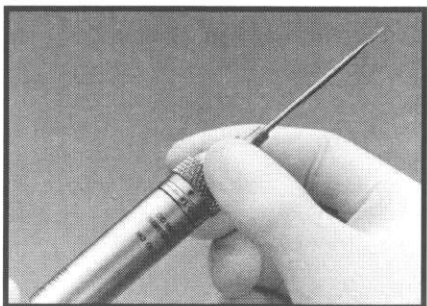
NOTES:

1. Laminectomy burs are the only burs inserted prior to placing a guard or an attachment on the handpiece.
2. For additional information refer to the *MicroChoice Angled Attachment Package Insert* or the *MicroChoice Bur Guard Package Insert*.

1. To fasten the bur to the handpiece:
 - (a) Rotate the handpiece bur lock collar counterclockwise to the "OPEN" position.

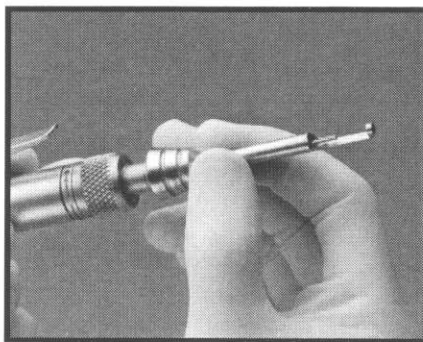


- (b) Insert the correct bur (5092-103 shown).



- (c) Rotate the handpiece bur lock collar clockwise until the indicator dots are aligned in the "LOCK" position to lock the bur into place.
 - (d) Pull on the bur to ensure it is locked in place.

2. To fasten the guard to the handpiece:
 - (a) Slide the Laminectomy Guard over the bur and the end of the drill. Be certain the guard is completely seated.



3. To remove the guard:
 - (a) Pull on the guard to remove it from the handpiece.
4. To remove the bur:
 - (a) Rotate the handpiece bur lock collar counterclockwise to the "OPEN" position and remove the bur.

3.4.4 Low Speed Drill (5020-026) Operation

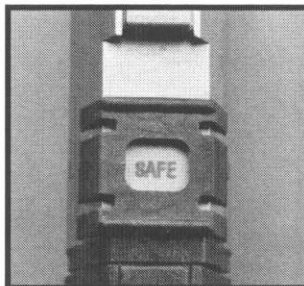
CAUTION: Make sure the head attachment matches the function selected. Improper head attachment selection may result in erroneous speed or torque.

NOTES:

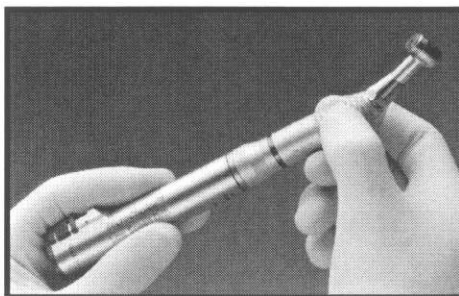
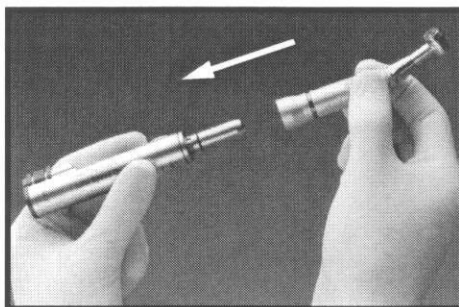
1. The Low Speed Drill can only be operated from Port 2 (Top Portion of Console).
2. Always operate the Low Speed Drill with the appropriate attachment, either the Dental Implant Drill Head (REF 5020-034) or the Implant Screw/Tap Head (REF 5020-035).
3. The Low Speed Drill accepts standard dental latch burs or Hall Surgical burs of the 5088 series.
4. The Low Speed Drill can only be operated by the footswitch.
5. When the Low Speed Drill is set to "SCREW" or "TAP" mode, the speed is not variable in the reverse direction.
6. If 25 in. oz. is exceeded while using this handpiece, the handpiece will stop and "MAXIMUM TORQUE" will display. The handpiece can only be reset by secondary activation of the footswitch.

1. To connect an attachment:

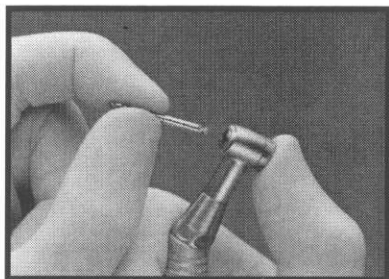
- (a) Place the "SAFE/RUN" Slide in the "SAFE" position. The controller will display the current operating mode ("SCREW" "TAP" "DRILL"), "SAFE ON", and the set flow rate ("OFF" will display if irrigation is not being used).



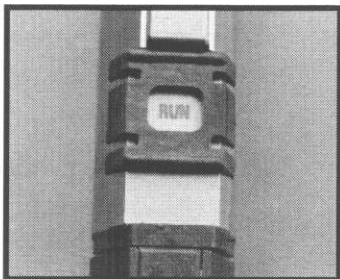
- (b) Slide the appropriate attachment over the front end of the handpiece and seat completely.



2. To insert a drill bit:
 - (a) Depress the rear portion of the attachment head and insert the drill bit into the front opening.
 - (b) Rotate the drill bit into place and release the attachment head.



- (c) Pull on the bit to ensure it is locked in place.
3. To remove the drill bit:
 - (a) Depress the rear portion of the attachment head and pull the drill bit out.
4. To operate the handpiece:
 - (a) Place the "SAFE/RUN" Slide in the "RUN" position. The controller will display the current operating mode, the handpiece maximum operating speed, and the set flow rate ("OFF" will display if irrigation is not being used).



- (b) Depress the preferred footswitch pedal.
5. To change the operating mode, reference **"3.6.5.2 Button Operation Using the Low Speed Drill (Port 2 Only)"** on page 80.
6. To change handpiece speeds, reference **"2.1.5 Controller Operation"** on page 38 or **"3.6.5.2 Button Operation Using the Low Speed Drill (Port 2 Only)"** on page 80.

3.5 MicroChoice Saws

3.5.1 Reciprocating Saw (5020-023) Operation

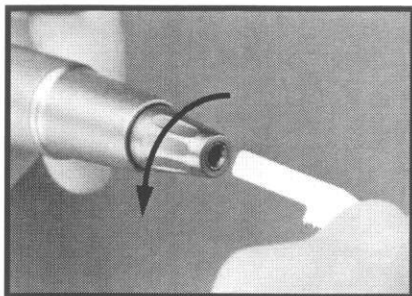
NOTE: Use only Hall 5053 series flat or round shanked blades.

1. To insert a blade:

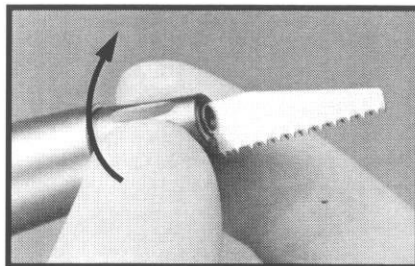
- (a) Place the “SAFE/RUN” Slide in the “SAFE” position.



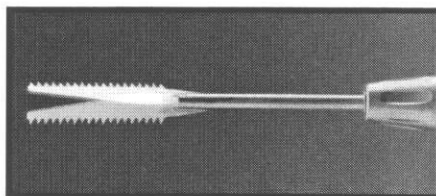
- (b) Twist the blade lock collar counter-clockwise and insert the shank of the blade into the collet. Ensure the blade is fully seated.



- (c) Twist the blade lock collar clockwise and tighten securely.

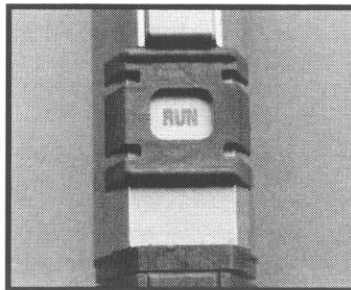


2. Round shank blades can be seated at any position within a 360° range.



3. Verify the blade is securely tightened by briefly activating the handpiece. To activate the handpiece:

- (a) Place the “SAFE/RUN” Slide in the “RUN” position. The controller will display the handpiece I.D. and its maximum (default) rpm or speed setting. If being used in Port 2 and irrigation is being used the top display will also show the set flow rate (“OFF” will be displayed if irrigation is not used).



- (b) Depress the Activation Lever or appropriate footswitch pedal.
 - (c) Place the handpiece back in the "SAFE" position.
 - (d) Retighten the blade locking collar.
4. To change operating speeds, reference **"2.1.5 Controller Operation" on page 38** if using Port 2 or **"3.6.5.1 Button Operation Using the Elite High Speed Drill, Medium Speed Drill, Saws and Modular Handpiece" on page 79.**
5. To remove blades:
- (a) Place the "SAFE/RUN" Slide in the "SAFE" position.



- (b) Twist the blade lock collar counter-clockwise and remove the blade.

3.5.2 Sagittal Saw (5022-022) Operation

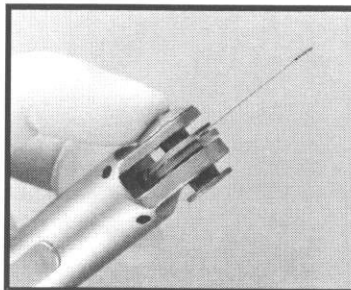
NOTE: Use only Hall 5023 series blades.

CAUTIONS:

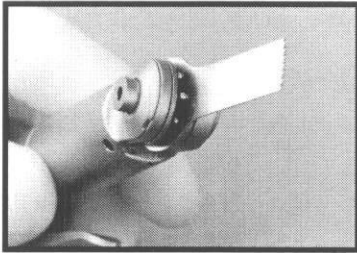
1. The blade collet lock mechanism must be completely closed to ensure the blade is held firmly in place.
 2. Do not use the XL Handpiece Activation Lever (REF 5020-059) with the Sagittal Saw.
1. To attach blades:
- (a) Place the "SAFE/RUN" Slide in the "SAFE" position.



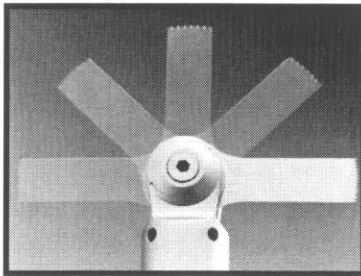
- (b) Depress the collet lock mechanism to open the collet. Position the blade on the pins inside the collet.



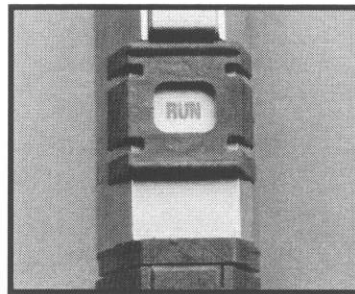
- (c) Depress the opposite side of the handpiece collet area to lock the blade into position.



- (d) Blades may be positioned at 45° intervals within a 180° arc.



2. Verify the blade is securely attached by activating the handpiece. To activate the handpiece:
- (a) Place the “SAFE/RUN” Slide in the “RUN” position. The controller will display the handpiece I.D. and its maximum (default) rpm or speed setting. If being used in Port 2 and irrigation is being used the top display will also show the set flow rate (“OFF” will be displayed if irrigation is not used).



- (b) Depress the Activation Lever or appropriate footswitch pedal.
3. To change operating speeds, reference **“2.1.5 Controller Operation” on page 38** if using Port 2 or **“3.6.5.1 Button Operation Using the Elite High Speed Drill, Medium Speed Drill, Saws and Modular Handpiece” on page 79.**

4. To remove saw blades:

- (a) Place the "SAFE/RUN" Slide in the "SAFE" position.



- (b) Depress the collet lock mechanism and remove the blade.

3.5.3 Oscillating Saw (5020-024) Operation

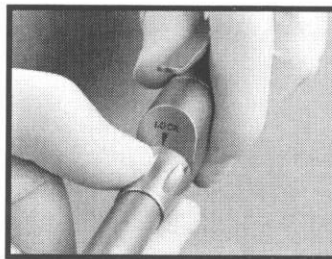
NOTE: Use only Hall 5023 series blades.

1. To attach saw blades:

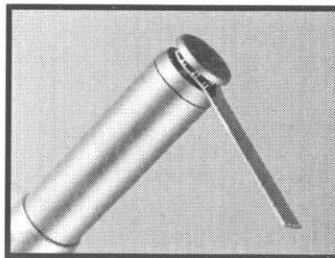
- (a) Place the "SAFE/RUN" Slide in the "SAFE" position.



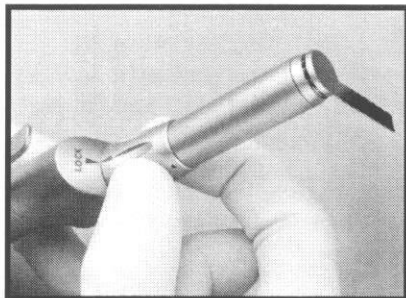
- (b) Twist the blade lock collar until the arrows are no longer aligned in the "LOCK" position.



- (c) Position the blade on the pins inside the collet.

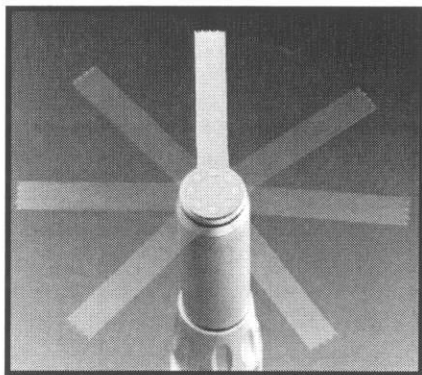


- (d) Twist the blade lock collar and align the arrows in the “LOCK” position to secure the blade.



CAUTION: The blade lock collar must be completely closed to ensure the blade is held firmly in place.

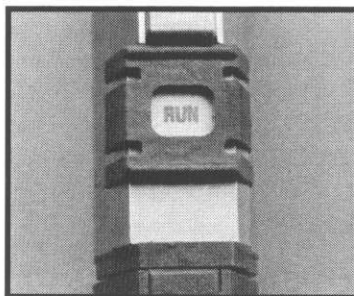
2. Blades may be positioned at 45° intervals within a 360° circumference of the collet.



3. Verify the blade is securely attached by briefly activating the handpiece.

4. To activate the handpiece:

- (a) Place the “SAFE/RUN” Slide in the “RUN” position. The controller will display the handpiece I.D. and its maximum (default) rpm or speed setting. If being used in Port 2 and irrigation is being used the top display will also show the set flow rate (“OFF” will be displayed if irrigation is not used).



- (b) Depress the Activation Lever or appropriate footswitch pedal.

5. Retighten the blade lock collar.
6. To change operating speeds, reference “2.1.5 Controller Operation” on page 38 if using Port 2 or “3.6.5.1 Button Operation Using the Elite High Speed Drill, Medium Speed Drill, Saws and Modular Handpiece” on page 79.

7. To remove saw blades:

- (a) Place the “SAFE/RUN” Slide in the “SAFE” position.



- (b) Twist the blade lock collar until the arrows are no longer aligned in the “LOCK” position and remove the blade.

3.5.4 Leverless Handpiece Operation

CAUTIONS:

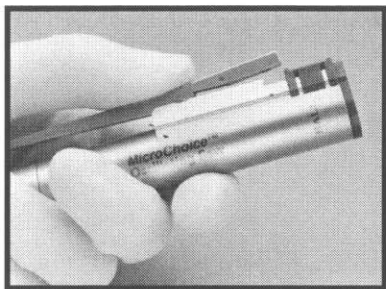
1. Before attempting to remove the Handpiece Activation Lever, **ALWAYS** place the “SAFE/RUN” Slide in the “SAFE” position.
2. Always remove the Activation Lever when operating the handpiece with a footswitch.
3. If a footswitch is in use and the handpiece Activation Lever has not been removed, depressing the Activation Lever will not control the handpiece until use of the footswitch has been discontinued.

WARNING: Do not use an XL Activation Lever (REF 5020-059) with the Sagittal Saw. Injury may result.

1. To remove the handpiece Activation Lever:
 - (a) Place the “SAFE/RUN” Slide in the “SAFE” position.



- (b) Depress the ribbed portion of the Activation Lever. Push towards the “SAFE/RUN” Slide until it disengages from the handpiece.



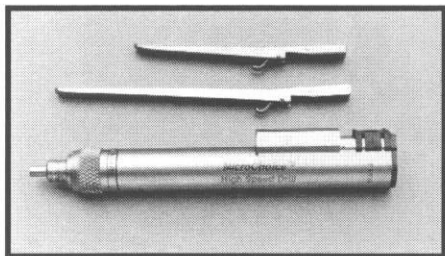
NOTE: If a levered handpiece is connected to the controller while disengaging the Lever, “MAGNETIC FIELD” will display if the controller is set to Text Display mode.

If the handpiece is being used in Port 3, and switch 5 on the bottom portion of the controller is set to Graphical Display mode, the controller will display:



2. To reattach the handpiece Activation Lever:
 - (a) Insert the Lever pins into the grooves and reverse the above steps.

NOTE: If the original Activation Lever is too short, remove it and attach an XL Handpiece Activation Lever (REF 5020-059).



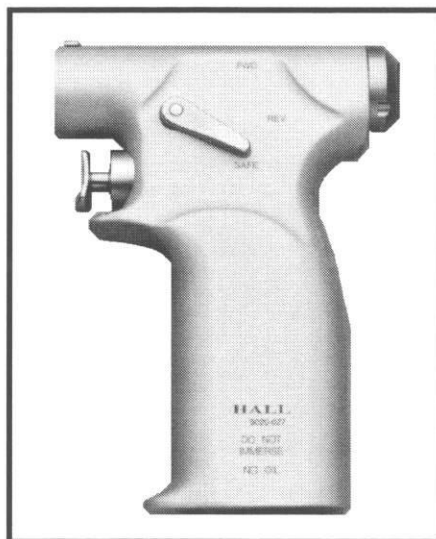
3.6 *MicroChoice Modular Handpiece (5020-027), Attachments and Accessories*

NOTE: The Modular Handpiece does not operate with a footswitch.

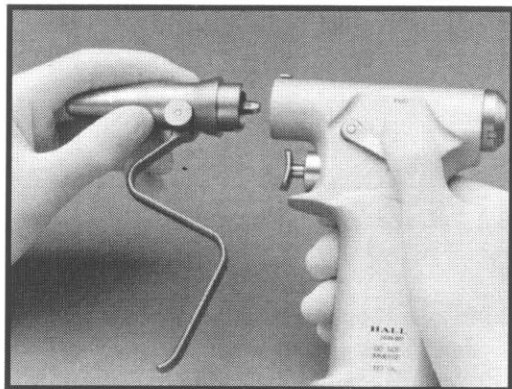
3.6.1 Connecting/Removing Attachments

All Modular Handpiece attachments connect/disconnect in the same manner. Reference pages 75 through 78 for attachment information.

1. To connect an attachment:
 - (a) Place the thumb lever in the “SAFE” position.

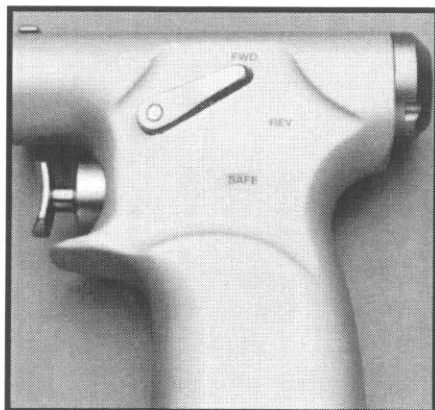


- (b) Orient the attachment shaft with the handpiece opening. Insert the shaft and press them until they snap together.



2. To operate the handpiece with any attachment connected:

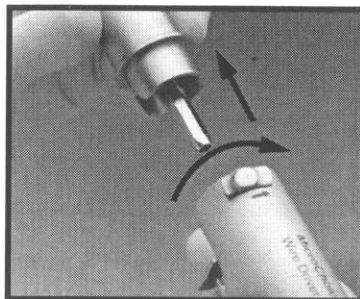
- (a) Place the Thumb Lever in the "FWD" or "REV" position.



- (b) Depress the trigger to activate the handpiece.

3. To remove an attachment:

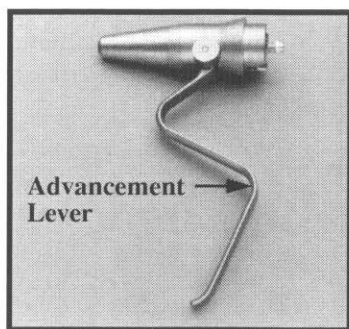
- (a) Place the thumb lever in the "SAFE" position.
- (b) Move the Slide Lock in the direction of the arrow and remove the attachment.



3.6.2 Pin and Wiredriver Attachments

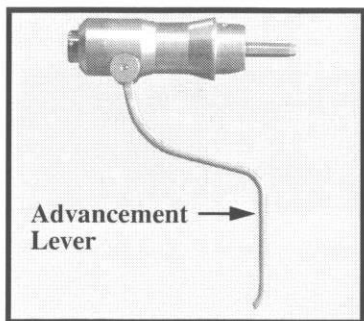
Insertion of pins and wires, and the functionality of the handpiece with either pins or wires, is the same with either attachment.

3.6.2.1 Wiredriver Attachment



NOTE: The wiredriver attachment cannulation accepts threaded or unthreaded K-Wires from 0.028 in. to 0.062 in. (0.7 mm to 1.6 mm).

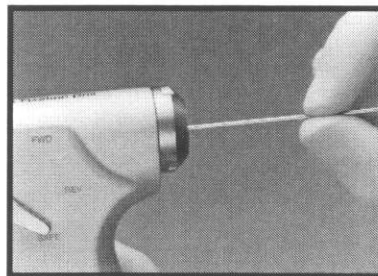
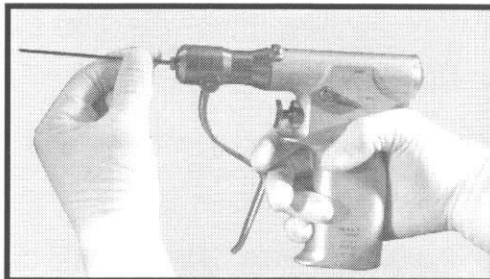
3.6.2.2 Pin Driver Attachment



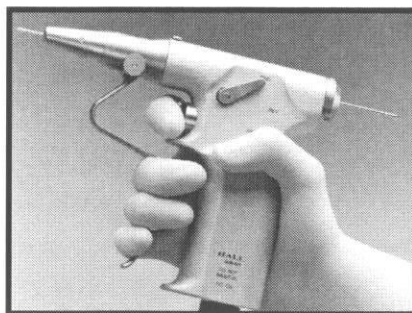
NOTE: The pin driver attachment cannulation accepts Steinman Pins from 0.079 in. to 0.125 in. (2.0 mm to 3.2 mm).

3.6.2.3 Pin and Wire Insertion

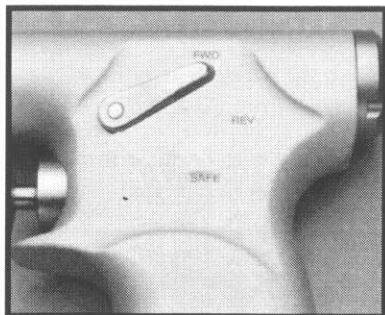
1. To insert a pin or wire:
 - (a) Push the Advancement Lever forward, or away from the handpiece.
 - (b) Insert the wire or pin, either from the front or rear of the handpiece.



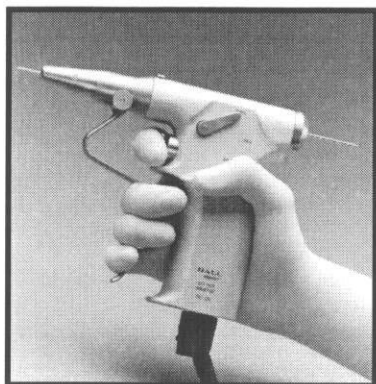
2. To operate the handpiece:
 - (a) Grip the wire or pin by squeezing the Advancement Lever.



- (b) Place the thumb lever in the "FWD" (forward) position.



- (c) Drive the wire or pin by squeezing the Advancement Lever and simultaneously depressing the trigger.

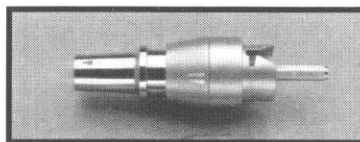


5. To remove threaded wires from patient:
- (a) Insert the wire into the front of the attachment (see step 1).
 - (b) Place the handpiece in the "REV" (reverse) position.
 - (c) Simultaneously squeeze the Advancement Lever and depress the trigger.
6. The Wire Guard (REF 5053-123) may be attached to the back of the handpiece to keep long wires or pins from bending, and for user protection.



NOTE: The wire or pin will not slip out of the attachment unless the Advancement Lever is pushed forward.

