

**MICROAIRE®**

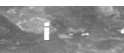


Instructions For Use  
Series 1000 Modular Instruments

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## Series 1000 Modular Instruments Instruction Manual

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-APPLICABLE INSTRUMENT PART NUMBERS -

REF Number	Description
1000-100	MicroAire Pneumatic Motor Module with Throttle MicroAire Hose Connector
1000-200	MicroAire Pneumatic Motor Module with Throttle Hall-Style Hose Connector
1000-300	MicroAire Pneumatic Motor Module with Throttle Linvatec/Hall Mini-Driver Style Hose Connector
1000-400	MicroAire Pneumatic Motor Module with Throttle Stryker-Style Hose Connector
1000-600	MicroAire Pneumatic Motor Module with Throttle Synthes-Style Hose Connector
1050-100	MicroAire Pneumatic Motor Module without Throttle MicroAire Hose Connector
1050-200	MicroAire Pneumatic Motor Module without Throttle Hall-Style Hose Connector
1050-300	MicroAire Pneumatic Motor Module without Throttle Mini-Driver Style Hose Connector
1050-400	MicroAire Pneumatic Motor Module without Throttle Stryker-Style Hose Connector
1050-600	MicroAire Pneumatic Motor Module without Throttle Synthes-Style Hose Connector
1000ET	MicroAire Electric Motor Module with Throttle
1000E	MicroAire Electric Motor Module without Throttle
1922	MicroAire Micro-Sagittal Saw Head Module
1930	MicroAire Micro Drill Head Module
1945	MicroAire Reciprocating Saw Head Module
1950	MicroAire Hall-Style Keyless Sagittal Saw Head Module
1970	MicroAire Micro-Oscillating Saw Head Module
1972	MicroAire Foot Surgery Oscillating Saw Head Module
1976	MicroAire Keyless Foot Surgery Oscillating Saw Head Module
1980	MicroAire Jacobs-Style Drill Head Module
1990	MicroAire Synthes-Style Drill Head Module
1991	MicroAire Synthes Micro-Mini Style Drill Head Module
1992	MicroAire Synthes Quick-Hex Style Drill Head Module
2120-000	MicroAire 20° Angled Micro Drill Head Module
2130-000	MicroAire High-Speed Drill Head Module
2250-000	MicroAire Hall-Style Sagittal Saw Head Module
2600-000	MicroAire Pencil-Grip Wire Driver Head Module

## - INTRODUCTION -

This manual has been written to help describe the procedures required to keep the MicroAire Series 1000 Modular Instruments operating properly.

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

**WARNING:** Used to indicate that the safety of the patient and hospital personnel could be involved.

**CAUTION:** Used to point out special procedures or precautions that must be followed to avoid damaging the system/instrument.

**NOTE:** Used to point out the easiest means of carrying out techniques.

## - GENERAL WARNINGS -

**WARNING:** Use care to ensure that there is no electromagnetic interference between these devices and other devices in use.

**CAUTION:** Federal Law restricts this device to sale by or on the order of a physician (or properly licensed practitioner).

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

**CAUTION:** If the REF 1000-XXX or REF 1050-XXX are run with excessive pressure, the rate of wear and the probability of instrument failure increase significantly.

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

**NOTE:** If using the REF 1000-XXX or REF 1050-XXX motor module, 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. (7 kg/cm<sup>2</sup>). If you have a wall or ceiling mounted air system and the air hose is longer than 10 ft. (3 m), the air pressure must be increased by 10 p.s.i. (0.7 kg/cm<sup>2</sup>) for each additional 10 ft. (3 m) of hose length.

## - DUTY CYCLE -

The Series 1000 Modular Instruments are designed to operate for 1 minute of continuous use, and should be allowed to cool to room temperature before operating the instruments again.

- SYMBOL DEFINITIONS -



**Attention, See instructions for use.**



European Conformity Mark with MicroAire Notified Body Number



**DO NOT** Lubricate



**DO NOT** Immerse



**DO NOT** Expose To Stray Magnetic Fields



Handpiece throttle set to “**SAFE**”  
and/or  
Drill Collet “**LOCK**”



Handpiece throttle set to “**RUN**”  
and/or  
Drill Collet “**UNLOCK**”



Date of Manufacture - YYYY-MM

**REF**

Product Catalog Number

**SN**

Product Serial Number



Temperature Limitations



Humidity Limitations



Atmospheric Pressure Limitations



Authorized European Representative


## - PNEUMATIC SYSTEM SETUP -

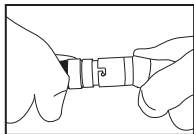
MicroAire Pneumatic instruments are powered by compressed nitrogen. Compressed air is also acceptable, provided the air is dried and filtered to 3 micrometers (3 microns).

1. Inspect the instruments, foot control, and hoses for damage, corrosion, or excessive wear. If any of the components look damaged or show signs of excessive wear, they should not be used.

**WARNING:** If any corrosion or debris is detected in/on the instrument, it must be considered contaminated. Either replace the instrument immediately or remove it from the sterile field and reprocess.

2. Check all surgical accessories. Make sure that they are not dull or bent.
3. Attach the air hose to a compressed air/nitrogen source.

