

3. Press **Finished** to close the window.

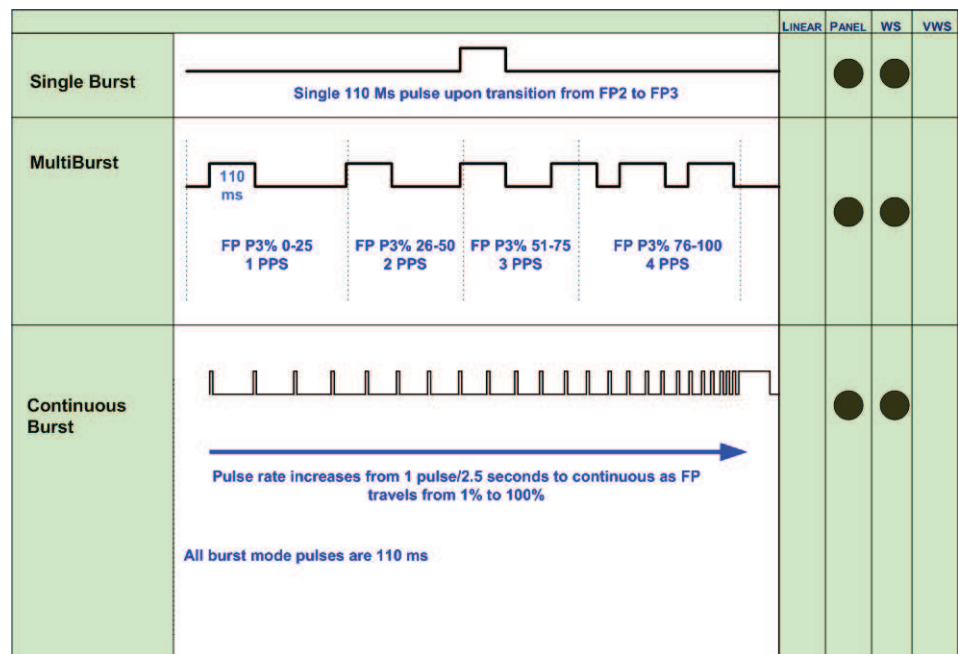
**Low Power Pulse Phaco Power**

Low Power Pulse generates short pulses of ultrasonic power in footpedal Position 3. When you press the footpedal, the pulses become longer and eventually blend together to become continuous phaco power.

**High Power Pulse Phaco Power**

High Power Pulse generates continuous Phaco Power in footpedal Position 3. When you press the footpedal, the continuous pulse changes into long pulses and then gradually changes to short pulses.

**Figure 5.31 – AMO™ Phaco Burst Power Modes**



**Single Burst Phaco Power (Panel Only)**

Single Burst delivers a single burst of ultrasonic power of 110 ms duration when you press the footpedal to Position 3. You must return to footpedal Position 2, pause for approximately one-half (.5) second, and then press the footpedal to Position 3 to obtain an additional burst of energy.

**Multiple Burst Phaco Power (Panel Only)**

Multiple Burst generates a burst of ultrasonic power of 110 ms duration, with additional bursts deployed beginning at approximately 1 burst per second when you press the footpedal to Position 3.

The frequency of burst increases as you press the footpedal. At the maximum level of footpedal Position 3, the bursts are delivered at the rate of 4 bursts per second.

### Continuous Burst Phaco Power (Panel Only)

Continuous Burst delivers a 110 ms ultrasonic burst duration. As you press the footpedal through Position 3, the bursts get closer together. At the maximum level of footpedal Position 3, the bursts blend together, and the power becomes continuous (at the preset power level).

### Override PHACO Submode Settings

You can override the settings for a PHACO submode by selecting the submode, and either press the **Up** and **Down** arrows to increase or decrease Aspiration Rate, Vacuum, or Power settings, or press **Settings** on the control panels for Aspiration Rate, Vacuum, or Power. If you pressed the **Settings** button, the **Settings** pop-up window appears.


**Figure 5.32 – Override PHACO Submode Settings**



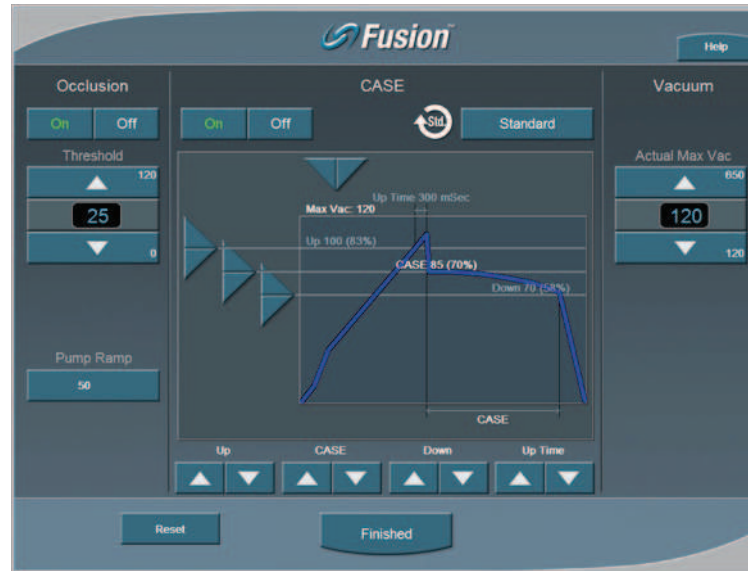
## OCCLUSION MODE™ Phaco Settings

### CASE Mode

To access the OCCLUSION MODE™ Phaco and CASE settings:

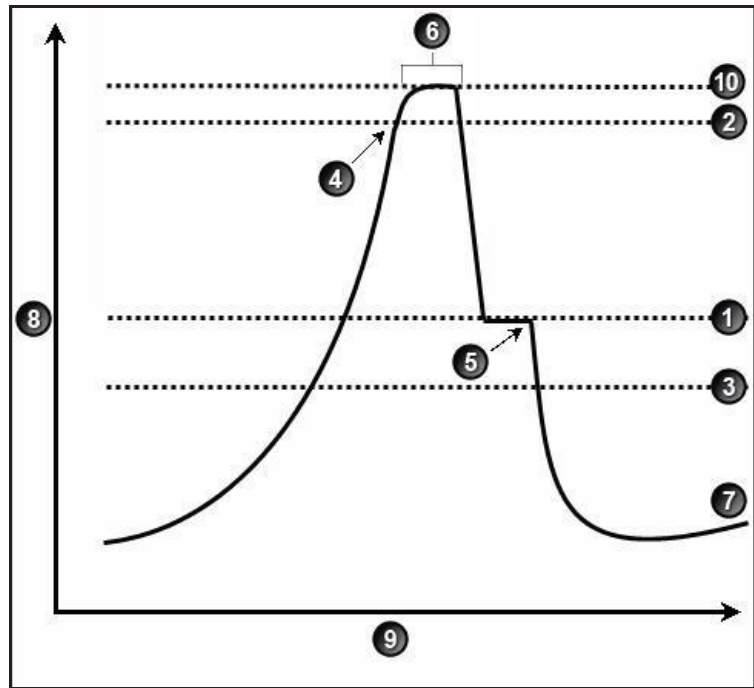
1. Press the  button from the PHACO operating screen.

**Figure 5.33 – CASE OCCLUSION MODE™ Phaco**



CASE maintains a stable chamber by detecting an impending occlusion break, and reducing the vacuum before occlusion surge can occur. When the occlusion is detected, the System waits long enough to allow the particle to be firmly grasped, and then reduces the vacuum to a lower level in order to allow the occlusion to be safely cleared. When the occlusion is fully cleared, the vacuum returns to the previous vacuum level.

**Figure 5.34 – CASE OCCLUSION MODE™ Phaco**



- |   |                 |
|---|-----------------|
| 1. CASE Vacuum                          | 6. Up Time      |
| 2. Upper Threshold                      | 7. Vacuum Level |
| 3. Lower Threshold                      | 8. Vacuum       |
| 4. Vacuum Level crosses Upper Threshold | 9. Time         |
| 5. Phaco activated                      | 10. Max Vac     |

You can control and customize the CASE behavior by setting the:

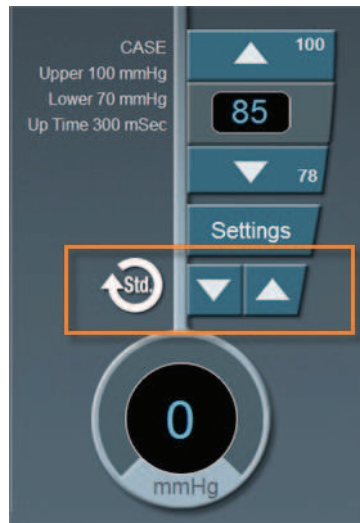
1. Upper and Lower Vacuum Threshold levels
2. CASE Vacuum Level
3. “Up Time” delay, which determines the maximum time that the Upper Threshold Vacuum level is maintained.

### CASE One Touch

To simplify the programming of the CASE function, you only need to define the basic CASE parameters once. The CASE function can then be adjusted quickly and simply from the CASE One Touch settings on the surgical screen. Using these controls, the CASE functionality can be changed to provide greater efficiency (**Up** arrow) or provide more control (**Down** arrow) to suit any particular combination of cataract density, surgical technique or personal preference.

When CASE is **On**, use the **One Touch** buttons to adjust the CASE parameters.

**Figure 5.35 – CASE One Touch**



**Table 5.10 – CASE One Touch Parameter Settings**


| Parameter            | CASE -2          | CASE -1          | CASE STD        | CASE +1          | CASE +2          |
|----------------------|------------------|------------------|-----------------|------------------|------------------|
| Pump Ramp Setting    | Program default  | Program default  | Program default | CASE STD +10%    | CASE STD +20%    |
| CASE Occlusion Delay | CASE STD -200 ms | CASE STD -100 ms | Program default | CASE STD +100 ms | CASE STD +200 ms |
| CASE Upper Threshold | CASE STD -5%     | Program default  | Program default | Program default  | CASE STD +5%     |

### OCCLUSION MODE™ Phaco Settings

You can set different Aspiration Rates for occluded aspiration as opposed to unoccluded aspiration.

With the OCCLUSION MODE™ Phaco you can set a different vacuum rise time when the phaco tip is occluded without changing the aspiration rate through an unoccluded needle.

To set the Occluded Aspiration Rate thresholds:

1. Press **PHACO**.
2. Press  on the left of the screen. Three new control panels appear for Aspiration and Power. The center panel is for a graphical display of the CASE settings.
3. Press **On** to set the thresholds.
4. Change the settings in the new control panels as needed.
5. Press **Finished** to close the window.

**Figure 5.36 – OCCLUSION MODE™ Phaco**



6. Press **Finished** to close the screen.

### Occlusion Vacuum Threshold

In OCCLUSION MODE™ Phaco, you can set an occluded threshold value for vacuum.

When in OCCLUSION MODE™ Phaco, there is an additional control panel for Vacuum. The Vacuum Threshold setting lets you choose the vacuum level at which occluded settings take effect.

To adjust the Occluded Vacuum Threshold:

1. Press the **Up** or **Down** arrows, in Occlusion mode, to increase or decrease the Occluded Vacuum Threshold.
2. When the threshold is decreased, the occlusion settings take effect sooner.

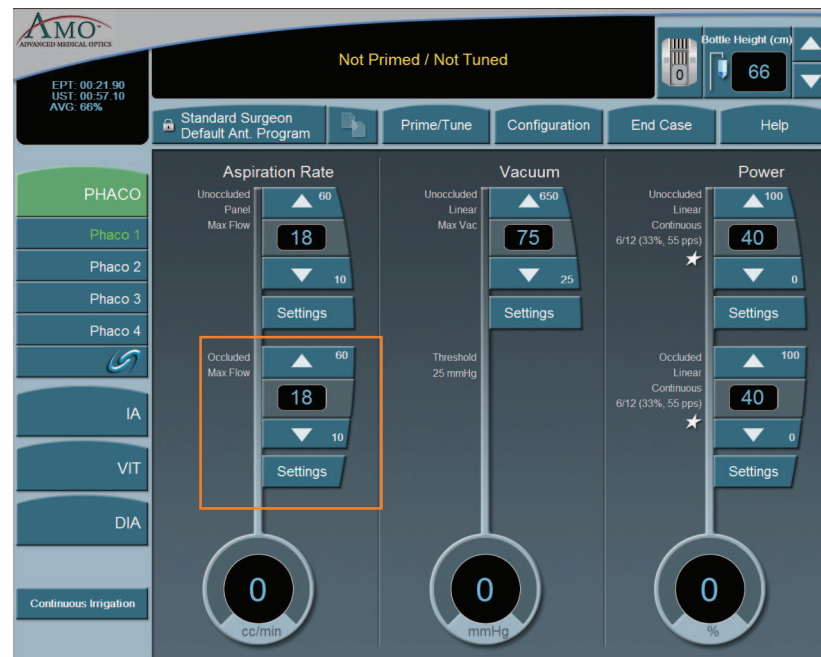
### Occlusion Aspiration Rate

In OCCLUSION MODE™ Phaco, you can set a different Max Flow value for aspiration. There is an additional control panel for aspiration below the standard aspiration control panel.

To adjust the occluded aspiration rate:

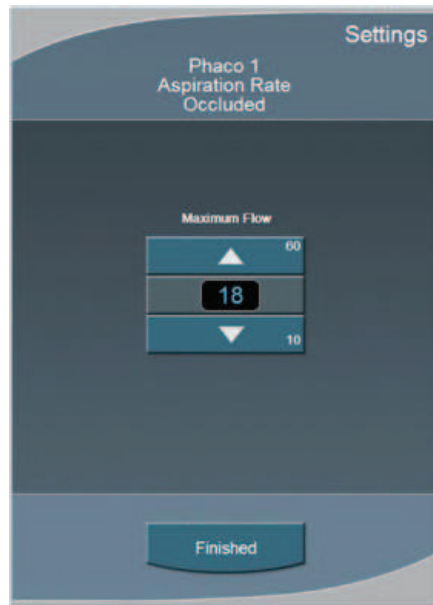
1. In OCCLUSION MODE™ Phaco, press the **Up** or **Down** arrows to increase or decrease the occluded aspiration rate.

**Figure 5.37 – Occlusion Aspiration Rate**



Or

2. Press **Settings**. The **Occluded Aspiration Rate** pop-up window appears.

**Figure 5.38 – Occluded Aspiration Rate Pop-up Window**

3. Press the **Up** or **Down** arrows to increase or decrease the occluded aspiration rate.
4. Press **Finished** to close the window.

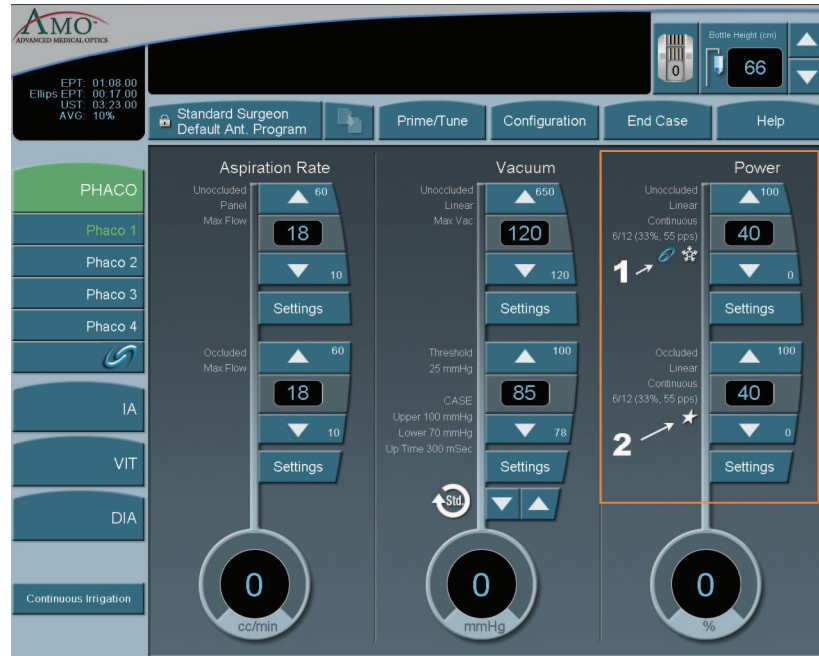


## OCCLUSION MODE™ Phaco Power Settings

You can set different power levels when the phaco tip is occluded.

When you are in OCCLUSION MODE™ Phaco, there is an additional control panel for Power.

**Figure 5.39 – OCCLUSION MODE™ Phaco Power Settings**



1. WHITESTAR® Technology with Pulse Shaping with Ellips™ Technology
2. WHITESTAR® Technology without Pulse Shaping

To adjust the occluded power delivery:

1. In OCCLUSION MODE™ Phaco, press the **Up** or **Down** arrows to increase or decrease the occluded power level.
2. Press **Settings** to change other power settings. A **Power Settings** screen opens.
3. Press **Linear** or **Panel**. Depending on whether you select **Linear** or **Panel**, there are a total of nine different power settings you can choose.
4. Press the buttons on the right of the **Settings** screen to select a power delivery value.
5. Press the **On** button to engage WHITESTAR® Technology.
6. Press **Finished** to close the screen.

### Venting an Occlusion

When the aspiration port is blocked or occluded by tissue or other material, the vacuum pressure builds up. The aspiration flow system vents to the bottle when the footpedal is released. Another choice is that you can release the footpedal to Position 1 and that causes the aspiration system fluid to vent using pump rotation.


These methods release the material at the aspiration port and gives you full control if the tip accidentally grabs the capsule or iris. The internal fluidic system allows the desired vacuum level to be maintained when you hold the footpedal at a constant position. The two adjustments associated with aspiration flow are Max Vac and Max Flow.

## Passive Reflux

You can select from either **Yes** or **No**. The **Yes** reverses the pump to vent. The **No** option opens a path to the bottle pressure and allows reflux into the eye.

1. Select **Configuration**.
2. Select **Surgeons and Programs**.
3. Select the applicable operating mode and submode.
4. Press the **Passive Reflux** button to select either **Yes** or **No**. The system default is **Yes**.

## Ellips™ Technology

Press the Ellips™ Technology button on the Phaco Power Settings screen to activate. The  is shown on the Phaco operating mode screen when Ellips™ Technology is on. Ellips™ Technology can be set for each Phaco submode.

Note: You must have an Ellips™ Phaco handpiece attached to the system before you can activate the Ellips™ Technology.

**Figure 5.40 – Phaco with Ellips™ Technology**



# 6

## SURGEON PROGRAMS

---

Select Surgeon/Program

---

Add a New Surgeon

---

Edit a Surgeon

---

Select a Preferred Program

---

Create a New Program

---

Edit a Surgeon Program

---

Copy a Surgeon Program

---

Delete a Surgeon

---

Delete a Program

---

Delete a Database

---

Lock a Program

---

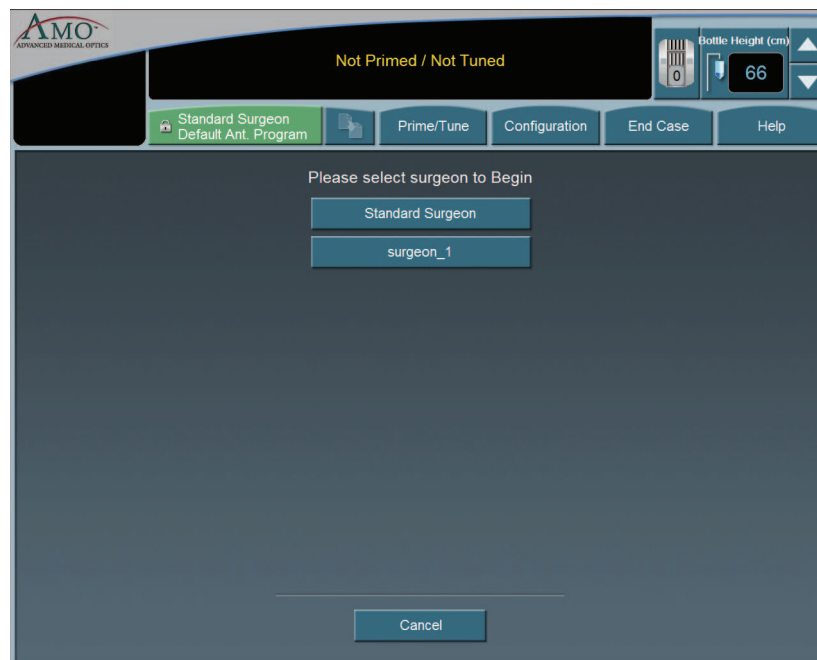
Program – Assign Order

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## Select Surgeon/ Program

1. When the System completes the Self Test routine, you are prompted by the System to select a Surgeon (by name). If there are no surgeons defined on the system this screen is not shown.  
Note: If your name is not listed, you can use **Standard Surgeon**, the AMO default surgeon setup, and then save those settings to your name.
2. After you select a surgeon, the System prompts you to select a **Surgeon Program**. If there are no programs defined on the system, the **Select A Surgeon Program** screen is not shown.