3.6.3 Universal Drill Attachment



Specifications:

Max. Operating:

Speed: 1,000 rpm, forward or reverse

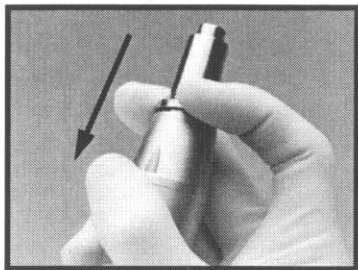
Settings: 10 to 100% in 10% increments

3. To reposition the handpiece on the wire or pin:
- (a) Release the trigger to stop rotation.
 - (b) Release the Advancement Lever and push it forward.
 - (c) Slide the handpiece along the wire or pin.
4. Follow step 2 to further drive the wire or pin.

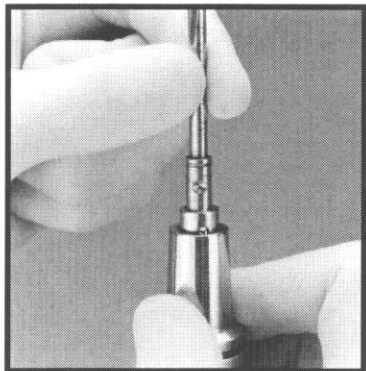
3.6.3.1 Trinkle Shank Accessories for the Universal Drill Attachment

1. To insert a Trinkle Shank accessory into the Universal Drill Attachment:

- (a) Pull the Universal Drill Attachment collet sleeve back.



- (b) Align the dimple on the trinkle shank with the black arrow on the outer collet sleeve. Totally insert the trinkle shank. The spring-loaded inner sleeve will retract.



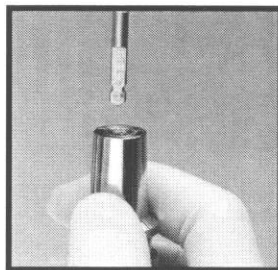
- (c) Release the collet sleeve and rotate the accessory until it is completely engaged. Pull the accessory firmly to ensure proper engagement.

2. To remove accessory, pull back the outer collet sleeve and remove the accessory.

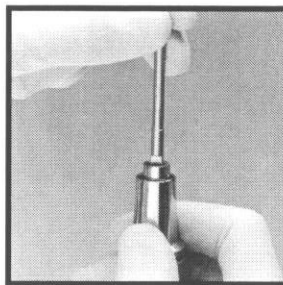
3.6.3.2 AO Drill Bits for the Universal Drill Attachment

1. To insert an AO Drill Bit into the Universal Drill Attachment.

- (a) Align the flat portion of the drill shank with the black arrow on the outer collet sleeve.



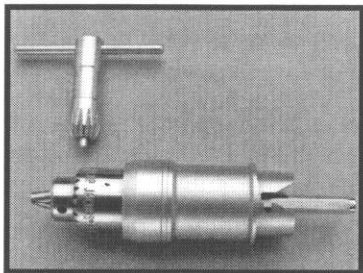
- (b) Insert the drill shank into the collet as far as it will go without pulling back the collet sleeve. Twist the shank to make sure it is aligned properly. If it is, it will not spin in the collet.
- (c) Pull back on the collet sleeve and push the shank completely into the collet.



- (d) Release the collet sleeve. The shank is now locked into the collet. Pull the drill bit firmly to verify it is properly seated.

2. To remove the drill bit, pull back on the collet sleeve and remove the bit.

3.6.4 All Jacobs Chuck Attachments



Specifications:

Operating Speeds:

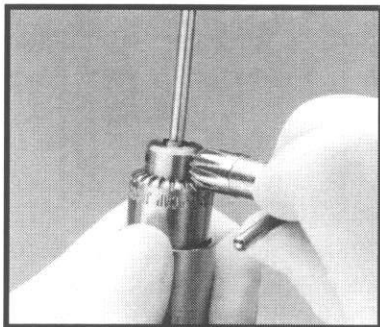
Jacobs Chuck: 1,000 rpm, forward or reverse

High Torque

Jacobs Chuck: 275 rpm, forward or reverse

Speed Settings: 10 to 100% in 10% increments

1. Connect any Jacobs Chuck attachment to the handpiece (See **“3.6.1 Connecting/Removing Attachments”** on page 73).
2. Insert an accessory into the chuck and secure it with the appropriate key (REF 999-052 for 1/4” chucks and 999-053 for 5/32”).



NOTE: The High Torque Jacobs Chuck has roughly a 4:1 gear ratio reduction.

3.6.5 Group 2 Handpiece Cord Button Operation

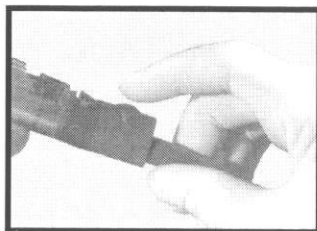
The Advantage Controller allows the user complete system control from within the sterile field. Speed settings can be changed using the handpiece cord button.

3.6.5.1 Button Operation Using the Elite High Speed Drill, Medium Speed Drill, Saws and Modular Handpiece

1. To enter the Speed menu, press the handpiece cord button either two or three times, quickly.

- (a) Pressing the handpiece cord button twice allows the user to decrease the operating speed.

- (b) Pressing the handpiece cord button three times allows the user to increase the operating speed.



2. After entering the Speed menu, the attached handpiece I.D. will display along with the current operating speed (the speed will be blinking). Press the handpiece cord button to change speed.

The Speed menu will scroll when the minimum or maximum speeds are reached.

3. When the desired speed is reached, stop pressing the button. After a few seconds the speed menu will time out. The handpiece is now ready for use.

Handpiece Speed Adjustment



To enter the menu options to adjust the handpiece speed, press the handpiece cord button two or three times.

Text Display Mode

The menu will default to the speed menu and display the attached handpiece and the current speed setting.

“HIGH SPEED” “###K RPM”

“###” is blinking



Press the handpiece cord button until the desired speed is displayed. Stop pressing the button.

Graphics Display Mode (Port 3 Only)



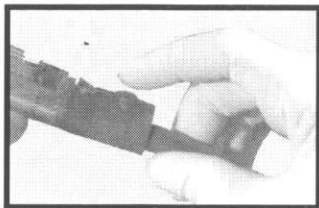
70K RPM



100K RPM

3.6.5.2 Button Operation Using the Low Speed Drill (Port 2 Only)

1. To enter the Mode menu, press the handpiece cord button either two or three times, quickly.



- (a) Pressing the handpiece cord button twice allows the user to decrease the operating speed.
 - (b) Pressing the handpiece cord button three times allows the user to increase the operating speed.
2. After entering the Mode menu, the possible function selections display: “SCREW” “TAP” “DRILL”. The current function will be blinking. Press the handpiece cord button until the desired function is blinking. Discontinue pressing.

CAUTION: Ensure the head attachment matches the function selected. Improper head attachment selection may result in erroneous speed or torque.

3. The speed is now displayed and blinking. Press the handpiece cord button until the desired speed is displayed.

The Speed menu will scroll when the minimum or maximum speeds are reached.

4. When the desired speed is reached, stop pressing the button. After a few seconds the new operating speed will stop blinking. The handpiece is now ready for use.

Group 3 Handpieces

CAUTION: When operating shaver blades or burs in any Group 3 handpiece the shaver handpiece suction port valve must be in the open or ON position, and the shaver blade or bur must be within the distention fluid of the joint. Otherwise, damage to the blade hub or bur hub will result.

NOTES:

1. Group 3 handpieces consist of *MicroChoice* (REF MC9820, MC9828, MC9840), Advantage (REF D9820, D9824), and APEX (REF C9820, C9824, C9828, C9840) Shaver Handpieces.
2. The *MicroChoice* (MC9820) and Advantage (D9820) Basic Shaver Handpieces, and *MicroChoice* Small Shaver Handpiece (MC9840) can ONLY be operated from Port 2 (Top portion of Controller) using a footswitch. For footswitch operation, see “2.1.6 Footswitch Operation (Top Portion Only)” on page 39.
3. The APEX Basic Large Shaver Handpiece (C9820) and APEX Small Shaver Handpiece (C9840) can be operated from either Port 1 or 2. However, to use them in Port 2 the E9320 Apex Adapter must be used and can only be controlled using a footswitch. For footswitch operation information, see “2.1.6 Footswitch Operation (Top Portion Only)” on page 39.
4. The following handpieces cannot be used in Port 3 because they require a footswitch to operate and there is no footswitch associated with Port 3 (C9820, MC9820, C9840, MC9840, and D9820).

5. The APEX Full-Function (C9828), and 2-Button (C9824) Shaver Handpieces can be operated from Ports 1, 2 or 3 using the handpiece buttons. However, to operate these handpieces from Ports 2 and 3 the E9320 APEX Adapter must be used. They can also be operated from Ports 1 or 2 using a footswitch. For footswitch operation, see “2.1.6 Footswitch Operation (Top Portion Only)” on page 39.
6. The *MicroChoice* Full-Function (MC9828) and Advantage 2-Button (D9824) Shaver Handpieces can be operated from Ports 2 or 3 using the handpiece buttons. They can also be operated from Port 2 using a footswitch. For footswitch operation, see “2.1.6 Footswitch Operation (Top Portion Only)” on page 39.

3.7 Preoperative Functional Test for Group 3 Shaver Handpieces

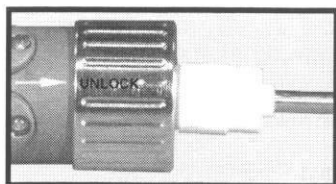
Prior to operating any of the Group 3 Shaver Handpieces, perform the following preoperative tests to verify proper functioning. Any operating difficulties should be reported to your Sales Representative or Linvatec Customer Service.

1. Before operating a shaver handpiece, check for:
 - any loose or missing parts
 - any physical damage
 - movable parts that do not move freely
2. Performance Testing:
 - (a) Connect the handpiece to the appropriate console port according to instructions on pages 28 through 30.
 - (b) Verify that the console properly recognizes the attached handpiece.
 - (c) Activate the handpiece by pressing the handpiece ON/OFF button, if applicable, or the appropriate footswitch pedal. Monitor the handpiece for any of the following and then stop the handpiece by pressing the ON/OFF button again or releasing the footswitch pedal:
 - excessive noise
 - excessive vibration
 - abnormal heat rise during the test procedure or during surgical use

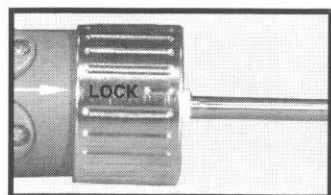
3.8 Accessory Insertion and Removal

3.8.1 Basic (C9820, MC9820), 2-Button (C9824), and Full-Function (C9828, MC9828) Large Shaver Handpieces

1. To install a shaver blade:
 - (a) Rotate the locking collet until the arrow on the shaver handpiece body lines up with the word "UNLOCK".
 - (b) Completely insert the blade hub.



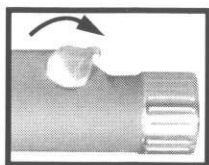
- (c) Lock the blade by rotating the locking collet until the arrow lines up with the word "LOCK".



2. To remove the blade, repeat the above steps.

3. To operate the suction port valve on any of these shaver handpieces:

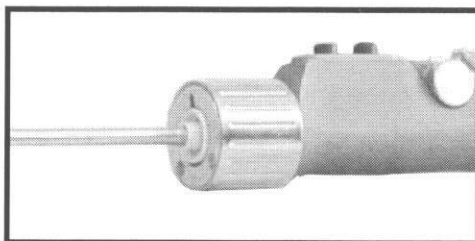
- (a) To open the suction port, move the suction port valve to the "ON", or forward position.



- (b) To shut suction off, move the suction port valve to the "OFF" position.

3.8.2 Advantage Basic (D9820) and 2-Button (D9824) Shaver Handpieces

1. To install a shaver blade:
 - (a) Align the key on the blade hub with the slot in the collet.
 - (b) Completely insert the blade hub into the collet until it snaps and locks into place.



- (c) Pull out on the blade to ensure it is locked into place.

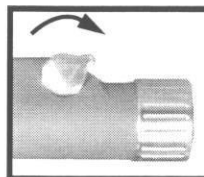
2. To remove the blade:

- (a) Rotate and hold the collet to the "UNLOCK" position and remove the blade.



3. To operate the suction port valve on these shaver handpieces:

- (a) To open the suction port, move the suction port valve to the "ON", or forward position.



- (b) To shut suction off, move the suction port valve to the "OFF", or rear position.

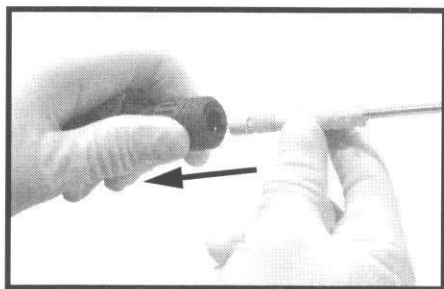
3.8.3 Small Shaver Handpieces (MC9840, C9840)

NOTE: If irrigation is being utilized, the E9416 (4.2 mm) or E9417 (3.7 mm) Tubing Sets must be used.

Accessory insertion and removal:

1. To install a shaver blade into the handpiece:

- (a) While pulling the quick-connect locking collet back towards the body of the handpiece, completely insert the shaver blade hub into the collet.

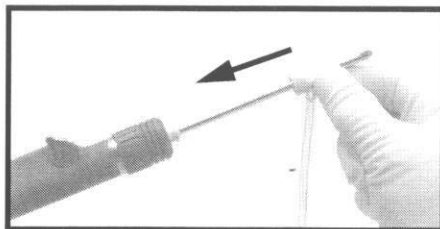


- (b) Release the locking collet. The shaver blade is now locked into place.

- (c) The shaver blade cutting window may be placed in any position by simply rotating the collet, which allows 360° positioning of the blade cutting window.

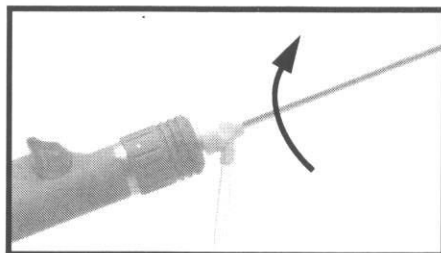
2. To remove the blade, repeat the above steps and pull the blade out.
3. If irrigation is being used, attach the tubing to the shaver blade and handpiece.

- (a) Slide the tubing set irrigation collar over the distal end of the shaver blade toward the shaver blade hub.

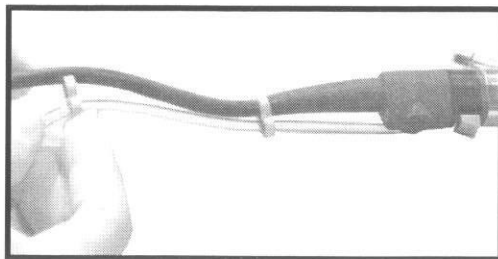


NOTE: The irrigator collar must be installed prior to bending the blade. See blade insert sheet for blade bending information.

- (b) Slide the inner recesses of the collar completely over the two hub-ears on the shaver blade hub.
- (c) Turn the irrigation collar clockwise (approximately 90°) and securely lock it into place.



- (d) Snap the handpiece cord clips onto the handpiece cable to secure the tubing.



3.9 Group 3 Handpiece Operation

3.9.1 Activating the Handpiece

3.9.1.1 Using the Footswitch to Activate the Handpiece

NOTE: This process applies to ALL shaver handpieces (C9820, D9820, MC9820, C9824, D9824, C9828, MC9828, C9840, MC9840).

1. To activate these handpieces, depress the appropriate footswitch pedal (see “**2.1.6 Footswitch Operation (Top Portion Only)**” on page 39).

3.9.1.2 Using the Handpiece ON/OFF Button to Activate the Handpiece

NOTE: This process applies ONLY to the APEX and Advantage 2-Button Handpieces (C9824, D9824), and the APEX and *Micro-Choice Full-Function* Handpieces (C9828, MC9828).

1. To activate these handpieces, press the handpiece ON/OFF button.

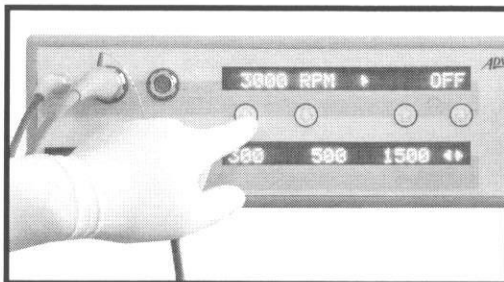
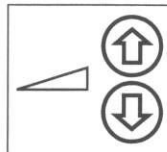


3.9.2 Changing Handpiece Operating Speeds

3.9.2.1 Using the Console Speed Buttons to Change Handpiece Speed

NOTE: This process applies to ALL shaver handpieces and pertains ONLY to Port 1 and Port 2 (C9820, D9820, MC9820, C9824, D9824, C9828, MC9828, C9840, MC9840).

1. To change operating speeds using the console buttons (Top Portion Only), press the console Speed Increase or Decrease buttons.



3.9.2.2 Using the Handpiece Direction Select and ON/OFF Buttons to Change Handpiece Speed

NOTE: This process applies **ONLY** to the APEX Full-Function (C9828) and APEX (C9824) and Advantage (D9824) 2-Button Handpieces.

1. The “Direction” and “On/Off” button function can be changed to “Increase Speed” and “Decrease Speed” respectively. To change the button functionality:



- (a) Stop the handpiece. Press and hold the Direction Select Button to enter the speed menu. An audible beep will sound twice indicating that the handpiece button function has changed. Release the button. To increase the speed, press this button again until the desired speed is obtained.



- (b) To decrease the speed, press the handpiece On/Off button.
- (c) When no further speed change is requested, the audible beep will sound twice again indicating that the button functionality has returned to “Direction” and “On/Off” control.



3.9.2.3 Using the Handpiece Speed Buttons to Change Handpiece Speed

NOTE: This process applies **ONLY** to the APEX (C9828) and *MicroChoice* (MC9828) Full-Function Handpieces.

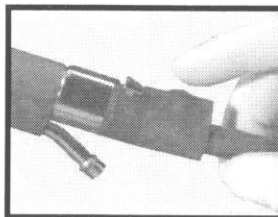
1. Press the handpiece Increase button to increase the handpiece speed. The speed will change incrementally. When the button is pressed and held, the speed will change continuously.
2. Press the handpiece Decrease button to decrease the handpiece speed. The speed will change incrementally. When the button is pressed and held, the speed will change continuously.



3.9.2.4 Using the Handpiece Cord Button to Change Handpiece Speed

NOTE: This process applies **ONLY** to the *MicroChoice* MC9820 Basic, the MC9828 Full-Function, and the MC9840 Small Shaver Handpieces.

1. Access the speed menu by pressing the handpiece cord button. See “3.10 Group 3 Handpiece Cord Button Operation” on page 88 for more specific information.

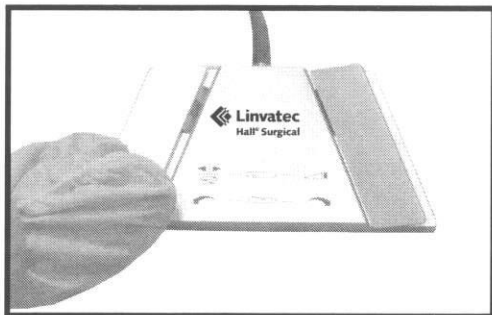


3.9.3 Changing Handpiece Operating Directions

3.9.3.1 Using the Footswitch to Change Handpiece Direction (Applies only to the 2-Pedal Footswitch - REF 5020-053)

NOTE: This process applies to ALL shaver handpieces operating in Port 1 or Port 2 (C9820, D9820, MC9820, C9824, D9824, C9828, MC9828, C9840, MC9840).

1. To change operating directions between forward, reverse, and oscillate on these handpieces, depress the left footswitch pedal (see “2.1.6 Footswitch Operation (Top Portion Only)” on page 39).



3.9.3.2 Using the Handpiece Direction Select Button

NOTE: This process applies ONLY to the APEX 2-Button (C9824) and Full-Function (C9828) Handpieces, the *MicroChoice* Full-Function (MC9828) Handpiece, and the Advantage 2-Button (D9824) Handpiece.

1. Press and release the Direction Select button to change operating directions between forward, reverse, and oscillate. A beep will sound every time the button is pressed and the controller will indicate the selected direction. If audio is enabled via the “TOP CONTROLLER OPTIONS” switches (Ports 1 and 2 only) the direction will be pronounced [See “2.1.3.4 Switch 3 (Top Portion Only) - Audio Selection” on page 34].

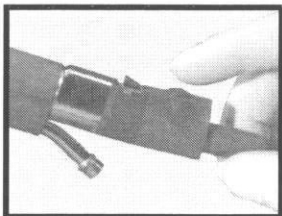


3.10 Group 3 Handpiece Cord Button Operation

NOTE: The following information applies only to the *MicroChoice* Basic (MC9820), Full-Function (MC9828), and Small (MC9840) Shaver Handpieces.

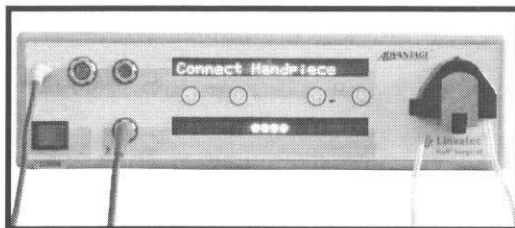
The Advantage Controller allows the user complete system control from within the sterile field when using a *MicroChoice* Shaver Handpiece. Speed settings can be changed using the handpiece cord button.

1. To enter the Speed menu, press the handpiece cord button either two or three times, quickly.



- (a) Pressing the handpiece cord button twice allows the user to decrease the operating speed.
 - (b) Pressing the handpiece cord button three times allows the user to increase the operating speed.
2. After entering the Speed menu, the operating speed will blink. Press the handpiece cord button to change the speed.
 - (a) To change the speed incrementally, press and release the button.
 - (b) To change the speed continuously, press and hold the button.

- (c) The Speed menu will scroll when the “**Aspirate Mode**” option is displayed. If the controller is set to Graphical Display mode, “**Aspirate Mode**” will be replaced with the following symbol:



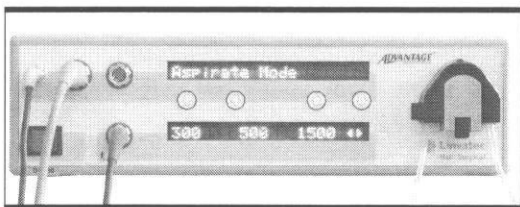
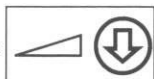
3. When the desired speed is obtained, stop pressing the button. After a few seconds the new operating speed will stop blinking. The shaver handpiece is now ready to use at the new speed setting.

3.10.1 Using APEX and Advantage Shaver Handpieces in Aspirate Mode

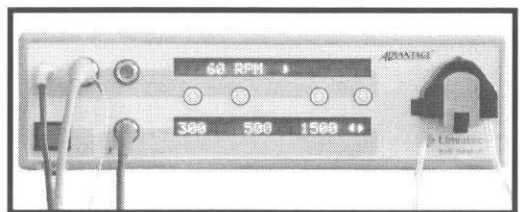
NOTES:

1. This process applies **ONLY** to the APEX (C9820, C9824, C9828, C9840) and Advantage (D9820, D9824) Handpieces.
 2. To access Aspirate Mode with these handpieces, they must be connected to either Port 1 or 2. Aspirate Mode cannot be achieved from Port 3. However, if an APEX handpiece is connected to Port 2 the E9320 APEX Adapter must be used.
1. To place a handpiece in aspirate mode:

- (a) Press and hold the console front panel Decrease button. Approximately two seconds after the minimum speed is reached the unit will enter and display “Aspirate Mode”.



- (b) Then press the appropriate footswitch pedal, “60 RPM” will display. The cutting window can now be positioned where desired.



3.10.2 Using the *MicroChoice* Basic Shaver Handpiece (MC9820) in Aspirate Mode

NOTE: To access Aspirate Mode with this handpiece, it must be connected to Port 2. Aspirate Mode cannot be achieved from Port 3.

1. To use the *MicroChoice* Basic Shaver Handpiece (MC9820) in aspirate mode, perform the following:
 - (a) Enter the Speed menu by pressing the handpiece cord button, either two or three times, quickly.
 - (b) Press the button until the display indicates “Aspirate Mode”.
 - (c) If the controller is set to Graphical Display mode, “Aspirate Mode” will be replaced with the following symbol:



- (d) While “Aspirate Mode” is displayed, press and hold the appropriate footswitch pedal to activate the shaver handpiece, “60 RPM” will display. Position the cutting window as desired.
- (e) To stop blade rotation, release the footswitch pedal. The controller will return to normal use at the previous operating speed.

3.10.3 Using the Full-Function Large Shaver Handpieces (MC9828, C9828) in Aspirate Mode

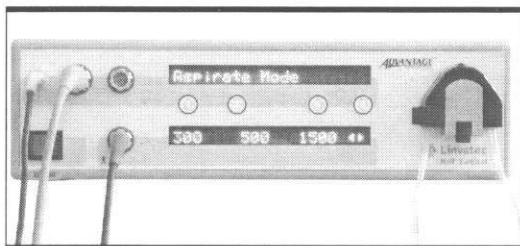
NOTES:

1. The *MicroChoice* Full-Function Handpiece (MC9828) can only be operated from Ports 2 or 3.
2. The APEX Full-Function Handpiece (C9828) can be operated from any port. However, if connecting to Ports 2 or 3 the E9320 APEX Adapter must be used.