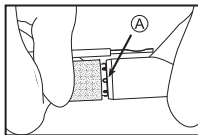
4. Make sure handpiece throttle is set to the  position, and if using the REF 9100-000 foot control, take care to ensure the foot control is not activated accidentally.



5. Attach the air hose to the pneumatic motor module, making sure the hose end is properly seated in the module hose connector.


6. Attach a MicroAire Series 1000 or Series 2000 head module (see page 1 for full listing) to the pneumatic motor module.


- (A)** Make sure the pin(s) on the head module align properly with the motor module locking collar.



7. Insert a surgical accessory into the handpiece. For detailed instructions for a specific handpiece, please refer to the corresponding section as shown in the table of contents inside the front cover of this manual.

8. Confirm the handpiece throttle is functional.


a. Make sure that, when the throttle safety lock is set to  it prevents activation of the motor by the hand throttle or foot control.

b. Make sure that, when the throttle safety lock is set to  it allows activation of the motor by the hand throttle or foot control.

c. Make sure that the throttle does not stick in the fully depressed position. If it has any tendency to stick, reclean and resterilize the handpiece. If the handpiece still does not meet the above requirements, return the handpiece to MicroAire or an Authorized MicroAire Repair Facility for service.

9. With the surgical accessory inserted, test run the instrument in the sterile field for five (5) seconds, checking for any indication of irregular noise, excessive heat, or vibration. Irregular grinding noises may indicate impending failure or overheating of the handpiece. If any irregular grinding noises are present, return the handpiece to MicroAire or an Authorized MicroAire Repair Facility for service.

**WARNING:** Excessive heat is the most likely cause of patient injury. Periodically monitor the temperature of the nose section. The temperature should not rise above 115°F (46°C). If the instrument temperature exceeds 115°F (46°C) please return the handpiece to MicroAire or an Authorized MicroAire Repair Facility for service.

10. Move handpiece throttle to the  position.
11. System is ready for use.



Pneumatic Motor Module with throttle set to "SAFE" position




Pneumatic Motor Module with throttle set to "RUN" position

## - ELECTRIC SYSTEM SETUP -

1. Inspect the handpiece, console, foot control, and cables for damage, corrosion, or excessive wear. If any of the components look damaged or show signs of excessive wear, they should not be used.

**WARNING:** If any corrosion or debris is detected in/on the instrument, it must be considered contaminated. Either replace the instrument immediately or remove it from the sterile field and reprocess.

2. Check all surgical accessories. Make sure that blades and rasps are not dull or bent.
3. Before plugging the console into the wall voltage outlet, check to see that the power switch on the front of the console is in the "OFF" position. Plug the power cord into a Hospital Grade outlet and turn the power switch to "ON" to activate the unit. The console will operate on 100 - 230V~ grounded outlets. Refer to your REF 1020 or REF 1025 console manual for more information.
4. Insert handpiece cable into handpiece cable receptacle on front of console. If using the REF 6401-000 foot control with the REF 1025 console, insert the foot control cable into the foot control cable receptacle on the front of the REF 1025 console.

5. Make sure handpiece throttle is set to the  position, and if using the REF 6401-000 foot control, take care to ensure the foot control is not activated accidentally.



6. Insert handpiece cable into receptacle on rear of handpiece, aligning the red dots on both cable end and receptacle to ensure proper fit.

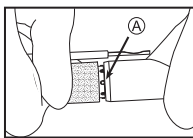
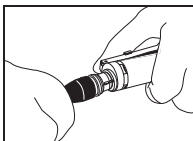
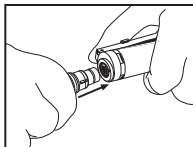
7. Attach a MicroAire Series 1000 or Series 2000 head module (see page 1 for full listing) to the REF 1000E or REF 1000ET electric motor module.

- (A)** Make sure the pin(s) on the head module align properly with the motor module locking collar.

8. Insert a surgical accessory into the handpiece. For detailed instructions for a specific handpiece, please refer to the corresponding section as shown in the table of contents inside the front cover of this manual.

9. Confirm the handpiece throttle is functional.



- a. Make sure that, when the throttle safety lock is set to  it prevents activation of the motor by the hand throttle or foot control.
- b. Make sure that, when the throttle safety lock is set to  it allows activation of the motor by the hand throttle or foot control.
- c. Make sure that the throttle does not stick in the fully depressed position. If it has any tendency to stick, reclean and resterilize the handpiece. If the handpiece still does not meet the above requirements, return the handpiece to MicroAire or an Authorized MicroAire Repair Facility for service.





10. With the surgical accessory inserted, test run the instrument in the sterile field for five (5) seconds, checking for any indication of irregular noise, excessive heat, or vibration. Irregular grinding noises may indicate impending failure or overheating of the handpiece. If any irregular grinding noises are present, return the handpiece to MicroAire or an Authorized MicroAire Repair Facility for service.

**WARNING:** Excessive heat is the most likely cause of patient injury. Periodically monitor the temperature of the nose section. The temperature should not rise above 115°F (46°C). If the instrument temperature exceeds 115°F (46°C) please return the handpiece to MicroAire or an Authorized MicroAire Repair Facility for service.