Figure 6.1 – Select Surgeon Window

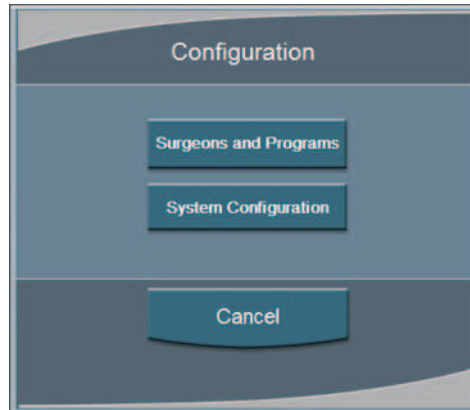


**Add a New Surgeon**

To create a new Surgeon program:

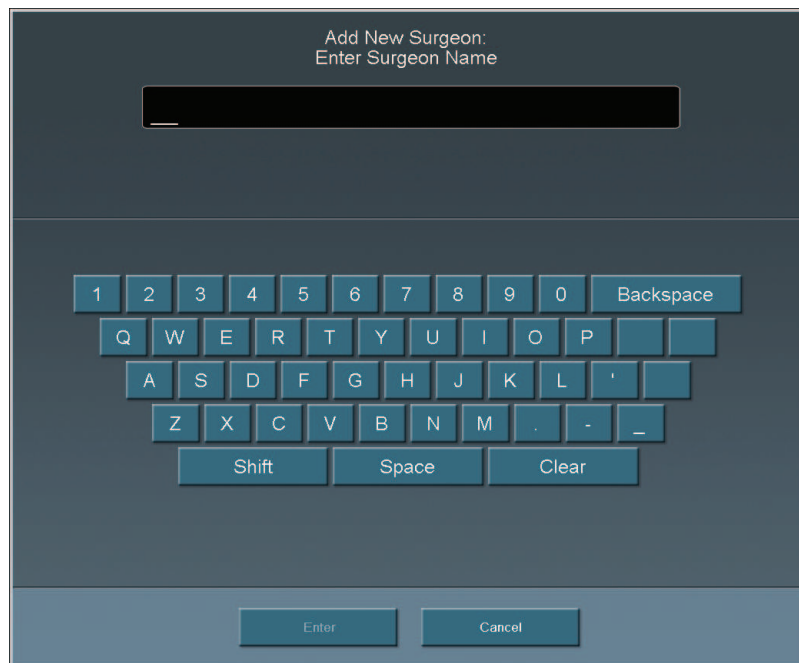
1. Press **Configuration**.
2. Press **Surgeons and Programs**.

**Figure 6.2 – Configuration Pop-up Window**



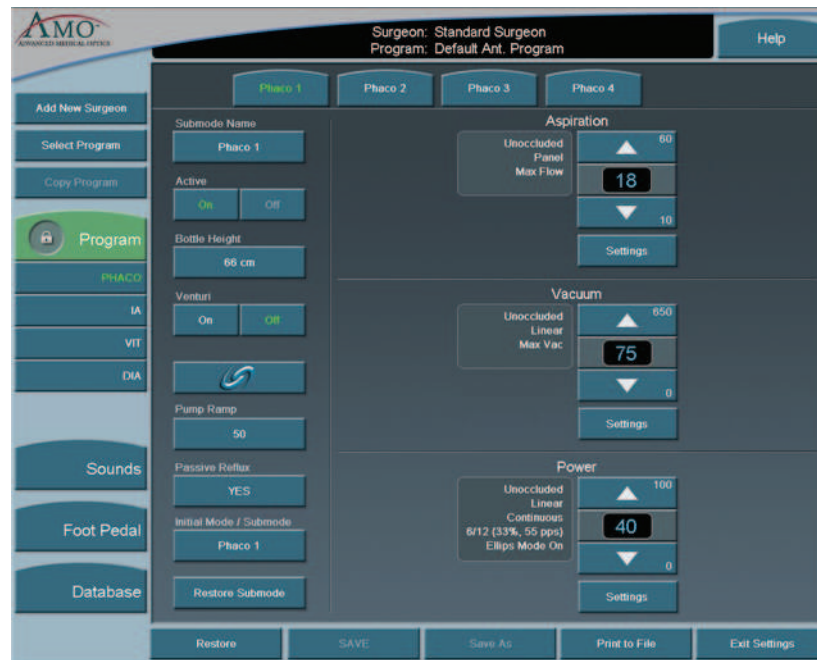
3. The **Program Settings** screen opens.
4. Press **Add New Surgeon**. The Keyboard window opens.
5. Enter the name of the surgeon.
6. Press **Enter** to save the new surgeon and exit the Keyboard window. The new Surgeon now appears in the list of available surgeons.

**Figure 6.3 – Keyboard Screen**



- Edit the settings for this surgeon on the **Program Settings** screen. Use the **Copy Program** to copy another surgeon's program. Refer to Copy a Surgeon Program in this chapter.

**Figure 6.4 – PHACO Submode Settings**

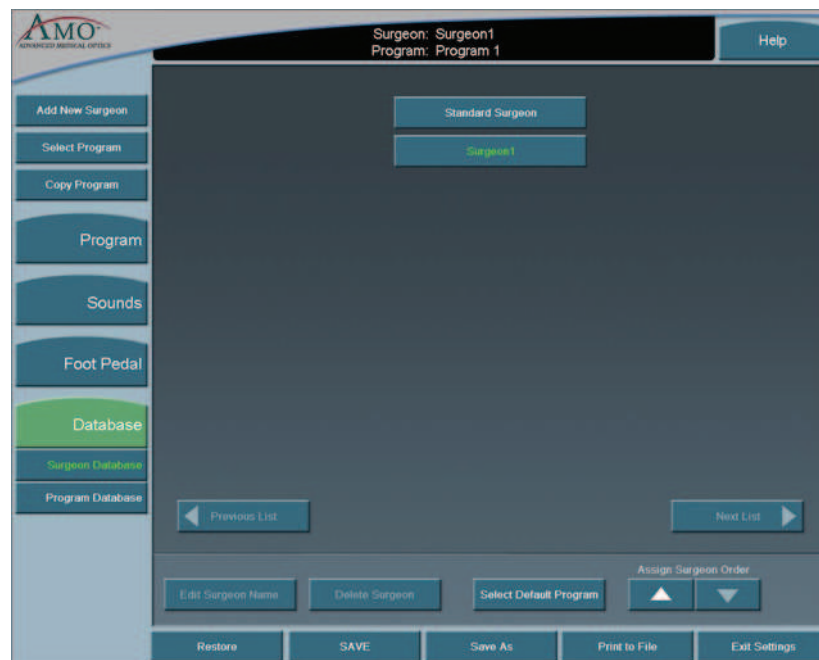


8. Press **SAVE**. If you do not edit any of the settings you can only use **Save As**.
9. Press **Exit Settings**.

## Edit a Surgeon

1. Press **Configuration**.
2. Press **Surgeons and Programs**.
3. Press **Database**.
4. Press **Surgeon Database** button.
5. Select a surgeon from the list.

**Figure 6.5 – Select Surgeon**



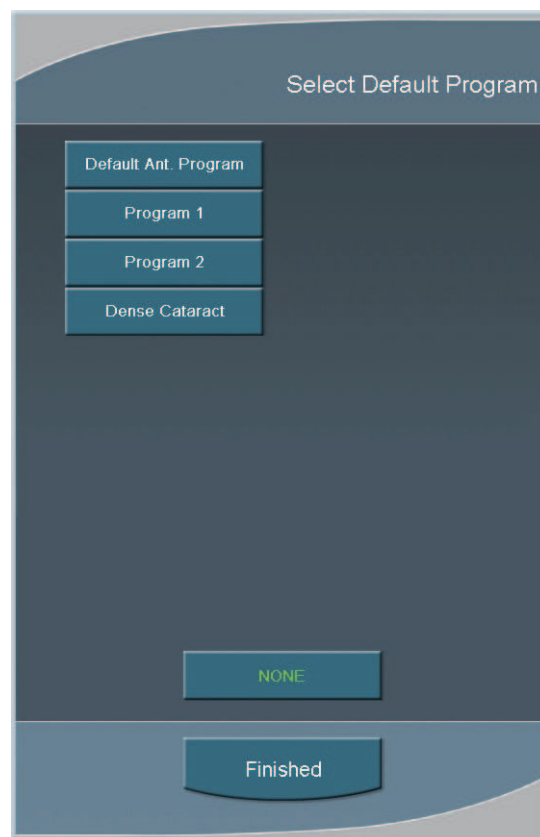
6. Press **Edit Surgeon Name**. The Keyboard window appears.
7. Edit the name.
8. Press **Enter**.
9. Press **Exit Settings**.

## Select a Preferred Program

Use the **Select Surgeon** screen to assign your preferred or default program. The program selected here is indicated with an asterisk (\*) on the **Select Program to Begin** screen when the system is started. When you select **Next Case** the system asks if you want to return to your preferred program. You are prompted only if you are not in your preferred program.

1. Press **Configuration**.
2. Press **Surgeons and Programs**.
3. Press **Database**.
4. Press **Surgeon Database**.
5. Select a surgeon from the list.
6. Select **Assign Default Program**.

**Figure 6.6 – Select Default Program Pop-up**



7. Select a program or select **None** to clear a selection.
8. Select **Finished** to close the window. Your preferred program is indicated with an asterisk on the **Select Program to Begin** screen when the system is started.



Figure 6.7 – Select a Program to Begin Screen



**Create a New Program**

When you create a new surgeon, that surgeon is assigned the **AMO Default Program** setup. You can customize a program for that surgeon name with your preferred settings. You can also create new programs for existing surgeons.

1. Press **Configuration**.
2. Press **Surgeons and Programs**.
3. Press **Select Program**.
4. Select the surgeon or program from the list.
5. Press **Enter**.
6. Edit the settings for this program on the **Settings** window. Use the **Copy Program** to copy another surgeon's program. Refer to Copy a Surgeon Program in this chapter.
7. Press **Save As**. The Keyboard window opens.
8. Enter the name of the program.
9. Press **Enter**.
10. Press **Exit Settings**.

## Edit a Surgeon Program

1. Press **Configuration**.
2. Press **Surgeons and Programs**.
3. Press **Select Program**.
4. Select the surgeon or program from the list.

**Figure 6.8 – Select Program**



5. Press **Enter**.
6. Select the mode and submode to edit.
7. Edit the settings for this program on the **Settings** window.
8. Press **SAVE**.
9. Press **Exit Settings**.

## Copy a Surgeon Program

You can copy the settings of one surgeon program for use by another surgeon.

To copy a surgeon program:

1. Press **Configuration**.
2. Select **Surgeons and Programs**.
3. Press **Copy Program** and select the **Surgeon** or **Program** you want to copy from the list. This copies all of the settings of the selected program and the submodes.

Note: If Standard Surgeon is the active surgeon, **Copy Program** is not available to the user. Press **Select Program** to change the surgeon and program.

4. Press **Enter**.
5. Press **Save As** at the bottom of the screen. The Keyboard window opens.
6. Enter the new name for the program.
7. Press **Enter** to save the new program and exit the Keyboard window. The new program now appears in the list of available programs.
8. Press **Exit Settings**.

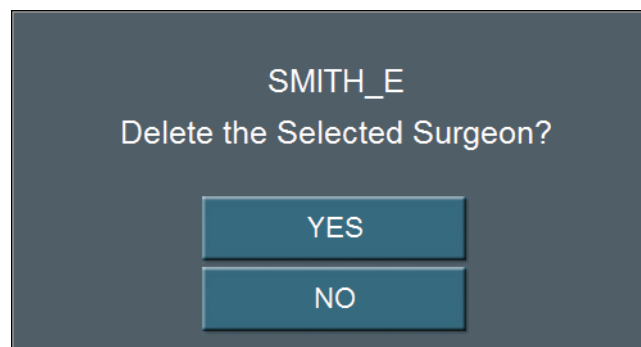
## Delete a Surgeon

Use **Delete Surgeon** to remove a surgeon from the Select Surgeon screen. You cannot delete the current surgeon.

Note: You cannot delete a current surgeon or a surgeon that is selected on the **Settings** screen.

1. Press **Configuration**.
2. Press **Surgeons and Programs**.
3. Press **Database**.
4. Press **Surgeon Database**.
5. Select a surgeon to delete.
6. Select **Delete Surgeon**. A delete confirmation pop-up appears.

**Figure 6.9 – Delete Confirmation Pop-up Window**



7. Press **Yes**.
8. Select **Exit Settings**.

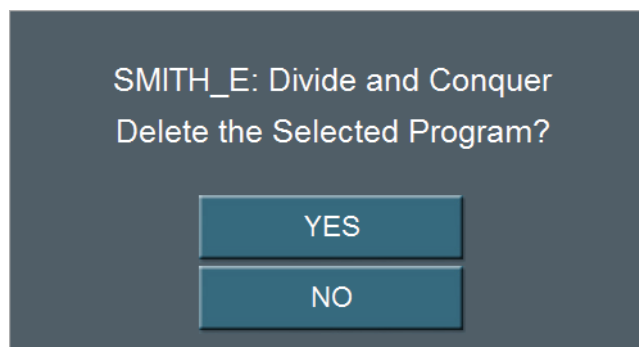
## Delete a Program

Use **Delete Program** to remove a surgeon program from the Select Program screen. You cannot delete the current program.

Note: You cannot delete a current program or a program that is selected on the **Settings** screen.

1. Press **Configuration**.
2. Press **Surgeons and Programs**.
3. Press **Database**.
4. Press **Program Database**.
5. Select a program to delete.
6. Select **Delete Program**. A delete confirmation pop-up appears.

**Figure 6.10 – Deletion Confirmation**



7. Press **Yes**.
8. Select **Exit Settings**.

## Delete a Database

You can delete a database from your memory device. Contact your AMO Service Representative to delete a database from your system's hard drive.

Note: Use only AMO recommended USB stick drives.

1. Insert the USB flash drive into the port on the back of the system.
2. From **Configuration**, press **System Configuration** to access the Diagnostic screen.
3. Press **Restore All**.
4. Press the database to delete from the list.
5. Press **Delete Selection**.
6. Press **OK** at the confirmation window.
7. Press **Finished** to close the window.

**Figure 6.11 – Database Restore Screen**

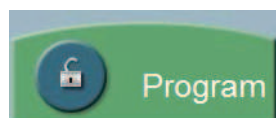


## Lock a Program

Press the open padlock at any time to lock the program. To edit a locked program, use **Save As** and rename the program.

Note: When a program is locked the program cannot be unlocked. You cannot edit a locked program.

**Figure 6.12 – Program Lock Button**



## Program – Assign Order

Use **Program Assign Order** to change the order in which the surgeon names are shown on the **Select Surgeon** window.

1. Press **Configuration**.
2. Press **Surgeons and Programs**.
3. Press **Database**.
4. Select **Program Database**. A list of programs appears.
5. Select a program.
6. Use the **Assign Program Order Up** and **Down** arrows to move the Program. The arrows are found at the bottom of the window.

**Figure 6.13 – Surgeon and Program Databases**



7. Repeat steps 5 and 6 until you are satisfied with the order.
8. Select **Exit Settings**.



# 7 DIAGNOSTICS

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Diagnostics

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Wireless Footpedal Setup

---

Wireless Foot Pedal Calibration

---

Wireless Remote Control Setup

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Calibrate Touch Screen

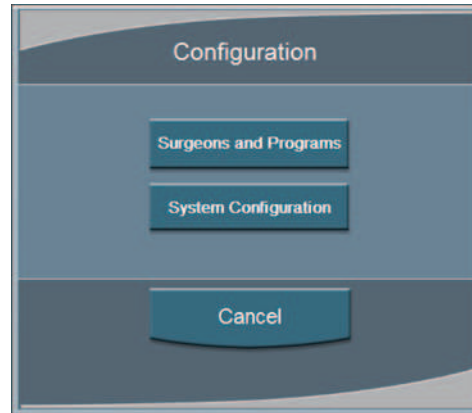
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## Diagnostics

To access diagnostics:

1. Press **Configuration**.

**Figure 7.1 – Configuration Pop-up Window**



2. Press **System Configuration**. On the System Configuration screen, **Diagnostic** is selected by default.

The Diagnostic screen shows the various Diagnostic Routines, Logs, System Utilities and Database Management functions that can be accessed by the Operator. Press the button for the diagnostic routine you want to run or view. Follow the instructions on the screen to complete the test process. The Service and Factory Diagnostic routines can only be accessed by authorized AMO service personnel.

**Figure 7.2 – Diagnostics Screen**

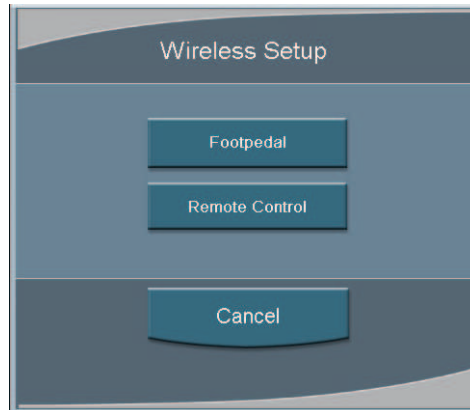


## Wireless Footpedal Setup

You can pair the Wireless Foot Pedal (Advanced Control Pedal) to the system with either the Footpedal Cable or wireless. The Wireless Foot Pedal uses Bluetooth<sup>®</sup> technology to communicate with the system. The Wireless Foot Pedal has a range of ten (10) feet from the system.

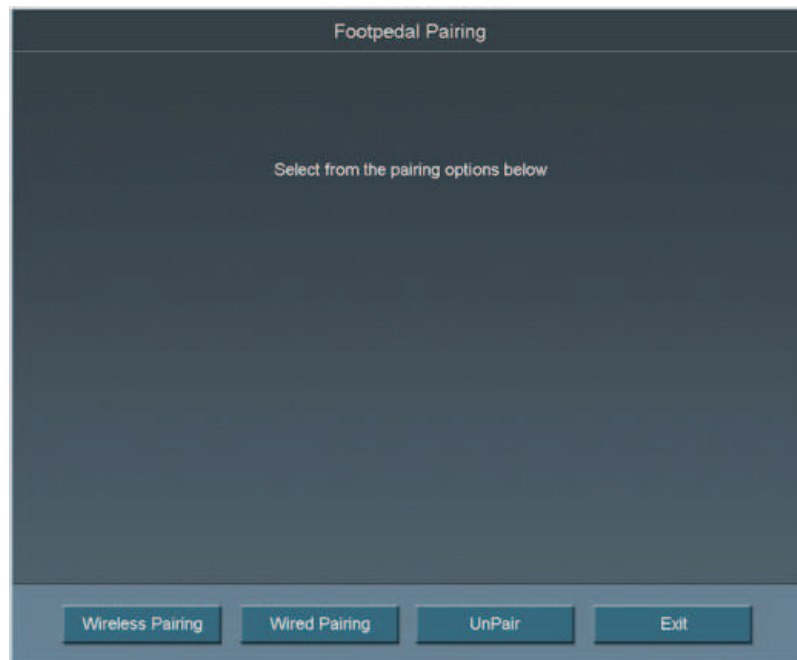
1. Press **Wireless Setup**.
2. Select **Footpedal**.

**Figure 7.3 – Wireless Setup Pop-up Screen**

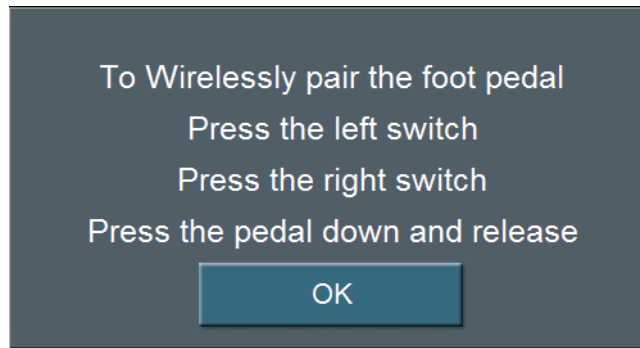


3. Select either **Wireless Pairing** or **Wired Pairing**. To use **Wired Pairing** you must have the Footpedal Cable attached to the system.

