

# Instruction Manual for the Pneumatic Power Instrument System



**MICROAIRE®**

• FACTORY SERVICE EVERY YEAR  
• DO NOT IMMERGE OR OIL  
• MONITOR NO. 1017

VAL ENCI, CALIFORNIA, U.S.A.

# Instruction Manual for Pneumatic Handpieces

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# Pneumatic Handpieces

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This manual has been written to help describe the procedures required to keep the MicroAire Pneumatic instruments operating properly.

Throughout the manual, the following terms are used to identify hints and precautions that will help avoid accidental injury to patients or personnel, or prevent damage to delicate power instruments.

1. **NOTE:** Used to point out the easiest means of carrying out the techniques.
2. **WARNING:** Used to indicate that the safety of the patient and hospital personnel could be involved.
3. **CAUTION:** Used to point out special procedures or precautions that must be followed to avoid damaging the instrument.

**NOTE:** All personnel should become familiar with the power equipment before it is set-up for use in any procedure. Personnel in-serviced should include, but not be limited to, central processing personnel, members of the surgical team, and the bioengineering department.

**WARNING:** Prior to use, system components should be inspected and operated to detect any damage or malfunction. Do not use if damage is apparent.

## MARKINGS

- |  |  |
|--|--|
|  Safe             |  DO NOT Immerse                         |
|  Run              |  DO NOT Expose To Stray Magnetic Fields |
|  DO NOT Lubricate |  European Conformity Mark               |

 **CLASS 1 EQUIPMENT:**  
Attention, See instructions for use. This unit is designed for Continuous Operation with Short-Time Loading.

## BASIC EQUIPMENT INSTRUCTIONS-EXPLANATIONS

The following components are used with MicroAire's 1000 and 2000 Series instrument systems:

1. Regulator
2. Hose
3. 1000 Series or 2000 Series handpieces
4. Foot Control (optional)
5. Appropriate burs, blades, drill bits, or wires.

**NOTE:** Personnel should become totally familiar with the power equipment before the first procedure is set-up to be done using the equipment. Personnel in-serviced should include, but not be limited to, Central Processing, Surgical Team, and Bio-Engineering if they are involved with the power equipment in the particular facility.

## Air Pressure

Use the MicroAire 9500-000 or similar pressure regulator. The main tank pressure gauge should indicate a minimum of 500 p.s.i. (35 kg/cm<sup>2</sup>). Set the output pressure gauge to indicate 100 p.s.i. (7kg/cm<sup>2</sup>) with the handpiece turning at full throttle.

**CAUTION:** If the Power Instruments are run with excessive pressure, there will be a rapid increase in the rate of wear and the probability of failure.

# MicroAire Instructional Manual

## Air Hose Connector

The nitrogen powered instrument motor modules are available with or without throttle and with a choice of air hose connectors. Be certain the connector on the handpiece matches the air hose:

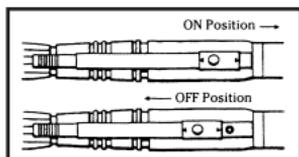
<u>Throttle</u>	<u>Throttleless</u>	
1000-100	1050-100	MicroAire hose connector
1000-200	1050-200	Zimmer/Hall style hose connector
1000-300	1050-300	3M Mini-Driver style hose connector
1000-400	1050-400	Stryker style hose connector
1000-600	1050-600	A. O. Synthes style hose connector

**NOTE:** If you encounter difficulty inserting the hose into the swivel, it could be that the sealing O-ring inside the swivel has dried out. Apply a small amount of sterile lubricant (even water) to the end of the hose, then rotate the hose 180° and reinsert.

**WARNING:** Check the air hose swivel connector to make sure that it will not unscrew (if it should unscrew during surgery, the air hose would whip about violently). If you can unscrew it, do not use the handpiece. Return it to the factory for service.

## Nitrogen Supply

Each handpiece is powered by compressed nitrogen. You may also use compressed air, provided it is dried and filtered to 3 microns.



## Safety Lock

Each handpiece has a safety lock on the lever. Slide it to the  position to deactivate the lever.

**WARNING:** Always use the safety lock when the handpiece is not in use or when changing head modules, blades, burs, drills or any other attachments.

## HANDPIECE

MicroAire has a variety of pneumatic handpieces designed for different orthopedic and oral surgical uses. These handpieces include both unitized and modular saws, drills, wire drivers, and other precision devices.

The modular 1000 Series handpieces consist of separate motor modules and interchangeable heads, as well as specific unitized, single function instruments.

Some handpieces are activated by depressing a fingertip throttle lever. Others are designed to be operated only by pressing on a foot control. Handpieces with throttle levers have a safety lock with two possible positions: "OFF" or , and "ON" or . When the safety lock is in the  position, the handpiece will not run.

**WARNING:** Always make sure the safety lock is in the  position when the handpiece is not in use or when inserting or removing head modules, blades, burs, drills or any other attachments.

# Pneumatic Handpieces

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## BURS, BLADES, TWIST DRILLS, AND K-WIRES

The head of each handpiece is adapted to accept the necessary blades, burs, drill bits, or K-wires. All of MicroAire's carbide or stainless steel saw blades, burs and drills have sharp, precision ground teeth or flutes. They are designed to provide the optimum combination of rapid cutting ability and economical price.

To enhance the performance of MicroAire pneumatic instruments, optimize preservation of bone surface, and ensure compliance with federal law (FDA 7124.23; FDA 7124.16), use a new saw blade, bur, or drill for each procedure. Using disposable accessories reduces handpiece wear, improves surgical cutting, and ensures quality patient care. Do not repackage or reuse blades, burs, or drills.

**CAUTION:** Dull burs and saw blades are major contributors to problems with powered surgical instruments. They require the surgeon to exert greater force, which increases stress, heat, and wear on gears, bearings, and other delicate mechanisms. Use of excessive force also increases the risk of thermal necrosis and overheating of the handpiece.

It is almost impossible to determine when a blade is dull. Simply counting the number of uses is not adequate. While certain procedures cause relatively little wear on a blade, bur, or drill, other procedures, especially where the blade, bur, or drill scrapes against metal templates or retractors, produce immediate wear or damage to the teeth.

