WHITESTAR SIGNATURE

OPERATOR'S MANUAL

RX Only – Z370338-001 Rev. A 0311

Abbott

Trademarks

AMO, WHITESTAR, ELLIPS, the ELLIPS logo, FUSION, the FUSION logo, LAMINAR, PHACOFIT, and WHITESTAR SIGNATURE are trademarks owned by or licensed to Abbott Laboratories, its subsidiaries or affiliates.

DUET and SOLO are trademarks of Micro-Surgical Technology, Inc.

BLUETOOTH is a trademark of Bluetooth SIG, Inc.

All other brand names, products, and company names mentioned in this document are the trade name, service mark, or registered trademarks of their respective owners.

Compliance

In accordance with:

- IEC/EN 60601-1

Abbott Medical Optics Inc.
1700 E. St. Andrew Place
Santa Ana, CA, USA 92705
1-877-AMO-4-LIFE (USA)
www.abbottmedicaloptics.com

CE 0413

AMO Ireland
Block B
Liffey Valley Office Campus
Quarryvale, Co. Dublin, Ireland

Order Surgical Products

(IOLs and Phaco Supplies) Call 1-877-AMO-4-LIFE (USA)

For outside the United States, contact your local representative.

Returns or Technical Service

Call 1-877-AMO-4-LIFE (USA)
All returns must be accompanied by a RGA# (Returned Goods Authorization) For outside the United States, contact your local representative.

Rx Only

TABLE OF CONTENTS

Trademarks . . . . . i-ii
Compliance . . . . . i-ii
Order Surgical Products . . . . . i-ii
Returns or Technical Service . . . . . i-ii

Introduction 1-1
About this Manual 1-2
About Phacoemulsification 1-2
Intended Use 1-2
WHITESTAR SIGNATURE System Description and Features 1-2
WHITESTAR Technology 1-3
FUSION Fluidics System 1-3
Accessories 1-4
WHITESTAR SIGNATURE System Console 1-5
WHITESTAR SIGNATURE System Operating Modes 1-6
Safety Precautions 1-7
Warnings 1-11
Symbol Definitions 1-13
System Disposal 1-16

System Components 2-1
Receipt and Inspection Instructions 2-2
WHITESTAR SIGNATURE System Components 2-2

System Setup 3-1
WHITESTAR SIGNATURE System Setup 3-2
Wireless Remote Control Setup and Testing 3-30
Pre-Operative Sterilization 3-35
Surgical Media Center (SMC) (Optional) 3-36
System Check-out 3-37
System Shutdown 3-39

Equipment Operation 4-1
Display Screens and Controls 4-2
Language Selection 4-4
Startup 4-5
Select Program and Install the FUSION Tubing Pack 4-7
Prime/Tune 4-8
Verify Irrigation/Aspiration Balance 4-12
Priming for Vitrectomy 4-13
Selecting and Changing Mode Parameters 4-14

Anterior Segment Surgery Operating Modes 5-1
Operating Mode Descriptions 5-2
FUSION Fluidics Phaco 5-16
Programming the Modes and Settings 5-23
Aspiration Flow Rate 5-31
Vacuum 5-33
Surgical Mode– Recommended Settings 5-37
Occlusion Mode Phaco Settings 5-41
Passive Reflux 5-49
ELLIPS Technology 5-49

Surgeon Programs 6-1
Select Surgeon/Program 6-2
Add a New Surgeon 6-3
Edit a Surgeon 6-5
Select a Preferred Program 6-6
Create a New Program 6-8
Edit a Surgeon Program 6-9
Copy a Surgeon Program 6-10
Delete a Surgeon 6-11
Delete a Program 6-12
Delete a Database 6-13
Lock a Program 6-13
Program – Assign Order 6-14

Care and Cleaning 7-1
Cleaning Procedures 7-2
Sterilization Procedures 7-4
WHITESTAR SIGNATURE System Cleaning and Care 7-6

Error Messages Troubleshooting and Diagnostics 8-1
Error Message Display 8-2
Fuse Replacement Procedure 8-3
Most Common User-Correctable Problems 8-5
Status, Warning and Error Messages 8-5

System Operation (Error) Messages 8-6
Troubleshooting 8-37

Warranty and Maintenance 9-1
Warranty Statement 9-2

Specifications 10-1
Physical Specifications 10-2
Environmental Specifications 10-3
Electrical Specifications 10-3
Diathermy Specifications 10-3
Irrigation and Aspiration Specifications 10-3
Phacoemulsification Specifications 10-4
Vitrectomy Specifications 10-4
Diathermy Power Graphs 10-5
Diathermy Power versus Load Impedance 10-10
Phaco Power Graphs 10-13

Accessories and Parts Reordering 11-1
List of Accessories with Part Numbers 11-2

Glossary 12-1

1 INTRODUCTION

About this Manual

About Phacoemulsification

Intended Use

WHITESTAR SIGNATURE System Description and Features

WHITESTAR Technology

FUSION Fluidics System

Accessories

WHITESTAR SIGNATURE System Console

WHITESTAR SIGNATURE System Operating Modes

About this Manual

This manual includes information about the design of **WHITESTAR SIGNATURE** System for anterior segment (phacoemulsification) surgical procedures.