**Figure 7.4 – Footpedal Pairing Screen**



4. Follow the instructions shown on the screen.

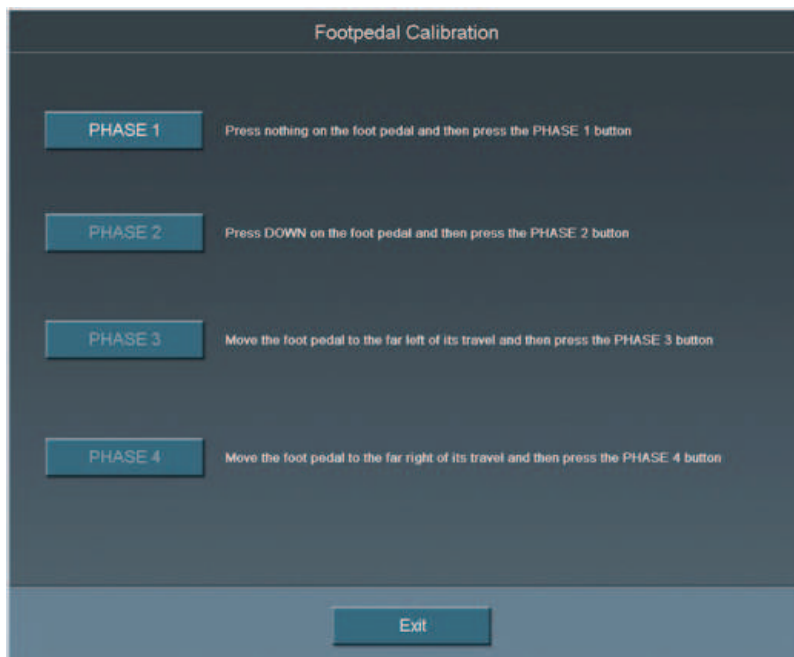
**Figure 7.5 – Wireless Footpedal Pairing Instructions**

5. Press **Exit** to close the screen and access the Foot Pedal Test screen.
  - If the blue light is on, the wireless foot pedal is paired.
  - If the blue light is flashing the wireless foot pedal is not paired.
  - If the green light is on, the batteries in the foot pedal are charged.
  - If the green light is blinking, the batteries in the wireless foot pedal need to be charged. Attach the cable to charge the batteries.
6. Use UnPair to unpair either of the Advanced Control Pedals (dual linear) from the system.

## Wireless Foot Pedal Calibration

To maintain optimal use of the foot pedal, the wireless foot pedal must be calibrated from time to time.

**Figure 7.6 – Footpedal Calibration Screen**



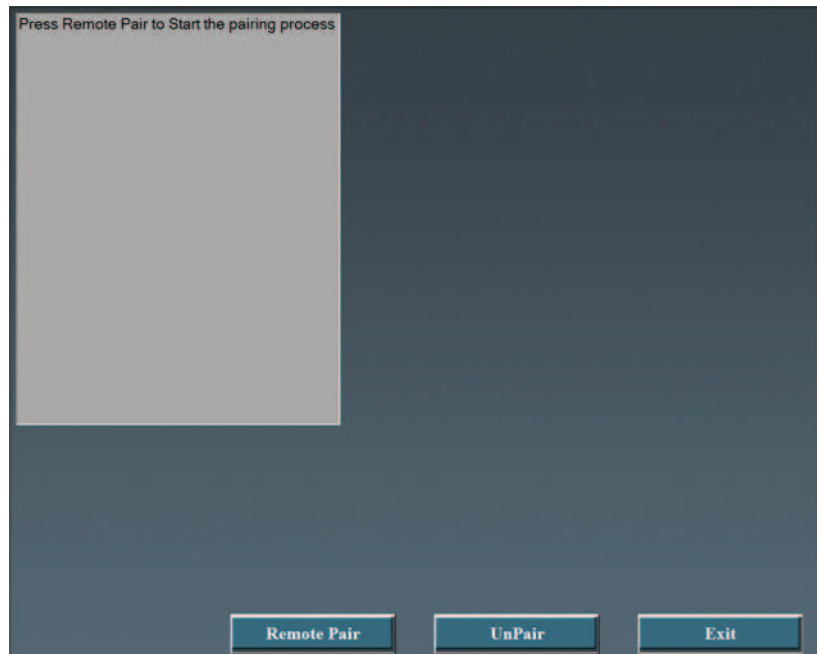
1. Press **Footpedal Calibration** from the **Diagnostic** screen. The Footpedal Calibration screen can also be accessed from the Foot Pedal Threshold screen.  
Note: Only press the foot pedal when you are instructed. If you press the foot pedal at any other time the calibration of the foot pedal can fail.
2. Follow the instructions shown on the screen. The Calibration screen closes automatically when completed and the Foot Pedal Test screen opens.
3. Test the foot pedal.

## Wireless Remote Control Setup

Use the **Wireless Setup** button to connect the System with a Wireless Remote Control.

Note: Make sure that the **Backlight** feature for the Wireless Remote Control is off (before you start the **Wireless Setup** process).

**Figure 7.7 – Wireless Setup Screen**



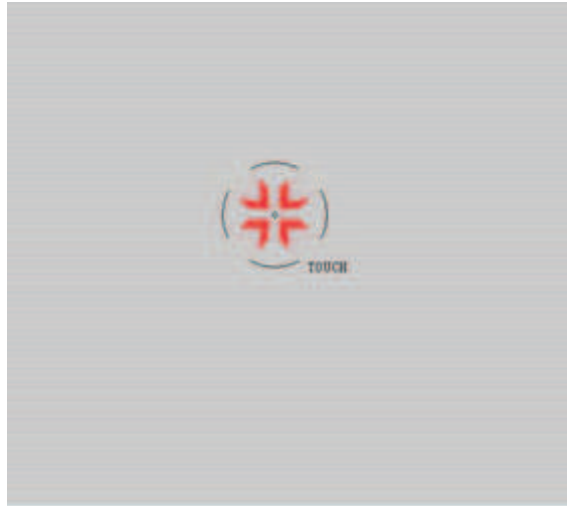
1. Press **Wireless Setup**.
2. Select **Remote Control**.
3. Press **Remote Pair**.
4. Follow the messages shown on the screen.
5. For the Remote Control:
  - Press the corresponding buttons on the wireless remote control as prompted. If **Remote Pair** fails, follow the instructions on the screen.
  - Press the buttons on the wireless remote control.
  - Verify for each button that the corresponding button on the screen lights. If the button does not light on the screen, the test fails. If the test fails contact AMO for technical service.
6. Press **Exit** to close the window.
7. Press the Unpair button to unpair the Remote.

## Calibrate Touch Screen

The System touch screen needs to be calibrated as part of the system maintenance. Press **Calibrate Touch Screen** to start the calibration procedure.

1. Press the center of the target circle until the **Touch** message changes to **Release**.

**Figure 7.8 – Touch Screen Target Circle**



2. When released, the circle moves to the next point to be calibrated.
3. Repeat Step 1 for all of the calibration points.
4. Press **Accept** when all of the calibration points are completed.





# 8

## CHECK-OUT PRECAUTIONS

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### System Check-out

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## System Check-out

The purpose of the check-out procedure is to verify that the System is installed and operating properly. The check-out procedure must be performed at least prior to the first case of the day and any time program changes are made as outlined in the following steps. The IA mode and handpiece are tested first, then the PHACO mode and handpiece, so that the phaco handpiece (which is used first) is set up and ready for surgery.

If any of the check-out steps are not successfully performed, they must be repeated. If the instrument still does not work correctly, refer to Chapter 10, “Error Messages Troubleshooting and Diagnostics”.

Note: Refer to **WARNINGS** in Chapter 3, “System Setup” before you set up the System.

### Set-Up and Prime/Tune

Refer to the System Setup and Equipment Operation chapters of this manual for instructions on installing the tubing and priming/tuning the system.

### Irrigation and Aspiration

1. Connect the tubing to the IA handpiece.
2. Select **IA** mode.
3. Hold the test chamber near the handpiece tip, press and hold the footpedal in Position 1.
4. Observe the irrigation flow.

### Phacoemulsification

1. Connect the tubing to the phaco handpiece.
2. Screw the phaco needle onto the handpiece, use your fingers to engage the screw thread, and then use the tip wrench to tighten the needle. Screw the irrigation sleeve assembly over the needle.
3. Select the **PHACO** mode.
4. Press and hold the footpedal in Position 1.
5. Observe the irrigation flow.
6. Hold the handpiece approximately at the patient’s eye level, and fill the test chamber with irrigation fluid.
7. Place the test chamber over the irrigation sleeve.
8. Occlude the aspiration tubing just below the phaco handpiece. Press and hold the footpedal in Position 2. The actual vacuum level should rise to the preset level.

9. Release the occlusion and watch the test chamber to make sure that the test chamber does not collapse. A dent or dimple in the test chamber is normal.
10. To test irrigation, pinch the irrigation tubing at the IA handpiece and watch for the test chamber to collapse. Release the irrigation tubing and the test chamber should fill.
11. Press **Next Case** to reset the Phaco timer.

Phacoemulsification check-out is complete.

### Diathermy



**CAUTION: IF A TONE IS NOT HEARD WHEN THE FOOTPEDAL IS PRESSED AND VOLUME ADJUSTMENT IS UNSUCCESSFUL, THE MODE IS NOT FUNCTIONING PROPERLY. REFER TO Chapter 10, “Error Messages Troubleshooting and Diagnostics”.**

1. Connect the Diathermy forceps to the cable and the cable to the front panel of the console.
2. Select the **Diathermy** mode.
3. Press the footpedal. A tone should be heard when the footpedal is pressed.

### Vitrectomy

1. Attach the irrigation and aspiration cassette pack tubing together.
2. Press **Prime** on the Prime/Tune screen.
3. Press the **VIT** button to enter **VIT** mode.
4. Follow the instructions on the screen.
5. Observe that the:
  - irrigation fluid flows
  - aspiration tubing is full and clear of air
  - the vitrectomy cutter motor is activated (slight sense of motion of the handpiece)
  - cutter blade operates
6. Press **Start Vit Prime**. The screen closes automatically when the handpiece is primed.

Vitrectomy check-out is complete.



# 9

## CARE AND CLEANING

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Cleaning Procedures

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Sterilization Procedures

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WHITESTAR SIGNATURE™ System Cleaning and Care

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## Cleaning Procedures

All previously used reusable items must be handled according to ANSI/AAMI ST79:2006 *Comprehensive guide to steam sterilization and sterility assurance in health care facilities*. Information about the reuse of any products can be found in the Directions for Use for the particular product. All single use items or items which have completed their recommended useful life must be disposed of in accordance with accepted hospital practices and procedures and local governing ordinances and recycling plans. These items can include, but are not limited to, waste materials, waste collection bags, tubing, infusion-sleeves and test chambers.

Note: Inspect the Diathermy, Vitrectomy and Phaco handpiece cables for possible damage on a daily basis.

### Phaco Handpiece

The following cleaning procedures for the phaco handpieces must be implemented immediately after use. The straight-through design of the phaco handpiece makes cleaning easy and greatly reduces the likelihood of the handpiece clogging.

However, to maximize the life of your instruments, you must clean the instruments immediately after use. Failure to properly clean the instrument can result in tissue buildup and dangerous cross-contamination.



**WARNING:** Balanced salt solutions tarnish and pit metals, which causes the handpiece to deteriorate. Proper cleaning of the instruments prolongs their useful life. AMO recommends using sterile nonpyrogenic water to clean the handpieces and accessories.



**CAUTION: DO NOT STERILIZE THE HANDPIECES PRIOR TO PERFORMING THE CLEANING PROCEDURES DESCRIBED BELOW.**

The following cleaning procedure is to be performed at the end of each surgical case:

1. With the tip cap sleeve and phaco tip still in place on the handpiece, inject 60 cc of sterile nonpyrogenic water through the irrigation tubing of the handpiece with a syringe. Remove the syringe and fill the syringe with air. Attach the syringe and flush the tube and handpiece with air.
2. Inject 60 cc of sterile nonpyrogenic water through the aspiration tubing of the phaco handpiece. It is helpful to use a female to female connector to attach the syringe to the aspiration tubing. Remove the syringe and fill the syringe with air. Attach the syringe and flush the tube and handpiece with air.
3. Carefully remove the phaco tip cap sleeve and phaco tip from the handpiece for disposal or to be sanitized and stored
4. Inject sterile nonpyrogenic water into the test chamber with a syringe and then empty. Repeat this step three to four times.

5. Aspirate sterile nonpyrogenic water through the phaco tip into a syringe; this clears any debris from within the tip and prevents clogging of the suction port.
6. Gently wipe the power cable of the handpiece with gauze soaked in distilled water.



**WARNING:** Improper/inadequate cleaning may result in particulate matter adhering to the instrument and exfoliation of particles into the surgical field. In addition, the function and life expectancy of the phaco handpiece can become compromised.



**CAUTION: DO NOT CLEAN THE PHACO HANDPIECE WITH ANY TYPE OF ULTRASONIC CLEANING DEVICE; THE CLEANING DEVICE CAN DAMAGE THE PIEZOELECTRIC CRYSTALS.**

#### **Irrigation/Aspiration Handpiece**

1. Back-flush the IA handpieces immediately at the end of the procedure.

Use a 10cc syringe with sterile nonpyrogenic water and flush the water from the back of the handpiece through the tip. This process must be performed at least two times through both the irrigation and aspiration channels.

Note: You can use other available AMO™ products designed for this process (IA Cleaning Kit, AMO Part No. OM05510114).

#### **Figure 9.1 – I/A Handpiece Cleaning**



2. Make sure IA handpieces are dry when they are stored.

#### **Diathermy Handpiece**

Clean the diathermy handpieces with the same procedures you use to clean other ophthalmic instruments.

Note: Inspect the Diathermy, Vitrectomy and Phaco handpiece cables for possible damage on a daily basis.

#### **Vitrectomy Cutter**

The vitrectomy cutter is a disposable, single-use instrument.

## Sterilization Procedures

AMO recommends that you follow the sterilization procedures outlined in this section to maximize the life of your System instruments.

All parts must be cleaned thoroughly prior to sterilization, and all sterilization equipment must be validated prior to use.



**CAUTION: DO NOT STERILIZE THE HANDPIECES PRIOR TO PERFORMING THE CLEANING PROCEDURES DESCRIBED EARLIER IN THIS SECTION.**

**THE STORAGE CASES PROVIDED CANNOT BE PLACED IN AN AUTOCLAVE.**

The following sterilization techniques, times, and temperatures must be used in order to ensure consistent product performance:

Gravity Displacement Sterilization – A type of sterilizer in which incoming steam displaces the residual air through a port or drain usually in or near the bottom of the sterilizer chamber. Typical operating temperatures are 121 to 123°C (250 to 254°F) and 132 to 135°C (270 to 275°F).

Prevacuum Sterilization – A type of sterilizer which relies on one or more pressure and vacuum excursions at the beginning or end of the cycle.

This method of operation usually results in shorter cycle times because of the rapid removal of air from the chamber and the load by the vacuum system, the usually higher operating temperature (132 to 135°C / 270 to 275°F; 141 to 144°C / 285 to 290°F), and the shorter exposure time for porous loads.

Note: The cycle times require the product to be wrapped. In an emergency situation only Flash Sterilization in accordance with ANSI/AAMI ST79:2006 *Comprehensive guide to steam sterilization and sterility assurance in health care facilities* can be used. The parameters for mixed porous and nonporous items must be used.



**CAUTION: GAS STERILIZATION IS NOT RECOMMENDED.**

Cooling is not necessary prior to reassembly; however, caution must be used to prevent burns. Follow the handpiece assembly instructions.





**WARNING:** Sterility assurance is the responsibility of the user. All non-sterile accessories must be sterilized prior to use. In addition, AMO recommends a terminal sterilization cycle in the autoclave after the final case of the day. This cycle must include a drying cycle to remove moisture from the tubing and handpieces for storage.

Devices undergoing sterilization must be thoroughly cleaned to minimize bio-burden. Validation of the sterilization vessel and the sterilization cycle is the responsibility of the user.

1. After sterilization, store the instruments in a safe, clean environment. Keep the instruments dry and free of dust. Make sure that the handpiece nose cone tips are adequately protected during storage.
2. Do not wind the phaco handpiece cord too tight. Handle the cord as you would a fiber optic cable. Follow the natural curve of the cord and wind only as tight as the natural curve of the cord (approximately 6 inch coiled cord diameter).



**WARNING:** Handle the phaco handpiece with extreme care. The piezoelectric crystal in the handpiece is very sensitive to shock. If the handpiece is dropped, it is possible that the handpiece might not function correctly. If this happens, contact AMO for repair information or replacement.

## **WHITESTAR SIGNATURE™ System Cleaning and Care**

1. Turn the power switch on the back of the System **Off** before you unplug the system from the wall outlet.
2. At the end of the day, thoroughly wipe down the system, cart, power pole and footpedal using a cloth dampened with a germicidal detergent and sterile nonpyrogenic water. Be careful not to saturate any part of the system or the footpedal with liquid. Excessive liquid can damage the System electronics.
3. Do not push or pull on the system components.
4. AMO recommends that you leave the footpedal and power cords connected to the system to prevent loss and unnecessary wear on the electrical connectors.
5. Although the footpedal is water-resistant, make sure that the footpedal is kept as dry as possible.
6. Place the Advanced Control Pedal (dual linear) in the storage recess at the bottom of the console so that the footpedal batteries can charge. You can attach the footpedal cable to the console to charge the batteries.
7. Place the wireless remote control in the storage recess on the top of the console so that the Wireless Remote Control batteries can charge.



# 10

## ERROR MESSAGES TROUBLESHOOTING AND DIAGNOSTICS

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Error Message Display

---

Fuse Replacement Procedure

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Wireless Foot Pedal Battery Replacement Procedure

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Most Common User-Correctable Problems

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Status, Warning and Error Messages

---

System Operation (Error) Messages

---

Troubleshooting

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## Error Message Display

The red Error Messages are shown at the top of the screen. Press the Help button to open the corrective action for that error. When the error is corrected, press OK to clear the error message from the screen. If the error message is cleared but not corrected, the error message is generated again.

The yellow Alerts are shown at the top of the screen. The alert does not need to be cleared as an error message. An alert, for example, can be: Remote Control Battery power level is 10 – 25% of maximum. The battery needs to be charged.



**WARNING:** DO NOT try to replace the Wireless Remote Control batteries. Call your AMO Technical Service representative to replace the batteries.

## Fuse Replacement Procedure

If the System does not turn on when the power switch is turned **On**, and you have confirmed that the power cord is properly connected and plugged in, check to see if the fuse is bad.

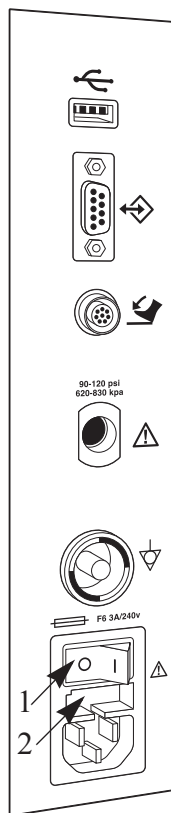
Note: To prevent the risk of fire or damage to the instrument, replace the fuses with the exact type and rating as indicated below (check the voltage sticker on the back panel of System to confirm your system voltage):

**Table 10.1 – Fuse Specifications**

|         | Voltage     | Quantity | Fuse Specifications     |
|---------|-------------|----------|-------------------------|
| Console | 100/120/240 | 2        | 6.3A, 250V, Bussman GDA |

To replace the console fuses:

1. Unplug the System electrical power.
2. Unplug the power cord from the back panel.
3. Locate the fuse holder on the back panel of the System, as shown below.
4. Use a small screwdriver to gently pry open the cover and expose the fuse holder.
5. Gently pry out the fuse holder.
6. Remove the bad fuse and replace the fuse with a new fuse (value and size specified above).
7. Replace the fuse holder. Make sure that the arrows point to the right side of the back panel. Tilt the fuse holder slightly to the right and push in.
8. Push the fuse holder cover up and in until the cover snaps closed.
9. Reconnect the power cord to the back panel.
10. Plug the System into an electrical receptacle (outlet).