## FOOT CONTROL

The 9100-000 Foot Control is normally used with the throttleless motor module. However, it may also be used with the hand control motor modules by locking down the finger throttle lever on the motor:

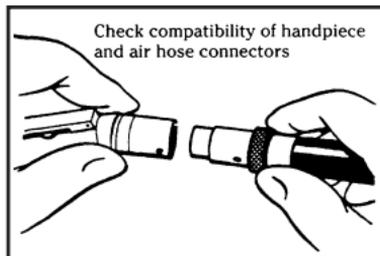
1. Connect the pressure hose of the foot control to the Schrader connector on the nitrogen regulator. Adjust the air pressure to 80-100 p.s.i.
2. Connect the handpiece to the air hose. Insert the appropriate blade/bur.
3. Connect the handpiece air hose to the foot control.
4. Lock down the throttle lever of the handpiece in the "ON" or  position with the throttle locking ring (cat. #9010-000).
5. Operate the handpiece by pressing the foot control. Adjust pressure regulator to 120 p.s.i. (8 kg/cm<sup>2</sup>).

## ASSEMBLY AND OPERATION

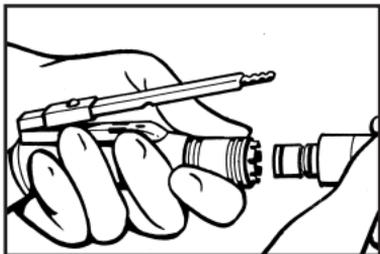
1. Firmly hold the handpiece and insert the pneumatic hose into the back end of the handpiece.
2. If using a foot control, connect foot control.
3. If using a 1000 Series handpiece, attach the desired head module to the motor module, as follows:
  - a. Retract the locking sleeve on the motor module.
  - b. Visually align the pin on the head module with any slot in the motor module.
  - c. Insert the head module and release the locking sleeve.
  - d. Push on the module to complete insertion.
  - e. Make sure the module is locked in place by gently pulling the head module.
4. Make sure the safety switch on the handpiece is in the  position. Insert cutting tool into handpiece making sure it is secure. (Different handpieces have different mechanisms for attaching these components. Please refer to the instructions specific to the handpiece).

5. If using a handpiece with hand throttle with the foot control, lock down the throttle lever of the handpiece in the "ON" or  position with the throttle locking ring (9010-000). Gently depress the foot control to activate the motor.

**WARNING:** When using the foot control and a handpiece with a throttle lever, be careful not to activate the throttle while unplugging the foot control.



6. To operate the handpiece without the foot control, slide the safety lock to the "ON" or  position. Gently depress the throttle lever to activate the motor.



# Pneumatic Handpieces

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## CUTTING TECHNIQUE

MicroAire 1000 Series handpieces are small, precise surgical instruments. They contain many tiny, delicate gears and mechanisms that produce their smooth, rapid cutting action. These instruments are suitable only for small bone work.

**CAUTION:** Take the following precautions to avoid damaging the handpiece:

When cutting, avoid excessive pressure on the handpiece. Use a light “pencil grip” and let the instrument do the work. Heavy force will rapidly wear the delicate components.

Avoid plunging a saw blade straight into the bone and “burying” the blade. This will lock up the blade and prevent it from completing its stroke, damaging or possibly breaking the oscillating mechanism. Use a slight “back and forth” or “side to side” motion when cutting. This will keep the cut wide enough to permit the blade to complete its stroke and maintain speed. Continuous stalling of the motor will cause rapid heating of the handpiece.

Avoid using a saw as a lever to complete a bone fracture. Also, take special care when making curved cuts to avoid locking the blade. Always keep the blade free to complete its stroke. When running a saw at full speed in free air, the blade may flex or whip at the tip when the speed reaches a resonant frequency. This is a result of the thinness of the blades (which is also a key to their fast cutting ability). Always begin the cut with the throttle set for moderate speed. After establishing the cut in the bone, advance the throttle to full speed. The blade will not flex in the bone.

## INSERTING BLADES, BURS, and TWIST DRILLS

Each handpiece has its own mechanism for attaching the corresponding blades, burs, or twist drills. The following section contains specific instructions for each of the handpieces available with the 2000 and 1000 Series instrument systems.

### 1140, 1930, and 2120 Micro Drills

The Micro Drill handpiece is the workhorse of small bone surgery. It is used for bone sculpting, drilling, wire passing, and reaming the intramedullary canals of small bones. This medium speed, high torque unit comes standard with a built-in, medium-length bur guard.

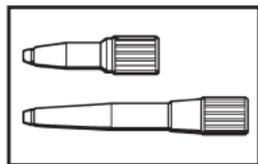
MicroAire Micro Drills will accept the MicroAire ZB 100, 200, and 300 Series burs. If other burs are used, make certain that they are designed for use in orthopedic or oral surgery. The bur shaft diameter must be within the range of .0919" (2.3mm) to .0928" (2.4mm).

**WARNING:** If burs of insufficient diameter are used, they may slip under load, resulting in rapid overheating, or, they may eject at great velocity, causing harm to patients or personnel.

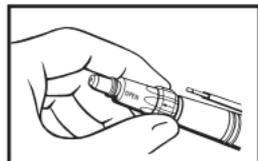
When using long or extra long burs, use the corresponding long (1100-005) or extra-long (1100-006) bur guard to prevent whipping or shattering of burs.

To insert a bur into a Micro Drill handpiece:

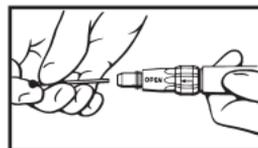
1. If using the throttle-lever handpiece, move the safety lock to . If using the handpiece with the foot control, take care to ensure that the foot control is not activated accidentally while inserting the bur.



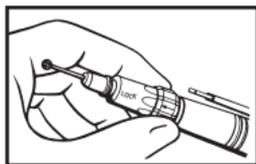
2. If using long or extra long burs, use the long (1100-005) or extra long (1100-006) bur guard.



3. Twist the collet to the  position.



4. Insert the bur.



5. Twist the nose collet to the  position.

**WARNING:** Collet must be in full  position to prevent overheating of the instrument.

6. Pull on the bur to make sure it does not slip loose.

**WARNING:** DO NOT run drill without a bur or drill will overheat.



Operating speed:  
30,000 RPM  
Torque:  
7.0 in. oz min.

# Pneumatic Handpieces

## 2130, 2910 and 2950 High Speed Drills

The High Speed Drill handpiece is a well-balanced, high performance drill that provides high speed for bone sculpting, along with power for difficult osteotomies.