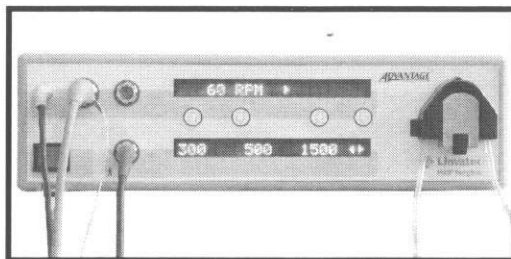
Using Ports 1 or 2:

1. To use the front panel buttons to access aspirate mode with the *MicroChoice* or APEX Full-Function Shaver Handpieces (MC9828, C9828), perform the following:

- (a) Press and hold the console front panel Decrease button. Approximately two seconds after the minimum speed is reached the unit will enter and display “Aspirate Mode”.



- (b) While “**Aspirate Mode**” is displayed, press the appropriate footswitch pedal or press and hold the handpiece ON/OFF button to activate the handpiece; “**60 RPM**” will display. Position the cutting window as desired.



- (c) If the controller is set to Graphical Display mode, “**Aspirate Mode**” will be replaced with the following symbol:

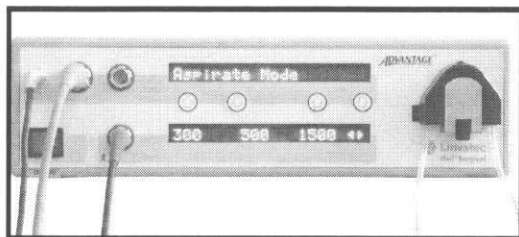


- (d) To stop blade rotation, release the footswitch pedal or the handpiece ON/OFF button. “**Aspirate Mode**” will display and then disappear. The controller will return to normal use at the previous operating speed.

2. To use the handpiece buttons to access aspirate mode with the *MicroChoice* or APEX Full-Function Shaver Handpieces (MC9828, C9828), perform the following:

NOTE: When using Port 3, the front panel buttons have no control. Therefore, to access Aspirate Mode the handpiece buttons must be used.

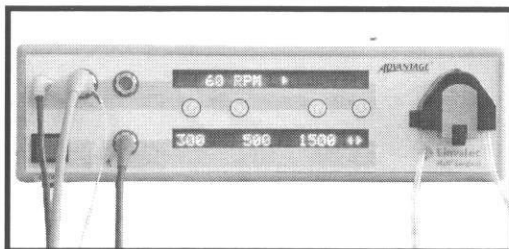
- (a) Press and hold the handpiece rpm decrease button. Approximately two seconds after the minimum speed is reached the unit will enter and display “Aspirate Mode”.



- (b) If the controller is set to Graphical Display mode, “Aspirate Mode” will be replaced with the following symbol:



- (c) While “Aspirate Mode” is displayed, press the appropriate footswitch pedal or press and hold the handpiece ON/OFF button to activate the handpiece; “60 RPM” will display. Position the cutting window as desired.



- (d) To stop blade rotation, release the footswitch pedal or the handpiece ON/OFF button. “Aspirate Mode” will display and then disappear. The controller will return to normal use at the previous operating speed.

Group 4 Handpieces

NOTES:

1. Group 4 handpieces consist of the ***PowerPro* Electric Modular Handpiece (PRO2100E)**, **Electric Two-Trigger Handpiece (PRO2200E)**, and **Electric Oscillator Handpiece (PRO2300E)**.
2. Group 4 handpieces will only operate in Port 3 (Bottom Portion of Console).
3. When using the ***PowerPro* Modular or Two-Trigger Handpiece** with any saw attachment (Sagittal Saw - PRO2043, Reciprocating Saw - PRO2045), do not operate in the oscillate mode. These handpieces should only be operated in the drill/ream mode when used with these attachments.

3.11 ***PowerPro* Electric Modular Handpiece**

The ***PowerPro* Electric Modular handpiece** operates in four individual modes:

Drill/Ream mode - used for drilling, and wire and pin driving, with a variable speed of 0-750 rpm and a minimum torque of 35 in. lbs. with all drilling, and wire and pin driving attachments. A variable speed of 0-250 rpm and torque of 100 in. lbs. with all reaming attachments (identified with a red-colored ring).



Oscillating Drill mode - used for drilling around soft tissue. This handpiece will operate at a variable speed of 0-500 rpm with 270° of rotation oscillation. Use only with the drilling attachments.



Tap mode - used in conjunction with a tap bit for making threads in holes for placement of screws.



Screw mode - used for driving and/or setting screws, with a variable speed of 0-250 rpm, a torque limitation of 20 in. lbs. in the forward direction, and a minimum of 35 in. lbs. in the reverse direction with all attachments.



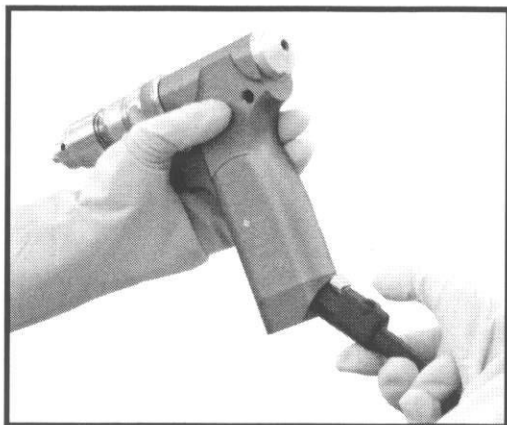
NOTE: All reaming attachments have a red-colored ring and should **not** be used in the screw or oscillating drill modes.

The individual operating modes are selected through the controller menu options using the handpiece cord button.

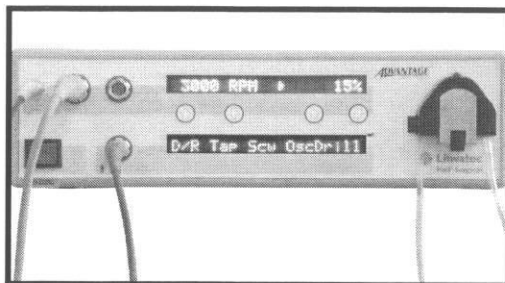
1. Place the handpiece thumb lever in either the forward or reverse position (reverse position shown).



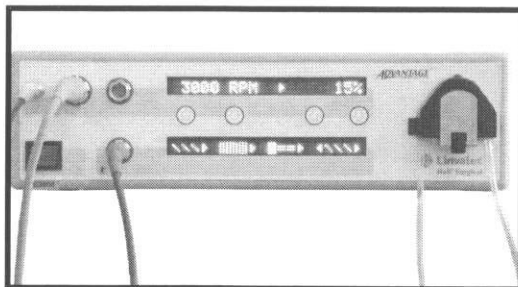
2. Access the menu by pressing the handpiece cord button twice.



The display will indicate “D/R” “Tap” “Scw” “OscDrill” (D/R - Drill/Ream, Tap - Tap, Scw - Screw, OscDrill - Oscillating Drill). The active mode will be blinking.



If the controller is set to graphical display mode, the following symbols will display with the active mode blinking.





3. Press the handpiece cord button until the desired mode is selected. The selected mode will be blinking.
4. Depress the handpiece trigger to operate the handpiece and activate the selected mode, or wait 2-3 seconds for the menu to time out. The handpiece is now ready for use in the selected operating mode.

“Drill/Ream” Selection Operation:





NOTE: The attachment connected (drill or reaming) determines the speed and torque. See page 120 for attachment matrix.

- (a) With the thumb lever in the forward position, depressing the trigger operates the handpiece in the clockwise direction. The speed is variably controlled by the trigger. 
- (b) With the thumb lever in the reverse position, depressing the trigger operates the handpiece in the counterclockwise direction. The speed is variably controlled by the trigger. A brief audible beeping tone indicates reverse direction when the handpiece is initially activated. 


“Tap” Selection Operation:



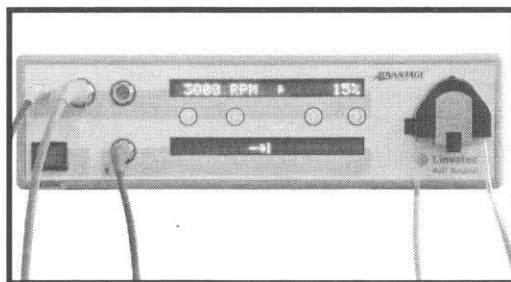
- (a) With the thumb lever in the forward position, depressing the trigger operates the handpiece 720° clockwise, then 360° counterclockwise (2 turns CW, 1 turn CCW). The speed is variably controlled by the trigger between 0 and 250 rpm. 
- (b) With the thumb lever in the reverse position, depressing the trigger operates the handpiece in the counterclockwise direction. The speed is variably controlled by the trigger. A brief audible beeping tone indicates reverse direction when the handpiece is initially activated. 


“Screw” Selection Operation:



- (a) With the thumb lever in the forward position, depressing the trigger operates the handpiece in the clockwise direction. The speed is variably controlled by the trigger between 0 and 250 rpm. Torque is limited to 20 in-lbs. 

NOTE: When the torque limit is reached, the handpiece shuts off and the controller displays “Maximum Torque”. To continue, release the trigger, then press again. If the controller is set to graphical display mode, the controller will display:



- (b) With the thumb lever in the reverse position, depressing the trigger operates the handpiece in the counterclockwise direction. The speed is variably controlled by the trigger. Full torque is available. A brief audible beeping tone indicates reverse direction when the handpiece is initially activated. 

**“Oscillating Drill” Selection
Operation:**



- (a) With the thumb lever in the forward position, depressing the trigger operates the handpiece in the oscillate mode within a range of 270° clockwise and 270° counterclockwise, with a variable speed of 0 - 500 rpm.
- (b) With the thumb lever in the reverse position, depressing the trigger operates the handpiece in the counterclockwise direction. The speed is variably controlled by the trigger. A brief audible beeping tone indicates reverse direction when the handpiece is initially activated.



NOTE: Reaming attachments (indicated by a red-colored ring) and sawing attachments are not designed to be used in the screw or oscillating drill modes.

3.12 *PowerPro* Electric Two-Trigger Handpiece

3.12.1 Default Mode of Operation

NOTE: To change the mode of operation from Swiss to Default, reference “2.1.3.5 Switch 3 (Bottom Portion Only) Handpiece Operating Mode Selection (*PowerPro* Electric Two-Trigger Handpiece Only)” on page 34.

When the controller is set to the Default Mode of Operation, the “**Tap**” mode is the only mode that requires using the handpiece cord button for accessibility.

A matrix that describes the functionality of the two triggers, alone or in combination, when the handpiece is set to Default mode is located on page 99.

DRILL/REAM Position



There is only one operating mode when the handpiece is operated with the thumb lever in the DRILL/REAM position, “**Drill/Ream**”.

“Drill/Ream” Operating Mode:



1. Place the handpiece thumb lever in the DRILL/REAM position. The handpiece operates as follows:



- (a) Depress the bottom trigger only to operate in the clockwise direction. The speed is variably controlled by the trigger.
- (b) Depress the top trigger only to operate in the counterclockwise direction. The speed is variably controlled by the trigger. A brief audible beeping tone indicates reverse direction when the handpiece is initially activated.
- (c) Depress both triggers simultaneously to operate in oscillating drill mode. The speed is variably controlled by the bottom trigger.



SCREW Position



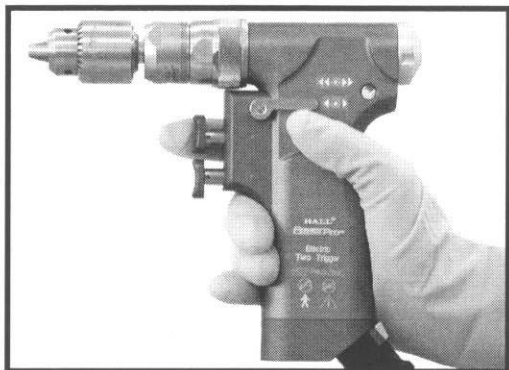
There are two operating modes when the handpiece thumb lever is in the SCREW position, “Screw” and “Tap”.

NOTE: Do not use reaming attachments (red ring) in the “Screw” or “Tap” operating modes.

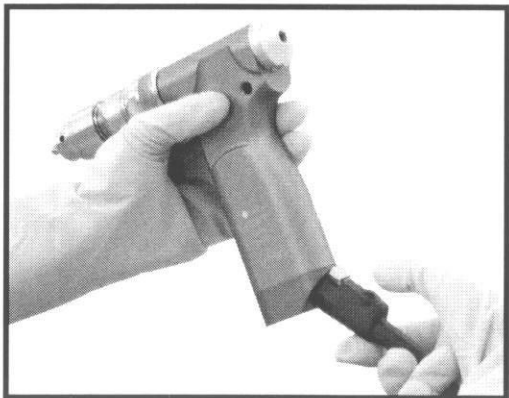
“Screw” Operating Mode:



1. Place the handpiece thumb lever in the SCREW position.

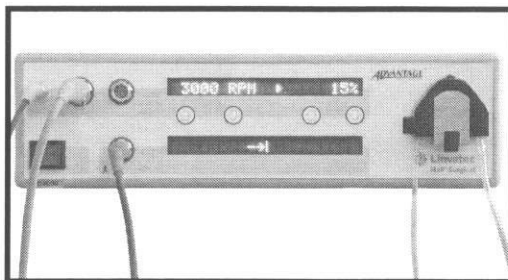


2. If the controller is set to “Tap” operating mode, double-press the handpiece cord button to toggle to the “Screw” operating mode. The handpiece operates as follows:



- (a) Depress the bottom trigger only to operate in the clockwise direction. The speed is variably controlled by the trigger and torque is limited to 20 in. lbs.

NOTE: When the torque limit is reached, the handpiece shuts off and the controller displays “Maximum Torque”. To continue, release the trigger, then press again. If the controller is set to graphical display mode, the controller will display the following.



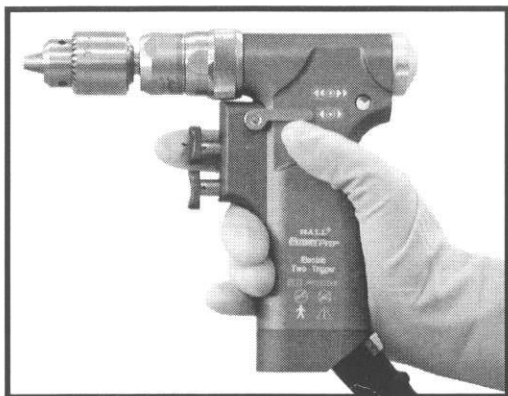
- (b) Depress the top trigger only to operate in the counterclockwise direction. The speed is variably controlled by the trigger. Torque is not limited. A brief audible beeping tone indicates reverse direction when the handpiece is initially activated.

NOTE: The handpiece is disabled when both triggers are simultaneously depressed.

“Tap” Operating Mode:










1. Place the handpiece thumb lever in the SCREW position.



2. If the operating mode is set to “Screw”, double-press the handpiece cord button to place the controller in “Tap” operating mode. The handpiece operates as follows:
 - (a) Depressing the bottom trigger only operates the handpiece 720° clockwise, then 360° counterclockwise (2 turns CW, 1 turn CCW). The speed is variably controlled by the trigger between 0 and 250 rpm.
 - (b) Depress the top trigger only to operate in the counterclockwise direction. The speed is variably controlled by the trigger. A brief audible beeping tone indicates reverse direction when the handpiece is initially activated.

NOTE: The handpiece is disabled when both triggers are simultaneously depressed.

Table 1: *PowerPro* Two-Trigger Handpiece Trigger Operating Matrix

| Default Mode | | | | |
|-------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|----------------------|-------------------------|------------------------------------------------------------------------------------|
| Lever Position | Operating Mode | Top Trigger Position | Bottom Trigger Position | Handpiece Action |
| DRILL/REAM  | “Drill/Ream”  | Not Pressed | Pressed | Forward |
| | | Pressed | Not Pressed | Reverse |
| |  | Pressed | Pressed | Changes handpiece operating mode to “Oscillating Drill” mode * |
| | | | |  |
| SCREW  | “Screw”  | Not Pressed | Pressed | Forward |
| | | Pressed | Not Pressed | Reverse |
| | | Pressed | Pressed | Inoperative |
| | “Tap”  | Not Pressed | Pressed | Tap Function |
| | | Pressed | Not Pressed | Reverse |
| | | Pressed | Pressed | Inoperative |

*** NOTE:** When using the *PowerPro* Two-Trigger Handpiece with any saw attachment (Sagittal Saw - PRO2043, Reciprocating Saw - PRO2045), do not operate in the oscillate mode. These handpieces should only be operated in the drill/ream mode when used with these attachments.

3.12.2 Swiss Mode of Operation

A matrix that describes the functionality of the two triggers, alone or in combination, when the handpiece is set to Swiss mode is located on page 103.

NOTE: To change the mode of operation from Default to Swiss, reference “2.1.3.5 Switch 3 (Bottom Portion Only) Handpiece Operating Mode Selection (PowerPro Electric Two-Trigger Handpiece Only)” on page 34.

DRILL/REAM Position

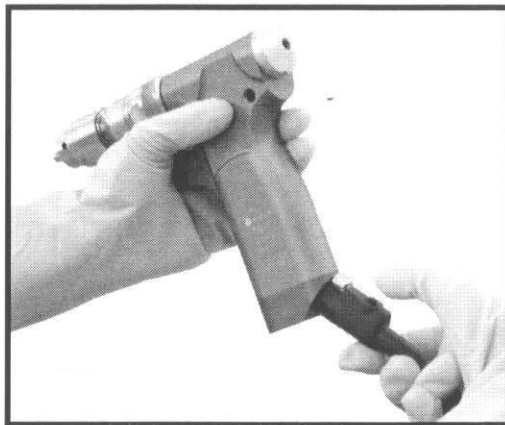
There are two operating modes when the handpiece thumb lever is in the DRILL/REAM position; “Drill/Ream” and “Oscillating Drill”.

“Drill/Ream” Operating Mode:

1. Place the handpiece thumb lever in the DRILL/REAM position.



2. If the controller is set to “Oscillating Drill” operating mode, double-press the handpiece cord button to toggle to the “Drill/Ream” operating mode. The handpiece operates as follows:



- (a) Depress the bottom trigger only to operate in the clockwise direction. The speed is variably controlled by the trigger.
- (b) Depress both triggers simultaneously to operate in the counterclockwise direction. The speed is variably controlled with the bottom trigger. A brief audible beeping tone indicates reverse direction when the handpiece is initially activated.

NOTE: When only the top trigger is pressed, the handpiece will not operate.

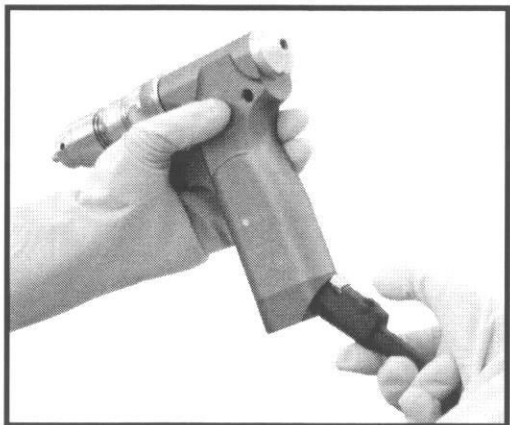
“Oscillating Drill” Operating Mode:



1. Place the handpiece thumb lever in the DRILL/REAM position.



2. If the controller is set to “Drill/Ream” operating mode, double-press the handpiece cord button to toggle to the “Oscillating Drill” operating mode. The handpiece operates as follows:



- (b) Depress both triggers simultaneously to operate in the counterclockwise direction. The speed is variably controlled with the bottom trigger. A brief audible beeping tone indicates reverse direction when the handpiece is initially activated.

NOTES:

1. When only the top trigger is pressed, the handpiece will not operate.
2. When using the *PowerPro* Two-Trigger Handpiece with any saw attachment (Sagittal Saw - PRO2043, Reciprocating Saw - PRO2045), do not operate in the oscillate mode. These handpieces should only be operated in the drill/ream mode when used with these attachments.

- (a) Depress the bottom trigger only to operate in the oscillate mode. The speed is variably controlled by the trigger.

SCREW Position



There are two operating modes when the handpiece thumb lever is in the SCREW position, “Screw” and “Tap”.

“Screw” Operating Mode:



1. Place the handpiece thumb lever in the SCREW position.



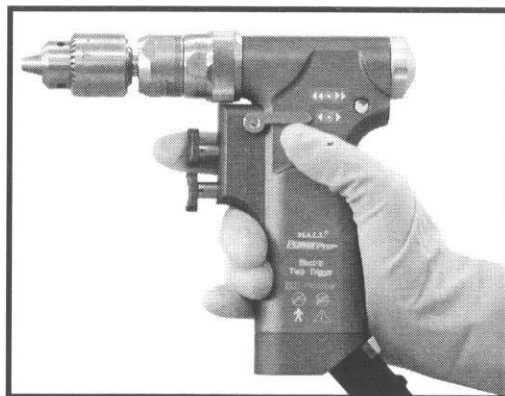
2. If the controller is set to “Tap” operating mode, double-press the handpiece cord button to toggle to the “Screw” operating mode. The handpiece operates as follows:
 - (a) Depress the bottom trigger only to operate in the clockwise direction. The speed is variably controlled by the trigger.
 - (b) Depress both triggers simultaneously to operate in the counterclockwise direction. The speed is variably controlled with the bottom trigger. A brief audible beeping tone indicates reverse direction when the handpiece is initially activated.

NOTE: When only the top trigger is pressed, the handpiece will not operate.

“Tap” Operating Mode:













1. Place the handpiece thumb lever in the SCREW position.



2. If the controller is set to “Screw” operating mode, double-press the handpiece cord button to toggle to the “Tap” operating mode. The handpiece operates as follows:
 - (a) Depressing the bottom trigger only operates the handpiece 720° clockwise, then 360° counterclockwise (2 turns CW, 1 turn CCW). The speed is variably controlled by the trigger between 0 and 250 rpm.
 - (b) Depress both triggers simultaneously to operate in the counterclockwise direction. The speed is variably controlled with the bottom trigger. A brief audible beeping tone indicates reverse direction when the handpiece is initially activated.

NOTE: When only the top trigger is pressed, the handpiece will not operate.

Table 2: *PowerPro* Two-Trigger Handpiece Trigger Operating Matrix

| Swiss Mode | | | | |
|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------------|------------------|
| Lever Position | Operating Mode | Top Trigger Position | Bottom Trigger Position | Handpiece Action |
| | | | | |
| DRILL/REAM  | “Drill/Ream”   | Not Pressed | Pressed | Forward |
| | | Pressed | Pressed | Reverse |
| | | Pressed | Not Pressed | Inoperative |
| | “Oscillating Drill”   | Not Pressed | Pressed | Oscillate* |
| | | Pressed | Pressed | Reverse |
| | | Pressed | Not Pressed | Inoperative |
| | | | | |
| SCREW  | “Screw”   | Not Pressed | Pressed | Forward |
| | | Pressed | Pressed | Reverse |
| | | Pressed | Not Pressed | Inoperative |
| | “Tap”   | Not Pressed | Pressed | Tap Function |
| | | Pressed | Pressed | Reverse |
| | | Pressed | Not Pressed | Inoperative |
| | | | | |

* NOTE: When using the *PowerPro* Two-Trigger Handpiece with any saw attachment (Sagittal Saw - PRO2043, Reciprocating Saw - PRO2045), do not operate in the oscillate mode. These handpieces should only be operated in the drill/ream mode when used with these attachments.

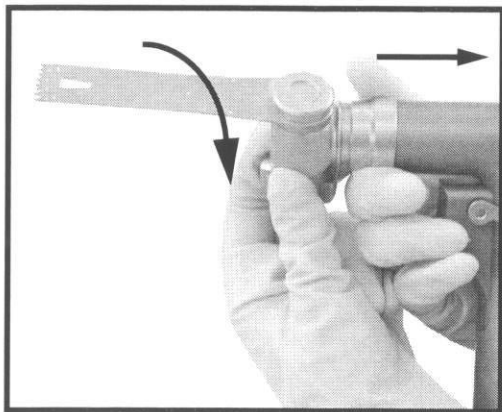
3.13 *PowerPro* Electric Oscillator Handpiece Operation

1. Before operating the *PowerPro* Oscillator Handpiece, ensure the blade is attached securely (see “3.13.1 Connecting Blades to the *PowerPro* Oscillator Handpiece” on page 105).
2. Position the rotating head to the desired position. The rotating head may be set in any of 12 positions at 30° intervals for the appropriate surgical access.

- (a) Place the handpiece in the SAFE position. The controller display will indicate “Safe”.



- (b) Pull the head locking collar in the direction of the arrow (towards the back of the handpiece).



- (c) Twist the rotating head to the desired position and release the head locking collar.

3. Move the thumb lever to the RUN position.



The controller display will indicate “Oscillator Saw”.