11. To set the throttle maximum speed at other than 100%:
- Move handpiece throttle to the  position.
  - Fully depress the throttle of the instrument.
  - Use the control knob to set the maximum speed.  
(Constant LED indicates maximum set point).
  - Maximum speed is now set for the desired instrument.
  - Move handpiece throttle back to the  position.

**NOTE:** The operator set value will be reset to 100% when the instrument is removed.

12. Move handpiece throttle to the  position.

13. Pre-use check:

Run instrument for 3 seconds to ensure that the instrument functions properly prior to use.

14. System is ready for use.



Electric Motor Module with throttle set to "SAFE" position



Electric Motor Module with throttle set to "RUN" position

## - PNEUMATIC SYSTEM TROUBLESHOOTING -

### 1. Air Hose is difficult to insert into motor module.


- a. Make sure that the type of air hose matches the connector type on the motor module. The number following the “-” designates the hose connector type.

REF Number Suffix	Air-Hose Type Needed	MicroAire® 10 ft (3m) Hose REF #
-100	MicroAire® Style Air Hose	9000-000
-200	Hall® Style Air Hose	9013-000
-300	Mini-Driver™ Style Air Hose	9014-000
-400	Stryker® Style Air Hose	9017-000
-600	Synthes® Style Air Hose	Not offered by MicroAire

Please refer to MicroAire brochure LIT-STERIL for a full list of pneumatic hoses and accessories.

- b. Steam sterilization may cause the O-ring inside the hose connector to become overly dry. Apply a small amount of sterile lubricant and/or sterile water around the distal end of the hose connector, and attempt to re-insert hose into motor module.
- c. The connector on either the motor module or hose could be damaged. Attempt to use a different hose or handpiece with a similar hose connector to isolate the problem.

### 2. Motor module will not start.

- a. Make sure the throttle is in the  position.
- b. Be sure the air pressure from the source is actually reaching the handpiece. Disconnect and reconnect the air hose to the motor module. Listen for the air pressure “pop” sound.
- c. Make sure 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 p.s.i. (35 kg/cm<sup>2</sup>).
- d. Make sure the air hose is fully inserted and locked into the regulator. Disconnect and reconnect the air hose to the regulator.
- e. Insert a different head module into the motor module, and attempt a different motor module (if available) with the same head module to isolate the problem to the head module, motor module, or air supply.

### 3. Instrument runs slowly and/or lacks power.

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



- a. If using a nitrogen tank, the tank may be almost empty. The main pressure gauge on the tank should show at least 500 p.s.i. (5.5-7 kg/cm<sup>2</sup>). Open the main valve several turns to ensure the air flow is not restricted.
- b. Check the regulator pressure with the instrument running. The gauge should indicate 80-100 p.s.i. (5.5-7 kg/cm<sup>2</sup>) when using a 10 foot (3 meter) air hose. The regulator pressure must be increased by 10 p.s.i. (0.7 kg/cm<sup>2</sup>) for each additional 10 ft. (3 m) of hose length.

## - ELECTRIC SYSTEM TROUBLESHOOTING -


### 1. Handpiece cable is difficult to insert into the handpiece or the console.

- a. Align connectors and receptacles carefully. Make sure the pins on the cable are aligned with the matching holes in the console or handpiece receptacle. This connection is a tight fit to keep particles from getting inside the handpiece.
- b. Make sure the plug is pressed fully into the handpiece and that the “snap lock” is fully engaged.

### 2. Handpiece will not start.

- a. Check that the console is “ON” (the main power switch is in the  position, with the switch illuminated) and the front panel LED’s are illuminated.
- b. Make sure the throttle is in the  position.
- c. Make sure the maximum speed display indicates a maximum speed, and the light over the cable receptacle is illuminated.
- d. Replace the handpiece cable.
- e. Remove the handpiece and plug a different handpiece into the console and cable. If this handpiece runs properly, then return the faulty handpiece to MicroAire or an Authorized MicroAire Repair Facility for service.
- f. If the handpiece does not run properly, return the system (console, handpieces and cables) to MicroAire or an Authorized MicroAire Repair Facility for service.

### 3. Handpiece runs slowly.

- a. Check that the throttle safety lock is all the way in the  position.
- b. Replace the handpiece cable.
- c. Remove the handpiece and plug a different handpiece into the console. If this handpiece runs at the proper speed, return the faulty handpiece to MicroAire or an Authorized MicroAire Repair Facility for service.
- d. If the second handpiece does not run properly, return the system (console, handpieces and cables) to MicroAire or an Authorized MicroAire Repair Facility for service.

### 4. Maximum speed set does not function properly.

- a. Make sure the lever was depressed in the proper sequence.
- b. Try another handpiece in place of the one not adjusting properly.
- c. If the second handpiece runs properly, then return the faulty handpiece to MicroAire or an Authorized MicroAire Repair Facility for service.
- d. If the second handpiece does not run properly, return the system (console, handpieces and cables) to MicroAire or an Authorized MicroAire Repair Facility for service.


## REF 1922 SAGITTAL SAW MODULE INSTRUCTIONS

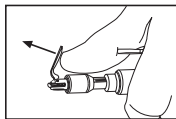
The REF 1922 Sagittal Saw Module offers good control, power, and maneuverability for cutting transverse or wedge osteotomies.