MicroAire High Speed Drills will accept the MicroAire ZB 100 and 200 Series burs. If other burs are used, make certain that they are designed for use in orthopedic or oral surgery. The bur shaft diameter must be within the range of .0919" (2.3mm) to .0928" (2.4mm).

**WARNING:** If burs of insufficient diameter are used, they may slip under load, resulting in rapid overheating, or, they may eject at great velocity, causing harm to patients or personnel.

**WARNING:** DO NOT use burs with head diameter larger than 4.0 mm (.15"), as they may break and cause injury. Do not use twist drills.

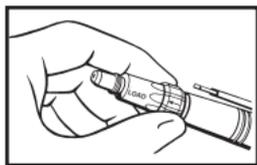
The High Speed Drills come with a medium length bur guard. When using long or extra-long burs in the 2130 drill use the long bur guard (2910-011) or extra-long bur guard (2910-019) to prevent whipping or shattering of burs. When using long or extra-long burs in the 1910 drill, use the long bur guard (1910-011) or extra-long bur guard (1910-019).

To insert a bur into a High Speed Drill handpiece:

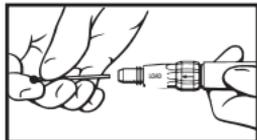
1. If using the throttle-lever handpiece, move the safety lock to . If using the handpiece with the foot control, take care to ensure that the foot control is not activated accidentally while inserting the bur.
2. If using long burs, unscrew the medium bur guard from the end of the nosepiece and replace with the long bur guard. If using extra-long burs, use the extra-long bur guard.



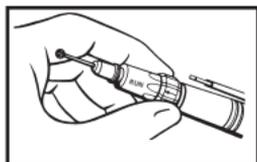
Operating speed:  
90,000 RPM  
Torque:  
2.5 in. oz min.



3. Twist the collet to the  position.



4. Insert the bur.



5. Twist the nose collet to the  position.

**WARNING:** Collet must be in full  position to prevent overheating of the instrument.

6. Pull on the bur to make sure it does not slip loose.

**WARNING:** DO NOT run drill without a bur or drill will overheat.

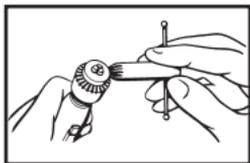
## 1980 Jacobs Style Drill

The 1980 Jacobs Style Drill handpiece is a low-speed, very high torque drill. By simply attaching this head module to a motor module, it is possible to use Jacobs style twist drills without changing to a wire/pin driver.

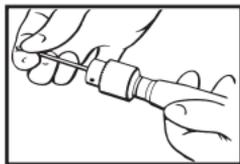
The Jacobs Style Drill Head handpiece accepts MicroAire 8051 and 8054 Series Jacobs style twist drills with diameters between 1.0mm (.039") and 4.0mm (.15"), up to 127mm (5") in length.

To insert a twist drill into the 1980 Jacobs Style Drill handpiece:

1. If using the throttle-lever handpiece, move the safety lock to . If using the handpiece with foot control, take care to ensure that the foot control is not activated accidentally while inserting the drill bit.



2. Using a Jacobs chuck key, open the chuck to the desired size.



3. Insert the twist drill, making sure that it seats properly.

4. Tighten the Jacobs chuck using the Jacobs chuck key.

5. Being careful of sharp drill flutes, pull on the drill bit to make sure it does not slip loose.



Operating speed:  
1,670 RPM  
Torque:  
135 in. oz min.

# Pneumatic Handpieces

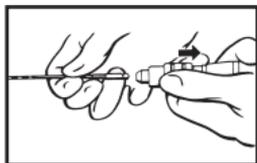
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## 1990 A.O. Synthes Style Drill

The 1990 A.O. Synthes Style Drill handpiece is a low-speed, very high torque drill that allows the use of A.O. Synthes style twist drills.

The 1990 A.O. Synthes Style Drill handpiece accepts any MicroAire 8053 Series quick coupling twist drills with diameters between 1.1mm (.05") and 3.5mm (.14"), up to 127mm (5") in length.

To insert a twist drill in to the A.O. Synthes Style Drill handpiece:



1. If using the throttle-lever handpiece, move the safety lock to . If using the handpiece with foot control, take care to ensure that the foot control is not activated accidentally while inserting the drill bit.

2. Retract the collar at the front of the handpiece.
3. Insert a quick connect A.O. Synthes type twist drill.
4. Make sure the drill is fully inserted and seated.
5. Release the collar to lock the drill in place.

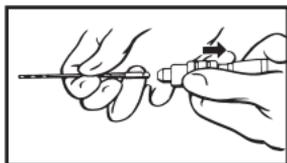


Operating speed:  
1,670 RPM  
Torque:  
135 in. oz min.

## 1991 A.O. Synthes Style Micro-Mini Drill

The 1991 A.O. Synthes Style Micro-Mini drill is a low-speed, high torque drill that allows the use of smaller drill bits. The 1991 drill accepts any MicroAire 2155 series drill bits, as well as other latch-style drill bits. Maximum recommended diameter used is 3.0mm.

To insert a twist drill into the A.O. Synthes Style Drill handpiece:



1. If using the throttle-lever handpiece, move the safety lock to . If using the handpiece with foot control, take care to ensure that the foot control is not activated accidentally while inserting the drill bit.

2. Retract the collar at the front of the handpiece.
3. Insert a latch type twist drill.
4. Make sure the drill is fully inserted and seated.
5. Release the collar to lock the drill in place.
6. Being careful of sharp drill flutes, pull on the drill bit to make sure it does not slip loose.

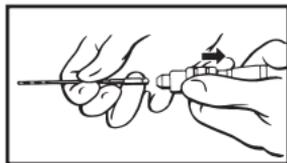


Operating speed:  
1,670 RPM

## 1992 A.O. Synthes Style Quick-Hex Drill

The 1992 A.O. Synthes Style Quick-Hex drill is also a low-speed, high torque drill. This 1992 drill allows the surgeon to use a power screwdriver for inserting hex-style screws. The hex-style screwdriver drills can be purchase from A.O. Synthes. Maximum recommended diameter used is 2.0mm.

To insert a twist drill into the A.O. Synthes Style Drill handpiece:



1. If using the throttle-lever handpiece, move the safety lock to . If using the handpiece with foot control, take care to ensure that the foot control is not activated accidentally while inserting the drill bit.