4. To activate handpiece, depress the trigger.

CAUTION: When operating the *PowerPro* Oscillator Handpiece, let the saw do the cutting. Too much pressure will bind the blade which can damage the handpiece.

3.13.1 Connecting Blades to the *PowerPro* Oscillator Handpiece

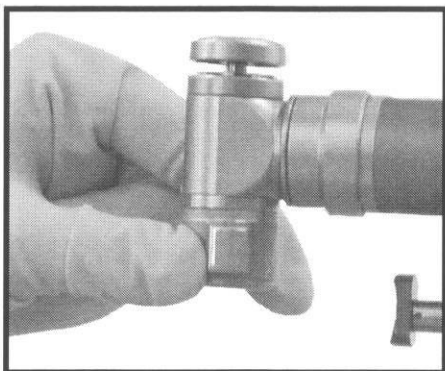
NOTE: The *PowerPro* Oscillator Handpiece requires Hall series 5071-XXX blades.

1. To attach a blade:

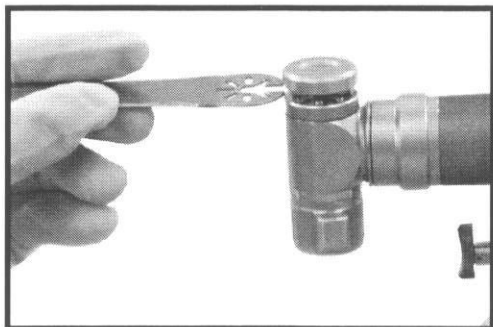
- (a) Place the thumb lever in the SAFE position.



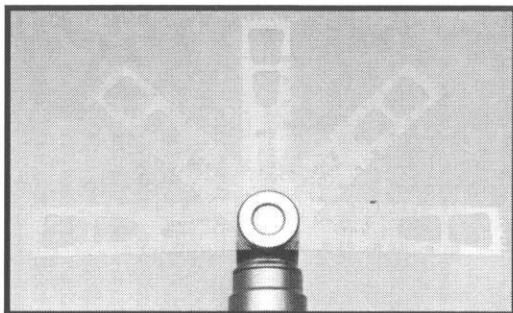
- (b) Rotate the blade locking knob in the direction of the arrow to the "OPEN" position. The blade locking collet will disengage.



- (c) Align the blade shank to the desired angle with the blade locking collet. Insert the blade.

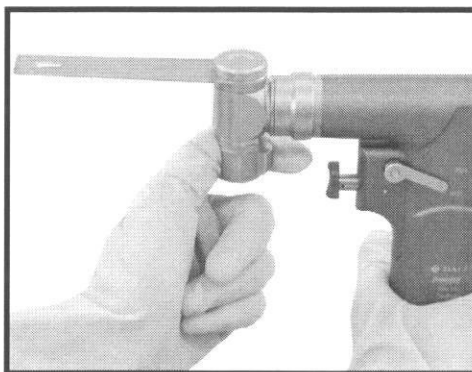


- (d) Blades can be positioned 45° off the center line in either direction.



- (e) Rotate the blade locking knob in the opposite direction of the arrow to lock the blade into place.

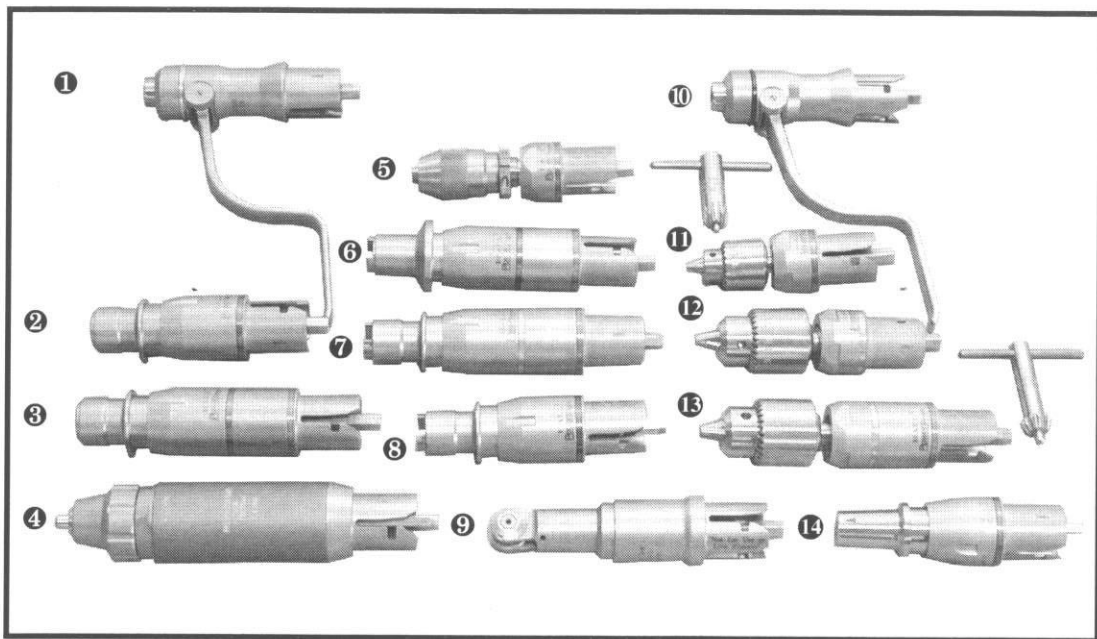
WARNING: The blade locking knob must be completely closed to hold the blade firmly in place.



2. To remove the blade:

- (a) Place the thumb lever in the SAFE position.
- (b) Rotate the blade locking knob to the "OPEN" position. The blade locking collet will disengage.
- (c) Remove the blade.





3.14 *PowerPro* Attachments

- ❶ Wire Driver (PRO2028)
- ❷ AO Drill (PRO2070)
- ❸ AO Reamer (PRO2040)
- ❹ Reciprocating Saw (PRO2045)
- ❺ 1/8" Keyless Chuck (PRO2050)
- ❻ Aesculap Reamer (PRO2060))
- ❼ Zimmer/Hudson Reamer (PRO2047)
- ❽ Zimmer/Hudson Drill (PRO2046)
- ❾ Sagittal Saw (PRO2043)
- ❿ Pin Driver (PRO2032)
- ⓫ 5/32" Jacobs Chuck (PRO2030)
- ⓬ 1/4" Jacobs Chuck (PRO2041)
- ⓭ 1/4" High Torque Jacobs Chuck (PRO2042)
- ⓮ Trinkle/AO (PRO2029)

All *PowerPro* attachments work with the *PowerPro* Modular (PRO2100E) and *PowerPro* Two-Trigger (PRO2200E) Electric Handpieces.

All *PowerPro* attachments are color coded by function for easy identification. Each attachment has a colored ring that identifies the following:

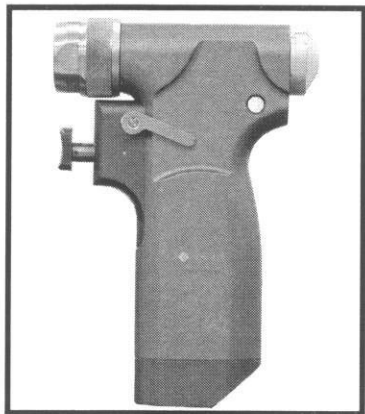
- Blue: Collet that accepts Zimmer, Hall Series 3/Series 4, and Hudson accessories
- Mustard: 1/4 inch Jacobs or Keyless Chuck
- Purple: Collet that accepts Trinkle and ASIF/AO accessories
- Green: 5/32 inch Jacobs Chuck or 1/8 inch Keyless Chuck
- Copper: Wire Driver
- Black: Pin Driver
- Red: Secondary ring that identifies the attachment as a high torque reaming attachment
- Teal: AO Drill
- Teal: AO Reamer
- Brown: Aesculap Reamer

3.14.1 Connecting and Removing Attachments

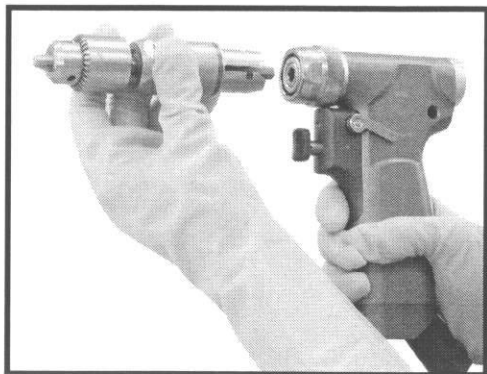
All attachments for the *PowerPro* Modular and *PowerPro* Two-Trigger Electric Handpieces connect/disconnect in the same manner. Reference pages 109 through 118 for information about each attachment.

1. To connect an attachment:

- (a) Place the thumb lever in the SAFE position.

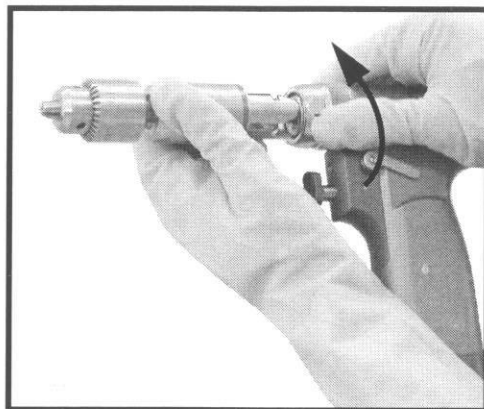


- (b) Orient the attachment shaft with the handpiece opening. Insert the shaft and press them until they snap together.



2. To disconnect an attachment:

- (a) Twist the attachment collet-lock in the direction of the arrow. Remove the attachment.



3.14.2 Reaming Attachments

All reaming attachments are geared down to provide higher torque levels for acetabulum and femoral reaming, hip screws, or any procedure where high torque is necessary. All *PowerPro* reaming attachments are easily recognized by the red-colored proximal ring.

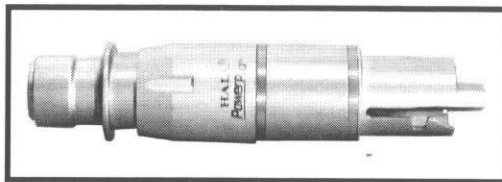
NOTE: Reaming attachments should only be used in the “Drill/Ream” mode and are not indicated to be used in the screw, tap or oscillating drill modes.

All reaming attachments have the following specifications in the “Normal” mode:

Variable Speed: 0-250 rpm

Torque (forward and reverse): 100 in. lbs.

3.14.2.1 AO Reamer (PRO2040)



Specifications:

Collet: Accepts large hex AO reamers

Cannulation: 5.1 mm

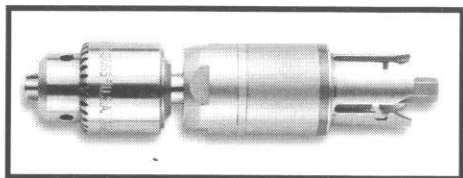
Color Ring: Teal/Red

1. To attach accessories to the AO Reamer attachment:

- (a) Place the thumb lever in the SAFE position.
- (b) Pull the collet sleeve back and insert the accessory shank into the collet. Release the collet sleeve.



3.14.2.2 1/4" High Torque Jacobs Chuck (PRO2042)



Specifications:

Collet: 1/4" Jacobs Chuck

Cannulation: 5.1 mm

Color Ring: Mustard/Red

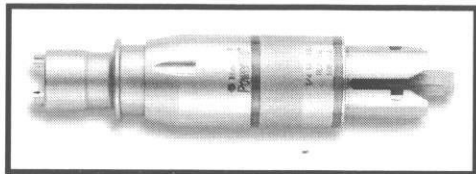
1. To attach accessories to the 1/4" High Torque Jacobs Chuck attachment:

- (a) Place the thumb lever in the SAFE position.



- (b) Insert the accessory shank into the chuck. Secure the chuck with the Jacobs Chuck Key (REF 5044-999-52)

3.14.2.3 Zimmer/Hudson Reamer (PRO2047)



Specifications:

Collet: Accepts Zimmer, Hall Series 3, Hall Series 4, and Hudson accessories

Cannulation: 5.1 mm

Color Ring: Blue/Red

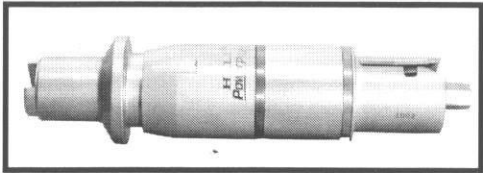
1. To attach accessories to the Zimmer/Hudson Reamer attachment:

- (a) Place the thumb lever in the SAFE position.



- (b) Pull the collet sleeve back and insert the accessory shank into the collet. Release the collet sleeve.

3.14.2.4 Aesculap Reamer (PRO2060)



Specifications:

- Collet: Accepts Aesculap Reamers
Cannulation: 5.1 mm
Color Ring: Brown/Red

1. To attach accessories to the Aesculap Reamer attachment:

- (a) Place the thumb lever in the SAFE position.
- (b) Pull the collet sleeve back and insert the accessory shank into the collet. Release the collet sleeve.



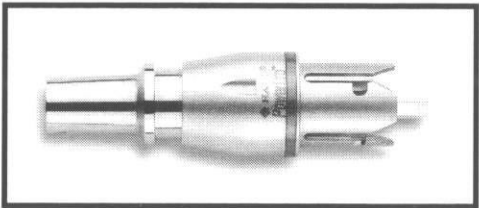
3.14.3 Drilling Attachments

All drilling attachment modes and specifications are as follows:

| <u>Mode</u> | <u>Speed (rpm)</u> | <u>Torque (in. lbs.) (FWD/REV)</u> |
|-------------|--------------------|------------------------------------|
| Drill/Ream | 0-750 | 35/35 |
| Screw | 0-250 | 20/35 |

| <u>Mode</u> | <u>Speed (rpm)</u> | <u>Oscillation Degrees</u> |
|-------------------|--------------------|----------------------------|
| Oscillating Drill | 0-500 | 270° |

3.14.3.1 Trinkle /AO Attachment (PRO2029)



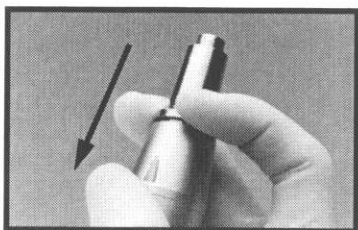
Specifications:

- Collet: Accepts Trinkle and ASIF/AO accessories
Cannulation: 3.4 mm
Color Ring: Purple

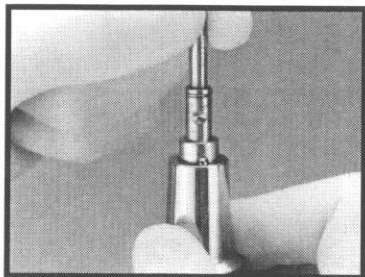
Trinkle Shank Accessories for the Trinkle/AO Attachment

1. To attach accessories to the Trinkle/AO attachment:

- (a) Place the thumb lever in the SAFE position.
- (b) Pull the collet sleeve back.



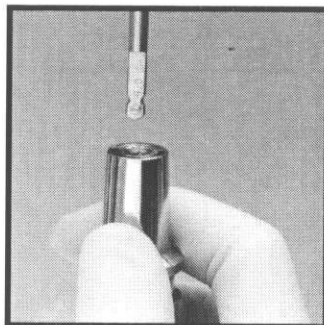
- (c) Align the dimple on the Trinkle shank with the black arrow on the outer collet sleeve. Totally insert the Trinkle shank. The spring-loaded inner sleeve will retract.



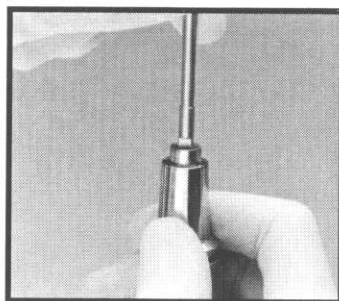
- (d) Release the collet sleeve and rotate the accessory until it is completely engaged. Pull the accessory firmly to ensure proper engagement.
- (e) To remove the accessory, pull back the outer collet sleeve and remove the accessory.

AO/ASIF Drill Bits for the Trinkle/AO Attachment

1. Align the flat portion of the drill bit shank with the black arrow on the outer collet sleeve.

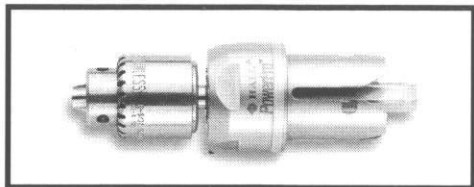


2. Insert the drill bit shank into the collet as far as it will go without pulling back the collet sleeve. Twist the shank to make sure it is aligned properly, it should not spin in the collet.
3. Pull back on the collet sleeve while pushing the shank completely into the collet.



4. Release the collet sleeve. The shank is now locked into the collet. Pull the drill bit firmly to verify it is properly seated.
5. To remove the drill bit, pull back on the collet sleeve and remove the bit.

3.14.3.2 5/32" Jacobs Chuck (PRO2030)



Specifications:

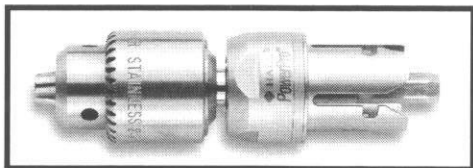
Collet: 5/32" Jacobs Chuck

Cannulation: 3.9 mm

Color Ring: Green

1. To attach accessories to the 5/32" Jacobs Chuck attachment, see "3.14.2.2 1/4" High Torque Jacobs Chuck (PRO2042)" on page 110.

3.14.3.3 1/4" Jacobs Chuck (PRO2041)



Specifications:

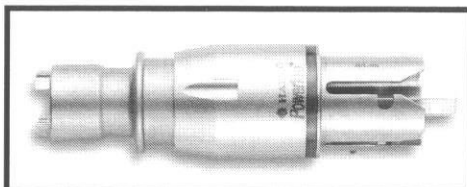
Collet: 1/4" Jacobs Chuck

Cannulation: 5.1 mm

Color Ring: Mustard

1. To attach accessories to the 1/4" Jacobs Chuck attachment, see "3.14.2.2 1/4" High Torque Jacobs Chuck (PRO2042)" on page 110.

3.14.3.4 Zimmer/Hudson Drill (PRO2046)



Specifications:

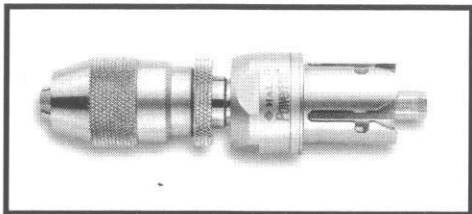
Collet: Accepts Zimmer, Hall Series 3, Hall Series 4, and Hudson accessories

Cannulation: 5.1 mm

Color Ring: Blue

1. To attach accessories to the Zimmer/Hudson Drill attachment, see "3.14.2.3 Zimmer/Hudson Reamer (PRO2047)" on page 110.

3.14.3.5 1/8" Keyless Chuck (PRO2050)



Specifications:

Collet: 1/8" Keyless Chuck

Cannulation: 2.0 mm

Color Ring: Green

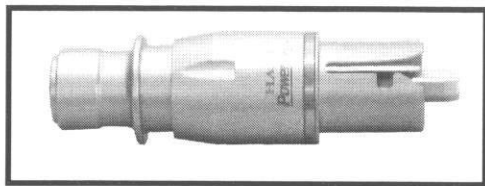
1. To attach accessories to the 1/8" Keyless Chuck attachment:

- (a) Place the thumb lever in the SAFE position.
- (b) Insert the accessory shank into the chuck.
- (c) While holding the knurled ring below the chuck, turn the knurled portion of the chuck and secure the accessory.



NOTE: The Keyless Chuck will loosen if the handpiece is operated in the reverse or oscillating drill modes.

3.14.3.6 AO Drill (PRO2070)



Specifications:

Collet: Accepts large hex style AO drill bits for Synthes DHS and DCS systems

Cannulation: 5.1 mm

Color Ring: Teal

1. To attach accessories to the AO Drill attachment:

- (a) Place the thumb lever in the SAFE position.
- (b) Pull the collet sleeve back and insert the accessory shank into the collet. Release the collet sleeve.



3.14.4 Wire and Pin Driving Attachments

NOTE: The Wire and Pin Driving attachments should only be used in DRILL/REAM or Oscillating Drill mode and are not indicated to be used in the “Screw” or “Tap” modes.

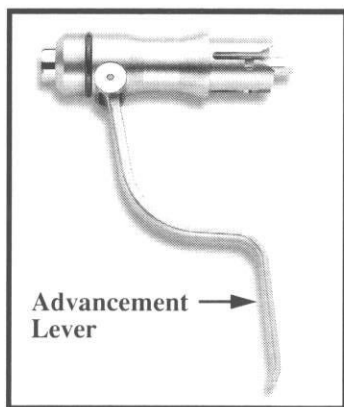
Wire and Pin Driving attachments have the following specifications in DRILL/REAM mode:

Variable Speed: 0-750 rpm

Torque (forward and reverse): 35 in. lbs.

Insertion of pins and wires, and the functionality of the handpiece with either pins or wires is the same with either attachment.

3.14.4.1 Wire Driver (PRO2028)



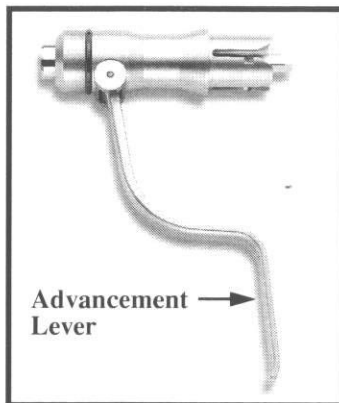
Specifications:

Collet: Wire Driver

Cannulation: Accepts wires from 0.028 in. (0.71 mm) to 0.062 in. (1.57 mm)

Color Ring: Copper

3.14.4.2 Pin Driver (PRO2032)



Specifications:

Collet: Pin Driver

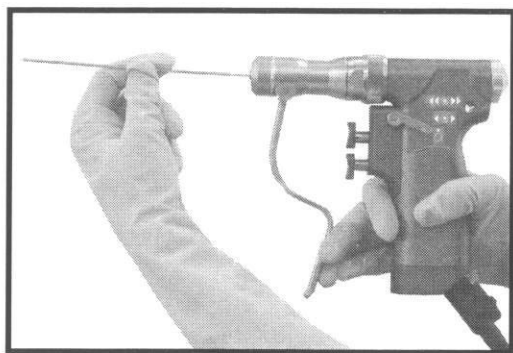
Cannulation: Accepts wires from 0.068 in. (1.72 mm) to 0.156 in. (4.0 mm)

Color Ring: Black

3.14.4.3 Insertion of Pins and Wires

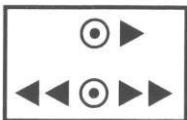
1. To insert a wire or pin:

- Place the thumb lever in the SAFE position.
- Push the Advancement Lever forward, or away from the handpiece.
- Insert the wire or pin, either from the front or rear of the handpiece.



2. To operate the handpiece:

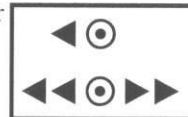
- Place the thumb lever in the appropriate operating position depending upon which handpiece is being used, either the forward or DRILL/REAM position.
- Set the operating mode to the “Drill/Ream” mode using the hand-piece cord button.



- Drive the wire or pin by simultaneously squeezing the Advancement Lever and depressing the trigger. If using the Two-trigger handpiece, depress the bottom trigger



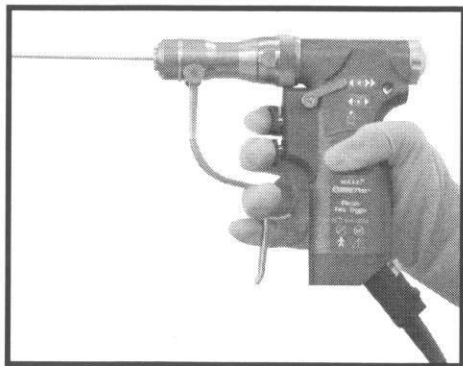
- To reposition the handpiece on the wire or pin:
 - Release the trigger to stop rotation.
 - Release the Advancement Lever and push it forward.
 - Slide the handpiece along the wire or pin.
- Follow step 2 to further drive the wire.
- To remove threaded wires from patient:
 - Insert the wire into the front of the attachment (see step 1).
 - Place the thumb lever in the appropriate operating position depending upon which handpiece is being used, either the reverse or DRILL/REAM position.
 - Set the operating mode to the “Drill/Ream” mode using the hand-piece cord button.



- (d) Simultaneously squeeze the Advancement Lever and depress the trigger.
- (e) If using the Two-trigger handpiece:
 - In the Default mode, depress the bottom trigger.



- In the Swiss Mode, depress both triggers.

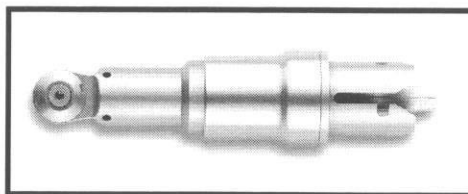


NOTE: Wires or pins will not slip out of the attachment unless the Advancement Lever is pushed forward.