This Sagittal Saw Module can be used with a variety of ultra-thin, 0.3mm (0.010" ), straight, angled, bent, or offset blades, such as MicroAire's 1200 Series blades. Please see MicroAire brochure LIT-2001 for a full listing of these blades..

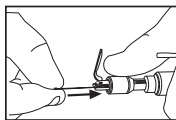
To insert a blade into the REF 1922 Sagittal Saw Module:

**NOTE:** At this point, the head module should be attached to the motor module, and the motor module should be connected to its corresponding power source. The pneumatic or electric power source should be set to "OFF". Please see System Setup for instructions on connecting the motor module to its corresponding power source to the electric console. (p. 4 for Pneumatic / p. 6 for Electric)

1. If using the throttle-lever handpiece, move the throttle 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.

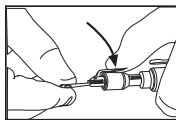


2. Open the blade locking lever to release the floating jaw.



3. Insert the blade between the floating jaw and the indexing pin, making sure to 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.



4. Close the locking lever.

5. Attempt to pull the blade out of the handpiece to confirm it is secure. If the blade can be removed by hand, open the blade locking lever and attempt to insert the blade into the handpiece again.

## REF 1930 MICRO DRILL MODULE INSTRUCTIONS

### REF 2120-000 20° ANGLED MICRO DRILL MODULE INSTRUCTIONS

The REF 1930 / REF 2120-000 Micro Drill handpieces are the workhorses of small bone surgery. They are used for bone sculpting, drilling, wire passing, and reaming the intramedullary canals of small bones. These medium speed, high torque instruments come standard with a built-in, medium-length bur guard.


These drills will accept the MicroAire ZB-100, -200, and -300 Series burs. Please see MicroAire brochure LIT-2001 for a full listing of these accessories. 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).

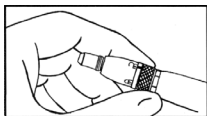
**WARNING:** If burs of insufficient diameter are used, they may slip under load, resulting in rapid overheating, or they may eject at great velocity, potentially causing harm to patients or personnel.

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

To insert a bur into a REF 1930 / REF 2120-000 Micro Drill module:

**NOTE:** At this point, the head module should be attached to the motor module, and the motor module should be connected to its corresponding power source. The pneumatic or electric power source should be set to "OFF". Please see System Setup for instructions on connecting the motor module to its corresponding power source to the electric console. (p. 4 for Pneumatic / p. 6 for Electric)

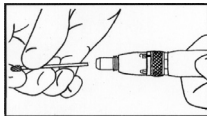
1. If using the throttle-lever handpiece, move the safety lock to . If using the handpiece with the foot control, take care to ensure that the foot control is not activated accidentally while inserting the bur.
2. Remove the silicone cap (if present).




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

4. Twist the collet to the  position.

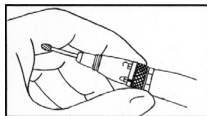
5. Insert the bur.



6. Twist the nose collet to the  position.

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

7. Pull on the bur to make sure it is secure.



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


## REF 1945 RECIPROCATING SAW MODULE INSTRUCTIONS

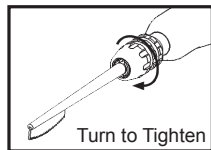
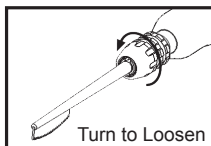
The REF 1945 Reciprocating Saw module can be used with a variety of surgical accessories from the MicroAire 1400 and small ZR series of micro-reciprocating blades and rasps. Please see MicroAire brochure LIT-2001 for a full listing of these accessories.

**NOTE:** MicroAire Large Reciprocating ZR Series of blades (ZR-032, -032M, -058, -059, -060, -061, -073, -079, -160,) cannot be used with the REF 1945 module.

To insert a surgical accessory into the REF 1945 Reciprocating Saw module:

**NOTE:** At this point, the head module should be attached to the motor module, and the motor module should be connected to its corresponding power source. The pneumatic or electric power source should be set to "OFF". Please see System Setup for instructions on connecting the motor module to its corresponding power source to the electric console. (p. 4 for Pneumatic / p. 6 for Electric)

1. If using the throttle-lever handpiece, move the throttle 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 surgical accessory.
2. Loosen the locking collar by turning it approximately four (4) times in a counter-clockwise direction as shown.
3. Insert the surgical accessory, making sure it is fully seated in the locking collar.
4. Tighten the locking collar by turning it in a clockwise direction as shown. Turn the locking collar until tight.
5. Run the instrument for 3-5 seconds, then attempt to pull the surgical accessory out of the handpiece to confirm it is secure. If accessory can be removed by hand, re-insert and properly tighten locking collar.