2. Retract the collar at the front of the handpiece.
3. Insert a Quick-Hex A.O. Synthes type drill.
4. Make sure the drill is fully inserted and seated.
5. Release the collar to lock the drill in place.
6. Being careful of sharp drill flutes, pull on the drill bit to make sure it does not slip loose.



Operating speed:  
1,670 RPM

# Pneumatic Handpieces

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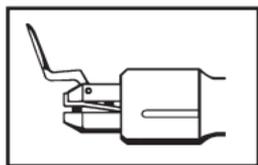
## 1220 and 1922 Sagittal Saw

The Sagittal Saw handpiece offers good control, power, and maneuverability for cutting transverse or wedge osteotomies.

The Sagittal Saw handpiece can be used with a variety of ultra-thin, .3mm (0.10"), straight, angled, bent, or offset blades, such as MicroAire's 1200 Series blades.

To insert a blade into the Sagittal Saw handpiece:

1. If using the throttle-lever handpiece, move the safety lock to . If using the handpiece with the foot control, take care to ensure that the foot control is not activated accidentally while inserting the blade.



2. Open the blade locking lever to release the floating jaw.

3. Insert the blade between the floating jaw and the indexing pin.

4. Fit the hole in the blade over the indexing pin.

5. Close the locking lever.

**CAUTION:** The blade hole must be seated over the indexing pin. If it is not, the head will be damaged when the locking lever is closed.

**DO NOT** force the locking lever if excessive resistance is felt.

Operating speed:  
30,000 CPM  
Stroke: 6°

## 1950 Zimmer Style Sagittal Saw, Keyless

The Zimmer Style Sagittal Saw handpiece is a powerful, heavy-duty saw for transverse or wedge osteotomies.

The Zimmer Style Sagittal Saw is designed to drive longer, larger ZS Series sagittal saw blades. The blade can be positioned at any point along a 180° arc providing good visibility and optimal approach.

To insert a blade into the Zimmer Style Sagittal Saw handpiece:

1. If using the throttle-lever handpiece, move the safety lock to  $\hat{m}$ . If using the handpiece with the foot control, take care to ensure that the foot control is not activated accidentally while inserting the blade.
2. Depress push button and insert the blade between the two jaws making sure that the blade is fully seated over the indexing pins.
3. Release push button.



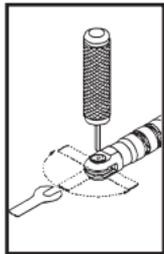
Operating speed:  
18,000 CPM  
Stroke: 7°

## 2250 Zimmer Style Sagittal Saw

The Zimmer Style Sagittal Saw handpiece is a powerful, heavy-duty saw for transverse or wedge osteotomies.

The Zimmer Style Sagittal Saw is designed to drive longer, larger ZS Series sagittal saw blades. The blade can be positioned at any point along a 180° arc providing good visibility and optimal approach.

To insert a blade into the Zimmer Style Sagittal Saw handpiece:



1. If using the throttle-lever handpiece, move the safety lock to "SAFE". If using the handpiece with the foot control, take care to ensure that the foot control is not activated accidentally while inserting the blade.
2. Insert the hex driver.
3. Turn the hex driver counterclockwise until there is a slight resistance.

4. Insert the blade in the space between the two jaws, making sure that the blade is fully seated.

5. Turn the hex driver clockwise to lock the blade.

6. Run the instrument for 10 seconds then retighten blade with hex driver.

**CAUTION: DO NOT** overtighten.



Operating speed:  
18,000 CPM

# Pneumatic Handpieces

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## 1400 and 1945 Reciprocating Saw

The powerful, quick cutting Reciprocating Saw handpiece is the instrument of choice for shaping, contouring, and preparing intramedullary canals of small bones.

The Reciprocating Saw accepts a variety of specially designed thin blades (including any of MicroAire's small 1400 Series blades or ZR blades) and rasps (including MicroAire's ZR Series rasps).

To insert a blade into the Reciprocating Saw handpiece:

1. If using the throttle-lever handpiece, move the safety lock to . If using the handpiece with the foot control, take care to ensure that the foot control is not activated accidentally while inserting the rasp/blade.
2. Unscrew the locking collar two to four turns for a saw blade, four to six turns for a rasp.
3. Insert the rasp/blade, making sure it is fully seated.
4. Lock the rasp/blade by screwing the collar down until it is tight.
5. Pull the rasp/blade to check for tightness.
6. Run the instrument for 10 seconds then retighten collar.

**NOTE:** If a rasp becomes loose when the handpiece is running, it was not seated properly. Move the rasp from side to side several times, and then retighten the locking collar.

**WARNING:** When operating the saw, be careful to retract or protect the patient's tissue near the locking collar. Pinching the tissue between the collar and the body of the instrument can cause a severe bruise or friction burn.



Operating speed:  
16,000 CPM  
Stroke: 2.5mm

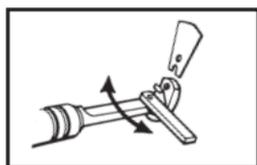
## 1700, 1710 and 1970 Oscillating Saw

The Oscillating Saw handpiece is useful for precise curves and straight osteotomies. The 1970 has an extended head for procedures where extra length provides better visibility.

The Oscillating Saw handpiece accepts MicroAire 1700 Series saw blades, which are extra-thin blades with 36 teeth per inch in either a straight or bent style.

To insert a blade into the Oscillating Saw handpiece:

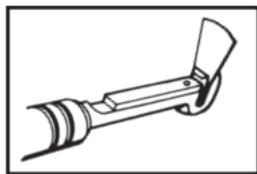
1. If using the throttle-lever handpiece, move the safety lock to . If using the handpiece with the foot control, take care to ensure that the foot control is not activated accidentally while inserting the blade.



2. Open the blade locking lever to release the floating jaw.

3. Insert the blade between the floating jaw and the indexing pin.

4. Fit the hole in the blade over the indexing pin.



**CAUTION:** The blade hole must be seated over the indexing pin. If it is not, the head will be damaged when the locking lever is closed. **DO NOT** force the locking lever if excessive resistance is felt.

5. Close the locking lever.



Operating speed:  
30,000 CPM  
Stroke: 6°

## 1740 and 1972 Oscillating Saw

This saw was specially designed for foot surgery.

A wide selection of straight, bend, and arc cutting blades (MicroAire's ZO Series blades) are available for this special purpose handpiece.

To insert a blade into the Oscillating Saw handpiece:

1. If using the throttle-lever handpiece, move the safety lock to .

If using the handpiece with the foot control, take care to ensure that the foot control is not activated accidentally while inserting the blade.