3.14.5 Sawing Attachments

NOTE: When using the *PowerPro* Modular or Two-Trigger Handpiece with any saw attachment (Sagittal Saw - PRO2043, Reciprocating Saw - PRO2045), do not operate in the oscillate mode. These handpieces should only be operated in the drill/ream mode when used with these attachments.

3.14.5.1 Sagittal Saw Attachment (PRO2043)



Specifications:

Operating Speed: 0 - 15,800 cpm

Stroke: 4° arc

NOTE: The sagittal saw attachment accepts only Hall 5023 Series Sagittal Saw blades.

CAUTION: The collet lock mechanism must be completely closed to ensure the blade is held firmly in place.

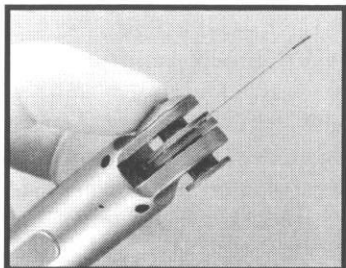
1. To attach sagittal saw blades:

- (a) Place the thumb lever in the SAFE position.

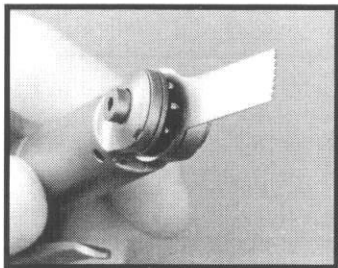
- (b) Depress the collet lock mechanism to open the collet.



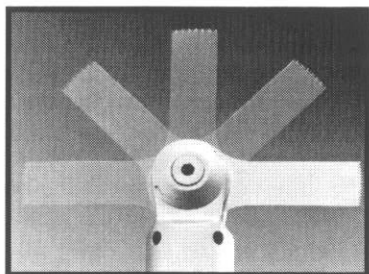
- (c) Position the blade on the pins inside the collet.



- (d) Depress the opposite side of the handpiece collet area to lock the blade into position. Briefly activate the handpiece to verify the blade is attached securely.



- (e) Blades may be positioned at 45° intervals within a 180° arc.



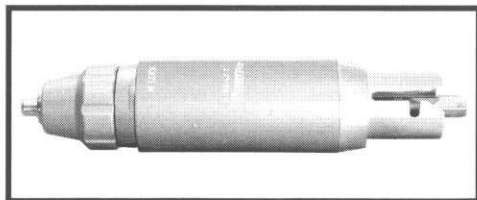
2. To remove saw blades:

- (a) Place the thumb lever in the SAFE position.
- (b) Depress the collet lock mechanism and remove the blade.



3.14.5.2 Reciprocating Saw Attachment (PRO2045)

NOTE: The reciprocating saw attachment is designed to accept Hall 5052-058 thru -061, -073, -179, -258 thru -261, -273, -276 and -279 series blades. Refer to the Hall Catalog for blade information.



Specifications:

Operating Speed: 0 - 15,800 cpm

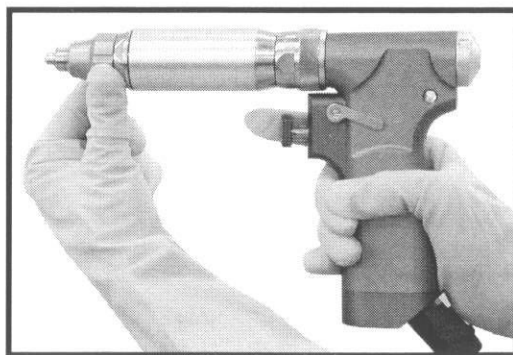
Cutting Stroke: 0.125 inch (3.2mm)

1. To attach a blade:

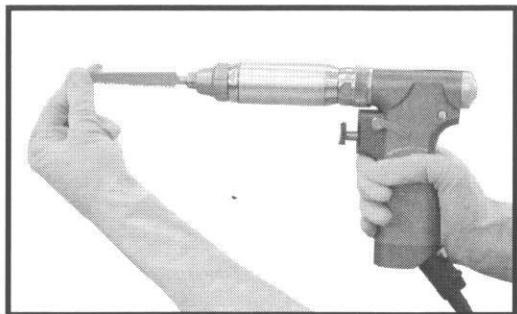
- (a) Place the thumb lever in the SAFE position.



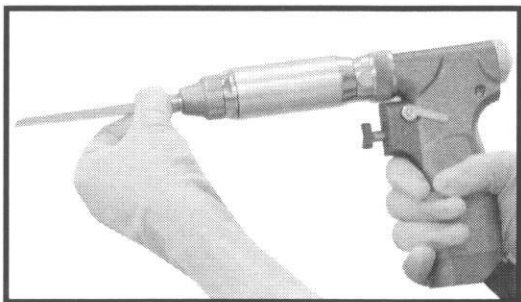
- (b) Open the blade-lock collet by turning the blade-lock knob in the opposite direction of the arrow (counterclockwise).



- (c) Insert the blade shank into the slot and completely seat.



- (d) Four detents are provided on the collet mechanism to allow accurate 90° positioning of the blade. To lock the blade in one of the positions, grasp the blade at the base of the collet and rotate to the desired position.



- (e) Twist the blade-lock knob in the direction of the arrow (clockwise) and the word "LOCK" to lock the blade in place.

2. To remove the blade, repeat the steps above.

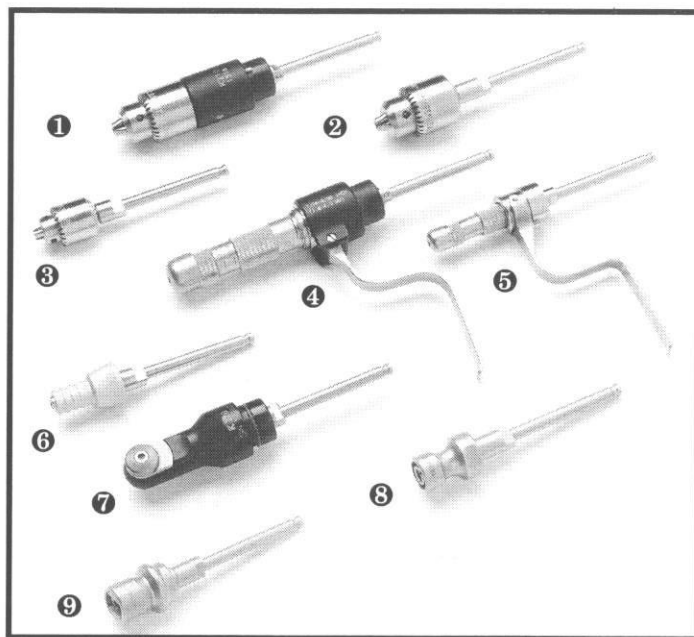
3.15 *PowerPro* Modular and Two-Trigger Electric Handpiece Attachment Matrix

Table 3: *PowerPro* Attachment Matrix

| | Drill/Ream Mode | | Oscillating Drill Mode | | Screw Mode | | Tap Mode | |
|------------------------------------|-----------------|-------------------|------------------------|-------------|-------------|---------------------------|-------------|------------|
| Attachment | Speed (rpm) | Torque (in. lbs.) | Speed (rpm) | Osc. Degree | Speed (rpm) | Torque (in. lbs.) FWD/REV | Speed (rpm) | Color Ring |
| PRO2029 Trinkle/AO | 0-750 | 35 | 0-500 | 270 | 0-250 | 20/35 | 0-250 | Purple |
| PRO2030 5/32" Jacobs Chuck | 0-750 | 35 | 0-500 | 270 | 0-250 | 20/35 | 0-250 | Green |
| PRO2041 1/4" Jacobs Chuck | 0-750 | 35 | 0-500 | 270 | 0-250 | 20/35 | 0-250 | Mustard |
| PRO2046 Zimmer/ Hudson | 0-750 | 35 | 0-500 | 270 | 0-250 | 20/35 | 0-250 | Blue |
| PRO2050 1/8" Keyless Chuck | 0-750 | 35 | X | X | 0-250 | 20/35 | X | Green |
| PRO2070 AO Drill | 0-750 | 35 | X | X | 0-250 | 20/35 | X | Teal |
| | | | | | | | | |
| Wire/Pin Driving Attachment | | | | | | | | |
| PRO2028 Wiredriver | 0-750 | 35 | 0-500 | 270 | X | X | X | Copper |
| PRO2032 Pin Driver | 0-750 | 35 | 0-500 | 270 | X | X | X | Black |

Table 3: *PowerPro* Attachment Matrix

| | Drill/Ream Mode | | Oscillating Drill Mode | | Screw Mode | | Tap Mode | |
|----------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------|------------------------|-------------|-------------|---------------------------|-------------|-----------------|
| Attachment | Speed (rpm) | Torque (in. lbs.) | Speed (rpm) | Osc. Degree | Speed (rpm) | Torque (in. lbs.) FWD/REV | Speed (rpm) | Color Ring |
| | | | | | | | | |
| Reaming Attachment | | | | | | | | |
| PRO2040 AO Reamer | 0-250 | 100 | X | X | X | X | X | Teal/Red |
| PRO2042 1/4" Jacobs Chuck | 0-250 | 100 | X | X | X | X | X | Mustard/ Red |
| PRO2047 Zimmer/ Hudson | 0-250 | 100 | X | X | X | X | X | Blue/Red |
| PRO2060 Aesculap | 0-250 | 100 | X | X | X | X | X | Brown/Red |
| | | | | | | | | |
| | Speed (cpm) | Saw Attachment | | | | | | |
| PRO2043 Sagittal Saw | 0-15,800 | X | X | X | X | X | X | X |
| PRO2045 Reciprocating Saw | 0-15,800 | X | X | X | X | X | X | X |
| NOTE: The “X” designator in the above table indicates that the attachment is not designed or indicated to operate in that mode. | | | | | | | | |



3.16 Mini-Driver Handpiece, Attachments and Accessories

3.16.1 Attachments and Accessories

- ❶ High Torque Jacobs Chuck (K210)
- ❷ 1/4" Jacobs Chuck (K109)
- ❸ 5/32" Jacobs Chuck (K110)
- ❹ Automatic Pin Driver (K211)
- ❺ Automatic Wire Driver (K111A)
- ❻ ASIF/AO Twist Drill Chuck (K114A)
- ❼ Sagittal Saw (K220)
- ❽ Hudson Chuck (K113)
- ❾ Trinkle Chuck (K112)

3.16.2 Connecting/Removing Attachments

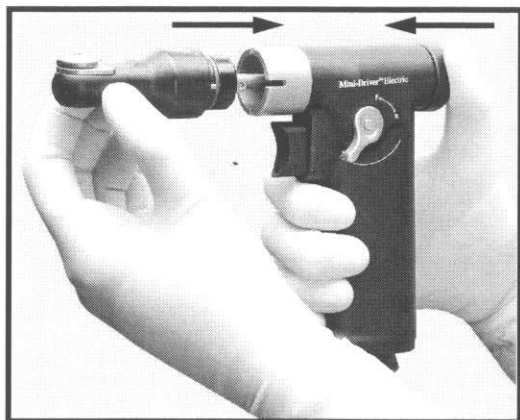
All Mini-Driver Handpiece attachments connect/disconnect in the same manner. See pages 123 through 131 for attachment information.

1. To connect an attachment:

- (a) Ensure the handpiece is in the safe or off position.
- (b) Press the lock/release collet and insert the arbor end of the attachment into the handpiece. Release the lock/release collet to secure the attachment to the handpiece.
- (c) Ensure the attachment is secure by pulling it outward.



NOTE: On attachments that contain alignment pins, guide the alignment pin into one of the four available slots on the nosepiece.

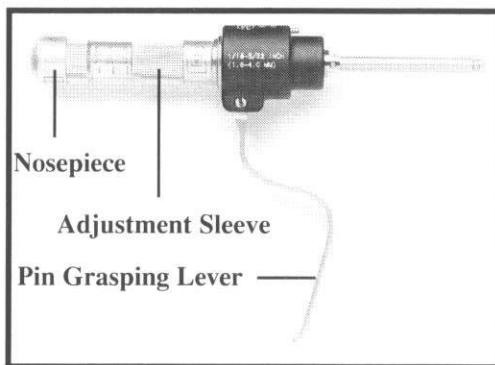


- (d) To remove the attachment, repeat steps 1(a) and 1(b) and pull out the attachment.

3.16.3 Pin and Wiredriver Attachments

Insertion of pins and wires, and the functionality of the handpiece with either pins or wires, is the same with either attachment.

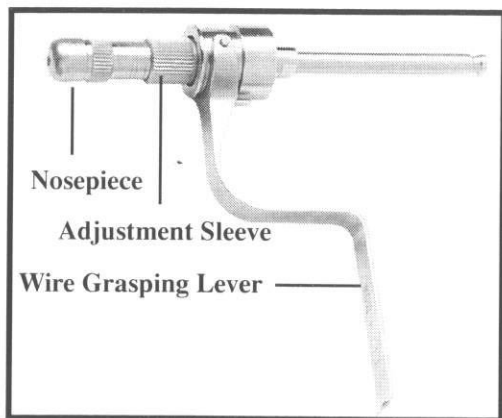
3.16.3.1 Pin Driver Attachment (K211)



The Automatic Pin Driver is designed to drive pins (wires) and drill bits compatible with the specifications below:

Through Cannulation: 1.6 - 4.0 mm
(0.062 in to 0.156 in.)
(1/16 - 5/32 in.)


3.16.3.2 Wiredriver Attachment (K111A)

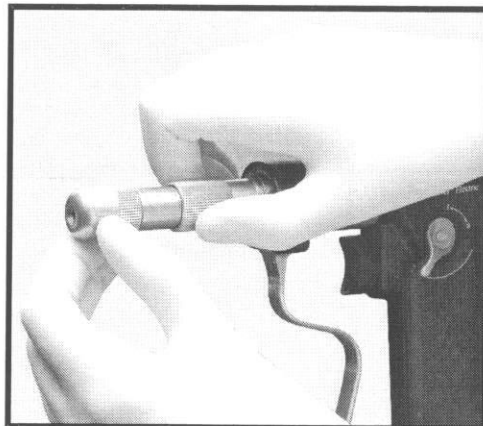


The Automatic Wire Driver has a quick release for easy wire insertion, removal and advancement.

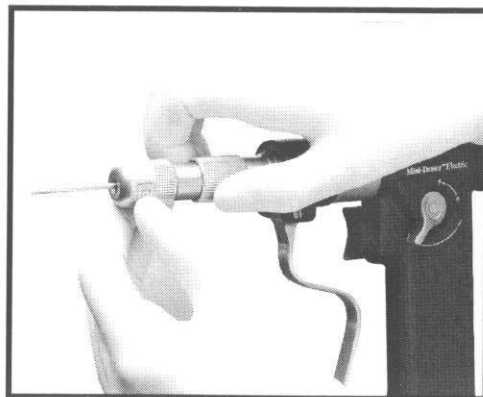
Through Cannulation: 0.7 - 1.8 mm
(0.028 in to 0.071 in.)
(1/32 - 5/64 in.)

3.16.3.3 Pin and Wire Insertion

1. To insert a pin or wire:
 - (a) Ensure the handpiece is in the safe or off position before inserting or removing a pin or wire. 
 - (b) Rotate the adjustment sleeve until the desired pin/wire size graduation appears on the shaft of the nosepiece.



- (c) Insert the pin or wire. While holding the nosepiece, tighten the adjustment sleeve until the pin or wire is held firmly in place.





- (d) Loosen the adjustment sleeve one half turn. The pin or wire should slide freely within the Pin/Wire Driver until the grasping lever is depressed.
- (e) For pin/wire sizes that fall between the pin/wire size graduation, loosen the adjustment sleeve one full turn. The pin or wire should slide freely within the Pin/Wire Driver until the grasping lever is depressed.

2. To operate the handpiece:

- (a) Release the safety and place the handpiece in the forward position.
- (b) To grip and drive the wire or pin, depress the grasping lever until flush with the handpiece and depress the trigger.



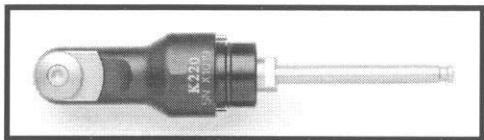
3. To reposition the handpiece on the wire or pin:

- (a) Release the trigger and grasping lever.
- (b) Slide the handpiece along the wire or pin.
- (c) Follow step 2 to further drive the wire or pin.


4. To remove threaded wires from the patient:

- (a) Insert the wire into the front of the attachment (see step 1(a) through 1(e)).
- (b) Place the handpiece in the reverse position.
- (c) Simultaneously squeeze the grasping lever and depress the trigger.

3.16.4 Sagittal Saw Attachment (K220)



NOTES:


1. The K220 Sagittal Saw attachment only accepts K140 and K150 series blades.
2. For more precise osteotomies, lower cutting temperatures, and reduced instrument wear, use a new blade for each procedure.
3. Sagittal Saw blades are single use only. Dispose of properly after use. 

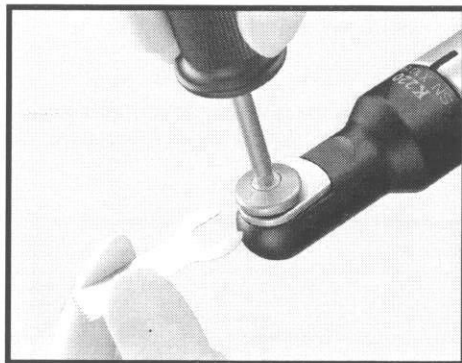
1. To attach the Sagittal Saw attachment, reference “3.16.2 Connecting/Removing Attachments” on page 122.



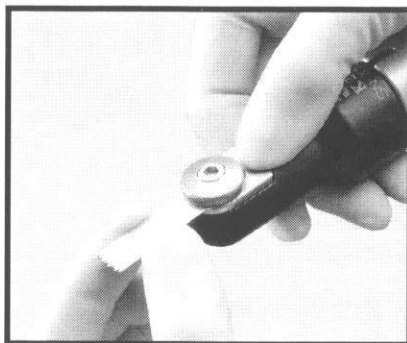
2. The Sagittal Saw attachment may be placed in any of four positions at 90 degree angles.

3. To attach a blade:

- (a) Ensure the handpiece is in the safe, or off position before attaching or removing blades. 
- (b) Insert the blade into the blade holder in the desired blade position. Blades may be placed in any of five positions with a 180 degree radius.
- (c) Tighten the blade by inserting the K201 Wrench and turning clockwise until secure.



- (d) Ensure the blade is secured by pulling outward on the blade.



4. To operate the handpiece, release the safety and depress the trigger.

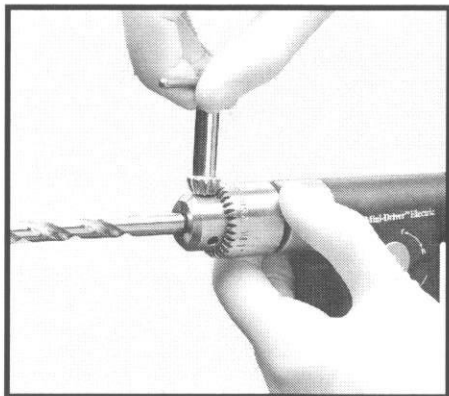
5. To remove a blade:

- (a) Ensure the handpiece is in the safe, or off position.
- (b) Insert the wrench and turn counterclockwise while simultaneously pulling the blade out.

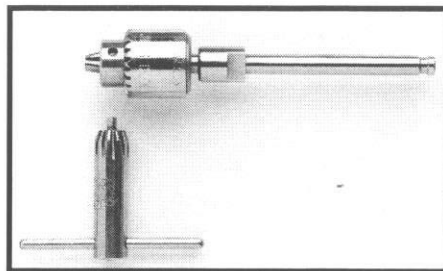


3.16.5 All Jacobs Chuck Attachments

1. To attach any Jacobs Chuck attachment, reference “3.16.2 Connecting/Removing Attachments” on page 122).
2. Insert the desired accessory into the chuck and secure it with the appropriate key.



3.16.5.1 5/32” Jacobs Chuck (K110)



This attachment is designed to drive straight plain shank twist drill bits, pins, and wires compatible with the specifications below:

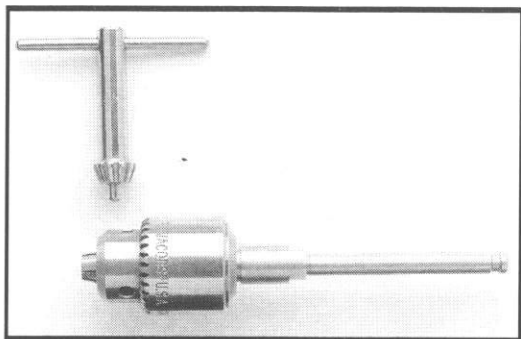
Specifications:

Jaw Cannulation: 0 - 4.0 mm
(0 to 0.156 in.)
(0 to 5/32 in.)

Through Cannulation: 4.0 mm
(0.156 in.)
(5/32 in.)

Associated Chuck Key: REF D298K

3.16.5.2 1/4" Jacobs Chuck (K109)



This attachment is designed to drive straight shank twist drill bits, pins, and wires compatible with the specifications below:

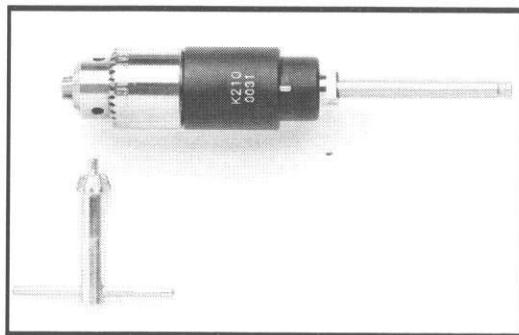
Specifications:

Jaw Cannulation: 0 - 6.35 mm
(0 to 0.25 in.)
(0 to 1/4 in.)

Through Cannulation: 4.0 mm
(0.156 in.)
(5/32 in.)

Associated Chuck Key: REF D298L

3.16.5.3 High-Torque Jacobs Chuck (K210)



This attachment is designed to drive large (6 mm - 14 mm) cannulated drill bits and pins. Accepts drill bits and other accessories compatible with the specifications below:

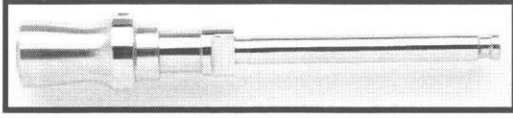
Specifications:

Jaw Cannulation: 0 - 6.35 mm
(0 to 0.25 in.)
(0 to 1/4 in.)

Through Cannulation: 2.4 mm
(0.094 in.)
(3/32 in.)

Associated Chuck Key: REF D298L

3.16.6 Trinkle Chuck Attachment (K112)

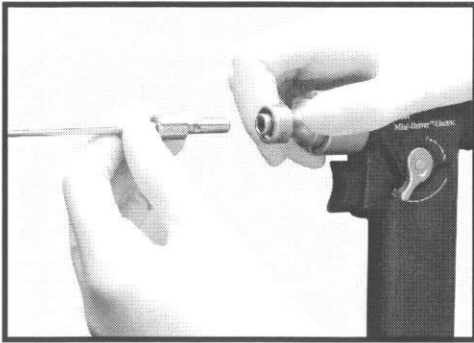


This attachment is designed to drive drill bits, automatic screwdrivers, and other accessories with Trinkle fittings.

Specifications:

Through Cannulation: 4.0 mm
(0.156 in.)
(5/32 in.)

1. To attach a Trinkle Chuck attachment, reference **“3.16.2 Connecting/Removing Attachments”** on page 122).
2. To insert a Trinkle Shank accessory into the Trinkle Chuck attachment:
 - (a) Pull the locking sleeve chuck back. Insert the accessory and release the locking sleeve.

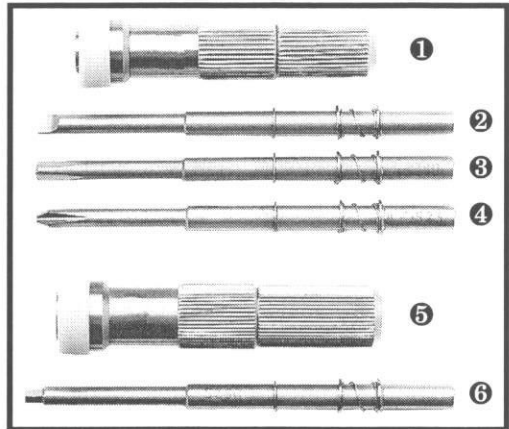


- (b) Ensure the attachment is secure by pulling it outward.

- (c) Ensure the accessory is securely seated in the attachment before use by pulling outward on it.

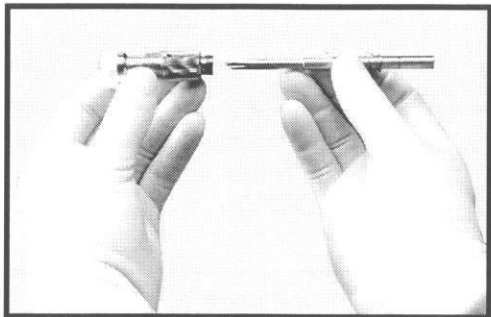
3. To remove accessory, pull back the locking sleeve chuck and remove the accessory.