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


**WARNING:** When operating this 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 may cause injury.

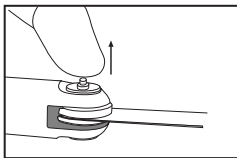
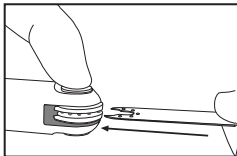
## REF 1950 HALL-STYLE KEYLESS SAGITTAL SAW MODULE INSTRUCTIONS

The REF 1950 Hall-Style Keyless Sagittal Saw handpiece is a powerful, heavy-duty saw for transverse or wedge osteotomies. This saw accepts MicroAire ZS series of Keyless Sagittal Blades. Please see MicroAire brochure LIT-2001 for a full listing of these blades. This saw will not accept MicroAire ZS-0XX series of Sagittal Blades.

To insert a blade into the REF 1950 Hall-Style Keyless Sagittal Saw module:

**NOTE:** At this point, the head module should be attached to the motor module, and the motor module should be connected to its corresponding power source. The pneumatic or electric power source should be set to “OFF”. Please see System Setup for instructions on connecting the motor module to its corresponding power source to the electric console. (p. 4 for Pneumatic / p. 6 for Electric)

1. If using the throttle-lever handpiece, move the throttle 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. 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.




## REF 1970 MICRO OSCILLATING SAW MODULE INSTRUCTIONS

The REF 1970 Micro-Oscillating Saw module is useful for precise curved and straight osteotomies. This saw has an extended head for procedures where extra length provides better visibility. The REF 1970 Micro-Oscillating Saw module accepts MicroAire 1700 Series saw blades, please refer to MicroAire brochure LIT-2001 for a complete listing of these blades.

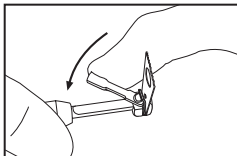
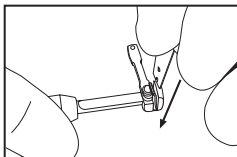
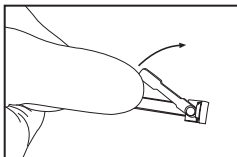
To insert a blade into the REF 1970 Micro-Oscillating Saw module:

**NOTE:** At this point, the head module should be attached to the motor module, and the motor module should be connected to its corresponding power source. The pneumatic or electric power source should be set to "OFF". Please see System Setup for instructions on connecting the motor module to its corresponding power source to the electric console. (p. 4 for Pneumatic / p. 6 for Electric)

1. If using the throttle-lever handpiece, move the throttle safety lock to . If using a motor module with a 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.






## REF 1972 FOOT SURGERY OSCILLATING SAW MODULE INSTRUCTIONS

The REF 1972 Oscillating Saw module was specially designed for foot surgery. A wide selection of straight, bent, and crescentic saw blades (MicroAire's ZO Series small oscillating blades) are available for this special purpose module. Please refer to MicroAire brochure LIT-2001 for a complete listing of these blades.

To insert a blade into the REF 1972 Oscillating Saw module:

**NOTE:** At this point, the head module should be attached to the motor module, and the motor module should be connected to its corresponding power source. The pneumatic or electric power source should be set to "OFF". Please see System Setup for instructions on connecting the motor module to its corresponding power source to the electric console. (p. 4 for Pneumatic / p. 6 for Electric)

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

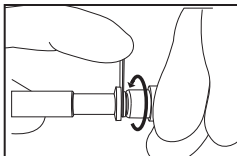
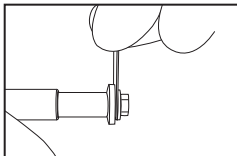
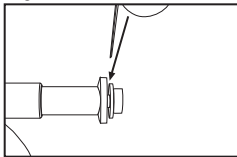
2. Loosen the head nut with the REF 1745-001 Oscillating Saw locking tool.

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

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

4. Tighten the nut using the MicroAire REF 1745-001 Oscillating Saw Locking Tool, and then pull on the blade to make sure it is secure.

5. Run the instrument for 3-5 seconds, then retighten nut.




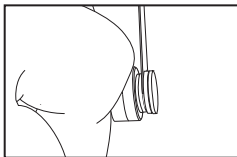
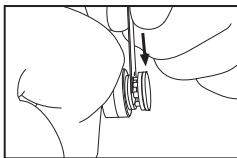
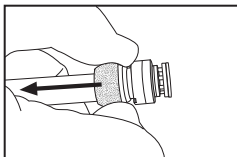
## REF 1976 KEYLESS FOOT SURG OSC. SAW MODULE INSTRUCTIONS

The REF 1976 Keyless Oscillating Saw module was specially designed for foot surgery. A wide selection of straight, bent, and crescentic saw blades (MicroAire's ZS-36x and ZS-37x Series blades) are available for this special purpose module. Please refer to MicroAire brochure LIT-2001 for a complete listing of these blades.

To insert a blade into the REF 1976 Keyless Oscillating Saw module:

**NOTE:** At this point, the head module should be attached to the motor module, and the motor module should be connected to its corresponding power source. The pneumatic or electric power source should be set to "OFF". Please see System Setup for instructions on connecting the motor module to its corresponding power source to the electric console. (p. 4 for Pneumatic / p. 6 for Electric)

1. If using the throttle-lever handpiece, move the throttle safety lock to . If using a motor module with a foot control, take care to ensure that the foot control is not activated accidentally while inserting the blade.
2. Pull the locking collar down and insert the oscillating blade between the two jaws, making sure the blade hub is fully seated over the indexing pins.
3. Once the blade is seated, release the locking collar to lock the blade in place.
4. Run the saw for 3-5 seconds to ensure blade is secure.