2. Loosen the head nut with the 1745-001 locking tool.

3. Insert the blade behind the washer (the washer goes next to the head nut) in any desired position.

4. Tighten the nut, and then pull on the blade to check the tightness.

5. Run the instrument for 10 seconds then retighten nut.

**NOTE:** Blade must be placed behind the washer or instrument will be damaged.



Operating speed:  
30,000 CPM  
Stroke: 6°

# Pneumatic Handpieces

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## 1976 Oscillating Saw

The 1976 Oscillating Saw handpiece was specially designed for foot surgery.

A wide selection of straight, bent, and arc cutting blades (MicroAire's ZS Series oscillating blades) are available for this special purpose handpiece.

To insert a blade into the Oscillating Saw handpiece:

1. If using the throttle-lever handpiece, move the safety lock to . If using the handpiece with the foot control, take care to ensure that the foot control is not activated accidentally while inserting the blade.
2. Unscrew the collar and insert the blade between the two jaws, making sure that the blade is fully seated over the indexing pins.
3. Lock the blade by screwing the collar until it is finger tight.

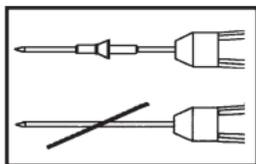


Operating speed:  
24,000 CPM  
Stroke: 8°

## 2600 Wire Driver

The 2600 Wire Driver was designed for small bone surgery only. There is no reverse mode.

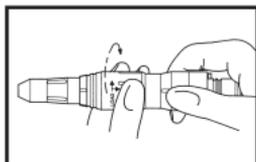
The 2600 Wire Driver accepts four standard sizes of K-wires, from .028" (.7mm) to .062" (1.6mm) in diameter, like the MicroAire 1600 Series K-wires. These K-wires are 5 1/2" (140mm) in length and are packaged with matching wire guides. Or, use any standard K-wire up to 6" (152mm) in length with the appropriate MicroAire wire guide to hold and center the wire properly. Always use a new plastic wire guide of the proper size to fit the wire.



**WARNING:** Do not use threaded K-wires, C-wires, or cut wires.

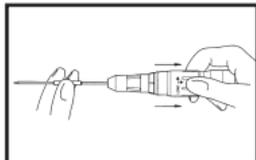
To insert a wire into the 2600 Wire Driver handpiece:

1. If using the throttle-lever handpiece, move the safety lock to . If using the handpiece with the foot control, take care to ensure that the foot control is not activated accidentally while inserting the wire.



2. Gently turn the collet clockwise until it stops in the "LOAD" position.

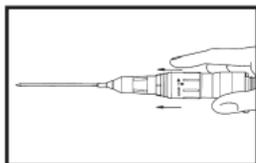
3. Making sure that the correct end is inserted into the handpiece, use a twisting action to insert the wire guide into the nose of the handpiece. Do not actuate the throttle without a wire inserted.



4. Retract the collet located at the front of the wire driver and insert a clean K-wire.

5. Release the collet to hold the wire in place.

6. Test the wire gripping mechanism by aiming the handpiece downward, away from other personnel.



**WARNING:** NEVER aim the 2600 Wire Driver at a person and actuate the throttle.

To advance the wire, make sure that the collet is in the "LOAD" position, then pull back on the handpiece. The wire will automatically advance. The automatic grip mechanism of the 2600 Wire Driver securely holds the wire while it is being driven.

To remove a wire that has been inserted into bone, gently turn the collet until it stops in the "RETRIEVE" position. Depress the lever and pull back to remove the wire. Do not reuse the wire during retrograde wire driving procedures.

**CAUTION:** Remove the wire guide immediately after surgery. This is very important. If the guide is broken off inside the nose during cleaning or sterilization, the broken part cannot be removed except at the factory.

Operating speed:  
14,000 RPM  
Torque:  
32 in. oz min.

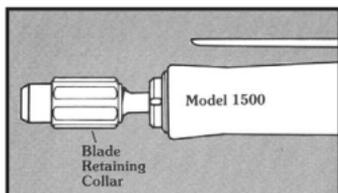
# Pneumatic Handpieces

## 1500 Micro Osteotome

This handpiece contains a special linear impulse motor that impacts the output shaft at high speed. The result is a unique combination of power and sensitivity with almost no movement of the blade. Because of the high energy of the impact hammer, the retaining collar will generate heat after approximately 30 seconds of running time. However, there is no heating at the blade tip.

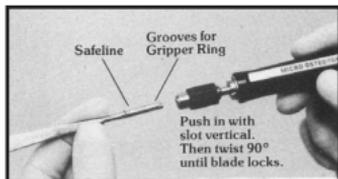
To insert a blade into the Micro Osteotome handpiece:

1. Before inserting or removing a blade, move the safety lock on the throttle lever to "SAFE".



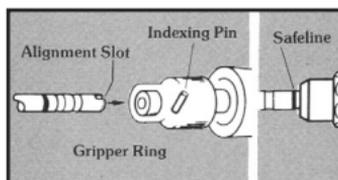
2. Unscrew the retaining collar 1 or 2 turns only.

3. Insert blade into the collar with the blade slot vertical. Then twist the blade until you feel the slot slip over the indexing pin. Then tighten the collar firmly.



**NOTE:** A moderate insertion force is required to overcome the resistance of the friction gripper ring in the retaining collar.

**NOTE:** Check to ensure that the blade is fully inserted to the safeline on the collar by attempting to twist the blade in the collar. If you can rotate it freely, it is not seated over the indexing pin. Reinsert.



### OPERATION

During operation, there is no visible movement of the blade (the impact hammer inside the handpiece moves). The cutting action is controlled by the pressure you exert through the handpiece.

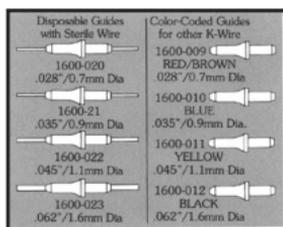
**NOTE:** If you desire slower cutting action, you may reduce the nitrogen pressure anywhere between 30-100 p.s.i. (2-7 kg/cm<sup>2</sup>). The Osteotome will function within this range of pressure.