**Figure 10.1 – Fuse Location**

1. Power Switch      2. Fuse Holder

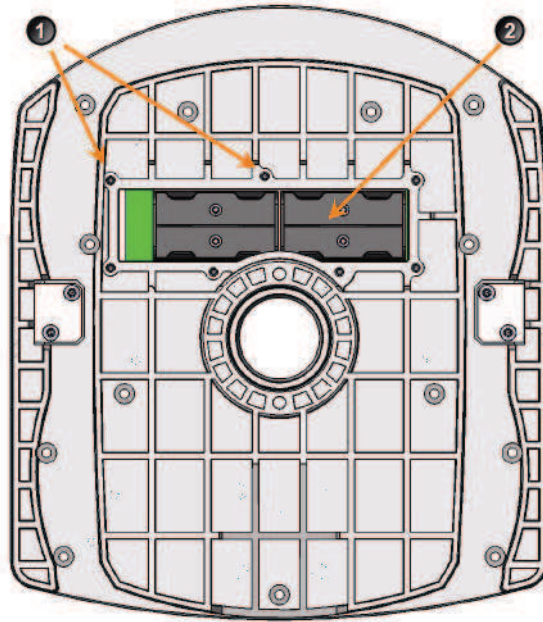
### Wireless Foot Pedal Battery Replacement Procedure

Four AA size NiMH batteries provide power to the wireless foot pedal. You must replace the batteries with the same size and type (NiMH) of batteries. If incorrect batteries are used, the wrong batteries might cause damage to the foot pedal.

To replace the batteries in the foot pedal:

1. Remove the screws on the battery cover. The battery cover is located on the bottom of the foot pedal.
2. Remove the old batteries. Do not throw the batteries in to the garbage. Use the proper disposal method for the batteries.
3. Insert the new batteries. Make sure that the batteries are inserted correctly.
4. Replace the battery cover and tighten all of the screws.

**Figure 10.2 – Battery Location for the Wireless Foot Pedal**



1. Battery Cover Screws (7)    2. NiMH Batteries

### Most Common User-Correctable Problems

Use the information in this section if you are not successful with the System Check-out. Consult this section to resolve the problem before you call AMO for technical service.

Before you call AMO for service:

- Make sure that the System is plugged in to a power receptacle.
- Make sure that there is electrical power to the receptacle.
- If there is no phacoemulsification, make sure that the phaco needle is tight on the handpiece.
- If there is no phacoemulsification, make sure that the phaco needle is compatible with the handpiece (for example, non-AMO™ phaco needle on an AMO™ handpiece).
- If there is no phacoemulsification, confirm that phaco needle/handpiece was not damaged by dropping or misuse.
- If no irrigation occurs, shake the drip chamber to confirm that the ball or valve moves freely. If there is no rattle sound, replace the drip chamber with another disposable tubing pack.

### Status, Warning and Error Messages

The System shows Status, Warning and Error Messages on the monitor.

The message can show possible solutions or recommendations to clear the error. The messages can indicate the available options if a component or subsystem fails.

The messages are listed in the following pages with the corrective actions to be taken to clear the error.

Recycle Power as a Corrective Action means that you turn the System **Off** (through the normal shut down procedure), wait a few seconds, and then turn the System **On**. If an error cannot be corrected, document the error message before you call AMO for technical service. Technical Service needs to know the error message to diagnose and correct the error.

### System Operation (Error) Messages

**Table 10.2 – Fluidic Controller Error Messages**

| Error Number | Message                         | Probable Cause                     | Corrective Action         |
|--------------|---------------------------------|------------------------------------|---------------------------|
| 14           | Vacuum Parameter Check Failure. | Hardware failure or program error. | Select <b>Next Case</b> . |
| 15           | Flow Parameter Error            | Hardware failure or program error. | Select <b>Next Case</b> . |
| 16           | FP Yaw Parameter Error          | Hardware failure or program error. | Select <b>Next Case</b> . |

| <b>Error Number</b> | <b>Message</b>                         | <b>Probable Cause</b>  | <b>Corrective Action</b>  |
|---------------------|--|--|---------------------------|
| 17                  | FP Pitch Parameter Error               | Hardware failure or program error.   | Select <b>Next Case</b> . |
| 18                  | IV Check Error                         | Hardware failure or program error.   | Select <b>Next Case</b> . |
| 19                  | Vit Cutter Check Error                 | Hardware failure or program error.   | Select <b>Next Case</b> . |
| 101                 | Fluidics communication error.          | Invalid data from the IH or communication errors.  | Select <b>Next Case</b> . |
| 102                 | Fluidics write error.                  | Microcontroller SPI, SPI Bus, EEPROM, or ADC is faulty.  | Cycle power.              |
| 103                 | Fluidics read error.                   | Microcontroller SPI, SPI Bus, EEPROM, or ADC is faulty.  | Cycle power.              |
| 104                 | Fluidics Reservoir Vacuum Level Error. | External air pressure low.<br>Venturi muffler clogged.<br>External air valve clogged.<br>External air leak.<br>Venturi vacuum path leak.<br>Vacuum sensor not calibrated or faulty.    | Reprime the System.       |
| 105                 | Fluidics Reservoir Leak.               | Venturi vacuum path leak   | Reprime the System.       |
| 106                 | Fluidics Tank Vacuum Level Error.      | Reservoir vacuum is low.<br>Tank vacuum path leak.<br>Vacuum sensor not calibrated or faulty.<br>Vacuum regulator not calibrated or faulty.<br>Vacuum regulator drive circuit failure. | Reprime the System.       |
| 107                 | Fluidics Tank Leak.                    | Tank vacuum path leak.   | Reprime the System.       |



| <b>Error Number</b> | <b>Message</b>                          | <b>Probable Cause</b>   | <b>Corrective Action</b>   |
|---------------------|---|---|--|
| 108                 | Fluidics Pack Vacuum Level Error.       | Reservoir vacuum is low.<br>Pack vacuum path leak.<br>Vacuum sensor not calibrated or faulty.<br>Vacuum regulator not calibrated or faulty.<br>Vacuum regulator drive circuit failure.  | Reprime the System.  |
| 109                 | Fluidics Pack Leak.                     | Pack leak.  | Reprime the System.  |
| 110                 | Fluidics RAM error.                     | Bad Microcontroller.  | Cycle power.   |
| 111                 | Fluidics ROM error.                     | Bad Microcontroller.  | Cycle power.   |
| 112                 | Fluidics Master Communication error.    | Instrument Host malfunction.<br>Bad microcontroller.  | Cycle power.   |
| 113                 | Drain Pump Fault.                       | Droplets, bubbles, or fog on chamber walls.<br>Bad fluid level sensor(s).<br>Bad cable.<br>Fluid level sensor drive circuits faulty.<br>Drain pump drive circuit fault.                 | Check the chamber and the bag for over-inflation.<br>Select <b>Next Case</b> . |
| 114                 | Fluidics DAC Fault.                     | Circuit failure (I2C bus, DAC, or micro).   | Reprime the System.  |
| 115                 | Fluidics Evacuation Vacuum Level Error. | Reservoir vacuum is low<br>Evacuation vacuum path leak<br>Vacuum sensor not calibrated or faulty<br>Vacuum regulator not calibrated or faulty<br>Vacuum regulator drive circuit failure | Reprime the System.  |
| 116                 | Fluidics Evacuation Leak.               | Evacuation path leak.   | Reprime the System.  |

| <b>Error Number</b> | <b>Message</b>                           | <b>Probable Cause</b>  | <b>Corrective Action</b>   |
|---------------------|--|--|--|
| 117                 | Fluidics Fluid Level Sense Error.        | Droplets, bubbles, or fog on chamber walls.<br>Bad fluid level sensor(s).<br>Bad cable.<br>Fluid level sensor drive circuits faulty. | Check the chamber and the bag for over-inflation.<br>Select <b>Next Case</b> .   |
| 118                 | Fluidics Irrigation Valve error.         | Valve failure.<br>Drive circuit failure.   | Cycle power.   |
| 119                 | Fluidics Pinch Valve error.              | Valve failure.<br>Drive circuit failure.   | Cycle power.   |
| 120                 | Fluidics Silicone Extraction Valve Fault | Valve failure.<br>Drive Circuit failure.   | Disable Venturi or select <b>Next Case</b> .   |
| 121                 | Fluidics Pack Alignment Valve Fault.     | Pump failure.<br>Drive circuit failure.  | Reinsert the pack and reprime.   |
| 122                 | Fluidics Dump Valve Fault.               | Valve failure.<br>Drive circuit failure.   | Disable Venturi or select <b>Next Case</b> .   |
| 123                 | Fluidics Venturi Valve Fault.            | Valve failure.<br>Drive circuit failure.   | Disconnect compressed air.<br>Reprime the system.  |
| 124                 | Fluidics Rotary Vane Fault.              | Pump failure.<br>Drive circuit failure.  | Connect compressed air.<br>Reprime the system.   |
| 125                 | Fluidics Pack Valve error.               | Valve failure.<br>Drive circuit failure.   | Cycle power.   |
| 127                 | Fluidics Valve Vent error.               | Irrigation blocked.  | <ol style="list-style-type: none"> <li>1. End the current Case.</li> <li>2. Start a New Case.</li> <li>3. Reprime the System.</li> <li>4. Turn the system off, wait a few seconds, then turn the system on.</li> <li>5. Install a new tubing cassette</li> <li>6. If the error does not clear or if the error continues to occur, document the Error Message and contact AMO for technical service.</li> </ol> |
| 128                 | Fluidics Pack Loading error.             | Pack not properly seated.  | Reload the tubing cassette.<br>Reprime.  |
| 129                 | Fluidics Proportional Valve Fault.       | Valve failure.<br>Drive circuit failure.   | Disconnect compressed air.<br>Reprime the system.  |

| <b>Error Number</b> | <b>Message</b>  | <b>Probable Cause</b>  | <b>Corrective Action</b>  |
|---------------------|---|--|---|
| 130                 | Fluidics Encoder error.                                       | Pack loading problem.<br>Encoder is faulty.<br>Decoder circuit is faulty.<br>Stepper driver circuit is faulty. | Reload the tubing cassette.<br>Select <b>Next Case</b> .                                |
| 131                 | Fluidics Mode error.  | Instrument Host malfunction.<br>Bad SSC Board.<br>Bad footpedal.   | Cycle power.  |
| 132                 | Fluidics VAC regulator current is too high or too low.        | Vacuum regulator faulty.<br>Drive circuit faulty.  | Disable Venturi or select <b>Next Case</b> .  |
| 133                 | Fluidics strain gauge ADC error.                              | ADC is faulty.   | Cycle power.  |
| 134                 | Fluidics Drain Pump Rotational Error.                         | Pack loading problem.<br>Encoder is faulty.<br>Decoder circuit is faulty.<br>Stepper driver circuit is faulty. | Insert Fusion™ Pack or select <b>Next Case</b> .<br>Reprime the system.                 |
| 135                 | Low external air pressure.                                    | Leak in external air supply path.<br>Pressure regulator set too low.<br>Pressure sensor faulty.                | Reinsert the pack and reprime.<br>Check the external air supply.                        |
| 136                 | Fluidics VAC Regulator Vent Fault.                            | Pinch valve is blocked.  | Disable Venturi or select <b>Next Case</b> .  |
| 137                 | Footpedal error.  | Bad footpedal or user depressing footpedal.  | Release the footpedal.<br>Disconnect and reconnect footpedal.<br>Cycle power and retry. |
| 138                 | Tank fluid level has reached the top sensor.                  | Drain pump cannot keep up with the input of fluid.   | Please wait for the tank to drain   |
| 144                 | Fluidics Vacuum Sensors Disagree Error.                       | Leak in vacuum path<br>Vacuum sensor faulty.   | Reinsert the pack and reprime.  |
| 147                 | Reservoir vacuum is too low. Target vacuum cannot be reached. | Leak<br>Vacuum regulator faulty<br>Drive circuit faulty  | Select <b>Next Case</b> .<br>Reprime the system.  |

| <b>Error Number</b> | <b>Message</b>  | <b>Probable Cause</b>                         | <b>Corrective Action</b>  |
|---------------------|---|---|---|
| 148                 | Pressure to pack capture mechanism is less than 60 psi. | Leak  | Reinsert the pack and reprime.  |
| 149                 | Unloaded strain gauge reading is too high or too low.   | Pack not loaded correctly.                    | Reinsert the pack and reprime.  |
| 201                 | Phaco Communication error.                              | Bad data sent from host.                      | Retune or cycle power.  |
| 202                 | Phaco power error.                                      | Hardware failure (phaco driver).              | Retune or cycle power.  |
| 203                 | Phaco handpiece error.                                  | Bad handpiece.                                | Retune or cycle power.<br>Replace the phaco handpiece.  |
| 204                 | Phaco handpiece error.                                  | Wire in handpiece broken.                     | Retune or cycle power.<br>Replace the phaco handpiece.  |
| 207                 | Incompatible Handpiece Error.                           | Incompatible handpiece.                       | 1. Turn off Ellips™ Technology.<br>2. Attach the Ellips™ handpiece.<br>3. Tune the handpiece. |
| 210                 | Phaco RAM error.  | Chip is bad.                                  | Cycle power.  |
| 211                 | Phaco ROM error.  | Bad 196 processor.                            | Cycle power.  |
| 212                 | Phaco controller timeout.                               | Host stopped writing to the Phaco controller. | Cycle power.  |
| 281                 | Phaco communication error.                              | Software bug or Hardware failure.             | Cycle power.  |
| 282                 | Phaco error.  | Bad handpiece.                                | Check handpiece and retune.   |
| 283                 | Phaco error.  | Driver failure.                               | Check handpiece and retune.<br>Replace the handpiece and tune.                                |
| 284                 | Phaco power supply error.                               | Bad Power Supply.                             | Cycle power or call service.  |
| 285                 | Check for loose handpiece and retune.                   | Tip is loose.                                 | Check for loose handpiece tip and retune.<br>Replace the handpiece and tune.                  |
| 286                 | Phaco handpiece impedance error.                        | Bad handpiece.                                | Check handpiece and retune.<br>Replace the handpiece and tune.                                |

| <b>Error Number</b> | <b>Message</b>                         | <b>Probable Cause</b>   | <b>Corrective Action</b>                                    |
|---------------------|--|---|---|
| 288                 | Diathermy error.                       | DIA subsystem issue.  | Check handpiece.<br>Select <b>Next Case</b> or cycle power. |
| 290                 | Footpedal error.                       | Bad footpedal or user pressing the footswitch.  | Check footpedal. Cycle power.                               |
| 291                 | Phaco Diathermy power supply error.    | Software or hardware failure.   | Cycle power.  |
| 301                 | Pneumatics RAM error.                  | Microcontroller failure.  | Cycle power.  |
| 302                 | Pneumatics ROM error.                  | Microcontroller failure.  | Cycle power.  |
| 303                 | Pneumatics Master communication error. | Watchdog event.<br>PC104 Bus failure.<br>Micro failure.<br>CPLD failure.  | Cycle power.  |
| 307                 | Pneumatics communication error.        | Invalid data received by the IH or communication error.   | Cycle power.  |
| 308                 | External air pressure high/low.        | Valve failure.<br>Drive circuit failure.  | Check compressed air supply.<br>Select <b>Next Case</b> .   |
| 309                 | Piston pump pressure high/low.         | Pump failure.<br>Drive circuit failure.   | Select <b>Next Case</b> .                                   |
| 310                 | Vit selector valve pressure high/low.  | VIT Selector Valve failure.<br>Drive circuit failure.   | Select <b>Next Case</b> .                                   |
| 311                 | Dump valve pressure high/low.          | VIT Dump Valve failure.<br>Drive circuit failure.   | Select <b>Next Case</b> .                                   |
| 312                 | Cut valve pressure high/low.           | VIT Cut Valve failure.<br>Drive circuit failure.  | Select <b>Next Case</b> .                                   |
| 322                 | Pneumatics system pressure too low.    | V1 External Air valve not open.<br>Piston Pump not working.<br>System leak.<br>Dump valve not closing.<br>Vitrectomy Cut valve always on. | Select <b>Next Case</b> .                                   |

| <b>Error Number</b> | <b>Message</b>  | <b>Probable Cause</b>   | <b>Corrective Action</b>                         |
|---------------------|---|---|--|
| 323                 | Pneumatics system pressure too low.                       | PP1 Piston Pump not working.<br>Piston Pump not working.<br>System leak.<br>Dump valve not closing.<br>Vitrectomy Cut valve always on.                                    | Select <b>Next Case</b> .                        |
| 327                 | Pneumatics system pressure too low at the high cut rates. | PP1 Piston Pump not working.<br>Piston Pump not working.<br>System leak.<br>Dump valve not closing.<br>Vitrectomy Cut valve always on.<br>Selector valve is not changing. | Select <b>Next Case</b> .                        |
| 336                 | Pneumatics system pressure too low at the low cut rates.  | PP1 Piston Pump not working.<br>Piston Pump not working.<br>System leak.<br>Dump valve not closing.<br>Vitrectomy Cut valve always on.<br>Selector valve is not changing. | Select <b>Next Case</b> .                        |
| 353                 | IH to GUI Communication Timed Out.                        | Software error or hardware error.   | Select <b>Next Case</b> .                        |
| 360                 | IH Fluidics – read error.                                 | Communication error.  | Cycle power.                                     |
| 361                 | IH Fluidics – write error.                                | Communication error.  | Cycle power.                                     |
| 362                 | H Fluidics – Comm. error.                                 | Communication error.  | Cycle power.                                     |
| 370                 | IH Phaco read error.                                      | Communication error.  | Cycle power.                                     |
| 371                 | IH Phaco write error.                                     | Communication error.  | Cycle power.                                     |
| 372                 | Bad Phaco long pulse.                                     | Communication error.  | Check program setting.<br>Cycle power.           |
| 373                 | IH Invalid Phaco burst setting.                           | Communication error.  | Check program. Cycle power.                      |
| 374                 | Handpiece removed during Phaco.                           | No handpiece is connected.  | 1. Attach a handpiece.<br>2. Tune the handpiece. |

| <b>Error Number</b> | <b>Message</b>                  | <b>Probable Cause</b>  | <b>Corrective Action</b>  |
|---------------------|---------------------------------|--|---|
| 375                 | Incompatible HP.                | Attempted to use Ellips™ Phaco settings with a WHITESTAR® handpiece. | <ol style="list-style-type: none"> <li>1. Turn off Ellips™ Technology.</li> <li>2. Attach the Ellips™ handpiece.</li> <li>3. Tune the handpiece.</li> </ol> |
| 380                 | IH Pneumatics – read error.     | Communication error.   | Cycle power.  |
| 381                 | IH Pneumatics – write error.    | Communication error.   | Cycle power.  |
| 390                 | IH Diag read error.             | Communication error.   | Cycle power.  |
| 391                 | IH Diag write error.            | Communication error.   | Cycle power.  |
| 416                 | Footpedal communication error.  | Could not open port.<br>Footpedal not responding.                    | Reconnect footpedal.  |
| 418                 | Footpedal compatibility error.  | New footpedal firmware.  | Replace footpedal.  |
| 501                 | Prime excessive vacuum error.   | Communication error.   | Check the tubing cassette.<br>Reload or replace the tubing cassette.<br>Reprime.  |
| 502                 | Prime low bottle height error.  | Bottle not at the proper height.                                     | Increase bottle height and reprime.   |
| 503                 | Prime low vacuum error.         | Hardware failure.  | Check the tubing cassette.<br>Reload or replace the tubing cassette.<br>Reprime.  |
| 507                 | Prime EQ pressure error.        | Hardware failure.  | Reprime.  |
| 508                 | Prime low venturi vacuum error. | Hardware failure.  | Reprime.  |
| 511                 | IV Pole communications error.   | Communication error.   | Reprime the system.   |
| 512                 | IV Pole communications error.   | Communication error.   | Reprime the system.   |
| 513                 | IV Pole communications error.   | Communication error.   | Reprime the system.   |
| 514                 | IV Pole error.                  | Communication error.   | Reprime the system.   |

| <b>Error Number</b> | <b>Message</b>                  | <b>Probable Cause</b>  | <b>Corrective Action</b>  |
|---------------------|---------------------------------|--|---|
| 515                 | IV Pole calibration error.      | Communication error.   | Reprime the system.   |
| 516                 | IV Pole communication error.    | Communication error.   | Reprime the system.   |
| 517                 | IV Pole jammed.                 | Jammed.<br>Motor failure.<br>A “Short” in the motor wires.<br>Obstruction is not allowing the pole to move | Check for obstructions.<br>Reprime the system.                    |
| 601                 | Tune excessive vacuum error.    | Hardware failure.  | Check the tubing and the connections to the handpiece.<br>Retune. |
| 605                 | Tune no handpiece error.        | Hardware failure.  | Insert handpiece and retune.                                      |
| 2000                | DLL CRC Error                   | DLL checksum does not match config.dat.  | Cycle power.  |
| 2001                | CRC Error                       | STR checksum does not match config.dat.  | Cycle power.  |
| 2002                | Database Self Test Error        | Database file checksum does not match config.dat.  | Cycle power.  |
| 2003                | Error updating database file.   | Error when database was saved.   | Cycle power.  |
| 2004                | Error adding language.          | Error during the Install Language session.   | Cycle power.  |
| 2005                | Error reading USB memory stick. | Error during an Import or Export session.  | Cycle power.  |
| 2006                | Error loading DLL.              | Cannot find or load a DLL file.  | Cycle power.  |
| 2007                | Record file save error.         | Error when Record database file was saved.   | Cycle power.  |
| 2008                | Error reading Record file.      | Cannot read Record database file.  | Cycle power.  |
| 2010                | IH Communication timed out.     | No communication with the IH.  | Cycle power.  |



| <b>Error Number</b> | <b>Message</b>                            | <b>Probable Cause</b>                       | <b>Corrective Action</b> |
|---------------------|---|---|--------------------------|
| 2011                | Error retrieving version strings from IH. | Cannot not retrieve the IH version numbers. | Cycle power.             |
| 2012                | IH timeout error.                         | No communication with IH.                   | Cycle power.             |
| 2014                | IH Selftest error.                        | Cannot get Selftest status from the IH.     | Cycle power.             |