## REF 1980 JACOBS STYLE DRILL MODULE INSTRUCTIONS

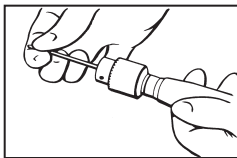
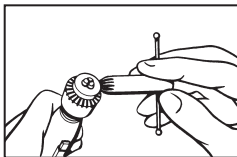
The REF 1980 Jacobs Style Drill module is a low-speed, high-torque drill.

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. Please refer to MicroAire brochure LIT-8000 for a full listing of these drill bits.

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

**NOTE:** At this point, the head module should be attached to the motor module, and the motor module should be connected to its corresponding power source. The pneumatic or electric power source should be set to "OFF". Please see System Setup for instructions on connecting the motor module to its corresponding power source to the electric console. (p. 4 for Pneumatic / p. 6 for Electric)

1. If using the throttle-lever handpiece, move the throttle safety lock to . If using a motor module with a foot control, take care to ensure that the foot control is not activated accidentally while inserting the drill bit.
2. Using a 5/32" Jacobs chuck key (REF 1645-004), 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 same Jacobs chuck key (1645-004).
5. Being careful of sharp drill flutes, pull on the drill bit to make sure it is secure.




## REF 1990 SYNTHES STYLE DRILL MODULE INSTRUCTIONS

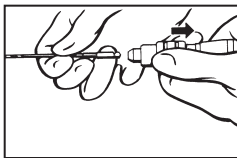
The REF 1990 Synthes Style Drill module is a low speed, high torque drill that allows the use of Synthes style quick-connect twist drills.

The REF 1990 Synthes Style Drill handpiece accepts any MicroAire 8053 Series quick-connect twist drills with diameters between 1.1mm (.05") and 3.5mm (.14"), up to 127mm (5") in length. Please refer to MicroAire brochure LIT-8000 for a full listing of these drill bits.

To insert a twist drill into the REF 1990 Synthes Style Drill module:

**NOTE:** At this point, the head module should be attached to the motor module, and the motor module should be connected to its corresponding power source. The pneumatic or electric power source should be set to "OFF". Please see System Setup for instructions on connecting the motor module to its corresponding power source to the electric console. (p. 4 for Pneumatic / p. 6 for Electric)

1. If using the throttle-lever handpiece, move the throttle safety lock to . If using a motor module with a 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 Synthes 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 is secure.




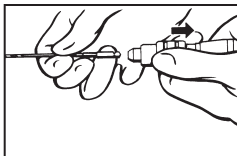
## REF 1991 SYNTHES MICRO-MINI STYLE DRILL MODULE INSTRUCTIONS

The REF 1991 Synthes Style Micro-Mini Style Drill module is a low speed, high torque drill that allows the use of smaller drill bits. The REF 1991 drill accepts any MicroAire 2155 series drill bits, as well as other latch-style drill bits. Maximum recommended diameter to be used is 3.0mm. Please refer to MicroAire brochure LIT-2001 for a full listing of the 2155 series drill bits.

To insert a drill bit into the REF 1991 Synthes Style Micro-Mini Style Drill module:

**NOTE:** At this point, the head module should be attached to the motor module, and the motor module should be connected to its corresponding power source. The pneumatic or electric power source should be set to "OFF". Please see System Setup for instructions on connecting the motor module to its corresponding power source to the electric console. (p. 4 for Pneumatic / p. 6 for Electric)

1. If using the throttle-lever handpiece, move the throttle safety lock to . If using a motor module with a 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 drill bit.
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 is secure.




## REF 1992 SYNTHES QUICK-HEX STYLE DRILL MODULE INSTRUCTIONS

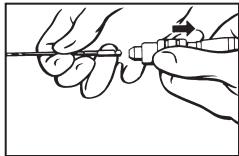
The REF 1992 Synthes Style Quick-hex Drill module is also a low-speed, high torque drill. This drill module allows the surgeon to use a power screwdriver for inserting hex-style screws.

The hex-style screwdriver drill bits can be purchased from Synthes, Inc. Maximum recommended diameter to be used is 2.0mm.

To insert a screwdriver drill bit into the Synthes Style Drill handpiece:

**NOTE:** At this point, the head module should be attached to the motor module, and the motor module should be connected to its corresponding power source. The pneumatic or electric power source should be set to “OFF”. Please see System Setup for instructions on connecting the motor module to its corresponding power source to the electric console. (p. 4 for Pneumatic / p. 6 for Electric)

1. If using the throttle-lever handpiece, move the throttle safety lock to . If using a motor module with a 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 hex-style screwdriver drill bit.
4. Make sure the drill is fully inserted and seated.
5. Release the collar to lock the drill in place.
6. Pull on the drill bit to make sure it is secure.



## REF 2130-000 HIGH-SPEED DRILL MODULE INSTRUCTIONS

The REF 2130-000 High Speed Drill module is a well-balanced, high performance drill that provides high speed for bone sculpting, along with power for difficult osteotomies.