## 1620 and 1625 Pencil Grip Wire Drivers

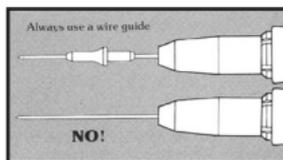
The 1620 Pencil Grip Wire Driver is a precision instrument for small bone surgery only (e.g., fingers, toes, or face). It has no reverse. The 1625 Pencil Grip Wire Driver is a cannulated version of the 1620. It will take K-wires up to 9" in length.

The Micro Wire Driver accepts special MicroAire 1600-020 series 5 1/2" (140 mm) K-wires with matching plastic guides that hold and center the wire. The four wire sizes available are .028", .035", .045", and .062" (0.7 to 1.6 mm). MicroAire K-wires and matching guides are packed together, ready for use. The wire is gripped automatically when the throttle is actuated. Do not use threaded wire, C-wire, or cut-off wires.



To insert a K-wire into the Pencil Grip Wire Driver:

1. Always use a fresh plastic wire guide that holds the wire with a light friction grip.
2. Be certain the wire is clean. During retrograde wire driving procedures, clean the wire to remove debris before reinserting it into the handpiece.
3. Insert the wire guide using a twisting action.
4. Test the wire gripping mechanism by aiming the handpiece downward, away from personnel.



Operating speed:  
3,000 RPM

**WARNING:** Never ever aim the wire driver hand piece at a person and actuate the throttle. If an air seal is damaged, or excessive air pressure is used, the wire can be forcibly ejected from the handpiece.

5. Do not actuate the throttle without a wire inserted.

**CAUTION:** Remove the wire guide immediately after surgery. If the guide is broken off inside the nose during cleaning or sterilization, the broken part cannot be removed except at the factory.

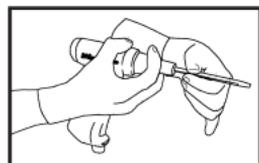
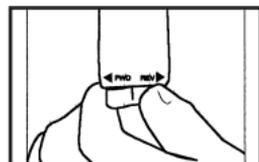
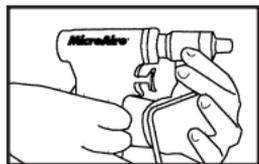
# Pneumatic Handpieces

## 6640 SmartDriver

The SmartDriver is a modular wire driver with attachments for pinning and drilling. The system includes a handpiece, an automatic wire collet for K-wires up to .062" (1.6mm), an automatic pin collet which accepts pins up to .125", a Jacobs chuck, a Synthes chuck, a Trinkle chuck, a high torque Jacobs chuck, a sagittal saw attachment, reciprocating saw, Zimmer and Hudson reamers.

To insert a K-wire or Steinmann pin into the 6640 SmartDriver:

1. Make sure safety lock is on by turning trigger button to either side.
2. Snap wire or pin collet into the nose of the handpiece.
3. Insert wire or pin into the front of the handpiece.
4. Screw the wire guard into the back of the handpiece to protect the operator from the point of the wire or pin.
5. Select "Forward" or "Reverse" on the bottom of the instrument.



9. Depress the release button on the top of handpiece and pull the chuck out.

To use the Jacobs chucks:

1. Make sure safety lock is on by turning trigger button to either side.
2. Snap Jacobs chuck into nose of handpiece.



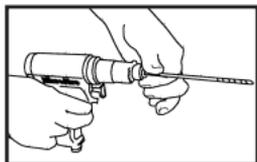
Operating speed:  
1600 RPM  
Torque:  
135 in. oz min.

6. Move the trigger button out of the "LOCK" position by positioning it straight up and down.
7. Squeeze the wire/pin advance lever and hold it down.
8. Depress the trigger to drive the wire/pin. The trigger is pressure sensitive so it allows variable speed operation.
9. To obtain additional wire or pin length, release the wire/pin advance lever and trigger and pull back on the instrument. Then squeeze the wire/pin advance lever and the trigger to drive the wire.
10. To remove threaded wires or pins, put the instrument in "Reverse", squeeze the wire/pin advance lever and then depress the trigger.
11. To release the wire or pin collet, put the trigger in the "LOCK" position.
12. Depress the release button on the top of the handpiece and pull the collet out.

To use the Synthes or Trinkle chuck:

1. Make sure safety lock is on by turning trigger to either side.
2. Snap Synthes or Trinkle chuck into the nose of the handpiece.
3. Pull back on chuck collar and insert drill.
4. Release collar and insure that the drill is fully seated.
5. Select "Forward" or "Reverse" on the bottom of the instrument.
6. Move the trigger out of the "LOCK" position by positioning it straight up and down.
7. Depress the trigger.
8. To remove chuck, put trigger in the "LOCK" position by rotating it to the side.

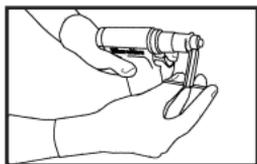
3. Turn ridged collar of chuck to open chuck.
4. Insert drill into chuck.
5. Use Jacobs chuck key to lock drill into place.
6. Select "Forward" or "Reverse" on the bottom of the instrument.
7. Move the trigger button out of the "LOCK" position by positioning it straight up and down.
8. Depress the trigger.
9. To remove the chuck, place handpiece trigger in "LOCK" position.
10. Use chuck key to unlock Jacobs chuck. Remove drill.
11. Depress release button on top of handpiece and pull out chuck.



To use the Sagittal Saw Module:

1. Move the trigger button to the "LOCK" position by turning trigger button to either side.
2. Snap Sagittal Saw Module into nose of handpiece.
3. Insert the hex driver.
4. Turn the hex driver counterclockwise until there is a slight resistance.
5. Insert the blade in the space between the two jaws, making sure that the blade is fully seated.
6. Turn the hex driver clockwise to lock the blade.

CAUTION: Do not overtighten.



7. Move the trigger button out of the "LOCK" position by positioning it straight up and down.

8. Depress the trigger to activate the instrument.
9. To remove the blade, insert the hex driver.
10. Turn the hex driver counterclockwise until blade can be removed.
11. To remove the Sagittal Saw Module from the handpiece, place handpiece trigger in "LOCK" position.
12. Depress release button on top of handpiece and pull out Sagittal Saw Module.

# Pneumatic Handpieces

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## GENERAL WARNINGS

Eye protection must be worn when operating any power equipment. Dislodged burs, blades, or bone fragments can result in eye injury, blindness, or contamination of the eye from patient tissue or body fluids.