**Troubleshooting**      **Table 10.3 – Troubleshooting – General**

| <b>General</b>  |  |
|---|--|
| <b>Problem</b>  | <b>Corrective Action</b>   |
| The System does not come on when the power switch is turned on. | <ol style="list-style-type: none"> <li>1. Turn the power switch <b>Off</b>.</li> <li>2. Confirm that the power cord is connected to the console back panel.</li> <li>3. Confirm that the power cord is plugged into the electrical receptacle or another power source.</li> <li>4. Confirm that there is electrical power to the wall receptacle or power source.</li> <li>5. Turn the system <b>On</b>.</li> <li>6. If the system still does not come on, turn the power <b>Off</b>. Check for bad fuses and replace the fuse if necessary.</li> <li>7. Contact AMO for Technical Service.</li> </ol> |

| <b>General</b>                                    |   |
|---|---|
| <b>Problem</b>                                    | <b>Corrective Action</b>  |
| <p>The wireless remote control does not pair.</p> | <ol style="list-style-type: none"> <li>1. Make sure that you are pairing only one remote. If you try to pair more than one remote at the same time, the pairing fails.</li> <li>2. Only pair the remote with one console at a time. Do not press the pairing key sequence on multiple remote controls as this causes the pairing to fail.</li> <li>3. Do not have any other Bluetooth™ devices in the same area as the remote and the console (other remote controls, dual linear foot pedals, cell phones, or headsets, for example) as the pairing operation will fail. The software only detects a maximum of nine (9) devices any more than nine and the pairing fails.</li> <li>4. Check to see if the remote control is in “Sleep” mode. If the remote is in “Sleep” mode, press the Backlight button on the remote. Complete the UP, DOWN, RIGHT, LEFT, RELOAD key sequence to pair the remote.<br/>Note: Always press the Backlight button before you pair the remote.</li> <li>5. The remote control can only be paired with one console at a time. Make sure that the remote has not been paired with another console. You must: <ul style="list-style-type: none"> <li>• Unpair the remote from the console.</li> <li>• Shut down the console.</li> <li>• Pair the remote with the new console. Make sure this console is at least 40 meters away from the first console.</li> </ul> </li> <li>6. The remote cannot be paired with another console after that remote has been paired. (You cannot pair one remote with two (2) consoles.) <ul style="list-style-type: none"> <li>• Unpair the remote from the console.</li> <li>• Move the first remote out of range from the console.</li> <li>• Wait for the first remote to go into “Sleep” mode.</li> <li>• Pair the new remote.</li> </ul> </li> <li>7. Make sure that the batteries are fully charged before you pair the remote with the console. Low batteries can cause pairing failures.</li> <li>8. Charge the batteries if pairing has failed after several attempts.</li> <li>9. When the batteries are charging (the remote is in the charge cradle): <ul style="list-style-type: none"> <li>• The Bluetooth™ is turned off</li> <li>• The remote cannot be used</li> <li>• Pairing cannot be performed</li> </ul> </li> </ol> |

| <b>General</b>  |   |
|---|---|
| <b>Problem</b>  | <b>Corrective Action</b>  |
| Dual Linear Foot Pedal does not pair.(Advanced Control Pedal) | <ol style="list-style-type: none"> <li>1. Make sure that the foot pedal is not paired with another console.</li> <li>2. Do not have any other Bluetooth™ devices in the same area as the foot pedal and the console (other remote controls, dual linear foot pedals, cell phones, or headsets, for example) as the pairing operation will fail. The software only detects a maximum of nine (9) devices any more than nine and the pairing fails.</li> <li>3. Make sure that the batteries are fully charged before you pair the foot pedal with the console. Low batteries can cause pairing failures.</li> <li>4. Charge the batteries if pairing has failed after several attempts.</li> <li>5. When the batteries are charging (the foot pedal is in the charge cradle): <ul style="list-style-type: none"> <li>• The Bluetooth™ is turned off</li> <li>• The foot pedal cannot be used</li> <li>• Pairing cannot be performed</li> </ul> </li> </ol> |
| The footpedal is not operating properly.                      | <ol style="list-style-type: none"> <li>1. Go to the Diagnostics section and perform a Footpedal Test.</li> <li>2. Confirm the footpedal cord is connected at the back of the console.</li> <li>3. Confirm the footpedal is paired to the System, for the Advanced Control Pedal (dual linear) only.</li> <li>4. Perform a Foot Pedal Calibration, for the Advanced Control Pedal (dual linear) only.</li> <li>5. Replace the wireless footpedal batteries, Advanced Control Pedal (dual linear) only.</li> </ol>  |
| The Programmable IV Pole does not respond.                    | <ol style="list-style-type: none"> <li>1. The pole might have reached maximum or minimum height.</li> <li>2. Attempt a Programmable IV Pole height adjustment with the touch screen, remote, or the up and down switch on the side of the system.</li> </ol>  |
| The Touch Screen does not respond.                            | Perform the Touch Screen Calibration procedure as described in Diagnostics.   |
| Priming Errors.   | <ol style="list-style-type: none"> <li>1. Check the tubing pack loading, including reloading the tubing cassette.</li> <li>2. Verify that there are no kinks, clogs, or loose fittings.</li> <li>3. Replace the handpiece and the tip and prime.</li> <li>4. Replace the tubing cassette.</li> <li>5. Check the test chamber for proper installation and leaks.</li> <li>6. Contact AMO Technical Service to check the vacuum.</li> </ol>   |

**Table 10.4 – Troubleshooting – Irrigation**

| <b>Irrigation</b>  |  |
|--|--|
| <b>Problem</b>   | <b>Corrective Action</b>   |
| No irrigation flow.  | <ol style="list-style-type: none"> <li>1. Make sure the appropriate mode is selected on the screen.</li> <li>2. Check for kinks in the irrigation tubing.</li> <li>3. Check the tubing connection to the handpiece.</li> <li>4. Tap the drip chamber to make sure the valve operates properly.</li> <li>5. Check the bottle height.</li> <li>6. Press the footpedal to Position 1 and check for flow.</li> <li>7. Listen for the irrigation pinch valve in the tubing manifold area to confirm that the valve operates when the footpedal is pressed.</li> <li>8. If there is still no flow, replace the tubing cassette.</li> </ol> |
| Reduced/insufficient irrigation flow.                              | <ol style="list-style-type: none"> <li>1. Check for kinks in the tubing or leaks in the tubing or the handpiece.</li> <li>2. Check the bottle height.</li> <li>3. Check the tubing connections.</li> <li>4. Check for a pinched irrigation sleeve at the incision.</li> </ol>  |
| Irrigation flow continues even when footpedal is Off (Position 0). | <ol style="list-style-type: none"> <li>1. Check that the footpedal is not obstructed and not stuck in P 1.</li> <li>2. Check the footpedal operation.</li> <li>3. Verify that <b>Continuous Irrigation</b> is not active.</li> </ol>   |
| Anterior chamber is too shallow or too deep.                       | <ol style="list-style-type: none"> <li>1. Check the bottle height.</li> <li>2. Too shallow, check for a pinched irrigation sleeve at the incision.</li> <li>3. Check the pump speed (flow rate).</li> <li>4. Check that the irrigation tubing is not obstructed.</li> <li>5. Make sure Irrigation and Aspiration are balanced.</li> </ol>  |
| Using large amounts of fluid.                                      | <ol style="list-style-type: none"> <li>1. Check the bottle height.</li> <li>2. Check the incision size.</li> <li>3. Check the flow rate (pump speed too high).</li> <li>4. Check that no fluid enters the collection bag when you do not use irrigation.</li> <li>5. Reseat or replace the tubing.</li> </ol>  |

**Table 10.5 – Troubleshooting – Aspiration**

| <b>Aspiration</b>                           |  |
|---|--|
| <b>Problem</b>                              | <b>Corrective Action</b>   |
| No aspiration.                              | <ol style="list-style-type: none"> <li>1. Make sure the appropriate mode is selected on the screen.</li> <li>2. Check for kinks or clogs in the tubing.</li> <li>3. Check the tubing connection to the handpiece.</li> <li>4. Make sure that the handpiece is not clogged.</li> <li>5. Press the footpedal to Position 2 and check the pump function.</li> </ol>   |
| Poor aspiration.                            | <ol style="list-style-type: none"> <li>1. Check the flow rate.</li> <li>2. Check the footpedal operation.</li> <li>3. Check for kinks or clogs in the tubing.</li> <li>4. Make sure that the handpiece is not clogged.</li> <li>5. Check the tubing connection to the handpiece.</li> <li>6. Check the IA handpiece o-rings for excessive wear. Replace the o-rings, if needed.</li> </ol>   |
| Not building vacuum.<br>Pump does not turn. | <ol style="list-style-type: none"> <li>1. Check the programming. If the surgeon is in “linear vacuum” as opposed to “linear aspiration”, the footpedal must be pressed through Position 2 for the vacuum to reach the preset maximum.</li> <li>2. Make sure the footpedal is pressed.</li> <li>3. Check the tubing connection to the handpiece.</li> <li>4. Check for air in the irrigation and aspiration tubing.</li> <li>5. Check the system vacuum settings.</li> <li>6. Replace the tubing cassette</li> <li>7. Run IA Prime.</li> <li>8. Check the flow rate.</li> </ol> |
| Chamber shallowing or partially collapses.  | <ol style="list-style-type: none"> <li>1. Check the bottle height and the handpieces for correct position.</li> <li>2. Check the flow rate setting.</li> <li>3. Check the tubing fittings to the handpiece.</li> <li>4. Check for kinks in the tubing.</li> <li>5. Remove the handpiece and perform the test chamber test to make sure the handpiece is balanced.</li> <li>6. Make sure Irrigation and Aspiration are balanced.</li> </ol>   |

**Table 10.6 – Troubleshooting – Phacoemulsification**

| <b>Phacoemulsification</b>                |  |
|---|--|
| <b>Problem</b>                            | <b>Corrective Action</b>   |
| No phacoemulsification.                   | <ol style="list-style-type: none"> <li>1. Make sure that the PHACO mode is selected on the touch screen.</li> <li>2. Make sure that the System is Primed and Tuned.</li> <li>3. Check the footpedal operation.</li> <li>4. Make sure that the phaco handpiece cord is properly connected to the phaco receptacle on the front of the system.</li> <li>5. Check the Phaco Power setting.</li> <li>6. Make sure that the phaco tip is tight on the handpiece.</li> <li>7. Check to make sure that the phaco tip is not damaged.</li> <li>8. If the tip is damaged, replace the tip with a new tip and retune.</li> </ol> |
| Poor or intermittent phacoemulsification. | <ol style="list-style-type: none"> <li>1. Check all of the corrective steps above for “No Phacoemulsification”.</li> <li>2. Remove the phaco tip and then replace the tip. Make sure the tip is tight on the handpiece.</li> <li>3. Check the Phaco Power delivery setting for both unoccluded and occluded (if applicable) settings.</li> <li>4. Tune the phaco handpiece.</li> </ol>   |

**Table 10.7 – Troubleshooting – Diathermy**

| <b>Diathermy</b>                |  |
|---------------------------------|--|
| <b>Problem</b>                  | <b>Corrective Action</b>   |
| No diathermy or poor diathermy. | <ol style="list-style-type: none"> <li>1. Make sure that the Diathermy mode is selected on the touch screen.</li> <li>2. Check the footpedal operation.</li> <li>3. Check the Diathermy Power setting.</li> <li>4. Check the diathermy cord for a secure connection to the forceps and to the diathermy receptacles on the system.</li> <li>5. Make sure that the diathermy cord connections are dry.</li> <li>6. Try to use diathermy starting at a low power setting and gradually increase the power.</li> <li>7. Replace the diathermy cord.</li> <li>8. Replace the diathermy handpiece.</li> </ol> |
| No sound when using diathermy.  | <ol style="list-style-type: none"> <li>1. Make sure the Volume Setting is set at 6 or greater in Settings.</li> <li>2. Check for sounds when you push any touch screen or remote buttons.</li> <li>3. Check for an audible confirmation upon completion of system start-up test (at power up).</li> <li>4. Perform the Sound Test on the Diagnostics screen.</li> </ol>  |

**Table 10.8 – Troubleshooting – Vitrectomy**

| <b>Vitrectomy</b>                      |  |
|--|--|
| <b>Problem</b>                         | <b>Corrective Action</b>   |
| No vitrectomy cutting or poor cutting. | <ol style="list-style-type: none"> <li>1. Make sure that the Vitrectomy mode is selected on the touch screen.</li> <li>2. Verify that the surgeon is in footpedal Position 3, if IAC step vitrectomy is programmed. If ICA is programmed, verify the footpedal is in Position 2.</li> <li>3. Check the footpedal operation.</li> <li>4. Check the tubing connections to the vitrectomy cutter.</li> <li>5. Check the vitrectomy tubing connection to the front panel receptacle on the system.</li> <li>6. Check the Vitrectomy Rate (CPM) setting on the touch screen. Lower the CPM, if necessary.</li> <li>7. Check that irrigation and aspiration are working correctly.</li> <li>8. Verify that the cutter blade moves.</li> <li>9. Replace the vitrectomy cutter and try again.</li> </ol> |





# 11

## WARRANTY AND MAINTENANCE

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Warranty Statement

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**Warranty Statement**

AMO warrants for a period of two years (24 months) from the date of installation of the WHITESTAR SIGNATURE™ System console, footpedal, wireless remote control, programmable power pole and the phaco handpiece to be free from defects in materials and workmanship when properly installed, maintained, and used for the intended purpose.

MISUSE AND MISHANDLING ARE NOT COVERED UNDER WARRANTY. AMO's sole obligation is to repair or replace, at AMO's option, the defective part(s).

The Irrigation/Aspiration Handpiece Set, Diathermy Forceps and Diathermy Cord are warranted for ninety (90) days.

This warranty applies only to the original purchaser/user of the device and only so long as the equipment is used in the country to which it was originally shipped by AMO.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL AMO BE LIABLE TO THE PURCHASER FOR CONSEQUENTIAL DAMAGES.

**Extended Warranty**

Extended Warranty Contracts (excluding the phaco handpiece) are available. Contact AMO for information on the availability of an Extended Warranty Contract.

Note: If outside the United States, contact your local AMO office or representative for warranty information.

**Maintenance**

User maintenance of the WHITESTAR SIGNATURE™ System is limited to those adjustments and corrective actions given in the Error Messages and Troubleshooting, and Diagnostics sections of this manual. There are no user serviceable components within the machine and you must not attempt to access the internal components. Any attempt to do so will void the warranty.

Routine or periodic maintenance of the WHITESTAR SIGNATURE™ System by an AMO representative is recommended at least annually. AMO recommends the measurement of PE resistance and leakage current according to IEC 601-1 every two years.

If a problem continues following setup, check-out and troubleshooting as per the procedures given in this manual, contact AMO for corrective action (1-877-AMO-4LIFE in USA 1-877-266-4543). Please contact your local AMO office or representative for region-specific phone numbers.

# 12

## SPECIFICATIONS

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Physical Specifications

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Environmental Specifications

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Electrical Specifications

---

Diathermy Specifications

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Irrigation and Aspiration Specifications

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Phacoemulsification Specifications

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Vitrectomy Specifications

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Diathermy Power Graphs

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Diathermy Power versus Load Impedance

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Phaco Power Graphs

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**Physical  
Specifications**
**Table 12.1 – System Physical Specifications**

|   |        | <b>English /<br/>U.S.</b>            | <b>Metric:</b> |
|---|--------|--------------------------------------|----------------|
| <b>WHITESTAR SIGNATURE™ System Console:</b> |        |                                      |                |
| Console Dimensions (with display)           | Width  | 24 inches                            | 61 cm          |
|   | Depth  | 24 inches                            | 61 cm          |
|   | Height | 54 inches                            | 137 cm         |
| Power Cord Length                           |        | 20 feet                              | 6 meters       |
| Electrical Enclosure Current Leakage        |        | IEC 60601-1 compliance<br>UL 60601-1 |                |
| Weight (including IV pole)                  |        | 195 pounds                           | 88.5 kg        |
| <b>Footpedal:</b>                           |        |                                      |                |
| <b>Single Linear</b>                        |        |                                      |                |
| Dimensions                                  | Width  | 12 inches                            | 31 cm          |
|   | Length | 10.5 inches                          | 27 cm          |
|   | Height | 5.5 inches                           | 14 cm          |
| Weight                                      |        | 10.0 pounds                          | 4.5 kg         |
| <b>Advanced Control Pedal (Dual Linear)</b> |        |                                      |                |
| Dimensions                                  | Width  | 10.5 inches                          | 27 cm          |
|   | Length | 14 inches                            | 36 cm          |
|   | Height | 5.5 inches                           | 14 cm          |
| Weight                                      |        | 15 pounds                            | 7 Kg           |
| Cord Length                                 |        | 11.8 feet                            | 36 cm          |
| <b>Power IV Pole:</b>                       |        |                                      |                |
| Maximum Travel                              |        | 41 inches                            | 107 cm         |
| Velocity                                    |        | 2.4 inches/sec                       | 6 cm/sec.      |
| Maximum Lift Weight                         |        | 2.43 pounds                          | 1.1 kg         |
| <b>Wireless Remote Control</b>              |        |                                      |                |
|   | Width  | 5 inches                             | 13 cm          |
|   | Length | 5 inches                             | 13 cm          |
|   | Height | 1.5 inches                           | 4 cm           |
|   | Weight | 2.0 pounds                           | .9 kg          |

**Environmental Specifications****Table 12.2 – Environmental Specifications**

|  |                       |                              |
|--|-----------------------|------------------------------|
| <b>Environmental Specifications</b>      | Operating Temperature | 10 to 40°C                   |
|  | Humidity              | Up to 95% RH, non-condensing |
| <b>Storage/Transportation Conditions</b> | Storage Temperature   | -20 to 60°C                  |
|  | Humidity              | Up to 95% RH, non-condensing |

**Electrical Specifications****Table 12.3 – Electrical Specifications**

|               | <b>Voltage</b>  | <b>Frequency</b> | <b>Rated Power</b> | <b>Fuse Rating</b>      | <b>Enclosure Current Leakage</b> |
|---------------|-----------------|------------------|--------------------|-------------------------|----------------------------------|
| <b>System</b> | 100/120/240 Vac | 50/60 Hz         | 750 VA             | 6.3A, 250V, Bussman GDA | <500 uA                          |

**Diathermy Specifications****Table 12.4 – Diathermy Specifications**

| <b>Diathermy Specifications</b> |   |                                 |
|---------------------------------|---|---------------------------------|
|                                 | Power Adjustment                                | 5 to 100%, in 5% increments     |
|                                 | Diathermy Power (maximum power into rated load) | 8.5 Watts into 350 ohms 386 KHz |
|                                 | Diathermy Type                                  | Bipolar                         |

**Irrigation and Aspiration Specifications****Table 12.5 – Irrigation and Aspiration Specifications**

| <b>IA Specifications</b> |              |                                 |
|--------------------------|--------------|---------------------------------|
| Peristaltic Pump         | Vacuum Level | 0–650 mmHg in 5 mmHg increments |
|                          | Pump Flow    | 0 to 60 cc/minute               |
| Venturi Pump             | Vacuum Level | 0-600 mmHg in 5 mmHg increments |