This manual includes information about optional system enhancements. Your AMO representative can confirm the availability of these features for your system configuration and availability in your area.

About Phacoemulsification

Over thirty years ago, Dr. Charles Kelman conceived and developed phacoemulsification, a method of cataract removal by use of ultrasonic emulsification with aspiration of the cataractous lens through a small incision. Phacoemulsification is advantageous for both patient and surgeon:

- Greater intraoperative control.
- The smaller incision requires fewer or no sutures, poses less risk of infection and induced astigmatism, and gives better long-term and short-term predictability of vision.
- Patients are able to resume normal activity much sooner and with fewer restrictions than with traditional cataract extraction surgeries.

AMO supports phacoemulsification with sophisticated instrumentation that optimizes the benefits of this surgical procedure.

Intended Use

The **WHITESTAR SIGNATURE** System is a modular ophthalmic microsurgical system that facilitates anterior segment (cataract) surgery. The modular design allows the users to configure the system to meet their surgical requirements.

You do not need a specified NEUTRAL ELECTRODE with this HIGH FREQUENCY (HF) SURGICAL EQUIPMENT.

WHITESTAR SIGNATURE System Description and Features

The **WHITESTAR SIGNATURE** System is a multifunctional tool for use in anterior segment surgery procedures. The **WHITESTAR SIGNATURE** System represents the latest generation of **AMO** phacoemulsification technology. Designed and manufactured into every **WHITESTAR SIGNATURE** System are safety, ease-of-use, and reliability. The **WHITESTAR SIGNATURE** System meets applicable United States and International safety requirements for this type of device.

The **WHITESTAR SIGNATURE** System contains a number of features based on extensive research and clinical trials with highly trained and noted ophthalmologists with experience as phacoemulsification surgeons.

WHITESTAR Technology

The **WHITESTAR** Technology represents the many enhancements to the power modulation for the **WHITESTAR SIGNATURE** System. The **WHITESTAR** Technology enhancement was the first to deliver finely modulated pulses of energy, interrupted by extremely brief cooling periods. This allows the **WHITESTAR SIGNATURE** System to achieve full ultrasound cutting efficiency and magnetic followability, while introducing less energy into the eye. Minimized or eliminated ultrasonic time reduces the risk of thermal damage.

WHITESTAR ICE Technology

The **WHITESTAR** ICE Technology was the next advance in micropulse phacoemulsification technology. This technology combined modulated ultrasonic power (pulse shaping) with vacuum control through the use of the Chamber Stabilization Environment (CASE).

This pulse shaping technology modified the standard “square” wave pulse, by increasing the amplitude of the first millisecond of the On Time “kick”. The technology then set the remaining part of the On Time to the standard power setting. This process repeats for each On Time pulse. This results in increased control and efficiency in phacoemulsification.

Occlusion Mode Phaco

The occlusion mode phaco regulates the vacuum rise time following an occlusion of the phaco tip, without limiting the choice of aspiration rate through an unoccluded needle. To independently control the aspiration rate and the vacuum rise time, you can have a different aspiration rate when the needle occludes than when the needle is unoccluded.

The occlusion mode phaco also regulates the ultrasound power modulation. You can program the power modulation of the phaco handpiece (continuous, pulse, burst) to automatically change when the phaco tip changes from an unoccluded condition to an occluded condition.

The **FUSION** Mode allows the user to access the settings and variables for both CASE and occlusion mode phaco. The CASE and occlusion mode Phaco can work together or independently.

FUSION Fluidics System

The **WHITESTAR SIGNATURE** System has both a flow-based peristaltic pump system and a vacuum based Venturi pump system. The patented microprocessor-based system continuously monitors and controls intraocular conditions of the flow and vacuum in the eye.

Chamber Stabilization Environment (CASE)

CASE is an intelligent vacuum monitoring system that regulates the maximum allowable vacuum used following the occlusion of the phaco tip. When the phaco tip becomes occluded, the vacuum rises. Clearing of the occlusion while the vacuum is at a high-level can lead to a post occlusion surge. When CASE is on, the system monitors the actual vacuum levels. When the vacuum exceeds a specific threshold for a specified duration, the system automatically adjusts the maximum allowable vacuum setting to a lower predefined CASE maximum vacuum level. When the occlusion clears, the system automatically restores the settings to the original programmed maximum vacuum setting. This function makes it possible to have a different maximum vacuum setting when the needle occludes than when the needle is unoccluded.

Accessories

WHITESTAR Handpiece

The design of the Phaco Handpiece has a straight-through aspiration channel for more efficient removal of nuclear fragments, to minimize clogging and to facilitate cleaning. The handpiece is lightweight, slim, and well-balanced, making it comfortable to use and easy to control.