The REF 2130-000 will accept the MicroAire ZB 100, 200 and 300 Series burs. Please refer to MicroAire brochure LIT-2001 for a full listing of these 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 shaft 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"); they may break and cause injury. **DO NOT** use twist drills.

**WARNING:** When using long or extra long burs, use the corresponding long (REF 2910-011) or extra-long (REF 2910-019) bur guard to prevent whipping or shattering of burs

To insert a bur into the REF 2130-000 High Speed Drill module:

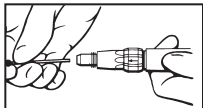
**NOTE:** At this point, the head module should be attached to the motor module, and the motor module should be connected to its corresponding power source. The pneumatic or electric power source should be set to "OFF". Please see System Setup for instructions on connecting the motor module to its corresponding power source to the electric console. (p. 4 for Pneumatic / p. 6 for Electric)

1. If using the throttle-lever handpiece, move the throttle safety lock to . If using a motor module with a foot control, take care to ensure that the foot control is not activated accidentally while inserting the drill bit.
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.
3. Twist the collet to the "LOAD" position.
4. Insert the bur.
5. Twist the nose collet to the "RUN" position.

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

6. Pull on the bur to make sure it is secure.

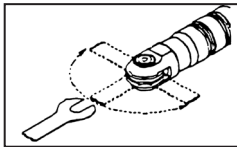
**WARNING:** **DO NOT** run the instrument without a bur, or the instrument will overheat.



## REF 2250-000 HALL-STYLE SAGITTAL SAW MODULE INSTRUCTIONS


The REF 2250-000 Hall-Style Sagittal Saw module is a heavy duty design saw which permits use of the longer ZS series sagittal saw blades for performing transverse or wedge osteotomies. Please refer to MicroAire brochure LIT-2001 for a full listing of these blades.

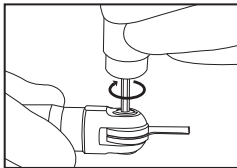
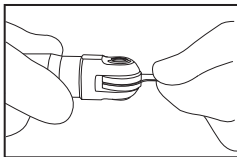
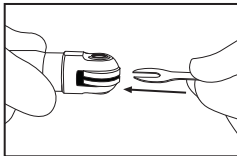
**NOTE:** The head module can be rotated to any position for the best blade angle, and the blade can be locked into the saw at any angle on an 180° arc.



To insert a blade into the REF 2250-000 Hall-Style Sagittal Saw module:

**NOTE:** At this point, the head module should be attached to the motor module, and the motor module should be connected to its corresponding power source. The pneumatic or electric power source should be set to "OFF". Please see System Setup for instructions on connecting the motor module to its corresponding power source to the electric console. (p. 4 for Pneumatic / p. 6 for Electric)

1. If using the throttle-lever handpiece, move the throttle 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. Insert the hex driver (2250-001) and turn it counter-clockwise until a slight resistance is felt.
3. Insert the blade in the space between the two jaws making sure that the blade is fully seated.
4. Turn the hex driver clockwise to lock the blade.  
**DO NOT** over-tighten.





## REF 2600-000 WIRE DRIVER MODULE INSTRUCTIONS

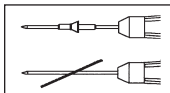
The REF 2600-000 Wire Driver module was designed for small bone surgery. There is no reverse mode.


The REF 2600-000 Wire Driver accepts four standard sizes of K-wires, from .028" (.7mm) to .062" (1.6mm) in diameter, like the MicroAire 1600-02x 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. Please refer to MicroAire brochure LIT-1600 for a listing of MicroAire K-wires and guides.

**WARNING: DO NOT** use threaded K-wires, C-wires, or cut wires.

To insert a blade into the REF 2600-000 Wire Driver module:

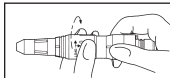
**NOTE:** At this point, the head module should be attached to the motor module, and the motor module should be connected to its corresponding power source. The pneumatic or electric power source should be set to "OFF". Please see System Setup for instructions on connecting the motor module to its corresponding power source to the electric console. (p. 4 for Pneumatic / p. 6 for Electric)



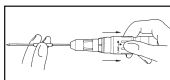
1. If using the throttle-lever handpiece, move the throttle safety lock to . If using the handpiece with the foot control, take care to ensure that the foot control is not activated accidentally while inserting the blade.

2. 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.

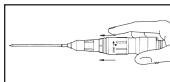


4. Retract the collet located at the front of the wire driver and insert a K-wire.



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.

## - INSTRUMENT CLEANING & DISINFECTION INSTRUCTIONS -

Dried blood, saline, and other deposits on the handpiece and its blade mount components 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 as ultrasonic cleaning can damage the bearings in the handpieces, potentially resulting in overheating or seizure.