**Phacoemulsification Specifications**      **Table 12.6 – Phacoemulsification Specifications**

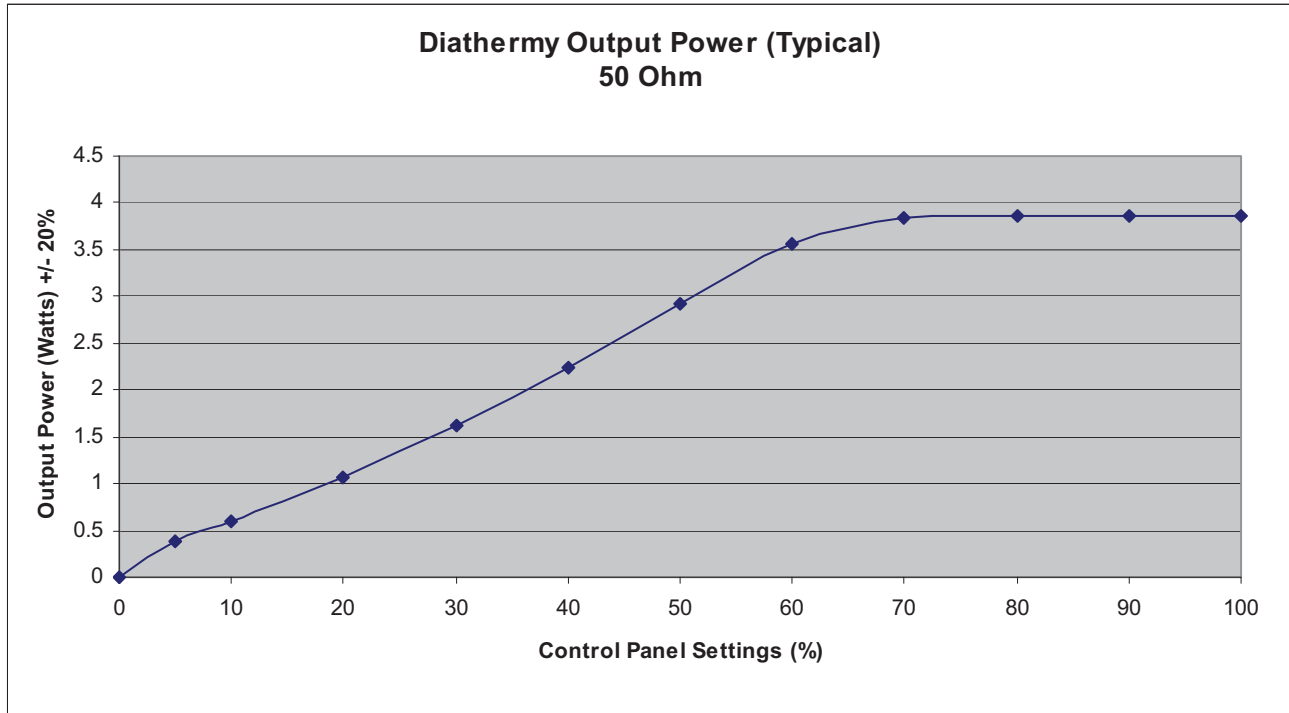
| <b>Phacoemulsification Specifications</b> | <b>Phaco Power</b> | <b>0 to 100%, in 5% increments</b> |
|---|--------------------|------------------------------------|
| Peristaltic Pump                          | Vacuum Level       | 0–650 mmHg in 5 mmHg increments    |
|   | Pump Flow Rate     | 0 to 60 cc/minute                  |
| Venturi Pump                              | Vacuum Level       | 0-600 mmHg in 5 mmHg increments    |

**Vitrectomy Specifications**      **Table 12.7 – Vitrectomy Specifications**

| <b>Vitrectomy Specifications</b> |                |  |
|----------------------------------|----------------|--|
| Peristaltic Pump                 | Vacuum Level   | 0–650 mmHg in 5 mmHg increments        |
|                                  | Pump Flow Rate | 10 to 60 cc/minute, in 2 cc increments |
| Venturi Pump                     | Vacuum Level   | 0-600 mmHg in 5 mmHg increments        |

## Diathermy Power Graphs

Table 12.8 – Diathermy Output Power (Typical) 50 Ohm



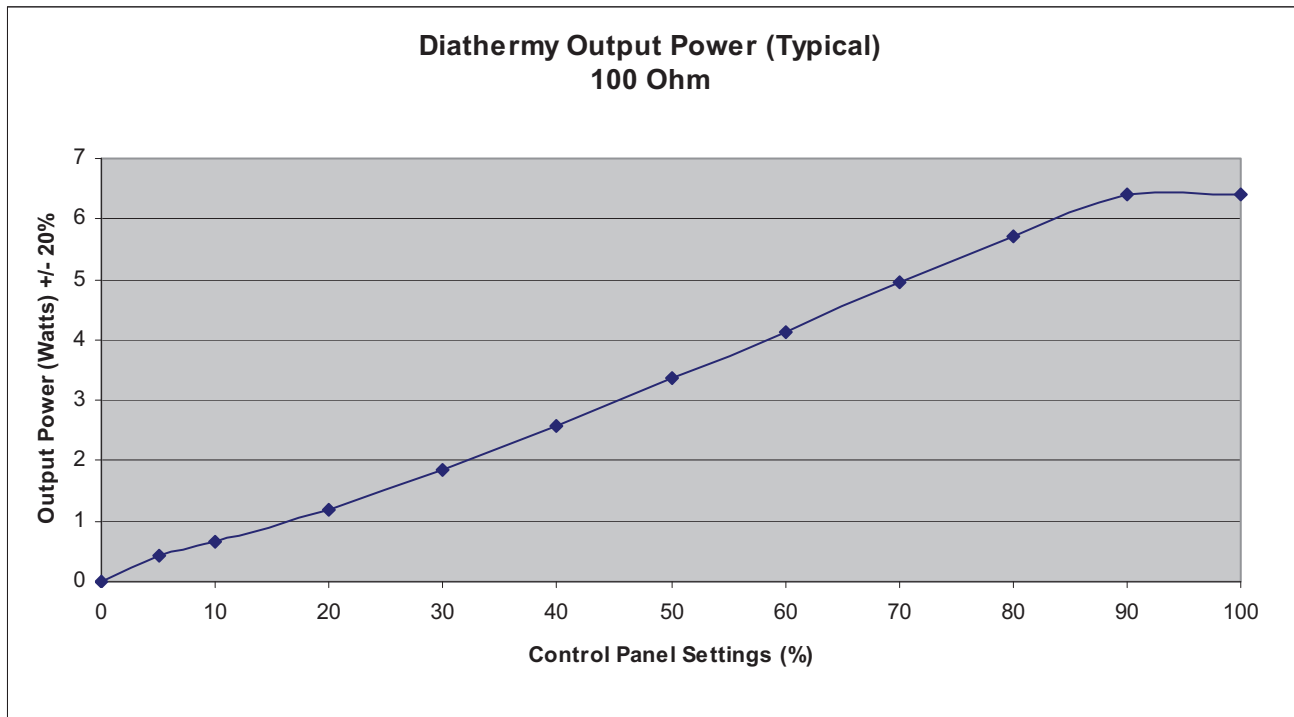
**Table 12.9 – Diathermy Output Power (Typical) 100 Ohm**



Table 12.10 – Diathermy Output Power (Typical) 200 Ohm

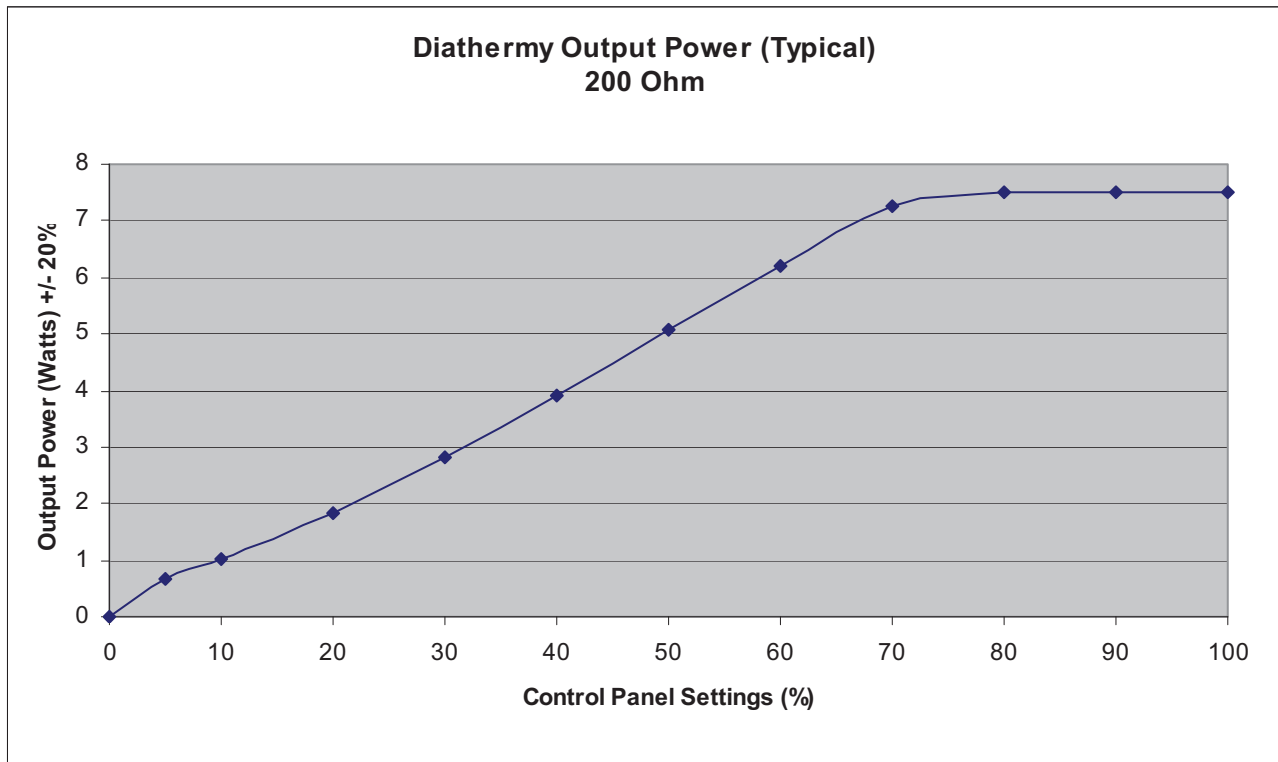


Table 12.11 – Diathermy Output Power (Typical) 500 Ohm

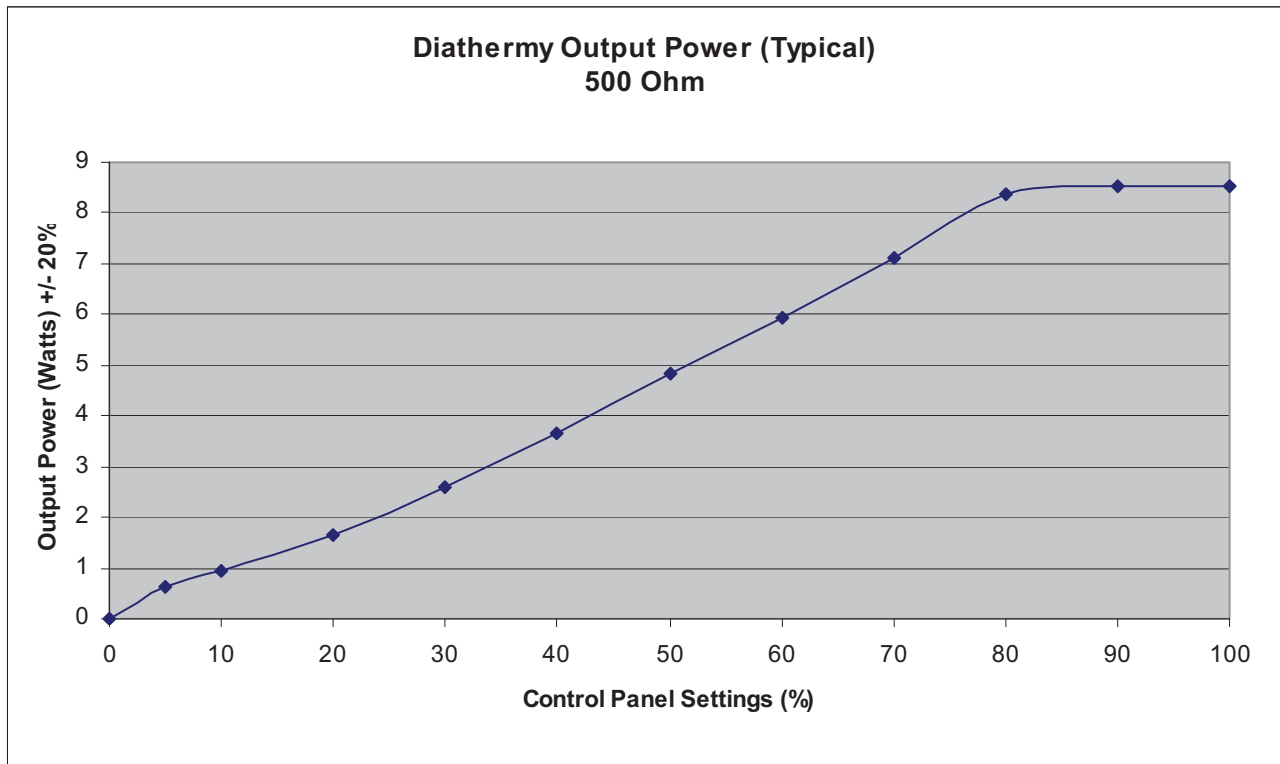
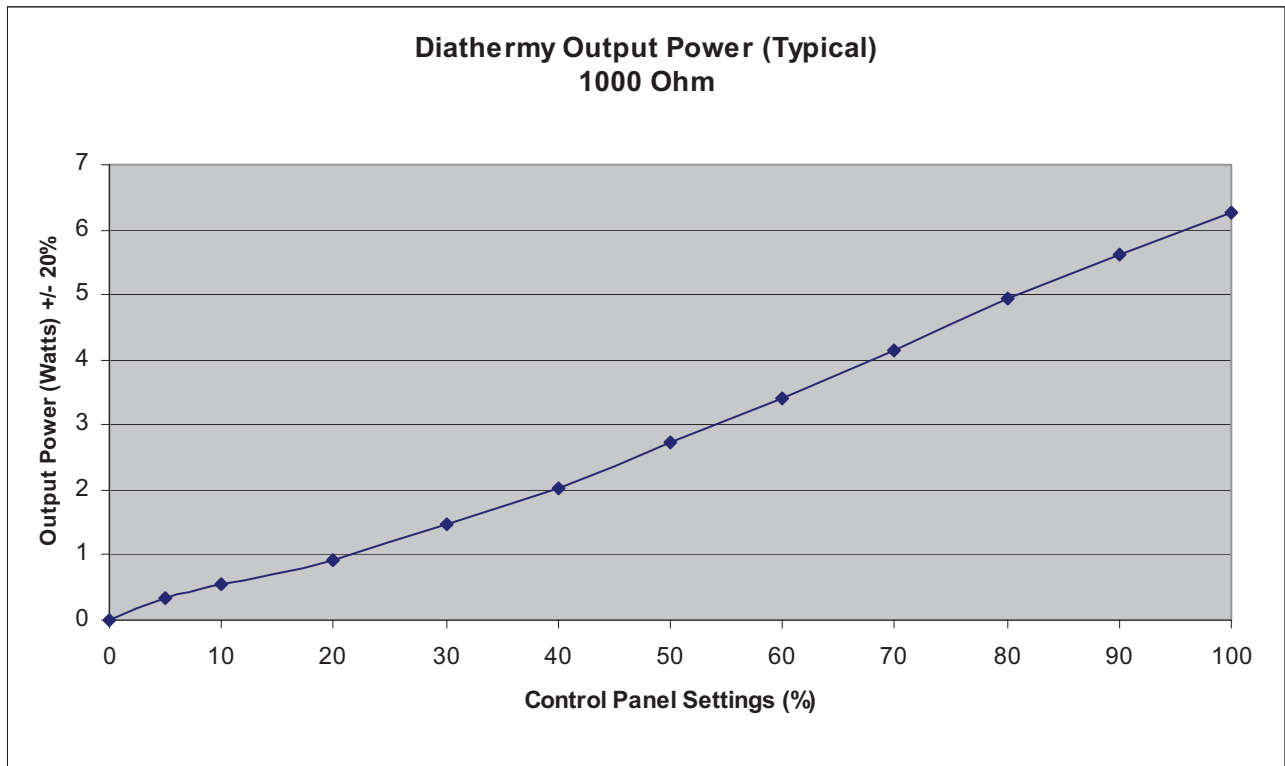


Table 12.12 – Diathermy Output Power (Typical) 1000 Ohm



## Diathermy Power versus Load Impedance

Table 12.13 – Diathermy Output Power (50% Setting)

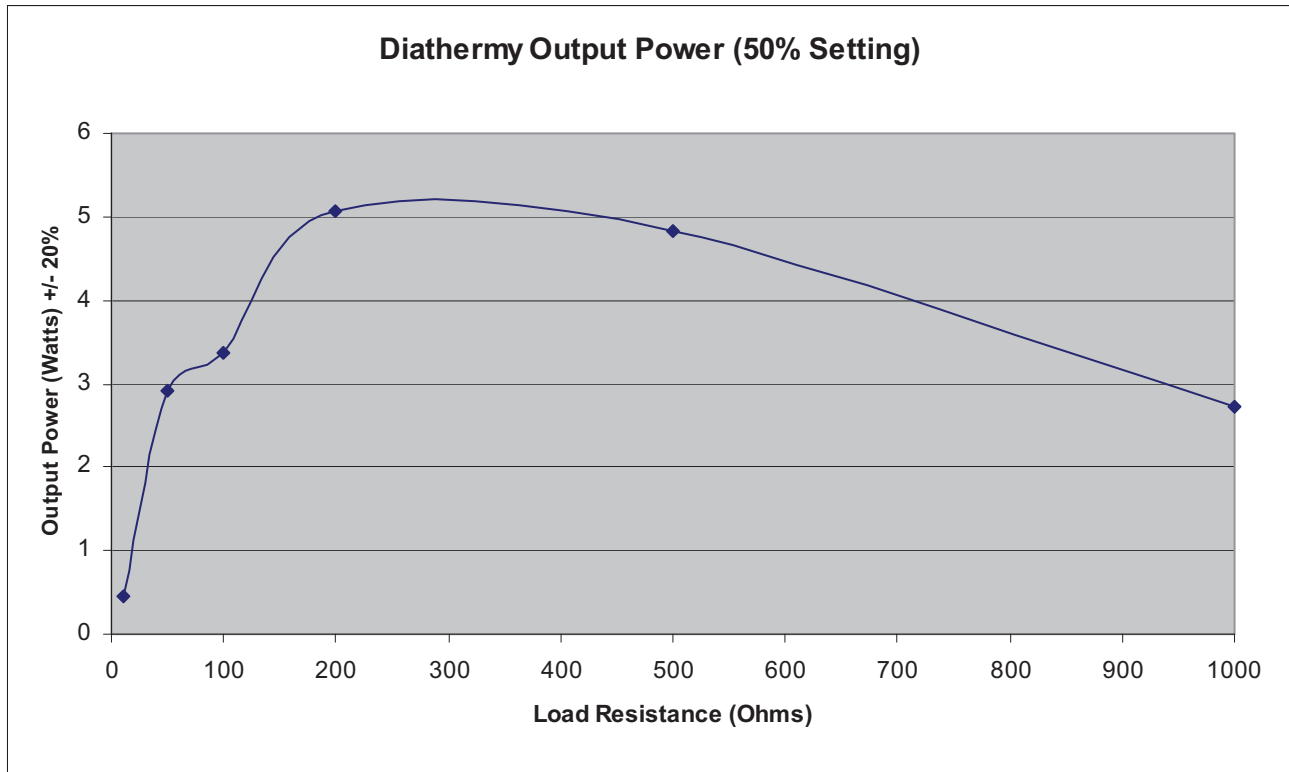


Table 12.14 – Diathermy Output Power (100% Setting)