3.16.6.1 Automatic Screwdrivers for the Trinkle Chuck Attachment (D520/D524)

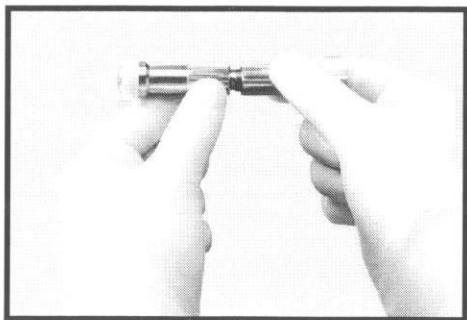


- ① Screwdriver (D520)
- ② Slotted Bit (D521)
- ③ Cruciate Bit (D522)
- ④ Phillips Bit (D523)
- ⑤ Screwdriver (D524)
- ⑥ Hex Bit for AO type screws (D525)

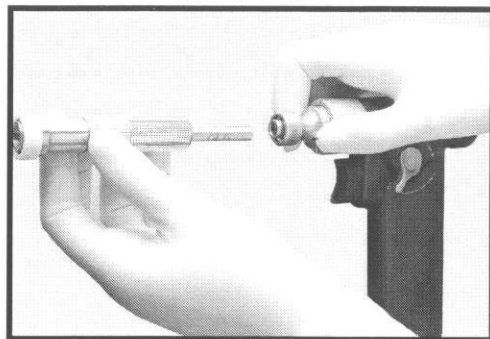
1. To insert a bit into the screwdriver.
 - (a) Unscrew the bit retainer section (counterclockwise) from the screwdriver.
 - (b) Insert the bit into the back of the screwdriver, tip first.



- (c) Slide the bit retainer over the bit and thread the retainer back on the screwdriver by turning it clockwise until tight.

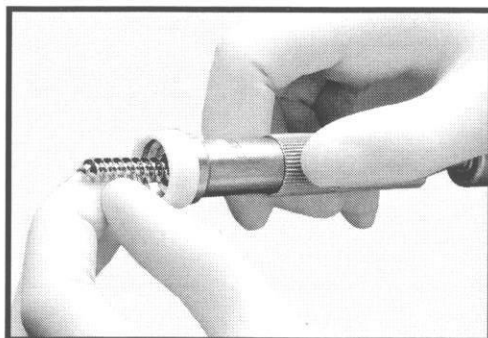


- (d) While retracting the locking sleeve on the Trinkle Chuck attachment, insert the screwdriver into the chuck and release the locking sleeve.



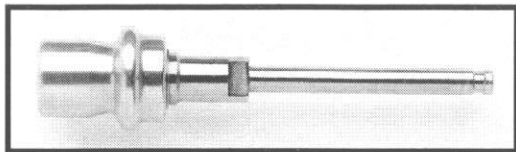
CAUTION: Ensure that the screwdriver is securely seated in the Trinkle Chuck before use.

2. To engage the screwdriver bit into the screw head.
 - (a) Insert the head of the screw into the screwdriver.
 - (b) Hold the screw firmly and press the knurled portion of the screwdriver body forward so the teflon collar snaps over the head of the screw.



3. To remove the screw, retract the teflon collar and remove the screw.

3.16.7 Hudson Chuck Attachment (K113)

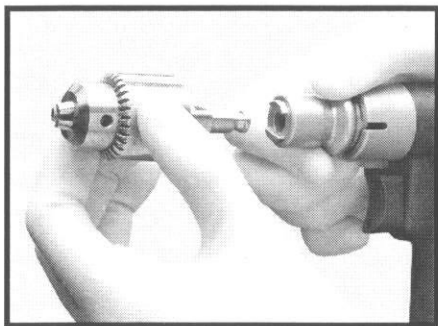


This attachment is designed to drive accessories with Hudson type fittings.

Specifications:

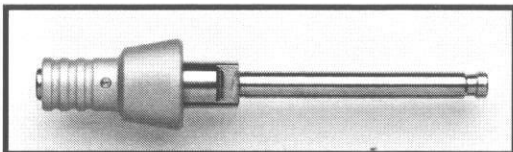
Through Cannulation: 4.0 mm
(0.156 in.)
(5/32 in.)

1. To attach a Hudson Chuck attachment, reference **“3.16.2 Connecting/Removing Attachments”** on page 122).
2. To insert a Hudson Shank accessory into the Hudson Chuck attachment:
 - (a) Pull the locking sleeve chuck back. Insert the accessory and release the locking sleeve.



- (b) Ensure the accessory is fully seated by pulling outward on it.

3.16.8 ASIF/AO Twist Drill Chuck Attachment (K114A)

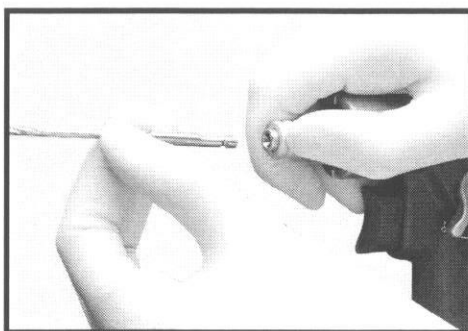


This attachment is designed to drive drill bits with ASIF/AO (Synthes) type fittings.

Specifications:

Through Cannulation: 3.2 mm
(0.125 in.)
(1/8 in.)

1. To attach an ASIF/AO Drill Chuck attachment, reference **“3.16.2 Connecting/Removing Attachments”** on page 122).
2. To insert an ASIF/AO drill bit into the an ASIF/AO Drill Chuck attachment:
 - (a) Pull the locking sleeve chuck back. Insert the accessory and release the locking sleeve.



- (b) Ensure the drill bit is fully seated by pulling outward on it.

3.17 Handpiece Default Settings

| <u>Handpiece</u> | <u>Default Speed</u> | <u>Irrigation</u> |
|-----------------------------------------------|------------------------------------------------------|-------------------|
| High Speed Shaver (E9005): | 5,000 rpm (forward/reverse) 3,000 rpm (Oscillate) | Off |
| High Speed Drill (E9010): | 60,000 rpm | - |
| (with E9414 Tube Set): | | Preset |
| (with E9415 Tube Set): | | 50% |
| Cranial Perforator Drive (E9015): | 750 rpm | NA |
| Elite High Speed Drill (5020-025) | 70,000 rpm | Off |
| Medium Speed Drill (5020-021) | 25,000 rpm | Off |
| Low Speed Drill (5020-026) | | |
| Drill Mode: | 2,500 rpm | Off |
| Screw/Tap Mode: | 30 rpm | Off |
| Reciprocating Saw (5020-023) | 100% | Off |
| Sagittal Saw (5020-022) | 100% | Off |
| Oscillating Saw (5020-024) | 100% | Off |
| Modular Handpiece (5020-027) | 100% | Off |
| Mini-Driver Handpiece (K500) | 1250 rpm | Off |
| Small Shaver Handpiece (MC9840/C9840) | See Below | Off |
| Basic Shaver Handpieces (MC9820/C9820) | Blade Dependent (See Below) | Off |
| 2-Button Shaver Handpieces (C9824) | Blade Dependent (See Below) | Off |
| Full-Function Shaver Handpiece (MC9828/C9828) | Blade Dependent (See Below) | Off |

| <u>Description</u> | <u>Speed Default</u> | <u>Speed Range</u> |
|-------------------------|-----------------------------------|----------------------------------|
| Small Shaver Handpiece | FWD/REV 3000 rpm OSC. 1500 rpm | 300 - 5000 rpm 300 - 2500 rpm |
| Low Speed Shaver Blade | FWD/REV 1500 rpm OSC. 500 rpm | 300 - 6000 rpm 300 - 1500 rpm |
| High Speed Shaver Blade | FWD/REV 2500 rpm OSC. 1500 rpm | 300 - 6000 rpm 300 - 1500 rpm |
| Low Speed Burr | 3500 rpm | 300 - 3500 rpm |
| High Speed Burr | 6000 rpm | 2000 - 6000 rpm |

The following information pertains to the Advantage Handpieces (REF D9820 and D9824):

| <u>Description</u> | <u>Speed Default</u> | <u>Speed Range</u> |
|-------------------------|-----------------------------------|--------------------|
| Low Speed Shaver Blade | FWD/REV 2000 rpm (Top Section) | 300 - 6000 rpm |
| | FWD/REV 2100 rpm (Bottom Section) | 300 - 6000 rpm |
| | OSC. 1500 rpm | 300 - 2500 rpm |
| High Speed Shaver Blade | FWD/REV 2000 rpm (Top Section) | 300 - 6000 rpm |
| | FWD/REV 2100 rpm (Bottom Section) | 300 - 6000 rpm |
| | OSC. 1500 rpm | 300 - 2500 rpm |
| Low Speed Burr | 3500 rpm | 300 - 3500 rpm |
| High Speed Burr | 7000 rpm | 2000 - 10,000 rpm |

4.0 MAINTENANCE

This section explains the importance of keeping your Advantage System well maintained. It contains a maintenance schedule to assist you in determining the maintenance interval requirements of your instruments.

Regular and proper maintenance of your Advantage System is the best way to protect your investment. It is essential that you have your powered surgical instruments serviced as scheduled so as to retain their optimum performance and reliability, which will reward you with safer, less problematic product performance over time. The following maintenance schedule specifies which Advantage instruments need attention and how often you should have them serviced.

The service and time intervals shown in the maintenance schedule assume you will use the Advantage instruments as indicated in this manual, including proper day-to-day operation, cleaning, and sterilization. Proper care and handling of the instruments on a day-to-day basis are extremely important to ensure safe and efficient operation. Refer to sections 2.0 and 3.0 of this instruction manual for information on proper system installation and operation and section 4.0 for proper day-to-day maintenance.

Your authorized Hall Surgical service department is the most knowledgeable about the Advantage instruments and will provide competent and efficient service. Service at Hall Surgical at the indicated service intervals is mandatory to keep your product warranties in effect. Any services and/or repairs done by any unauthorized repair facility may result in reduced performance of the instruments or instrument failure.

Table 4: Maintenance Schedule

| Catalog Number | Product Description | (Months) | | | |
|----------------------------|------------------------------------------------|----------|----|----|----|
| | | 6 | 12 | 24 | 36 |
| D3000/ D3000I D3000J | Advantage Controller | | | | • |
| PRO2100E | <i>PowerPro</i> Electric Modular Handpiece | | • | | |
| PRO2200E | <i>PowerPro</i> Electric Two-Trigger Handpiece | | • | | |
| PRO2300E | <i>PowerPro</i> Electric Oscillator Handpiece | | • | | |
| PRO2032 | Pin Driver Attachment | | | • | |
| PRO2040 | AO Reamer Attachment | | | • | |
| PRO2043 | Sagittal Saw Attachment | | | • | |
| PRO2045 | Reciprocating Saw Attachment | | | • | |
| PRO2060 | Aesculap Reamer Attachment | | | • | |
| PRO2070 | AO Drill Attachment | | | • | |
| PRO2028 | Wiredriver Attachment | | | • | |
| PRO2029 | Trinkle/AO Attachment | | | • | |
| PRO2030 | 5/32" Jacobs Chuck Attachment | | | • | |
| PRO2041 | 1/4" Jacobs Chuck Attachment | | | • | |
| PRO2042 | 1/4" High Torque Jacobs Chuck Attachment | | | • | |
| PRO2046 | Zimmer/Hudson Attachment | | | • | |
| PRO2047 | Zimmer/Hudson Reamer Attachment | | | • | |
| PRO2050 | 1/8" Keyless Chuck Attachment | | | • | |

Table 4: Maintenance Schedule

| Catalog Number | Product Description | (Months) | | | |
|-------------------|----------------------------------------------|----------|----|----|----|
| | | 6 | 12 | 24 | 36 |
| 5020-021 | <i>MicroChoice</i> Medium Speed Drill | | • | | |
| 5020-022 | <i>MicroChoice</i> Sagittal Saw | • | | | |
| 5020-023 | <i>MicroChoice</i> Reciprocating Saw | | • | | |
| 5020-024 | <i>MicroChoice</i> Oscillating Saw | | • | | |
| 5020-025 | <i>MicroChoice</i> Elite High Speed Drill | • | | | |
| 5020-026 | <i>MicroChoice</i> Low Speed Drill | | • | | |
| 5020-027 | <i>MicroChoice</i> Modular Handpiece | | • | | |
| 5020-028 | Wire Driver Attachment | | | • | |
| 5020-029 | Universal Drill Attachment | | | • | |
| 5020-030 | 5/32" Jacobs Chuck Attachment | | | • | |
| 5020-031 | 5/32" High Torque Jacobs Chuck Attachment | | | • | |
| 5020-032 | Pin Driver Attachment | | | • | |
| 5020-034 | Dental Implant Drill Head | | | • | |
| 5020-035 | Dental Implant Screw/Tap Head | | | • | |
| 5020-041 | 1/4" Jacobs Chuck Attachment | | | • | |
| 5020-042 | 1/4" High Torque Jacobs Chuck Attachment | | | • | |
| 5020-063 | 20° Angle Attachment | | | • | |
| 5020-064 | Extra-Long 20° Angle Attachment | | | • | |
| 5020-065 | 70° Contra Angle Attachment w/ Surgical Head | | | • | |
| 5020-066 | 90° Angle Attachment | | | • | |
| 5020-069 | 70° Contra Angle Attachment w/ Dental Head | | | • | |

Table 4: Maintenance Schedule





| Catalog Number | Product Description | (Months) | | | |
|-------------------|---------------------------------------------------|----------|----|----|----|
| | | 6 | 12 | 24 | 36 |
| MC9820 | <i>MicroChoice</i> Basic Shaver Handpiece | • | | | |
| MC9828 | <i>MicroChoice</i> Full-Function Shaver Handpiece | • | | | |
| MC9840 | <i>MicroChoice</i> Small Shaver Handpiece | • | | | |
| K500 | Mini-Driver Electric Handpiece | • | | | |
| K109 | 1/4" Jacobs Chuck Attachment | | | • | |
| K110 | 5/32" Jacobs Chuck Attachment | | | • | |
| K111A | Automatic Wire Driver Attachment | | | • | |
| K112 | Trinkle Chuck Attachment | | | • | |
| K113 | Hudson Chuck Attachment | | | • | |
| K114A | ASIF/AO Twist Drill Chuck Attachment | | | • | |
| K210 | High Torque Jacobs Chuck Attach. | | | • | |
| K211 | Automatic Pin Driver Attachment | | | • | |
| K220 | Sagittal Saw Attachment | | • | | |
| C9820 | APEX Basic Shaver Handpiece | | • | | |
| C9824 | APEX Two-Button Shaver Handpiece | | • | | |
| C9828 | APEX Full-Function Large Shaver Handpiece | | • | | |
| C9840 | APEX Small Shaver Handpiece | | • | | |
| D9820 | Advantage Basic Shaver Handpiece | | • | | |
| D9824 | Advantage 2-Button Shaver Handpiece | | • | | |
| E9005 | High Speed Shaver Handpiece | • | | | |
| E9010 | High Speed Drill Handpiece | • | | | |
| E9015 | Cranial Perforator Drive | • | | | |

Table 4: Maintenance Schedule

| Catalog Number | Product Description | (Months) | | | |
|-------------------|-------------------------------------------|----------|----|----|----|
| | | 6 | 12 | 24 | 36 |
| | Guards | | | | |
| 5020-060 | <i>MicroChoice</i> Medium Bur Guard | • | | | |
| 5020-061 | <i>MicroChoice</i> Long Bur Guard | • | | | |
| 5020-062 | <i>MicroChoice</i> Extra-Long Bur Guard | • | | | |
| 5020-067 | <i>MicroChoice</i> Laminectomy Guard | • | | | |
| 5020-068 | <i>MicroChoice</i> Tissue Retractor Guard | • | | | |
| E9011-1 | Medium Bur Guard | • | | | |
| E9011-2 | Long Bur Guard | • | | | |
| E9011-3 | Extra-Long Bur Guard | • | | | |
| E9011-7 | Short Neuro Guard | • | | | |
| E9011-8 | Medium Neuro Guard | • | | | |
| E9011-9 | Long Neuro Guard | • | | | |

4.1 Cleaning and Sterilizing

4.1.1 Cleaning Precautions

1. Follow universal precautions for protective apparel when handling and cleaning contaminated instruments.
2. Dispose of all non-reusable tubing sets, irrigation tips, burs, saw blades and bits properly after use. 
3. Do not lubricate any handpieces. 
4. **Do not immerse the controller, K501 Mini-Adapter, E9320 APEX Adapter, footswitches, handpieces (unless indicated - see "4.1.3 Handpiece Cleaning Instructions" on page 140), attachments or accessories.** 

5. Never clean handpieces with bleach, chlorine-based detergents, liquid or chemical disinfectants, or any products containing sodium hydroxide (i.e., INSTRU-KLENZ, Buell Cleaner). They will degrade the coatings.
6. Never clean equipment in an ultrasonic cleaner or a combination washer/sterilizer.

4.1.2 Controller and Footswitch Cleaning Instructions

1. Disconnect the controller from the electrical power source.
2. Wipe the controller, footswitch, Mini-Adapter (REF K501) and APEX Adapter (REF E9320) with a clean, soft cloth dampened with a mild, pH-balanced detergent.
 - (a) Thoroughly clean the tubing cassette roller area on the controller. Ensure rollers are free of all debris.
 - (b) Be sure to wipe the underside of the footswitch to ensure no metal objects have attached themselves.
3. Wipe equipment again with distilled or sterilized water to prevent metal discoloration.

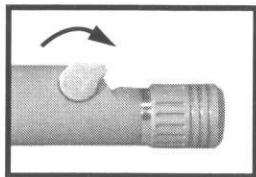
4.1.3 Handpiece Cleaning Instructions

Clean handpieces and attachments as soon as possible after use.

4.1.3.1 *MicroChoice*, *Advantage*, and *APEX* Shaver Handpiece Cleaning Instructions

NOTE: The following cleaning instructions apply to the following *MicroChoice*, *APEX*, and *Advantage* Shaver Handpieces: MC9820/C9820/D9820 Basic Handpieces, C9824/D9824 2-Button Handpieces, MC9828/C9828 Full-Function Handpieces, and MC9840/C9840 Small Shaver Handpieces.

1. Disconnect the handpiece cord from the controller prior to cleaning.
2. Remove all accessories (i.e., burs, shaver blades) from the handpiece prior to cleaning.
3. Ensure the suction control valve is in the "ON", or forward position prior to cleaning.



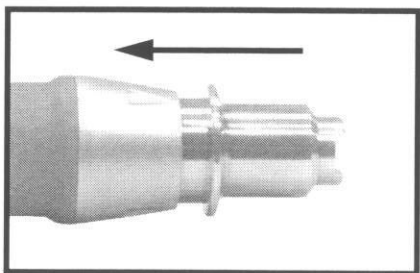
4. This step applies **ONLY** to the MC9820 Basic, MC9828 Full-Function, and MC9840 Small Shaver Handpieces:
 - (a) Remove the handpiece cord from the handpiece prior to cleaning and/or immersing in water for cleaning.

5. Thoroughly scrub the handpiece and handpiece cord with a clean, soft brush dampened with a mild, pH-balanced detergent. Remove all traces of blood, debris and stains. **Do Not immerse** equipment in soap solution or rinse water, other than the handpieces indicated previously in step 4.
6. Clean the suction tube thoroughly with a cleaning brush until all debris is removed.
 - (a) Feed the wire end of the cleaning brush through the back of the handpiece. Repeat until all debris is removed.
7. Manipulate all moving parts of the handpiece to ensure all debris is removed. If not, clean again until all debris is removed.
8. Rinse under running water, or immerse the handpieces that can be immersed as indicated previously in step 4, to remove all traces of soap.
9. Flush all surfaces free of tap water with distilled water to prevent metal discoloration.
10. Gently shake the equipment free of water and wipe the surfaces with a clean, lint-free towel.

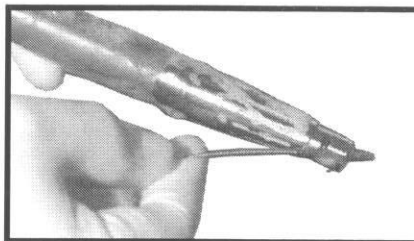
4.1.3.2 E9000 Handpiece Cleaning Instructions

NOTE: The following cleaning instructions apply to the following handpieces: E9005, E9010, and E9015.

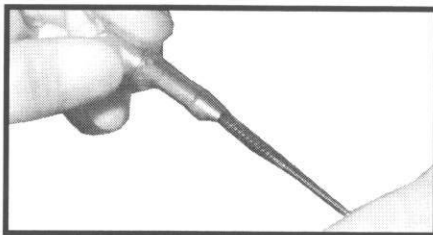
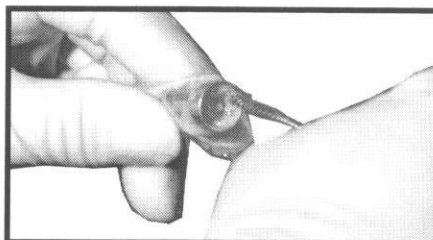
1. Remove all attachments (i.e., bur guards) and accessories (i.e., bits, burs) from the handpiece prior to cleaning.
2. Disconnect the handpiece cord from the controller prior to cleaning.
3. Ensure the handpiece cord is securely fastened to the handpiece during cleaning.
4. With the nose of the handpiece facing downward, thoroughly scrub the handpiece, handpiece cord, and guards with a clean, soft brush dampened with a mild, pH-balanced detergent. Remove all traces of blood, debris and stains. **Do Not immerse** equipment in soap solution or rinse water.
 - (a) On the Cranial Perforator Drive (E9015) thoroughly clean the chuck by pulling the chuck sleeve back and scrubbing the area with a soft bristled brush.



- (b) On the High Speed Drill (E9010) thoroughly clean the collet area with a soft bristled brush.



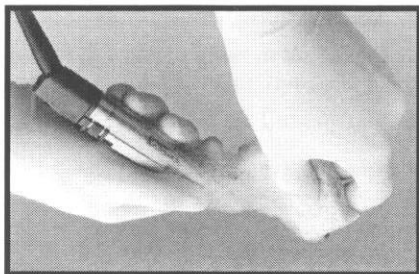
- (c) Using a cleaning brush, thoroughly clean the inside of the bur guard. Repeat until all debris is removed.



5. Manipulate all moving parts of the handpiece to ensure all debris is removed. If not, clean again until all debris is removed.
6. Keeping the nose of the handpiece pointed downward, rinse under running water to remove all traces of soap.
7. Flush all surfaces free of tap water with distilled water to prevent metal discoloration.
8. Shake the equipment free of water and wipe the surfaces with a clean, lint-free towel.

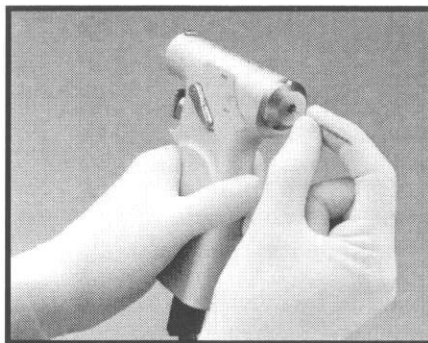
4.1.3.3 *MicroChoice Drills, Saws, Modular Handpiece, Mini-Driver Handpiece and PowerPro Handpiece Cleaning Instructions*

1. Remove all attachments (i.e., chucks, saws) and accessories (i.e., saw blades, burs) from the handpiece prior to cleaning. For levered handpieces, remove the Activation Lever (Reference “3.5.4 Leverless Handpiece Operation” on page 72 for removal information).
2. Disconnect the handpiece cord from the controller prior to cleaning.
3. Ensure the handpiece cord is securely fastened to the handpiece during cleaning.
4. With the nose of the handpiece facing downward, thoroughly scrub the handpiece, handpiece cord, attachments, accessories and activation lever, if applicable, with a clean, soft brush dampened with a mild, pH-balanced detergent. Remove all traces of blood, debris and stains. **Do Not immerse** equipment in soap solution or rinse water.

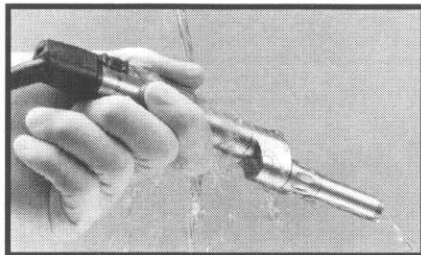


5. To clean the cannulated section of the *PowerPro*, *MicroChoice* Modular, and *Mini-Driver* handpieces:

- (a) If using a wire guard, if applicable, remove it from the handpiece.
- (b) Feed the wire end of a cleaning brush through the back of the handpiece.



- (c) Pull the brush through the handpiece. Repeat until all debris is removed.
6. Manipulate all moving parts of the handpiece and attachments to ensure all debris is removed. If not, clean again until all debris is removed.
7. Keeping the nose of the handpiece pointed downward, rinse under running water to remove all traces of soap. Rinse all attachments and accessories likewise.