1. Disassemble and transport to the decontamination area.
2. Remove all inserted surgical cutting accessories (blades, rasps) from the handpiece. Disposable surgical accessories should be discarded after use, handling them as any contaminated sharp accessory is handled. Reuse of surgical cutting accessories is not recommended.
3. Clean the device immediately, using an appropriate detergent solution.
  - a. Immediate decontamination protects personnel and prevents transmission of unknown pathogens.
  - b. Make sure the handpiece cable is connected to the handpiece to keep detergent solution and water from entering the handpiece through the cable receptacle.
  - c. Clean the handpiece cable thoroughly with warm water, mild detergent, and a soft brush.
4. Rinse with the handpiece cable connected, rinse components under running water to remove all traces of detergent solution. If possible, use distilled water for the final rinse.
5. Dry.
6. **DO NOT** lubricate or oil the handpieces. Lubrication may damage the internal motor mechanism. Also take special precautions to avoid the use of cleaners that contain lubrication.
7. **DO NOT** immerse the handpiece in any fluid. If a handpiece is accidentally immersed in saline, disinfectant, cleaning fluid, or any other corrosive substance, take the following steps to save the handpiece.
  - a. 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.
  - b. 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, and help avoid corrosion.

## - INSTRUMENT STERILIZATION INSTRUCTIONS -

MicroAire powered surgical instruments (including handpieces, and the handpiece cable) are normally sterilized by steam, using either a gravity displacement or prevacuum autoclave sterilizer. **DO NOT** sterilize the console or its power cord.

### 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 the suggested sterilization parameters, 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 instruments in liquid to cool.

### 2. Flash sterilization

Please contact MicroAire for the most up-to-date information on this sterilization method.

### 3. Ethylene Oxide Sterilization.

Ethylene Oxide 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. Peracetic Acid

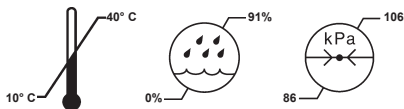
**DO NOT** process powered surgical instruments in equipment that uses peracetic acid as a liquid sterilant.

## - PERIODIC INSPECTION -

Because of the stressful nature of surgical use, decontamination, and sterilization, we recommend that the MicroAire Series 1000 Electric Instruments be returned for routine inspection and service at least once a year. There is no charge for service during the warranty period.

## - ENVIRONMENTAL PARAMETERS -

### OPERATING CONDITIONS



**WARNING:** Monitor instrument temperature if operating handpiece at ambient temperatures above 80° F/ 27° C to prevent burning of personnel or patient.

### SHIPPING & STORAGE CONDITIONS



**Shipping:** The materials and components used in the construction of this device were selected to ensure that the device could be shipped by any standard commercial method without special handling conditions.

## - IN HOSPITAL SERVICE -

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

**WARNING:** Repairs or alterations to MicroAire products made by anyone other than MicroAire or an Authorized MicroAire Repair Facility will void that product's warranty, and the customer will be responsible for any costs related to returning the product to working condition.

## - MICROAIRE REPAIR SERVICE -

Responsive service comes with every MicroAire product. If a problem should arise with your equipment, contact our Customer Service Department at:

	<b>Telephone:</b>	<b>Fax:</b>	<b>Email:</b>
<b>USA:</b>	800-722-0822	800-438-6309	inquiry@microaire.com
<b>Outside USA:</b>	434-975-8000	434-975-4134	intlsvc@microaire.com

**NOTE:** Mailing address information located on back cover.

We may be able to help solve the problem quickly without returning the item for service. **DO NOT** disassemble or attempt to service the equipment. It can only be serviced by MicroAire or an Authorized MicroAire Repair Facility. Unauthorized service will void the warranty.

To return an item for service, follow this procedure:

1. Contact Customer Service for a Return Material Authorization (RMA) number.

**NOTE:** **DO NOT** return equipment without an RMA number. This could cause delays in service, and/or problems tracking your return.

2. Clean and disinfect equipment before sending for repair.
3. 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.
4. 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.
5. 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.
6. Return the merchandise prepaid.
7. If an estimate of repair costs is needed before the repair technicians start work, include the name and telephone number of the person to contact.
8. We will repair and reship the item by 2nd Day Air within the United States and by Federal Express or Air Freight outside the U.S. unless specified otherwise.

## - WARRANTY -

MicroAire Surgical Instruments LLC warrants its modular instruments to be free 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 normal surgical environment, or in the event disassembly, alteration, or repair of the product not authorized by the 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 the Manufacturer.

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

## - EXTENDED WARRANTY / SERVICE AGREEMENT -

Extended warranties and service agreements are available on MicroAire power equipment. Extended warranties may be purchased while the equipment is covered by the original warranty. If the equipment is out of warranty, it must first be restored, if necessary, to full serviceable condition before being eligible for a service agreement.

Part Number		1000E Electric Motor Module	1000ET Electric Motor Module with Hand Switch
Power Output	kW-KiloWatts	0.05	0.05
Vibration Exposure	$a_{hv}$ (m/s <sup>2</sup> )	1.68	1.68
	Uncertainty K (m/s <sup>2</sup> )	1.5	1.5
Noise Emission Value	$L_{PA}$ (db(A))	74	74
	$L_{C,peak}$ (db(C))	-	-
	$L_{WA}$ (db(A))	-	-
Mass	Weight (kg)	0.22	0.22

## - REFERENCES -

### **Association for the Advancement of Medical Instrumentation (AAMI)**

AAMI Good Hospital Practice: Flash Sterilization-Steam Sterilization of Patient-Care Items for Immediate Use. 1995 Edition. pp. 61-79

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