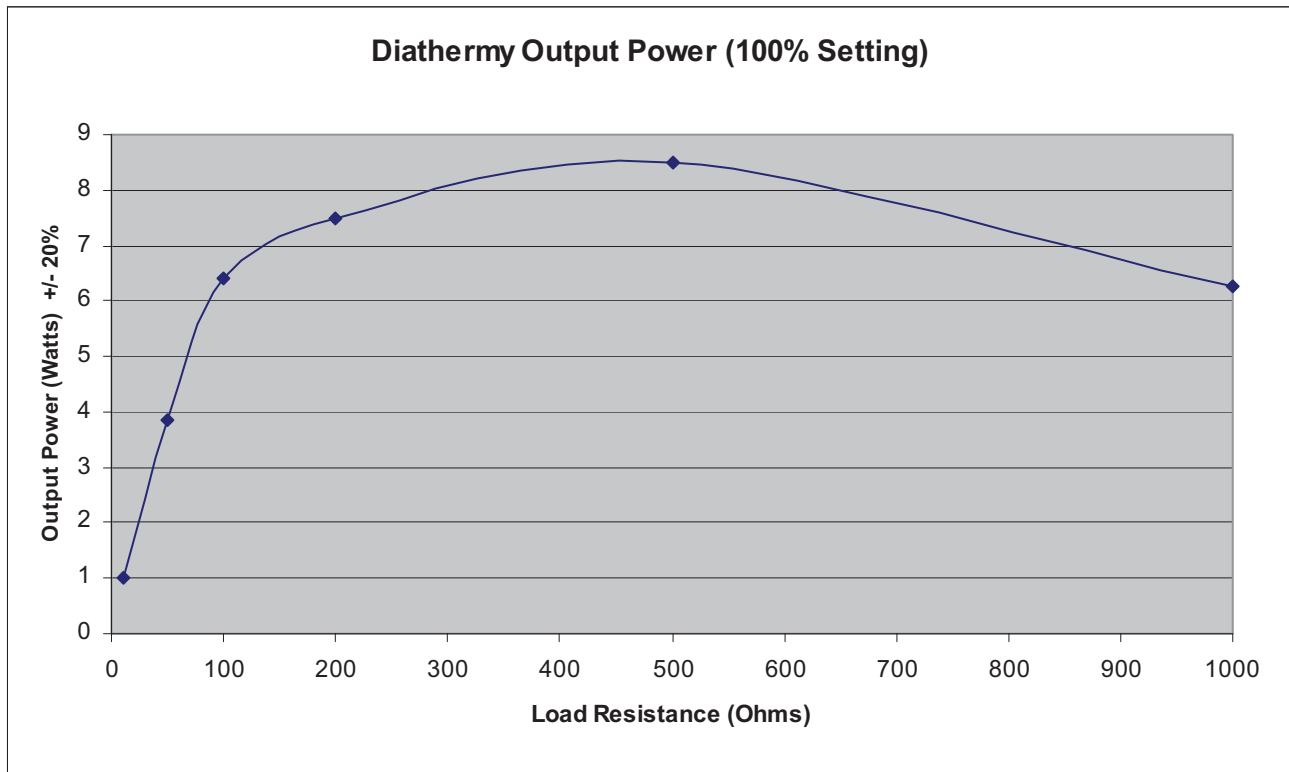
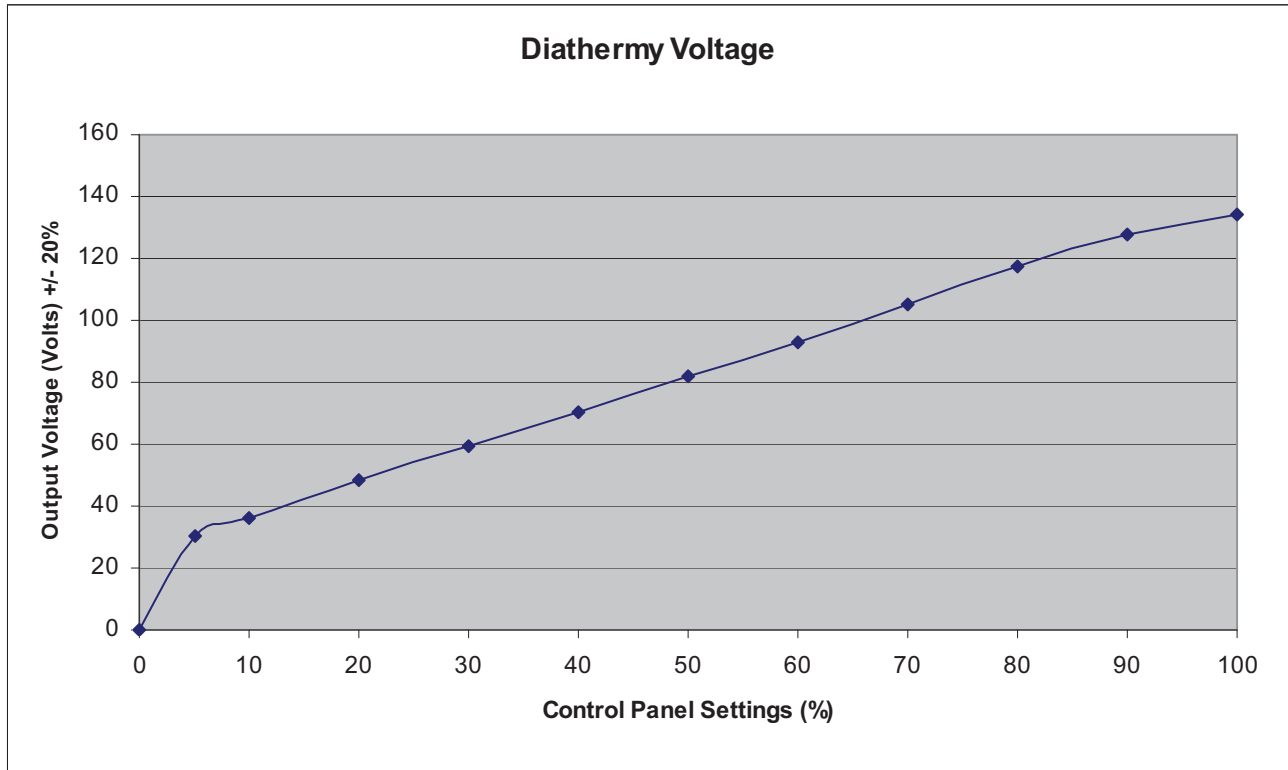


Table 12.15 – Diathermy Voltage



## Phaco Power Graphs

Table 12.16 – Longitudinal Phaco Power

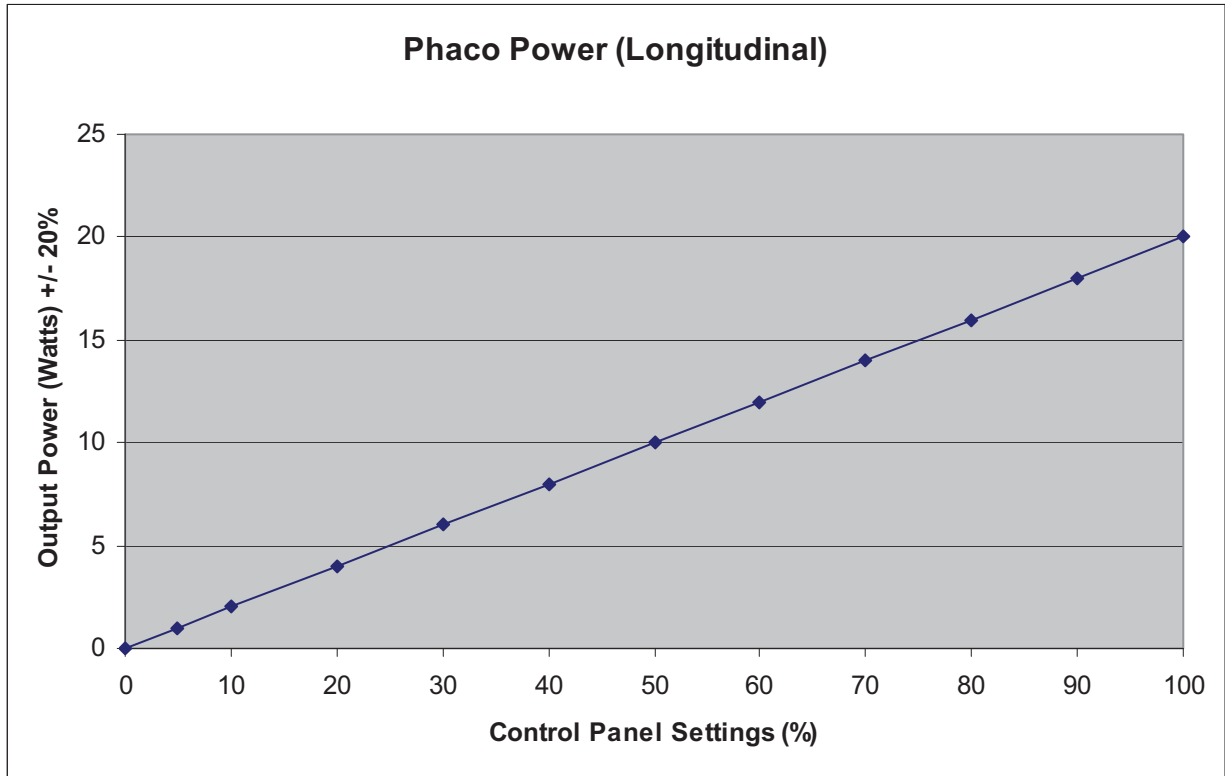
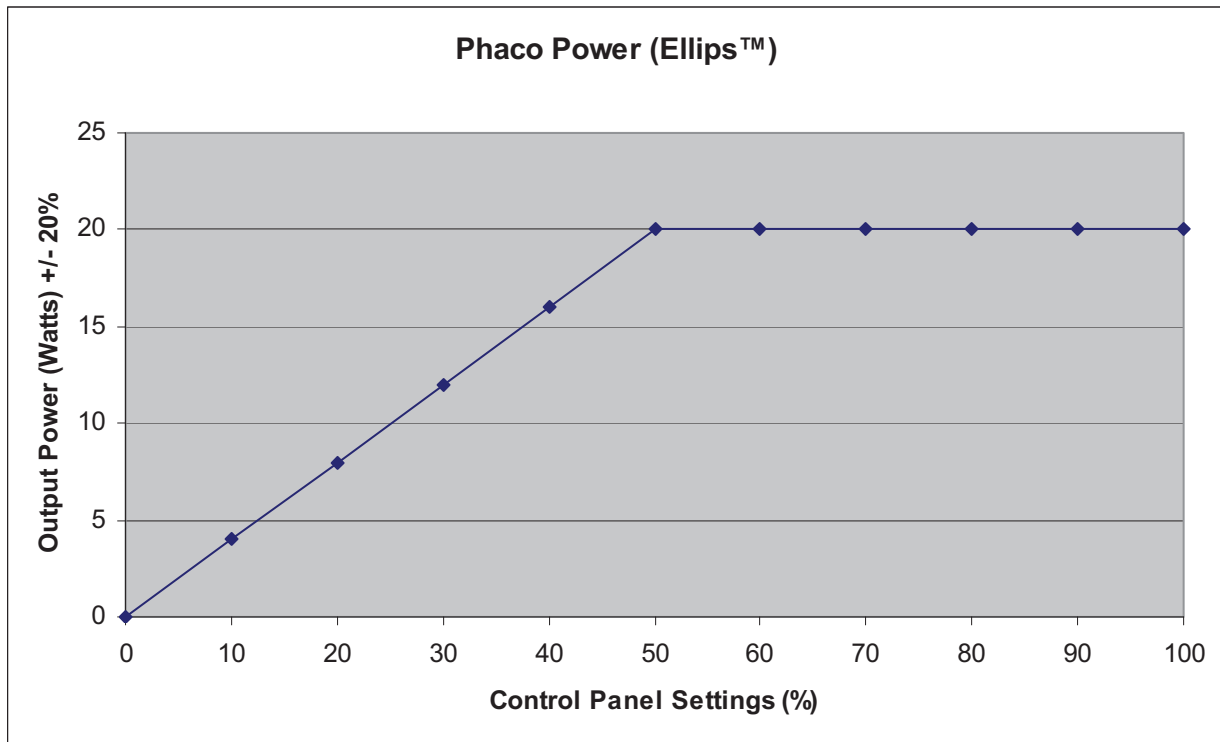


Table 12.17 – Ellips™ Phaco Power Ellips





**Table 12.18 – Ellips™ and Longitudinal Phaco Power**

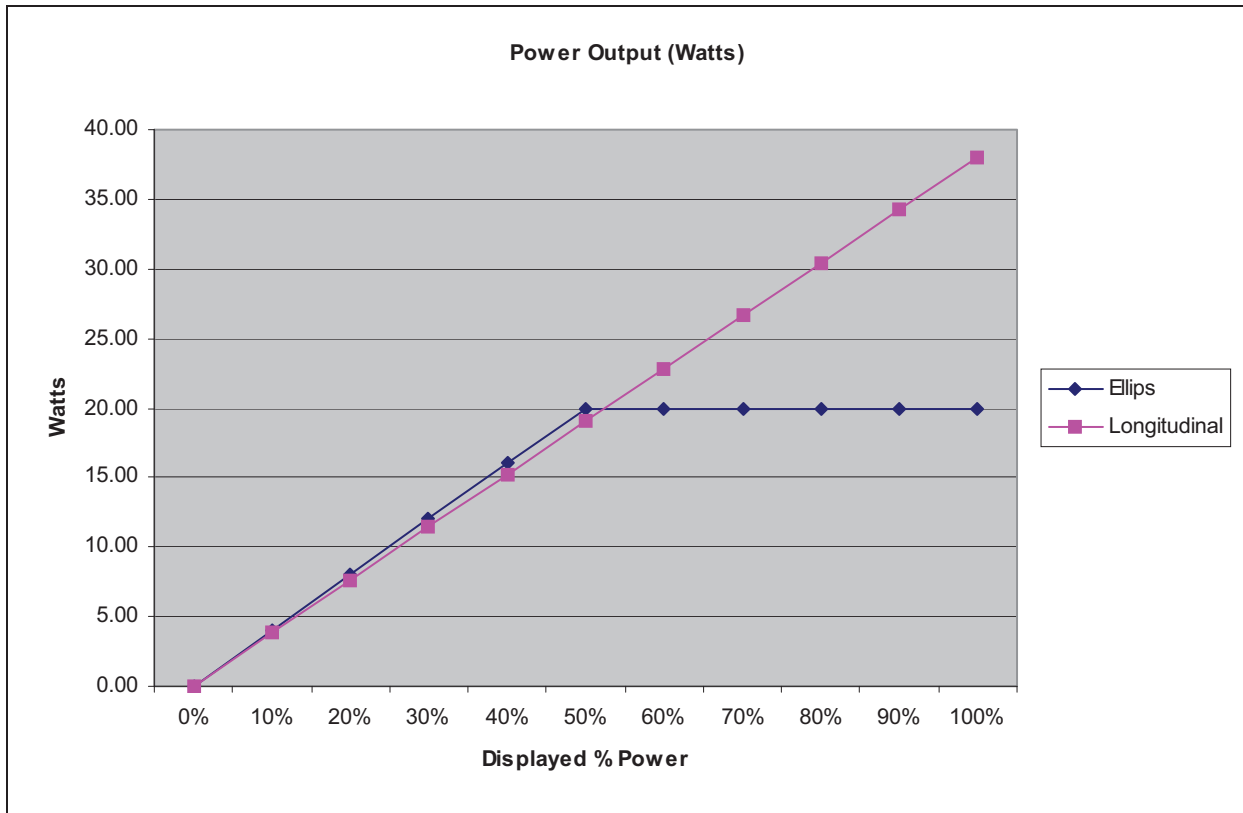
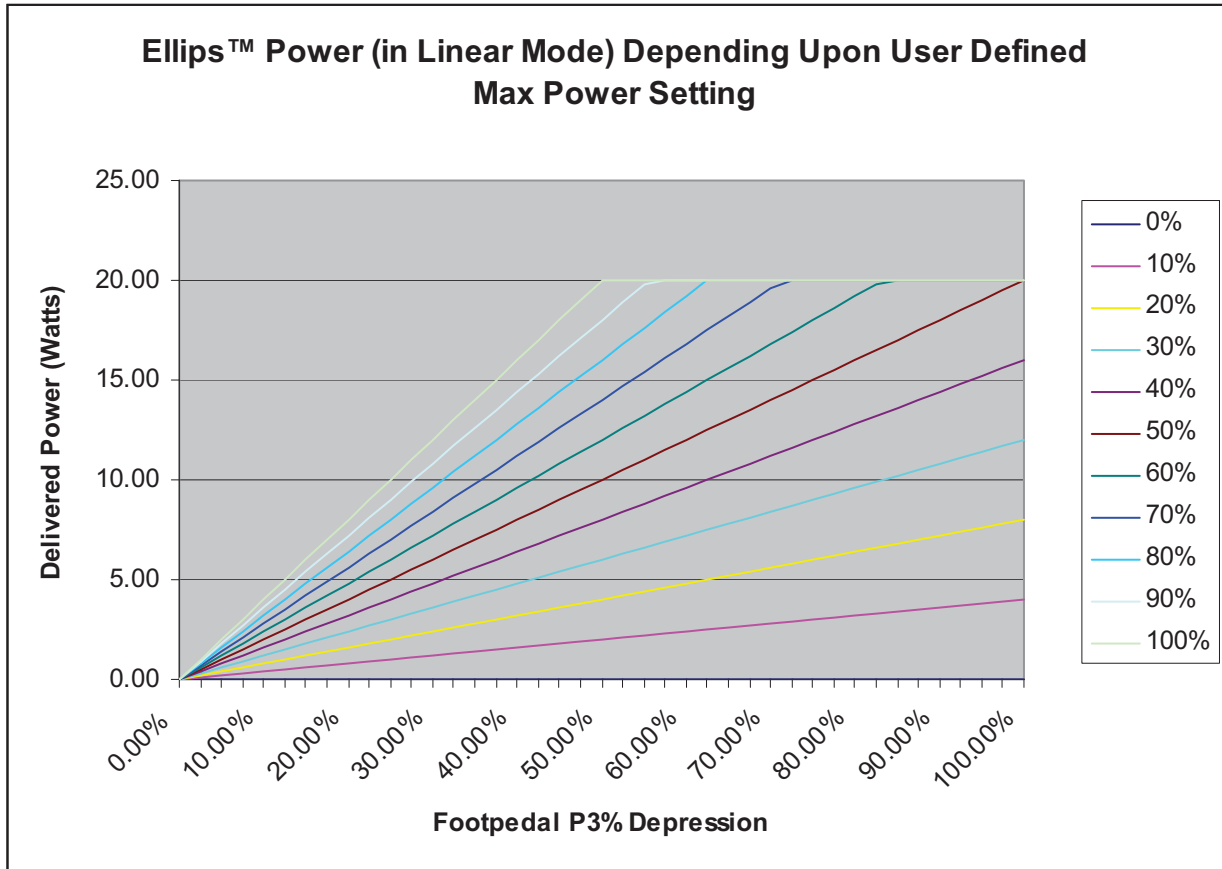


Table 12.19 – Ellips™ Phaco Power Linear Mode



# 13

## ACCESSORIES AND PARTS REORDERING

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List of Accessories with Part Numbers

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**Table 13.1 – WHITESTAR SIGNATURE™ System Part Number**

| Name                                | Description                         | Part No.  |
|-------------------------------------|-------------------------------------|-----------|
| <b>WHITESTAR SIGNATURE™ Console</b> | An ophthalmic microsurgical system. | NGP680300 |

**List of Accessories with Part Numbers**

The following table is a list of accessories that you can use to reorder parts for your WHITESTAR SIGNATURE™ System. Your AMO representative can advise you of recommended inventory levels based on the volume of phacoemulsification procedures done in your facility. All of the items listed below are ordered through your AMO representative or directly through AMO Customer Service.