### 1. Check the power supply.

**CAUTION:** It is essential to dry and filter compressed air because the air lines frequently contain oil vapors, moisture and bacteria.

a. Make sure that the type of air hose matches the connector on the handpiece (Zimmer/Zimmer, 3M/3M, etc.). Note that a MicroAire connector will accept only the MicroAire 9000-000 air hose.

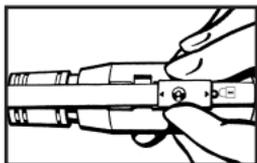
b. Check that the main storage tank gauge indicates a minimum of 500 p.s.i. (35kg/cm<sup>2</sup>) Set the output gauge to indicate 80-100 p.s.i. (5.5-7 kg/cm<sup>2</sup>) with the handpiece running at full throttle. Do not allow the output pressure to exceed 115 p.s.i. (8 kg/cm<sup>2</sup>). If there is a wall or ceiling mounted air system, and the air hose is longer than 3 meters, the air pressure must be increased by 1.5 p.s.i. (.01 kg/cm<sup>2</sup>) for each additional meter of hose length. This may require the gauge to indicate 115 to 130 p.s.i. when the handpiece is not running. If the handpiece runs slowly and lacks power, it is probably not getting enough air pressure.

### 2. Check saw blades, drills, and/or burs. Make sure that blades, drills, and/or burs are not dull or bent, and that they lock correctly into the handpiece.

### 3. Inspect and test the handpiece.

a. Inspect the handpiece for damage, or corrosion, or excessive wear.

**WARNING:** If any corrosion or debris is broken loose into the instrument, it must be considered contaminated. Either replace it immediately or remove it from the sterile field and reprocess.



b. Check the safety lock and lever on the handpiece. Make sure that, when the safety lock is on , it prevents activation of the motor. Make sure that the throttle does not stick in the full "ON" or  position. If it has any tendency to stick, reclean and resterilize it. If it continues to stick, send it back to the factory for repair.

c. With the blade, bur, or drill bit attached, test run the instrument in the sterile field for 3 10-second intervals, checking for any indication of irregular speed, noise, or excessive heat or vibration. Irregular grinding noises may indicate impending failure or overheating of the handpiece.

### 4. Check for excessive heat.

**WARNING:** Excessive heat is the greatest potential cause of patient injury. Any power instrument is subject to overheating, especially in the nose section. Even normal operation of the system in a cycle other than 1 minute "ON" and 4 minutes "OFF" may cause the handpiece to become hot.

Surgical usage, cleaning, and sterilization can be destructive to instruments for several reasons:

- Blood deposits, saline, and bone fragments often enter the forward section of the hand piece during operation. Saline causes corrosion, and blood produces restrictive deposits.
- Repeated sterilization removes grease from the bearings, and leaves mineral deposits on moving parts. Regular maintenance is recommended to replace bearings, seals, and “o” rings.
- The force of cutting produces wear on bearings and oscillating mechanisms.
- Powered surgical instruments operate at high speed without regular maintenance.

These conditions will eventually cause overheating or total failure of the instrument.

To check for overheating, test run the handpiece for approximately 30 seconds. Periodically monitor the temperature of the nose section. The temperature should not rise above 115°F and nose should not become uncomfortable to touch with gloved fingers.

# Pneumatic Handpieces

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## TROUBLESHOOTING

### 1. Difficulty Inserting Air Hose

- a. Make sure that the type of air hose matches the connector on the handpiece (Zimmer/Zimmer, 3M/3M, etc.). Note that a MicroAire connector will accept only a 9000-000 small instrument air hose.
- b. Autoclaving can cause the O-ring inside the hose connector to become dry. Apply a small amount of sterile lubricant and/or sterile water around the distal end of the air hose connector.
- c. The connector or hose fitting could be bent. Try another handpiece to isolate the problem.

### 2. The Handpiece Will Not Start

- a. Check to see that the safety lock is off.
- b. Be sure that the air pressure is actually reaching the handpiece. Disconnect and reinsert the air hose. Listen for the air pressure “pop” sound.
- c. Make sure that the regulator pressure is set between 80-100 p.s.i. (5.5-7 kg/cm<sup>2</sup>), and that the main tank has at least 500 pounds of pressure.
- d. Make sure that the air hose connector is fully inserted and locked into the nitrogen regulator. Remove and reinsert it.
- e. Disconnect the air hose and try to manually move the attachment. Then reconnect the air hose, and see if the handpiece will start.
- f. Test another head module on the same motor. Then reconnect the air hose, and see if the handpiece will start. If not, test another motor on the head module. This will isolate the problem to the head module, the motor, or the air supply.

### 3. The Handpiece Runs Slowly or Lacks Power

**CAUTION:** If the handpiece runs slowly or irregularly, be alert for the possibility of overheating or other malfunctioning.

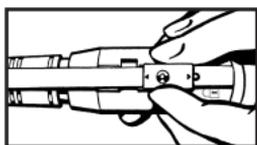
- a. The nitrogen tank may be almost empty. It should have a minimum of 500 pounds on the main tank gauge. Also, open the main tank valve several turns in case the flow is restricted.
- b. Check the regulator pressure gauge with the handpiece running. It should indicate 80-100 p.s.i. (5.5- kg/cm<sup>2</sup>) when using a 3-meter air hose. The regulator pressure should be increased by 1.5 p.s.i. (0.1 kg/cm<sup>2</sup>) for each additional meter of hose length.

## ROUTINE CLEANING/DECONTAMINATION

Dried blood, saline, and other deposits inside the handpiece are a major cause of equipment malfunction. Proper cleaning and inspection prior to sterilization will avoid delays during the surgical procedure.

**CAUTION:** The handpiece is sensitive to moisture. **DO NOT** immerse the handpiece in saline, disinfectant, or any other liquid. **DO NOT** use an ultrasonic cleaner or any other automated cleaning equipment, such as washer/decontaminators or washer/sterilizers. Ultrasonic cleaning, in particular, can damage the bearings in the handpieces, potentially resulting in overheating or seizure.

### 1. Disassemble and transport to the decontamination area.



- If using the throttle lever handpiece, slide the safety lock to the  position. If using the throttleless handpiece, unplug the foot control.
- Remove and discard used saw blades, burs, and drills after use, handling them as any contaminated sharp instrument is handled. Reuse of the saw blades and burs is not recommended.