8. Flush all surfaces free of tap water with distilled water to prevent metal discoloration.
9. Gently shake the equipment free of water and wipe the surfaces with a clean, lint-free towel.

4.1.4 Attachment Lubricating Instructions

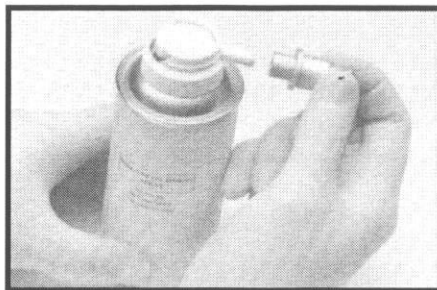
WARNING: The spray container is pressurized and the contents are flammable (contains LP gas). Do not expose can to temperatures exceeding 40°C (104° F). Do not puncture or burn can, even when empty. Do not spray on or near open flames or incandescent material.

NOTES:

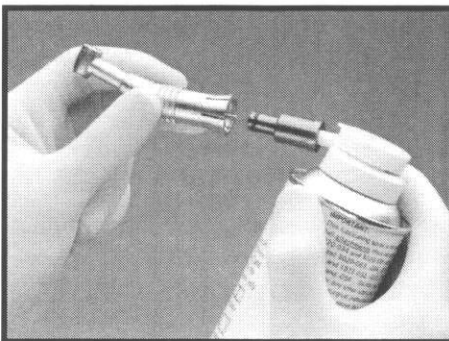
1. Attachments must be cleaned prior to lubrication.
2. Use only Pana Spray Attachment Lubricant (REF 1375-037).

CAUTION: Only the 20° (REF 5020-063, 5020-064), 70° (REF 5020-065, 5020-069), and 90° (REF 5020-066) angle attachments, the following Low Speed Drill Attachments (REF 5020-034, 5020-035), and the *Micro-Choice* Wiredriver Attachment (REF 5020-028) are to be lubricated. Do not lubricate any handpieces or other attachments.

1. Before using, shake the can well. Read all the information and instructions on the spray can label.
2. If the spray nozzle is not attached, securely attach it to the spray can dispenser.



3. Completely insert the spray nozzle in the bottom of the attachment.




4. With the can in an upright position, depress the button and spray the lubricant for one to two seconds or until lubricant flowing from the attachment is clear and free of traces of blood. Wipe any excess lubricant from the attachment.
5. After lubrication is complete, connect the attachment to the handpiece and operate for approximately 15 seconds.

4.1.5 Sterilization Information

Steam sterilization is safe and effective and has no contraindications for its use in sterilizing powered surgical handpieces, attachments and accessories.

4.1.5.1 Sterilization Warnings, Precautions and Notes

1. Do not sterilize equipment with Ethylene Oxide (EtO).
2. Do not sterilize the controller or the 3-Pedal Footswitch (C9863). 
3. Never sterilize any handpiece in a Washer/Sterilizer, STERIS System, STERRAD System, Abtox Plazlyte™ or comparable sterilization methods.
4. Do not sterilize handpieces in cold sterilants like CIDEX.
5. **Do Not “Peel Pack”** handpieces or attachments for sterilization. Sterilization in a sealed pouch traps moisture which can cause damage.
6. ALWAYS lubricate the 20°, 70°, and 90° angle attachments, Low Speed Drill attachments, and the *MicroChoice* Wiredriver Attachment (REF 5020-028) prior to sterilization. See “4.1.4 Attachment Lubricating Instructions” on page 143.
7. Handpieces with collet mechanisms and suction control valves must be sterilized with the collet and suction control valve **fully open**.

8. **Do not** run handpieces while warm. Allow adequate time for cooling prior to surgery. **Do not immerse** in liquid or cover with a damp cloth to cool. Cool by exposure to room temperature.

WARNING: The use of disinfecting solutions for an exterior instrument wipe will not sterilize the equipment.

NOTES:

1. The following guidelines do not guarantee that the device is sterile after the procedure. Your institution is still responsible for the normal sterility assurance validation.
2. Additional drying time may be required for complete heat and moisture dissipation. Operation of a handpiece that is not completely cool or dry may decrease performance and/or reliability.
3. Sterilization validation is based on AAMI guidelines (Association for the Advancement of Medical Instrumentation).

All handpieces, attachments and kits may be processed in a pre-vacuum steam sterilizer (Steam Pre-vacuum) or in a gravity (downward) displacement sterilizer (Steam Gravity). Place handpiece, handpiece cord, and/or attachments/accessories in an appropriate instrument tray or a fully perforated, wrapped container, when applicable.

Recommended sterilization exposure times are as follows:

Table 5: Sterilization Parameters

| Sterilization Type | Temperature | Exposure Time | Dry Time |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|---------------|---------------------|
| MicroChoice Kit Configuration Sterilization Parameters | | | |
| Steam Pre-vacuum | 270 - 272°F (132 - 133°C) | 4 minutes | 8 minutes minimum * |
| Steam Gravity | 270 - 272°F (132 - 133°C) | 50 minutes | 8 minutes minimum * |
| Steam Gravity | 250 - 254°F (121 - 123°C) | 105 minutes | 8 minutes minimum * |
| MicroChoice Drills and Saws (REF 5020-021, -022, -023, -024, -025, -026, -027); Mini-Driver Handpiece (REF K500); High Speed Drill (REF E9010); Cranial Perforator Drive (REF E9015); Associated Attachments; 2-Pedal Footswitch (REF 5020-053); and Handpiece Cords | | | |
| Steam Pre-vacuum | 270 - 272°F (132 - 133°C) | 4 minutes | 8 minutes minimum * |
| Steam Gravity | 270 - 272°F (132 - 133°C) | 15 minutes ** | 8 minutes minimum * |
| Steam Gravity | 250 - 254°F (121 - 123°C) | 60 minutes ** | 8 minutes minimum * |
| ** NOTE: If sterilizing bur guards in an instrument tray, add five (5) minutes to exposure times. | | | |
| PowerPro Handpieces (REF PRO2100E, PRO2200E, PRO2300E), Associated Attachments, and Handpiece Cord | | | |
| Steam Pre-vacuum | 270 - 272°F (132 - 133°C) | 4 minutes | 8 minutes minimum * |
| Steam Gravity | 270 - 272°F (132 - 133°C) | 25 minutes | 8 minutes minimum * |
| Steam Gravity | 250 - 254°F (121 - 123°C) | 50 minutes | 8 minutes minimum * |
| * CAUTION: An eight (8) minute minimum dry cycle must be run on all handpieces, guards and attachments every time the product is sterilized. Failure to use a dry cycle on the products may lead to reduced product performance or premature product failure. Operation of a hand-piece that is not completely cool or dry may decrease performance and/or reliability. | | | |

Table 5: Sterilization Parameters

| Sterilization Type | Temperature | Exposure Time | Dry Time |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|---------------|---------------------|
| High Speed Shaver (REF E9005), Advantage Shavers (REF D9820, D9824), <i>MicroChoice</i> Shaver Handpieces (REF MC9820, MC9828, MC9840), APEX Shaver Handpieces (REF C9820, C9824, C9828, C9840), Associated Attachments, and Handpiece Cords | | | |
| Steam Pre-vacuum (Flash) | 270 - 272°F (132 - 133°C) | 3 minutes | 8 minutes minimum * |
| Steam Pre-vacuum | 270 - 272°F (132 - 133°C) | 4 minutes | 8 minutes minimum * |
| Steam Gravity | 270 - 272°F (132 - 133°C) | 10 minutes | 8 minutes minimum * |
| * CAUTION: An eight (8) minute minimum dry cycle must be run on all handpieces, guards and attachments every time the product is sterilized. Failure to use a dry cycle on the products may lead to reduced product performance or premature product failure. Operation of a hand-piece that is not completely cool or dry may decrease performance and/or reliability. | | | |

4.2 Troubleshooting

Table 6: Troubleshooting

| Symptom | Possible Cause | Corrective Action |
|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Controller does not power on when standby power switch is turned on. | <ul style="list-style-type: none"> ◆ Power cord unplugged or faulty. ◆ Blown fuse(s). | <ul style="list-style-type: none"> ◆ Plug in power cord. ◆ Replace power cord. ◆ Replace fuses. Reference “4.4 Fuse Replacement and Voltage Selection Means” on page 151. |
| Handpiece does not operate. | <ul style="list-style-type: none"> ◆ Handpiece cord not connected securely, if applicable. ◆ Handpiece cord and/or button, if applicable, faulty. ◆ Handpiece faulty. ◆ If using a footswitch, footswitch cord not connected securely. ◆ Footswitch cord or footswitch faulty. ◆ Handpiece safety is in the safe, or off position, if applicable. | <ul style="list-style-type: none"> ◆ Securely connect handpiece cord to the handpiece, if applicable, and the controller receptacle. ◆ Replace handpiece cord, where applicable. If handpiece cord is permanently affixed, return handpiece for service. ◆ Return for service. ◆ Securely connect footswitch cord to controller receptacle. ◆ Return for service. ◆ Move safety, if applicable, to the appropriate operating position. |

Table 6: Troubleshooting

| Symptom | Possible Cause | Corrective Action |
|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The E9010 High Speed Drill overheats. | <ul style="list-style-type: none"> ◆ Tubing set is not completely primed. | <ul style="list-style-type: none"> ◆ Prime tubing set by following the priming procedure (See “E9414 Tubing Set with Recirculation only:” on page 52. |
| A <i>MicroChoice</i> , Group 2 handpiece overheats. | <ul style="list-style-type: none"> ◆ Worn bearings in the bur guard. ◆ Moisture in the handpiece. | <ul style="list-style-type: none"> ◆ Reference “4.5 Bur Guard Testing Procedure” on page 152. If resistance is noticed, return bur guard for service. If no resistance is noticed, return handpiece for service. ◆ Resterilize the handpiece according to sterilization parameters and drying times, reference “4.1.5 Sterilization Information” on page 144. |
| Leakage occurring at the tubing handpiece cassette and handpiece interface. | <ul style="list-style-type: none"> ◆ Handpiece cassette not completely or incorrectly attached to the handpiece. | <ul style="list-style-type: none"> ◆ Remove the tubing handpiece cassette from the handpiece and reinstall. If leakage still occurs, replace with a new tubing set. |

Table 6: Troubleshooting

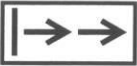






| Symptom | Possible Cause | Corrective Action |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Error Messages | | |
| <p>“MOTOR OVER-SPEED”</p>  <p>“HP SERVICE REQUIRED”</p>  <p>“CANNOT ID HANDPIECE”</p>  <p>messages display.</p> | <ul style="list-style-type: none"> ◆ Handpiece, handpiece cord and/or controller faulty. | <ul style="list-style-type: none"> ◆ Replace handpiece. If symptom is corrected, return handpiece for service. ◆ Else, replace handpiece cord. If symptom is corrected, return faulty handpiece cord. ◆ Else, return controller for service. ◆ Remove both handpieces from the top section to clear the fault condition. |
| <p>“STALL CHECK BUR LOCK”</p>  <p>message displays.</p> | <ul style="list-style-type: none"> ◆ Bur lock in open position. ◆ Handpiece, handpiece cord and/or controller faulty. | <ul style="list-style-type: none"> ◆ Put bur lock in lock position. ◆ Replace handpiece. If symptom is corrected, return handpiece for service. ◆ Else, replace handpiece cord. If symptom is corrected, return faulty handpiece cord. ◆ Else, return controller for service. |

Table 6: Troubleshooting

| Symptom | Possible Cause | Corrective Action |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Error Messages (Continued) | | |
| <p>“STALL CHECK BUR LOCK”</p>  <p>message displays upon initial activation of the E9010 High Speed Drill while a bur is locked in place.</p> | <ul style="list-style-type: none"> ◆ The drill was not cleaned correctly and the bearings are locked due to debris build-up. | <ul style="list-style-type: none"> ◆ Disconnect the handpiece from the controller. Rotate the bur in the handpiece with your fingers until the bur spins freely. If the message still displays when the handpiece is activated with the footswitch, return the handpiece and bur guard to Linvatec for service. |
| <p>“Magnetic Field”</p>  <p>is displayed on the controller.</p> | <ul style="list-style-type: none"> ◆ The handpiece is in close proximity to a magnetic drape. ◆ Removable activation lever partially connected. ◆ Faulty handpiece. | <ul style="list-style-type: none"> ◆ Remove the handpiece from the magnetic drape area. ◆ Completely connect the activation lever (See “3.5.4 Leverless Handpiece Operation” on page 72). ◆ Return handpiece to Linvatec for service. |
| <p>“CONNECT HANDPIECE”</p>  <p>message displays when the handpiece is already plugged into the controller.</p> | <ul style="list-style-type: none"> ◆ Handpiece or handpiece cord not connected securely. ◆ Handpiece, handpiece cord and/or controller faulty. | <ul style="list-style-type: none"> ◆ Securely connect handpiece or handpiece cord. ◆ Replace handpiece. If symptom is corrected, return handpiece for service. ◆ Else, replace handpiece cord. If symptom is corrected, return faulty handpiece cord. ◆ Else, return controller for service. |

4.3 Calibration

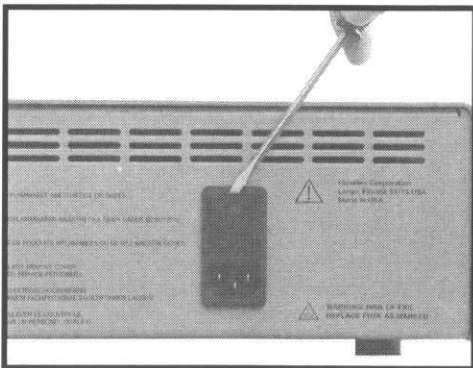
The Advantage System is calibrated at the factory. No additional calibration is required unless the controller is serviced or updated. If the controller displays “CALIBRATE?”, the calibration prompt was inadvertently activated. No further operator action is required. The system will automatically return to the operating status.

4.4 Fuse Replacement and Voltage Selection Means

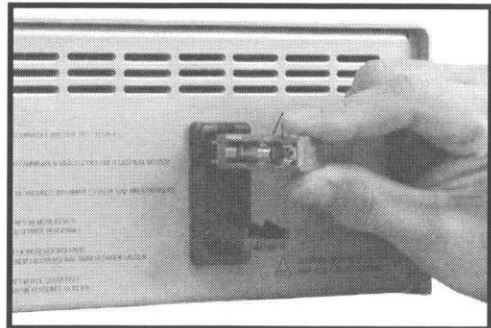
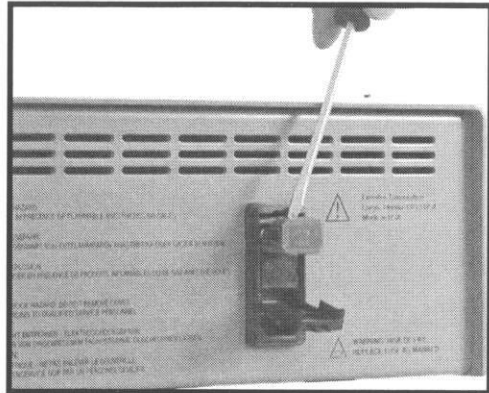
NOTE: There is no voltage selection for the D3000J model controller. The operating voltage is set at a fixed range of 90-110 VAC.

Each controller is factory pre-set for a specific voltage range. Make sure the setting for your local line (mains) supply is correct. Should there be a need for changing this requirement, the following instructions should be utilized:

1. Turn the controller power off and disconnect the mains power cord.
2. Using a flat blade tool, remove the fuse cover to access the fuse holder.



3. Remove the fuse holder and replace both fuses with the correct value, as stated on the controller or in the Technical Specifications section of this manual, that corresponds to the local voltage.



4. If the voltage in use is different from what the controller is currently set for, rotate the fuse holder and completely reinstall it so that the correct voltage is displayed through the fuse cover opening for the power source in use, either 115V or 230V.

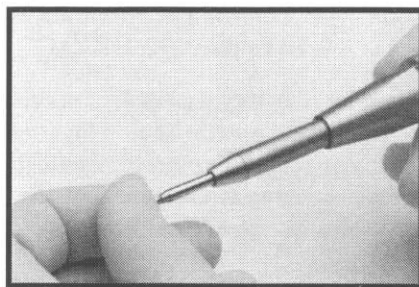


5. Snap the fuse cover securely into place.

4.5 Bur Guard Testing Procedure

NOTE: Bur and neuro guards are to be returned to the factory or a Linvatec authorized service facility for routine maintenance every six (6) months.

1. Prior to testing, remove the guard from the handpiece.
2. Check for worn bearings:
 - (a) Insert a bur into the nose of the guard.
 - (b) While holding the bur, spin the guard. The guard should spin freely around the bur shaft without resistance.



- (c) Attach the guard and bur to the drill.
- (d) Operate the handpiece for at least 30 seconds. Stop the handpiece and carefully feel the end of the guard where the guard encases the shaft of the bur for overheating. If overheating is noticed, return the guard for service.

4.6 Ground Continuity Test

The purpose of this test is to check the continuity of the ground bond from the power plug to the chassis whenever any maintenance has been performed.

Test Equipment Required:

Simpson Model 265 Multimeter or equivalent.

Procedure:

1. Set the multimeter to the lowest ohms range. Connect the test leads to each other and zero the instrument.
2. With the controller unplugged from the AC power source, connect one test lead to chassis ground and the other to the power cord ground pin. Measure the resistance value. The meter should measure less than 0.1 ohm.
3. If the reading obtained is greater than 0.1 ohm, the line cord or chassis wiring may be damaged. The unit should not be placed into service until the source of the problem is determined and corrected.

4.7 Leakage Test

The purpose of this test is to measure the amount of 50/60 cycle leakage from the transformer primary to the circuitry of the instrument. The AC leakage from any exposed metal part to earth ground and from all exposed metal parts having a return to chassis must not exceed 100 μ a.

Test Equipment Required:

ED&D Leakage Current Tester, Model LT-601 or equivalent.

Procedure:

1. Plug the power cord into the back of the controller. Plug the controller power cord into the test instrument test receptacle.
2. Turn the controller on and allow to warm up a minimum of two (2) minutes.
3. Measure the leakage current.
4. Turn the controller and test equipment off. Disconnect all test equipment from the controller.
5. If leakage exceeds limits, the unit may have a faulty line cord or power transformer and should not be placed into service until the problem has been resolved.

4.8 Theory of Operation

The Advantage Control Board and Power Supply/Pump Controller provide the necessary controls for the user to operate the handpieces. The Control Board main function blocks are a housekeeping DC/DC converter, a Motorola 68HC11 micro-controller, and a Unitrode UC3625 DC three-phase brushless motor controller.

The housekeeping DC/DC converter on the Power Supply/Pump Controller provides voltages necessary to operate the Control Board and handpiece electronic components. The +50VDC motor voltage is converted to +5VDC, +6VDC and +12VDC, facilitated by a Unitrode Pulse Width Modulator, UC3843 and a Flyback conversion topology. The +50VDC motor voltage is applied to transformer primary T1, storing energy in its inductance. After a set amount of time, the voltage is removed from the primary and the stored energy is transferred to the secondary windings to provide necessary housekeeping output voltages.

The 68HC11 micro-controller gives the Control Board the decision making necessary to operate the handpieces. Speed, direction, cable mode select, DIP switch settings, identification and front panel console display are only a few functions that interface with the 68HC11, which is an 8 bit micro-controller operating with 8 MHz clock speed. It contains multiple input and output ports that can be manipulated via a software program, which is contained in an EPROM and provides extended inputs and outputs to the 68HC11.

The DC three-phase brushless motor controller, is a mixed signal device that provides commutation and motor driver control. This device provides outstanding closed loop speed control and adds protection to the output three phase driver by limiting peak switch current. This device allows an electronic commutation scheme needed to commutate the DC three phase motor.

5.0 TECHNICAL SPECIFICATIONS

5.1 Controller

I.E.C. Equipment Classification: Patient Applied, continuous operation with intermittent loading as Class 1, Type B per IEC 601-1, UL 2601-1 and CSA 601-1.

The system was tested and complies with IEC 601-1-2 as follows: Operation is subject to the following two conditions: (1) The system may not cause harmful interference and (2) The system must accept any interference received, including interference that might cause undesirable operation.

The system is considered fail-safe, and can recover from error mode by power-down restart or by a method described to the user via the system display.

| Typical Operating Requirements: | <u>D3000</u> | <u>D3000I</u> | <u>D3000J</u> |
|---------------------------------|------------------------------------------------------------------------------|----------------|----------------|
| Input Voltage: | 115 VAC | 230 VAC | 100 VAC |
| Frequency: | 50/60 Hz | 50/60 Hz | 50/60 Hz |
| Power Consumption: | 500 VA | 500 VA | 500 VA |
| Line Frequency Leakage: | Less than 100 μ a | | |
| Fuses: | T 8.0 A, 250 V | T 4.0 A, 250 V | T 8.0 A, 250 V |
| Output: | 3 phase motor drive and control circuits, 325 VA | | |
| Port 1 Output: | 180 VA | | |
| Port 2 Output: | 180 VA | | |
| Port 3 Output: | 325 VA | | |
| Total Port Output: | 325 VA max. (With 2 handpieces simultaneously connected) | | |
| Dimensions: | 17.0" (W) x 5.0" (H) x 13.75" (D) 43.2 cm (W) x 12.7 cm (H) x 35.0 cm (D) | | |
| Weight: | 19.5 lbs. (8.86 kg) | | |
| Pump Flow Rate: | 0 - 150 mL/minute | | |

The controller is designed with "closed loop feedback" that provides immediate electronic feedback to hold handpiece speed constant, even with increasing load. Low input voltage may result in reduced speed.

NOTE: There are no toxic components used in the manufacture of the Advantage System. After the useful life of the product, dispose of components and service parts properly.

5.2 Power Cord Requirements

100/120 VAC:

Use only a listed (UL, CSA) detachable power cord manufactured to the following specifications.

- Plug End
 - NEMA 5-15P hospital grade, 15 amps, 125V
- Receptacle End
 - IEC 320/CEE-22, 6 amps, 250V/15 amps, 125V
- Cord
 - UL style SJT, 18 AWG, 3 conductor

220/240 VAC

- Plug End
 - Molded straight PVC plug with double grounding system
 - DIN 49441, CEE 7/U11, 10/16A, 250V
 - CEBEC, DEMKO, KEMA, NEMKO, OVE, SEMKO, VDE, UTE, FEMKO
- Receptacle End
 - Molded straight PVC plug
 - DIN 49457, CEE 22/V, 10A, 250V
 - VDE, D, N, S, SEV, OVE, KEMA
- Cord
 - PVC, 7.2mm diameter
 - 10A, 250V
 - Conductors: $3 \times 1 \text{ mm}^2$
 - Conductor Colors - brown, blue, green/yellow stripe

5.3 System Environmental Requirements

Operating:

| | |
|---------------------------------------|-----------------------------------|
| Ambient Operating Temperature: | + 50°F to 77°F (+ 10°C to + 25°C) |
| Relative Humidity: | 30% to 75% |
| Atmospheric Pressure: | 700 hPa to 1060 hPa |

Transport and Storage:

| | |
|------------------------------|------------------------------------|
| Ambient Temperature: | - 40°F to 158°F (- 40°C to + 70°C) |
| Relative Humidity: | 10% to 100% including condensation |
| Atmospheric Pressure: | 500 hPa to 1060 hPa |

5.4 Footswitches (5020-053 and C9863)

| | |
|---------------------|------------------------------------------------------------------------------|
| Dimensions: | 10.0" (W) x 1.87" (H) x 4.75" (D) 25.4 cm (W) x 4.75 cm (H) x 12.0 cm (D) |
| Cord Length: | Approximately 10 ft. (3 m) |
| Weight: | 3.5 lbs. (1.58 kg) |

5.5 Handpiece Cords

| | <u>MC5057</u> | <u>MC5056</u> | <u>M334</u> |
|---------------------|------------------------|----------------------|------------------------|
| Cord Length: | Approx. 12 ft. (3.6 m) | Approx. 10 ft. (3 m) | Approx. 15 ft. (4.6 m) |
| Weight: | 10.9 oz. (309 g) | 8.5 oz. (243 g) | 17.5 oz. (518 g) |

5.6 Tubing Sets

| | |
|----------------------------|--------------------------------------------------------------------------------------------------------------------|
| Material: | PVC, ABS, Polycarbonate, Silicone, Acrylic |
| Overall Dimensions: | Approximately 14.0 feet (4.2 m) |
| Weight: | E9414 - 3.5 oz. (99 g) E9415/E9415A - 4.0 oz. (115 g) E9416/E9417 - 2.5 oz. (72 g) E9418 - 2.1 oz. (61 g) |



NOTE: These tubing sets are latex-free products.

5.7 Handpieces

High Speed Shaver (E9005)

Operating Speeds:

Forward and Reverse: 500 - 10,000 rpm (nominal)

Oscillate (fixed- and variable-turn): 500 - 5,000 cpm (nominal)

Default Speed (forward/reverse): 5,000 rpm (nominal)

Default Speed (oscillate): 3,000 cpm (nominal)

Torque: 9.0 in. oz.