**Table 13.2 – Accessories and Parts List**

| System Accessories     | Description  | Part No.   |
|------------------------|--|------------|
| <b>Phaco Handpiece</b> | AMO™ Phaco Handpiece   | SOV680290  |
|                        | WHITESTAR™ Phaco Handpiece, Coaxial                                | 690697     |
|                        | Ellips™ Phaco Handpiece  | 690858     |
|                        | 19 Gauge LAMINAR™ Flow Phaco Tip, 0° Round Tip                     | OFOR0019L  |
|                        | 19 Gauge LAMINAR™ Flow Phaco Tip, 15° Round Tip                    | OPOD1519L  |
|                        | 19 Gauge LAMINAR™ Flow Phaco Tip, 30° Round Tip                    | OPOD3019L  |
|                        | 19 Gauge LAMINAR™ Flow Phaco Tip, 45° Round Tip                    | OPOD4519L  |
|                        | Disposable 20 Gauge LAMINAR™ Flow Phaco Tip, 0° Round Tip          | OPOD0020L  |
|                        | Disposable 20 Gauge LAMINAR™ Flow Phaco Tip, 15° Round Tip         | OPOD1520L  |
|                        | Disposable 20 Gauge LAMINAR™ Flow Phaco Tip, 30° Round Tip         | OPOD3020L  |
|                        | Disposable 20 Gauge LAMINAR™ Flow Phaco Tip, 45° Round Tip         | OPOD4520L  |
|                        | Disposable LAMINAR™ Flow Phaco Tip, 19 Gauge, 30° Curved           | OPOCR3019L |
|                        | Disposable LAMINAR™ Flow Phaco Tip, 20 Gauge, 30° Curved           | OPOCR3020L |
|                        | 19 Gauge LAMINAR™ Flow Irrigation Sleeve and Test Chamber          | OPOS19L    |
|                        | Disposable 20 Gauge LAMINAR™ Flow Infusion Sleeve and Test Chamber | OPOD20L    |

| <b>System Accessories</b> | <b>Description</b>  | <b>Part No.</b> |
|---------------------------|---|-----------------|
|                           | LAMINAR™ Flow Tip Wrench                                  | OPOMTWL         |
|                           | SOLO™ I/A Handpiece, 20 Ga., Curved Silicone Sleeve Tip   | OPOIA20CRV      |
|                           | SOLO™ I/A Handpiece, 20 Ga., 45° Silicone Sleeve Tip      | OPOIA2045D      |
|                           | SOLO™ I/A Handpiece, 20 Ga., Straight Silicone Sleeve Tip | OPOIA20STR      |
|                           | SOLO™ I/A Handpiece Kit                                   | OPOIA20KIT      |
| <b>I/A Handpiece</b>      | PHACOFIT™ Titanium Handle                                 | OM055002        |
|                           | PHACOFIT™ I/A Tip Curved .5 mm Port                       | OM05510110      |
|                           | PHACOFIT™ O-Ring's I/A Tip (5PK)                          | OM05510112      |
|                           | PHACOFIT™ Titanium, Multi-Tip Set                         | OM05510113      |
|                           | PHACOFIT™ Cleaning/Flushing Kit                           | OM05510114      |
|                           | PHACOFIT™ Tip, Luer Adapter (Aspiration)                  | OM05510115      |
|                           | PHACOFIT™ Tip, 45 Degree Silicone (No Sleeve)             | OM05510116      |
|                           | PHACOFIT™ I/A Tip Straight .3MM Port                      | OM0551011       |
|                           | PHACOFIT™ I/A Tip Curved .3 mm Port                       | OM0551012       |
|                           | PHACOFIT™ I/A Tip 45 Degree 0.3 mm Port                   | OM0551013       |
|                           | PHACOFIT™ I/A Tip 90 Degree 0.3 mm Port                   | OM0551014       |
|                           | PHACOFIT™ I/A Tip Binkhorst 0.3 mm Port                   | OM0551015       |
|                           | PHACOFIT™ I/A Tip Straight SI 0.3 mm Port                 | OM0551016       |
|                           | PHACOFIT™ I/A Luer Adapter, F/F                           | OM0551017       |
|                           | PHACOFIT™ I/A Tip Curved, SI, .3 mm Port                  | OM0551018       |
|                           | PHACOFIT™ I/A Tip Straight .5MM Port                      | OM0551019       |
|                           | PHACOFIT™ Athlete I/A Tip Straight Type                   | OM0551020J      |
|                           | PHACOFIT™ Athlete I/A Tip 45 Degree Type                  | OM0551021J      |
|                           | DUET™ STARTER KIT, 20GA                                   | DUA02020        |

| <b>System Accessories</b>      | <b>Description</b>  | <b>Part No.</b> |
|--------------------------------|---|-----------------|
|                                | DUET™ ASPIRATION HANDLE   | DU02100         |
|                                | DUET™ IRRIGATION HANDLE   | DU02200         |
|                                | DUET™ 20G CURVED IRRIGATOR<br>CLOSED END                                | DU02301         |
|                                | DUET™ 20G CURVED ASPIRATION<br>.3MM PORT CAP POL                        | DU02302         |
|                                | DUET™ 19G FINE IRRIGATING<br>CHOPPER                                    | DU02303         |
|                                | DUET™ 20G OLSON II IRRIGATING<br>CHOPPER                                | DU02305         |
|                                | DUET™ MST Aguirre Duet Tip  | DU02325         |
|                                | DUET™ MST Fine/Nagahara Tip   | DU02335         |
| <b>Diathermy Handpiece</b>     | Bipolar Cord with Fischer Connection                                    | K106075         |
|                                | Bipolar Forceps, Curved Iris 0.5 mm Tip                                 | K121085         |
|                                | 18 Gauge Straight Diathermy Pencil,<br>reusable                         | K147000         |
| <b>Vitreotomy Cutter</b>       | 20 gauge Vitreous Cutter  | NGP0020         |
|                                | 23 gauge Vitreous Cutter  | NGP0023         |
|                                | 25 gauge Vitreous Cutter  | NGP0025         |
| <b>FUSION™ Tubing Pack</b>     | Fusion™ Tubing Pack (disposable,<br>sterile)                            | OPO70           |
|                                | Fusion™ Dual Pump Tubing Pack<br>(disposable, sterile)                  | OPO71           |
| <b>Wireless Remote Control</b> | WHITESTAR SIGNATURE™ System<br>Remote Control                           | NGP680135       |
| <b>Footpedal</b>               | WHITESTAR SIGNATURE™ Foot<br>Pedal (Single Linear)                      | NGP680701       |
|                                | Advanced Control Pedal for the<br>WHITESTAR SIGNATURE™<br>(Dual Linear) | NGP680702       |
| <b>Miscellaneous</b>           | Power Cord, Hospital Grade, 20 ft., 6.1<br>meters                       | 2410-0049-L     |
|                                | Footpedal Cable to WHITESTAR<br>SIGNATURE™ System                       | 0100-0055       |
|                                | WHITESTAR SIGNATURE™ Dust<br>Cover                                      | 0100-0750       |
|                                | Sterilization Tray  | MSR309          |
|                                | WHITESTAR SIGNATURE™ System<br>Owner's Manual (English)                 | NGP Z370147     |

| <b>System Accessories</b> | <b>Description</b>   | <b>Part No.</b> |
|---------------------------|--|-----------------|
|                           | WHITESTAR SIGNATURE™ System<br>Owner's Manual (Chinese)        | NGP Z370161     |
|                           | WHITESTAR SIGNATURE™ System<br>Owner's Manual (Korean)         | NGP Z370163     |
|                           | WHITESTAR SIGNATURE™ System<br>Owner's Manual (Japanese)       | NGP Z370162     |
|                           | WHITESTAR SIGNATURE™ System<br>Owner's Manual (French)         | NGP Z370148     |
|                           | WHITESTAR SIGNATURE™ System<br>Owner's Manual (German)         | NGP Z370150     |
|                           | WHITESTAR SIGNATURE™ System<br>Owner's Manual (Swedish)        | NGP Z370157     |
|                           | WHITESTAR SIGNATURE™ System<br>Owner's Manual (Finnish)        | NGP Z370160     |
|                           | WHITESTAR SIGNATURE™ System<br>Owner's Manual (Portuguese)     | NGP Z370152     |
|                           | WHITESTAR SIGNATURE™ System<br>Owner's Manual (Italian)        | NGP Z370149     |
|                           | WHITESTAR SIGNATURE™ System<br>Owner's Manual (Spanish)        | NGP Z370151     |
|                           | WHITESTAR SIGNATURE™ System<br>Owner's Manual (Danish)         | NGP Z370158     |
|                           | WHITESTAR SIGNATURE™ System<br>Owner's Manual (Dutch)          | NGP Z370153     |
|                           | WHITESTAR SIGNATURE™ System<br>Owner's Manual (Greek)          | NGP Z370156     |
|                           | WHITESTAR SIGNATURE™ System<br>Owner's Manual (Norwegian)      | NGP Z370159     |
|                           | WHITESTAR SIGNATURE™ System<br>Owner's Manual (Polish)         | NGP Z370154     |
|                           | WHITESTAR SIGNATURE™ System<br>Owner's Manual (Russian)        | NGP Z370155     |
|                           | WHITESTAR SIGNATURE™ System<br>Owner's Manual CD, Multilingual | NGP Z370164     |





# GLOSSARY

| <b>Term</b>                          | <b>Definition</b>   |
|--------------------------------------|---|
| Active Reflux                        | Reflux that occurs in response to a user request (typically by way of the footpedal).   |
| Active State                         | The state where the instrument responds to the footpedal in all zones. All the surgical modes are operative.  |
| Active Vacuum Vent                   | The vacuum is relieved by a controlled reversal of the peristaltic pump or by the vacuum regulator.   |
| Advanced Control Pedal (Dual Linear) | A footpedal for the WHITESTAR SIGNATURE™ Phacoemulsification System that operates in two independent linear movement planes (Pitch and Yaw). The two linear movement planes provide proportional control of user-defined functions. |
| Anterior Chamber                     | A fluid filled space inside the eye between the iris and the innermost corneal surface.   |
| Anterior Mode                        | The Anterior function operating mode of the instrument.   |
| Anterior Segment                     | The front third of the globe; includes structures located between the front surface of the cornea and the vitreous.   |
| Aspiration                           | Removal of fluid from the eye using the pumps.  |
| Aspiration Line                      | Fluids pathway within the handpiece that is utilized to extract fluid and tissue from the eye.  |
| Burst Mode                           | One of the available options on the WHITESTAR SIGNATURE™ System for phaco power delivery. Characterized by short periods of time where the power is turned on, interspersed with off times.   |
| CASE                                 | Chamber Stabilization Environment is an intelligent vacuum system that monitors occlusions and adjusts the vacuum to prevent or reduce post occlusion surge or chamber collapse.  |
| Cassette                             | The tubing packs that are installed on the system to connect the tubing on the hand pieces to the vacuum and irrigation sources in the instrument.  |
| Compatible Surgeon Programs          | Programs that have the same Pack Type, Pump Type, and Infusion method.  |
| Continuous Phaco Power               | One of the available Phaco power delivery modes.  |

| <b>Term</b>                    | <b>Definition</b>  |
|--------------------------------|--|
| Controller                     | A processor or microcontroller that is programmed to fulfill a specific task. It can be anything from a small 8-bit microprocessor to a PC-compatible system. On the WHITESTAR SIGNATURE™ system, the following controllers have been identified: GUI Host Processor, Instrument Host Processor, Fluidics Controller, Phaco-Diathermy (PD) Controller, Pneumatic Controller, Diagnostic Controller, IV Pole Controller, Remote Controller, Touch Screen Controller, Footpedal Controller, Footpedal Wireless Controller, Remote Wireless Controller, and Sound Controller. |
| Continuous Burst Phaco Power   | One of the available Phaco power delivery modes.   |
| Diathermy                      | Method used to coagulate blood vessels during a cataract procedure and to join together the conjunctiva at the end of a cataract procedure using electrical current.   |
| DLL                            | Dynamic Link Library. A collection of software routines that can be loaded and accessed at run time.   |
| Ellips™ Technology             | A technology that provides both longitudinal and transverse movement within the Ellips™ handpiece.   |
| EMI                            | Electromagnetic Interference. Emitted by electrical circuits carrying rapidly changing signals, as a by-product of their normal operation, and which causes unwanted signals (interference or noise) to be induced in other circuits.  |
| Evacuation                     | The removal, by suction, of fluids from the eye cavity through a phacoemulsification ultrasonic handpiece.   |
| Extraction                     | The process or act of pulling or drawing out fluids from the eye cavity during Phacoemulsification surgery.  |
| Fluidics                       | The components and aspects of the system involving fluid; specifically, irrigation, aspiration, vacuum, pressure and their performance as interdependent systems.  |
| FPn                            | Foot Pedal zone position (0, 1, 2, or 3). The zone changes when the footpedal is pressed.  |
| FUSION™                        | The screen in which the Occlusion mode, CASE mode, and Actual Maximum Vacuum settings can be modified.   |
| FUSION™ Fluidics Pack (OPO70)  | The fluidic tubing pack which interfaces only with the peristaltic pump related components.  |
| FUSION™ Dual Pump Pack (OPO71) | The FUSION™ dual pump fluidic tubing pack which interfaces with both the peristaltic and the vacuum-based pump related components.   |
| Gravity Infusion               | The bottle height-induced irrigation when the IV pole is positioned at a specific height.  |
| GUI                            | Graphical User Interface. Used to reference the interface presented to the user on a graphical screen.   |
| High Power Pulse Phaco Power   | One of the available Phaco power delivery modes.   |

| <b>Term</b>                 | <b>Definition</b>   |
|-----------------------------|---|
| IV Pole                     | The programmable pole used to position the irrigation solution during the phacoemulsification process.  |
| I/A                         | A general term for Irrigation/Aspiration, and a specific footpedal configuration.   |
| IAC                         | A Vitrectomy mode that uses the Irrigation, Aspiration, and Cutting sequences as the footpedal is pressed.  |
| ICA                         | A Vitrectomy mode that uses the Irrigation, Cutting, and Aspiration sequences as the footpedal is pressed.  |
| Irrigation                  | Causing fluid to be moved into/toward the eye via the irrigation line.  |
| Irrigation Line             | The fluid path within the handpiece that is used to allow the clean balanced salt solution to travel from the bottle into the eye.  |
| LCD                         | The Liquid Crystal Display on the WHITESTAR SIGNATURE™ System.  |
| Linear Variable             | Any switch on the footpedal that is used for Linear control. (Pitch or Yaw.)  |
| Long Pulse Phaco Power      | One of the available Phaco power delivery modes.  |
| Low Power Pulse Phaco Power | One of the available Phaco power delivery modes.  |
| Max Vac (Maximum Vacuum)    | The value for a vacuum based fluidic is the lesser of 600 mmHg or 85% of the CASE Upper Threshold. The maximum value for a peristaltic pump is 650 mmHg.  |
| Motor Venting               | Used with both the FUSION™ Fluidics pack (OPO70) and the Dual Linear (OPO71) pack. Driving the peristaltic pump in the reverse direction to vent.   |
| Multiple Burst Phaco Power  | One of the available Phaco power delivery modes.  |
| NiMh                        | Nickel-Metal Hydride. A type of rechargeable battery.   |
| One-Touch CASE              | The ability to alter the CASE settings with a single press of a button. The modes are +2, +1, Standard, -1, -2.   |
| Operating Mode              | The current operating mode of the instrument. The modes are Phaco, I/A, Vitrectomy, and Diathermy.  |
| Pairing                     | The process of matching two BlueTooth Devices, the console and the remote control or the console and the wireless foot pedal, so that they can communicate with one another.  |
| Pars Plana Incision         | A surgical cut into the eyeball that passes through the sclera and the pars plana area of the ciliary body, between the pars plana and the ora serrata. Common site for instruments used for Vitrectomy procedures. |
| Passive Reflux              | A small reflux from the aspiration line that occurs automatically when the system vents. Historically, this has occurred on AMO systems that utilize valve venting.   |
| Peristaltic                 | A flow based pump.  |

| <b>Term</b>                             | <b>Definition</b>   |
|---|---|
| Phacoemulsification / Phaco             | The term is abbreviated as Phaco. Phaco is a cataract extraction technique originally developed by Dr. Charles Kelman. To use this technique, a surgeon makes a small incision in the eye and emulsifies the cataract with the help of a vibrating needle inserted through the incision. The emulsified particles of the cataract are gently aspirated through the needle while the surgeon continues to irrigate the eye's chamber to maintain intraocular pressure (IOP). |
| Pitch                                   | The vertical travel of the footpedal.   |
| Pneumatics                              | Components and aspects of the system involving high and low pressure and vacuum.  |
| Post Occlusion Surge                    | A result of rapidly changing pressures within the anterior chamber of the eye. The fluid surge is caused when the Phaco Tip is blocked during a procedure and is suddenly cleared. The surge can cause an imbalance of fluids leaving the eye and potential damage to the eye tissue.   |
| Power Boost Mode                        | An operating mode in which the yaw movement of the Advanced Control Pedal (Dual Linear Footpedal) is utilized to provide a temporary increase (Boost) in phaco power.   |
| Primary Venting Mechanism               | A venting mechanism (valve, motor) selected by the host software as the preferred means of performing venting.  |
| Programming Mode (System Configuration) | When the system is not Primed/and not Tuned Phaco, I/A, and Vitrectomy surgical modes are not available. However, the user can program and update surgical and system settings.   |
| Pump Ramp                               | A characteristic of the peristaltic pump that determines the point at which the pump speed is decreased in order to maintain a manageable rate of vacuum rise.  |
| Pulse Shape                             | A feature of WHITESTAR <sup>®</sup> Technology which allows the user to define a "kick" of increased power at the beginning of a WHITESTAR <sup>®</sup> pulse over a range of Phaco power settings.   |
| Reflux                                  | Fluid that is moved into/toward the eye via the aspiration port/line. The reverse flow within the aspiration line that can be used to release or dislodge unwanted material from the handpiece tip or to "tent" the incision site to allow easier tip insertion. Reflux is not intended to clear a clogged handpiece. However, reflux can be used to identify a blockage.   |
| Remote Control                          | A user interface control for the GUI system through a wireless connection. The Remote Control commands are interpreted to control the GUI software.   |
| Safe State                              | A state where the Phaco, Vitrectomy, Diathermy, and fluidics functions are disabled, with irrigation on and the fluid vented. The instrument the footpedal is disabled. As a result, all of the surgical modes become inoperable.   |

| <b>Term</b>                  | <b>Definition</b>  |
|------------------------------|--|
| Secondary Venting Mechanism  | A venting mechanism (valve, motor or vacuum regulator) automatically used by the system to attempt venting if the primary venting mechanism should fail.   |
| Short Pulse Phaco Power      | One of the available Phaco power delivery modes.   |
| Single Burst Phaco Power     | One of the available Phaco power delivery modes.   |
| Single Linear Footpedal      | A footpedal with only one plane of travel allowing proportional control of system parameters.  |
| SubMode                      | A submode is a defined set of parameters for the current mode. Most operating modes have multiple submodes. For example, there are three I/A submodes for Anterior surgery, each of which contains a set of potentially different parameters for the I/A mode.       |
| Surgical Media Center (SMC)  | An optional accessory product that can be connected to the WHITESTAR SIGNATURE™ system to generate and record video images of the surgery. The video images contain embedded information about the instrument status and settings throughout the surgical procedure. |
| System                       | A hardware unit and associated peripherals including software required to perform a specific function.   |
| Tenting the Incision (Wound) | Using reflux while inserting the handpiece into the eye. This technique causes the incision (wound) to open slightly (tent), thus making handpiece insertion easier.   |
| Touch Screen                 | The display surface of the Liquid Crystal Display (LCD) that responds to touch.  |
| Vacuum Boost Mode            | An operating mode in which the yaw movement of the Dual Linear Footpedal is utilized to provide a temporary increase (Boost) in the maximum vacuum.  |
| Vacuum Regulator Venting     | Using the vacuum regulator in the WHITESTAR SIGNATURE™ system to vent the vacuum in the OPO71 vacuum tank. Used only with the Venturi pump.  |
| Valve Reflux                 | The fluid flows back through the pinch valve.  |
| Valve Vent                   | The vacuum is vented through the aspiration line.  |
| Valve Venting                | Used with OPO70 pack only. Manipulation of the fluidic connections to cause fluid from the irrigation bottle to be directed toward the aspiration port in order to vent. Typically this results in passive reflux.   |
| Variable WS                  | A mode where the user can define the WHITESTAR® Technology delivery based on the footpedal position.   |
| Venting                      | Relieving vacuum in the aspiration tube. Typically venting is performed when the Footpedal is moved from position 2 into position 1 or 0.  |
| Venturi                      | A vacuum based pump.   |

---

| <b>Term</b>                       | <b>Definition</b>  |
|-----------------------------------|--|
| Vitrectomy                        | The removal of vitreous with a needle-like cutter that has fluid injection and suction capabilities.   |
| WHITESTAR <sup>®</sup> Technology | A proprietary software technology that is used to deliver finely modulated pulses of energy, interrupted by extremely brief cooling periods. |
| Yaw                               | The horizontal movement of the footpedal that works from either the left or the right of the footpedal.                                      |
| Yaw Threshold                     | The programmed yaw movement that is allowed before the yaw switch is activated on the footpedal.   |

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