### 2. Clean the device immediately, using an appropriate detergent solution.

- Immediate decontamination protects personnel and prevents transmission of pathogens.
- Make sure the air hose is connected to the handpiece to keep detergent solution and water out of the motor.
- Clean the air hose thoroughly with warm water, mild detergent, and a soft brush. Pay vigorous attention to crevices.

### 3. Use a cannulation brush on cannulated handpieces.



- Clean the cannulated shaft of wire drivers with the small cylindrical wire driver cannulation brush (9600-063).
- Remove bur guard from drills.
- Clean inside drill collets and bur guards with the drill cannulation brush (9600-064).

### 4. Flush the noses of drills and wire drivers with a Water-Pik. Flushing removes blood, debris, and saline deposits.

### 5. Rinse air hose. With the air hose connected, rinse components under running water to remove all traces of detergent solution. If possible, use distilled water for the final rinse.

### 6. Dry. Disconnect the air hose from the handpiece. Dry all the components with a lint-free towel.

### 7. Lubrication of head modules. **DO NOT** lubricate or oil the handpieces. Lubrication will clog the motor and prevent it from starting. Also take special precautions to avoid the use of cleaners which contain lubrication.

### 8. Accidental immersion. If a handpiece is accidentally immersed in saline, disinfectant, cleaning fluid, or any other corrosive substance, take the following steps to save the handpiece.

- Totally immerse the handpiece in distilled water for 1 minute to dilute the corrosive fluid. **DO NOT** allow the water to dry in the handpiece.

- Immediately after soaking, steam sterilize in a prevacuum sterilizer at 270°F(132°C) for 4 minutes followed by an 8 minute drying time. Sterilizing will dry out the handpiece, avoid rusting, and prevent contamination from collecting in the motor.

# Pneumatic Handpieces

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## STERILIZATION

MicroAire's powered surgical instruments (including handpieces, and irrigation tubing) are normally sterilized by steam, using either a gravity displacement or prevacuum sterilizer.

### 1. Sterilization parameters

Sterilizers vary in design and performance parameters. Verify cycle parameters against the written instructions of the sterilizer and container manufacturers. Prevacuum sterilization is the preferred method of sterilization for powered surgical instruments because it allows for rapid sterilization of the internal components. The following are suggested sterilization parameters for MicroAire's 1000 Series instruments, using the wrapped or unwrapped method:

a. Prevacuum Steam Sterilization:

4 minutes at 270°F(132°C), 8 minutes drying time.

b. Gravity displacement steam sterilization:

35 minutes at 270°F(132°C), 8 minutes drying time.

NOTE: DO NOT run instruments while warm. Cool by exposure to room temperature.  
DO NOT immerse in liquid to cool.

### 2. Flash sterilization

Flash sterilization is NOT recommended for the sterilization of powered surgical instruments because it does not result in internal sterilization of the instrument.

### 3. Ethylene Oxide Sterilization.

Ethylene is NOT recommended for powered surgical instruments because lengthy aeration time is needed to assure that no ethylene oxide is left in the internal mechanisms or on the surface of the instrument.

### 4. Washer/Sterilizer

DO NOT process powered surgical instruments in a washer/sterilizer. The washer cycle will damage the motor and other internal components. The sterilization cycle is too short to ensure internal sterilization of the instrument. In addition, this type of equipment does not have a drying cycle which is required for powered surgical instruments.

### 5. Peracetic Acid

DO NOT process powered surgical instruments in equipment that uses peracetic acid as a liquid sterilant.

# MicroAire Instructional Manual

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## SERVICE AND REPAIRS

Periodic inspection and factory-authorized service is essential to keep precision MicroAire instruments running properly. If repairs are required, they can be accomplished quickly and with a minimum of disruption to the hospital's schedule.

### IN-HOSPITAL SERVICE

All MicroAire equipment should be inspected and tested periodically in accordance with the facility's bioengineering policy. Such service should be documented within the bioengineering department.

### MICROAIRE REPAIR SERVICE

Responsive service comes with every MicroAire product. If a problem arises, contact our Customer Service Department at:

Telephone	FAX	EMAIL
800) 722-0822	(434) 975-4131	repairs@microaire.com
(434) 975-8000	(800) 648-4309	

We may be able to help solve the problem quickly without returning the item to the factory. **DO NOT** disassemble or attempt to service the equipment. It can only be serviced at the factory or by factory-trained technicians. Unauthorized service will void the warranty or void the product liability coverage.

To return an item to the factory, follow this procedure:

1. Clean and sterilize equipment before sending in for repair.
2. Along with the items sent for repair, enclose a description of the problem encountered, the type of use, the place of use, a contact name, and a telephone number. This information is helpful to our repair technicians.
3. If the instrument is out of warranty, enclose a purchase order number with the instrument. If the instrument is under warranty, include the purchase date.
4. In the United States, ship the merchandise by Express Mail, Federal Express, or UPS Blue Label to prevent shipping delays. From outside the United States, return goods by Federal Express or Air Freight.
5. Return the merchandise prepaid.
6. If an estimate of repair costs is needed before repair technicians start work, include the name and telephone number of the person to contact.
7. We will repair and reship the item by Federal Express 2nd Day Air within the United States and by Federal Express or Air Freight outside the U.S. unless specified otherwise.

### PERIODIC INSPECTION

Because of the stressful nature of surgical usage, decontamination, and sterilization, we recommend that all equipment be returned to the factory for routine inspection and service at least once a year. There is no charge for this service during the warranty period.

### WARRANTY

MicroAire Surgical Instruments, warrants its 1000 and 2000 Series power surgical instruments to be free

# Pneumatic Handpieces

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from defects in material and workmanship in their manufacture for a period of 1 year from the original purchase date by the end customer. The warranty is limited to the repair or replacement of the product without charge.

This warranty is void in the event of abuse, misuse, or use in other than a normal surgical environment, or in the event of disassembly, alteration, or repair of the product not authorized by Manufacturer, or in the event that the product has not been used in a reasonable manner and in compliance with the written instructions furnished by Manufacturer.

All other expressed or implied warranties and all other warranties of fitness of merchantability are excluded here from, and Manufacturer shall have no liability of any kind for incidental or consequential damages.

## EXTENDED WARRANTY

An extended warranty is available on all MicroAire instruments. If the handpiece is out of warranty, it must be first restored, if necessary, to fully serviceable condition before being eligible for the extended warranty.

## REFERENCES

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Occupational Safety and Health Administration. "Occupational exposure to bloodborne pathogens, final rule." Federal Register 56 (December 6, 1991): 64004-64182.





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