Length: 5.75 in. (14.6 cm)

Diameter: 0.75 in. (1.9 cm)

Weight: 5.6 oz. (160 g)

Cord Length: 10 ft. (3 m)

Material: Anodized Aluminum and Stainless Steel

High Speed Drill (E9010)

Operating Speeds (forward/reverse): 5,000 - 80,000 rpm (nominal)

Default Speed: 60,000 rpm (nominal)

Torque: 2.0 in. oz.

Length: 5.5 in. (14 cm)

Diameter: 0.75 in. (1.9 cm)

Weight: 5.3 oz. (150 g)

Cord Length: 10 ft. (3 m)

Material: Anodized Aluminum and Stainless Steel

Cranial Perforator Drive (E9015)

Operating/Default Speed (forward only): Variable to 750 rpm

Torque: 14 in.-lbs.

Length: 7.63 in. (19.4 cm)

Diameter: 1.25 in. (3.2 cm)

Weight: 15.7 oz. (445 g)

Cord Length: 10 ft. (3 m) (Detachable)

Material: Anodized Aluminum and Stainless Steel

MicroChoice Modular Handpiece (5020-027)

| | |
|------------------------|------------------------------------------|
| Speed Settings: | 10 to 100% (1,000 rpm) in 10% increments |
| Cannulated: | Maximum 0.125 in. (3.2 mm) diameter |
| Width: | 4.10 in. (10.4 cm) |
| Height: | 5.61 in. (14.2 cm) |
| Weight: | 23 oz. (644 g) |
| Material: | Anodized Aluminum and Stainless Steel |
| Torque: | 10 in. lbs. |

MicroChoice Elite High Speed Drill (5020-025)

| | |
|----------------------------|----------------------------------------------------------|
| Speed Settings: | 10,000 to 100,000 rpm (nominal) in 10,000 rpm increments |
| Default Speed: | 70,000 rpm |
| Torque: | 2 in. oz. |
| Bur Pull Out Force: | Exceeds 12.0 lbs. (5.4 kg) |
| Length: | 5.85 in. (14.9 cm) |
| Diameter: | 0.75 in. (1.9 cm) |
| Weight: | 7 oz. (196 g) |
| Material: | Stainless Steel |

MicroChoice Medium Speed Drill (5020-021)

| | |
|----------------------------|-------------------------------------------------------|
| Speed Settings: | 1,000 to 25,000 rpm (nominal) in 2,000 rpm increments |
| Default Speed: | 25,000 rpm |
| Torque: | 6 in. oz. |
| Bur Pull Out Force: | Exceeds 12.0 lbs. (5.4 kg) |
| Length: | 4.86 in. (12.3 cm) |
| Diameter: | 0.70 in. (1.8 cm) |
| Weight: | 7 oz. (196 g) |
| Material: | Stainless Steel |

MicroChoice Low Speed Drill (5020-026)

Drill Head (single color band)

| | |
|-----------------|--------------------------------------------------|
| Speed Settings: | 250 to 2,500 rpm (nominal) in 250 rpm increments |
| Default Speed: | 2,500 rpm (nominal) |
| Torque: | 15 in. oz. |
| Length: | 5.85 in. (14.9 cm) |
| Diameter: | 0.75 in. (1.9 cm) |
| Weight: | 4.5 oz. (126 g) |
| Material: | Stainless Steel |

Screw/Tap Head (two color bands)

| | |
|-----------------|-------------------------------------------|
| Speed Settings: | 4 to 30 rpm (nominal) in 2 rpm increments |
| Default Speed: | 30 rpm (nominal) |
| Torque: | 25 in. oz. (screw) |
| | 55 in. oz. (tap forward) |
| | 60 in. oz. (tap reverse) |

MicroChoice Sagittal Saw (5020-022)

| | |
|-----------------|------------------------------------------|
| Speed Settings: | 20 - 100% (20,000 cpm) in 10% increments |
| Stroke: | 4° arc |
| Length: | 6.64 in. (16.9 cm) |
| Diameter: | 1.0 in. (2.54 cm) |
| Weight: | 6.9 oz. (195 g) |
| Material: | Stainless Steel |

MicroChoice Reciprocating Saw (5020-023)

| | |
|-----------------|------------------------------------------|
| Speed Settings: | 20 - 100% (17,000 cpm) in 10% increments |
| Stroke: | 1/10 in. (2.54 mm) |
| Length: | 8.17 in. (20.8 cm) |
| Diameter: | 0.75 in. (1.9 cm) |
| Weight: | 8 oz. (208 g) |
| Material: | Stainless Steel |

MicroChoice Oscillating Saw (5020-024)

| | |
|------------------------|------------------------------------------|
| Speed Settings: | 20 - 100% (25,000 cpm) in 10% increments |
| Stroke: | 8° arc |
| Length: | 7.37 in. (18.7 cm) |
| Diameter: | 1.5 in. (3.8 cm) |
| Weight: | 8 oz. (208 g) |
| Material: | Stainless Steel |

MicroChoice and APEX Basic (MC9820/C9820), Full-Function (MC9828/C9828) and APEX 2-Button (C9824) Large Shaver Handpieces

| | |
|-------------------------|---------------------------------------------------------------------------|
| Operating Speed: | 300 - 6,000 rpm, F/R 300 - 1,500 cpm, Single- and Multi-turn Oscillate |
| Torque: | 30 in. oz. (nominal) |
| Length: | 8.0 in. (20.3 cm) |
| Diameter: | Approx. 1.125 in. tear drop (2.9 cm) |
| Weight: | 14.6 oz. (415 g) |
| Material: | Anodized Aluminum and Stainless Steel |

MicroChoice and APEX Small Shaver Handpiece (MC9840/C9840)

| | |
|-------------------------|--------------------------------------------------------------------------|
| Operating Speed: | 300 - 5000 rpm, F/R 300 - 2,500 cpm, Single- and Multi-turn Oscillate |
| Torque: | 19 in. oz. (nominal) |
| Length: | 7.15 in. (18.2 cm) |
| Diameter: | Approx. 0.785 in. tear drop (2.0 cm) |
| Weight: | 8.4 oz. (237 g) |
| Cord Length: | 10 ft. (3 m) Detachable (C9840 - Non-detachable) |
| Material: | Anodized Aluminum and Stainless Steel |

Advantage Basic (D9820) and 2-Button (D9824) Shaver Handpieces

| | |
|------------------|----------------------------------------------------------------------------|
| Operating Speed: | 500 - 10,000 rpm, F/R 500 - 2,500 cpm, Single- and Multi-turn Oscillate |
| Torque: | 22 in. oz. (nominal) |
| Length: | 7.25 in. (18.4 cm) |
| Diameter: | Approx. 1.125 in. tear drop (2.9 cm) |
| Weight: | 15.8 oz. (450 g) |
| Cord Length: | 12 ft. (3.6 m) Non-detachable |
| Material: | Anodized Aluminum and Stainless Steel |

Mini-Driver Handpiece (K500)

| | |
|------------------|----------------------------|
| Operating Speed: | 0 - 1250 rpm |
| Cannulated: | 0 - 4.0 mm (0 - 0.156 in.) |
| Torque: | 8.0 in.-lbs. (nominal) |
| Width: | 4.375 in. (11.1 cm) |
| Height: | 6.25 in. (15.9 cm) |
| Weight: | 20.4 oz. (571 g) |

TECHNICAL
SPECIFICATIONS

PowerPro Electric Oscillator Handpiece (PRO2300E)

Saw Specifications:

| | |
|--------------------|-------------------|
| Speed Range: | 0 - 11,000 cpm |
| Oscillation Range: | 4.5° |
| Height: | 6.0 in. (15.2 cm) |
| Length: | 6.0 in. (15.2 cm) |
| Weight: | 2.0 lbs. (910 g) |

PowerPro Electric Modular Handpiece (PRO2100E)

Attachment Specifications:

Drill/Ream Mode

Drill Attachments

Speed Range: 0 - 750 rpm

Torque: 35 in-lbs.

Reaming/High Torque Attachments

Speed Range: 0 - 250 rpm

Torque: 100 in-lbs.

Tap Mode with Drill Attachments Only

Speed Range: 0 - 250 rpm

Screw Mode with Drill Attachments Only

Speed Range: 0 - 250 rpm

Torque

(forward): 20 in-lb.

(reverse): 35 in-lbs.

Oscillating Drill Mode

Speed Range: 0 - 500 rpm

Oscillation Range: 0 - 270°

Height: 6.0 in. (15.2 cm)

Length: 4.0 in. (10.2 cm)

Weight: 1.62 lbs. (740 g)

PowerPro Electric Two-Trigger Handpiece (PRO2200E)

Attachment Specifications:

Drill/Ream Mode

Drill Attachments

| | |
|--------------|-------------|
| Speed Range: | 0 - 750 rpm |
| Torque: | 35 in-lbs. |

Reaming Attachments

| | |
|--------------|-------------|
| Speed Range: | 0 - 250 rpm |
| Torque: | 100 in-lbs. |

Screw Mode

| | |
|--------------|-------------|
| Speed Range: | 0 - 250 rpm |
| Torque | |
| (forward): | 20 in-lb. |
| (reverse): | 35 in-lbs. |

Tap Mode

| | |
|--------------|-------------|
| Speed Range: | 0 - 250 rpm |
|--------------|-------------|

Oscillating Drill Mode

| | |
|--------------------|-------------|
| Speed Range: | 0 - 500 rpm |
| Oscillation Range: | 0 - 270° |

| | |
|----------------|-------------------|
| Height: | 6.0 in. (15.2 cm) |
| Length: | 4.0 in. (10.2 cm) |
| Weight: | 1.64 lbs. (750 g) |

NOTE: Handpiece measurements are without cord and attachment.

Table 7: Duty Cycles

| Description | Duty Cycle at 25°C Ambient |
|-------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Controller (D3000 and D3000I) | Designed to operate at its rated maximum load of 325 VA output for a time period of 2 minutes ON, 6 minutes OFF. |
| Controller (D3000J) | Designed to operate at its rated maximum load of 325 VA output for a time period of 2 minutes ON, 8 minutes OFF. |
| High Speed Shaver Handpiece (E9005) | 30 seconds ON, 5 minutes OFF. |
| High Speed Drill Handpiece (E9010) | 30 seconds ON, 6 minutes OFF. |
| Cranial Perforator Drive (E9015) | 1 minute ON, 3 minutes OFF. |
| <i>MicroChoice</i> Medium Speed Drill (5020-021) | 2 minutes ON, 3 minutes OFF. |
| <i>MicroChoice</i> Sagittal Saw (5020-022) | 30 seconds ON/OFF for 6 cycles, then wait 30 minutes. |
| <i>MicroChoice</i> Reciprocating Saw (5020-023) | 30 seconds ON/OFF for 4 cycles, then wait 30 minutes. |
| <i>MicroChoice</i> Oscillating Saw (5020-024) | 30 seconds ON/OFF for 4 cycles, then wait 30 minutes. |
| <i>MicroChoice</i> Elite High Speed Drill (5020-025) | 2 minutes ON, 8 minutes OFF. |
| <i>MicroChoice</i> Low Speed Drill (5020-026) with Drill Head | 1 minute ON, 3.5 minutes OFF. |
| <i>MicroChoice</i> Low Speed Drill (5020-026) with Screw/Tap Head | 100% duty cycle. |
| <i>MicroChoice</i> Modular Handpiece (5020-027) | 100% duty cycle. |
| <i>MicroChoice</i> and APEX Basic Shaver Handpiece (MC9820/C9820) | 100% duty cycle (with irrigation). |
| APEX Two-Button Shaver Handpiece (C9824) | 100% duty cycle (with irrigation). |

Table 7: Duty Cycles

| Description | Duty Cycle at 25°C Ambient |
|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| <i>MicroChoice</i> and APEX Full-Function Large Shaver Handpiece (MC9828/C9828) | 100% duty cycle (with irrigation). |
| <i>MicroChoice</i> and APEX Small Shaver Handpiece (MC9840/C9840) | 1 minute ON, 3 minutes OFF (no irrigation). 100% duty cycle (with irrigation). |
| Advantage Basic Shaver Handpiece (D9820) | 100% duty cycle (with irrigation). |
| Advantage 2-Button Shaver Handpiece (D9824) | 100% duty cycle (with irrigation). |
| <i>PowerPro</i> Electric Modular Handpiece (PRO2100E) | 60 seconds ON, 2.5 minutes OFF. |
| <i>PowerPro</i> Electric Two-Trigger Handpiece (PRO2200E) | 60 seconds ON, 2.5 minutes OFF. |
| <i>PowerPro</i> Electric Oscillator Handpiece (PRO2300E) | 60 seconds ON, 4 minutes OFF. |
| Mini-Driver Handpiece (K500) | 1 minute ON, 3 minutes OFF |

6.0 CUSTOMER SERVICE, REPAIRS and WARRANTY

6.1 Customer Service

If you need technical assistance regarding the use or application of this product, or you encounter a problem that requires servicing or repair, contact Linvatec Customer Service at 800-925-4255 or your Hall Surgical Representative. Outside the U.S. contact your local Linvatec Hall Representative.

Report any events involving injuries or malfunctions to the Linvatec Regulatory Affairs Department.

Returning products for any reason requires a Return Goods (R.G.) number that can be obtained by contacting Linvatec Customer Service. Please provide the following information:

- Product Number
- Serial/Lot Number
- Reason for Return
- Original Invoice Number
- Date of Purchase

Repairs

Products returned for repair must have an authorized Return Goods (R.G.) number prominently displayed on the box and included on all paperwork. Refer to this number if making inquiries about the repair status. Please call Linvatec Customer Service and provide the following information to obtain an R.G. number prior to returning a product for repair:

- Product Number
- Serial/Lot Number - if applicable
- Original Invoice Number
- Date of Purchase
- Detailed description of the problem
- Purchase Order Number

If you require a quote - Notify Customer Service when requesting your R.G. number, or on the paperwork returned with the product indicate that a quote is required. If a quote is not requested the repair will be processed and your account billed accordingly - provided the repair is not covered under warranty.

Minimum repair charge - There is a minimum repair charge (except for products covered under warranty). This charge also applies to products returned for repair in which a problem cannot be verified.

Whenever it is required to return your product for repairs, be sure to package it in a protective carton. We recommend that you save the original shipping container for this purpose. In-transit damage is not covered by the warranty, therefore, it is best to always insure shipments.

Returned Goods

Products must be returned within 45 days of ship date. Returned products are subject to a restocking fee of fifteen percent (15%) of the purchase price (minimum charge \$25). Products returned as a result of errors attributable to Linvatec are exempt from this fee.

Returns must have an authorized Return Goods (R.G.) number prominently displayed on the box and included on all paperwork.

Returns must be shipped prepaid freight, otherwise they will not be accepted. Products must be decontaminated and sterilized before returning. Products that are contaminated with biohazardous materials will be immediately returned to you for proper decontamination and sterilization.

Linvatec

**Attn.: Customer Service Dept.
11311 Concept Boulevard
Largo, Florida 33773-4908 USA**

Customer Service

(within U.S.)

Phone: 800-925-4255

FAX: 727-399-5256

(outside U.S.)

Phone: 727-392-6464

FAX: 727-397-4540

Linvatec Regulatory Affairs

(within U.S.)

Phone: 800-237-0169

(outside U.S.)

Phone: 727-399-6620

6.2 Handpieces, Attachments and Accessories

| <u>REF</u> | <u>Description</u> |
|------------------------------|---------------------------------------------------|
| <u>Advantage Controllers</u> | |
| D3000 | Advantage Controller (115 VAC) with AC Power Cord |
| D3000I | Advantage Controller (230 VAC) with AC Power Cord |
| D3000J | Advantage Controller (100 VAC) with AC Power Cord |

Handpieces and Footswitches

| | |
|----------|---------------------------------------------------------|
| E9005 | High Speed Shaver Handpiece |
| E9010 | High Speed Drill Handpiece |
| E9015 | Cranial Perforator Drive Handpiece |
| 5020-021 | <i>MicroChoice</i> Medium Speed Drill |
| 5020-022 | <i>MicroChoice</i> Sagittal Saw |
| 5020-023 | <i>MicroChoice</i> Reciprocating Saw |
| 5020-024 | <i>MicroChoice</i> Oscillating Saw |
| 5020-025 | <i>MicroChoice</i> Elite High Speed Drill |
| 5020-026 | <i>MicroChoice</i> Low Speed Drill |
| 5020-027 | <i>MicroChoice</i> Modular Handpiece |
| MC9820 | <i>MicroChoice</i> Basic Large Shaver Handpiece |
| MC9828 | <i>MicroChoice</i> Full-Function Large Shaver Handpiece |
| MC9840 | <i>MicroChoice</i> Small Shaver Handpiece |
| C9820 | APEX Basic Large Shaver Handpiece |
| C9824 | APEX Two-Button Large Shaver Handpiece |
| C9828 | APEX Full-Function Large Shaver Handpiece |
| C9840 | APEX Small Shaver Handpiece |
| D9820 | Advantage Basic Shaver Handpiece |
| D9824 | Advantage 2-Button Shaver Handpiece |
| PRO2100E | <i>PowerPro</i> Electric Modular Handpiece |
| PRO2200E | <i>PowerPro</i> Electric Two-Trigger Handpiece |
| PRO2300E | <i>PowerPro</i> Electric Oscillator Handpiece |
| K500 | Mini-Driver Electric Handpiece |
| 5020-053 | <i>MicroChoice</i> Footswitch, 2 Pedal |
| C9863 | <i>MicroChoice</i> Footswitch, 3 Pedal |
| E9320 | APEX Adapter |

REF**Description****Cords**

| | |
|--------|-------------------------------------------------|
| M334 | Mini-Driver to D3000 Controller Handpiece Cord |
| MC5056 | <i>MicroChoice</i> Handpiece Cord, 10 ft. (3 m) |
| MC5057 | Advantage Handpiece Cord, 12 ft. (3.6 m) |
| C7104 | AC Power Cord (115 VAC) |
| C7105 | AC Power Cord (230 VAC) |

Miscellaneous Irrigation Accessories

| | |
|----------|----------------------|
| 5020-054 | Controller Stand |
| 5020-071 | IV Pole Accessory |
| 5040-180 | Fluid Bag Hanger Rod |

E9010 Handpiece Guards

| | |
|---------|------------------------------------------------|
| E9011-1 | Medium Bur Guard - Limited Reuse |
| E9011-2 | Long Bur Guard - Limited Reuse |
| E9011-3 | Extra Long Bur Guard - Limited Reuse |
| E9011-7 | Short Neuro Guard - with E9012 Locking Collar |
| E9011-8 | Medium Neuro Guard - with E9012 Locking Collar |
| E9011-9 | Long Neuro Guard - with E9012 Locking Collar |
| E9012 | Locking Collar for E9010 Drill |

E9000 Irrigation Tubing and Accessories

| | |
|--------|----------------------------------------------------------------------------------------------------------------------|
| E9414 | Tubing Set for E9010 High Speed Drill <u>without</u> Irrigation - Disposable |
| E9415 | Tubing Set for E9010 High Speed Drill <u>with</u> Irrigation - Disposable |
| E9415A | Tubing Set for E9010 High Speed Drill <u>with</u> Irrigation and an affixed irrigation tip - Disposable |
| E9416 | Tubing Set for use with 4.2 mm Shaver Blades - Disposable |
| E9417 | Tubing Set for use with 3.7 mm Shaver Blades - Disposable |
| E9418 | Tubing Set for use with Group 3 Handpieces (5020-021, 5020-022, 5020-023, 5020-024, 5020-025, 5020-026) - Disposable |

REF**Description****E9000 Irrigation Tips for Use with E9415 Tubing Set**

| | |
|-------|--------------------------------------------------------|
| E9513 | Medium Disposable Irrigation Tip for E9011-1 Bur Guard |
| E9514 | Long Disposable Irrigation Tip for E9011-2 Bur Guard |
| E9515 | XL Disposable Irrigation Tip for E9011-3 Bur Guard |

MicroChoice Guards & Attachments

| | |
|----------|---------------------------------------------|
| 5020-034 | Dental Implant Drill Head |
| 5020-035 | Dental Implant Screw/Tap Head |
| 5020-060 | Medium Bur Guard |
| 5020-061 | Long Bur Guard |
| 5020-062 | Extra Long Bur Guard |
| 5020-063 | 20° Angle Attachment |
| 5020-064 | XL 20° Angle Attachment |
| 5020-065 | 70° Contra Angle Attachment w/Surgical Head |
| 5020-066 | 90° Angle Attachment |
| 5020-067 | Laminectomy Guard |
| 5020-068 | Tissue Retractor Guard |
| 5020-069 | 70° Contra Angle Attachment w/Dental Head |
| 5020-074 | Dental Attachment Cleaning Ring |
| 5020-075 | Low Speed Attachment Wrench |

MicroChoice Modular Handpiece Attachments and Accessories

| | |
|----------|-------------------------------------------|
| 5020-028 | Wiredriver Attachment |
| 5020-029 | Universal Drill Attachment |
| 5020-030 | 5/32" Jacobs Chuck Attachment w/key |
| 5020-031 | High Torque Jacobs Chuck Attachment w/key |
| 5020-032 | Pin Driver Attachment |
| 5020-041 | 1/4" Jacobs Chuck |
| 5020-042 | 1/4" High Torque Jacobs Chuck |

REF**Description****MicroChoice Miscellaneous**

| | |
|----------|-----------------------------|
| 0999-052 | 1/4" Replacement Chuck Key |
| 0999-053 | 5/32" Replacement Chuck Key |
| 1375-003 | Bur Changer |
| 1375-015 | Bur Cleaning Brush |
| 1375-037 | Pana Spray |
| 5020-057 | Replacement Safe Slide |
| 5020-058 | Handpiece Replacement Lever |
| 5020-059 | XL Handpiece Lever |
| 5053-008 | Bur Rack |
| 5053-123 | Wire Guard |
| 5053-124 | Cleaning Brush |

MicroChoice Irrigation Accessories

| | |
|----------|---------------------------------------|
| 5040-130 | Reusable Irrigation Handpiece Clip |
| 5040-200 | Reusable Medium Bur Tip |
| 5040-201 | Reusable External 70° & 90° Angle Tip |
| 5040-202 | Reusable Long Bur Tip |
| 5040-203 | Reusable Internal 70° & 90° Angle Tip |
| 5040-205 | Reusable Sagittal Saw Tip |
| 5040-206 | Reusable Oscillating Saw Tip |
| 5040-207 | Reusable Reciprocating Saw Tip |
| 5040-208 | Reusable XL Bur Tip |
| 5040-219 | Disposable Universal Irrigation Tip |
| 5040-220 | Disposable Medium Bur Tip |
| 5040-222 | Disposable Long Bur Tip |
| 5040-228 | Disposable XL Bur Tip |

Irrigation Tubing

| | |
|----------|-----------------------|
| 5040-120 | Disposable Tubing Set |
| 5040-128 | Reusable Y Tubing Set |
| 5040-129 | Reusable Tubing Set |

REF**Description****PowerPro Handpiece Attachments and Accessories**

| | |
|---------|------------------------------------------|
| PRO2028 | Wiredriver Attachment |
| PRO2029 | Trinkle/AO Attachment |
| PRO2030 | 5/32" Jacobs Chuck Attachment w/key |
| PRO2032 | Pin Driver Attachment |
| PRO2040 | A.O Reamer Attachment |
| PRO2041 | 1/4" Jacobs Chuck Attachment |
| PRO2042 | 1/4" High Torque Jacobs Chuck Attachment |
| PRO2043 | Sagittal Saw Attachment |
| PRO2045 | Reciprocating Saw Attachment |
| PRO2046 | Zimmer/Hudson Drill Attachment |
| PRO2047 | Zimmer/Hudson Reamer Attachment |
| PRO2050 | 1/8" Keyless Chuck Attachment |
| PRO2060 | Aesculap Reamer Attachment |
| PRO2070 | AO Drill Attachment |

| <u>REF</u> | <u>Description</u> |
|-----------------------------------------------------------------|----------------------------------------------------|
| <u>Mini-Driver Handpiece Attachments and Accessories</u> | |
| K501 | Mini-Adapter |
| K109 | 1/4" Jacobs Chuck Attachment |
| D298L | Key for 1/4" Jacobs Chuck Attachment |
| K110 | 5/32" Jacobs Chuck Attachment |
| D298K | Key for 5/32" Jacobs Chuck Attachment |
| K111A | Automatic Wire Driver Attachment |
| K112 | Trinkle Chuck Attachment |
| K113 | Hudson Chuck Attachment |
| K114A | ASIF/AO Twist Drill Chuck Attachment |
| K210 | High Torque Jacobs Chuck Attachment |
| K211 | Automatic Pin Driver Attachment |
| K220 | Sagittal Saw Attachment |
| K201 | Wrench for K220 Sagittal Saw Attachment |
| D520 | Screwdriver Attachment |
| D521 | Slotted Bit |
| D522 | Cruciate Bit |
| D523 | Phillips Bit |
| D524 | Screwdriver Attachment |
| D525 | Hex Bit for AO type screws |
| M105A | Blitz II Surgical Instrument Cleaner and Lubricant |
| M317 | Lubricant |