ELLIPS FX Handpiece

The **ELLIPS FX** phaco handpiece is available for use with the **WHITESTAR SIGNATURE** System. The **ELLIPS FX** handpiece provides both longitudinal and transversal movement. You can use the handpiece with a straight tip or a curved tip.

Foot Pedal

The foot pedal controls the various operating modes of the instrument. You can program the foot pedal settings through the user interface. You can use either the **WHITESTAR SIGNATURE** standard foot pedal or the Advanced Control Pedal with the system.

The foot pedal design offers control through the use of increased linearity with the foot pedal movement. The design provides uniform pressure throughout the foot pedal movement, easing foot, and leg fatigue. You can select the degrees of movement for each foot pedal position. You can save the settings for each surgeon/mode, pitch for the standard foot pedal only and pitch and yaw for the Advanced Control Pedal giving the pedal dual linear functionality. Programmable switches activate Reflux, giving an immediate response.

Wireless Remote Control

The **WHITESTAR SIGNATURE** System can be controlled from the wireless remote control keypad. You can access all modes and adjust all settings with the use of the wireless remote control, including full programming and priming capabilities. Backlighting supports low light operating room conditions.

WHITESTAR SIGNATURE System Console

Operating Room teams contributed significantly to the successful design of the **WHITESTAR SIGNATURE** System Console. The solid wheel base and locking wheels make the console stable and smooth rolling. An adjustable height Mayo tray accommodates the handpieces and tubing. The remote control is wireless and recharges when placed in remote control storage bay. The foot pedal has an open bin area for storage.

WHITESTAR SIGNATURE System Display (Graphic User Interface-GUI)

The **WHITESTAR SIGNATURE** System graphic screen display is easy to read and easy to operate. You can see at a glance the status of the system. The screen gives you visual indication of operating modes, settings, and system status. Messages cue you through the procedure, and error messages indicate improper connections, or selections. Help information is available from the touch screen controls.

Prime/Tune

Before the start of each surgical case, the system requires that you run Prime, Tune or Prime/Tune. The Prime mode incorporates the function of clearing the tubing of fluid. The Prime mode then fills the tubing and completes the fluid aspiration check and the vacuum check. The Tune mode incorporates an ultrasonic power calibration check and safety check for the connected phaco handpiece. The Prime/Tune mode allows the system to prime and tune the handpiece at the same time.

Dual Pump

The **WHITESTAR SIGNATURE** System provides a fluid aspiration system that uses either a peristaltic (flow-based) pump or a Venturi (vacuum-based) pump system. The surgeon can use the Venturi pump in the Phaco, IA, and Vitrectomy surgical modes.

Continuous Irrigation

Continuous Irrigation is immediately available by way of the touch screen or the wireless remote control. Surgeon control of Continuous Irrigation with the foot pedal is also available. You can use Continuous Irrigation to fill cups prior to Prime/Tune. You can use the Cup Fill feature in place of Continuous Irrigation when you fill a cup. The Cup Fill feature is only available from the Prime/Tune screen. (See Chapter 4 Equipment Operation, Prime/Tune for Detailed information.)

Programmable Operating Parameters

The **WHITESTAR SIGNATURE** System is programmable through the screens on the touch screen monitor. You can select your desired settings for each portion of the anterior surgical procedure. The instrument program memory stores up to 50 surgeon names with a maximum of 20 different setups, plus the AMO default settings program. This allows different users to preset their preferences, or an individual user to select setups for different procedures, including a personalized initial operating mode.

MMP – Multiple Mode Programming

Multiple submodes are available within the **WHITESTAR SIGNATURE** System operating modes. The multiple submodes allows you to preset your settings for specific techniques such as phaco chop or viscoelastic removal.

Programmable IV Pole

The **WHITESTAR SIGNATURE** System has a programmable IV pole. You can set the programmable IV pole height parameters independently for each of the Phaco modes plus settings for Diathermy, IA, and Vitrectomy. During surgery, the programmable IV pole height changes to the preprogrammed height when you switch modes.

The automated and programmable IV pole allows adjustment of the bottle height to provide gravity infusion through each procedural phase. Two up and down arrows on the touch screen or the wireless remote control raises and lowers the bottled balanced salt solution, while maintaining the sterility of the operating field. A separate up and down switch allows IV pole adjustment from the side of the system.

WHITESTAR SIGNATURE System Operating Modes

The design of the **WHITESTAR SIGNATURE** System provides all the Operating Modes and surgical capabilities that the anterior segment surgeon or the cataract surgeon requires. These capabilities include:

Diathermy (DIA)

Most surgeons use the Diathermy mode to coagulate blood vessels during the procedure and by some surgeons to “coag” the conjunctiva at the end of the procedure. An isolated output frequency allows noncontact tissue coagulation, eliminating adhesion, and traction. Also, the depth of penetration of the energy field is less than that of lower frequency units, which minimizes tissue shrinkage or charring. The gentleness of the diathermy mode allows the surgeon to stop “bleeders” within the incision with only minimal scleral shrinkage.

Phacoemulsification (Phaco)

You use the Phacoemulsification mode to break up (emulsify) the nucleus of the lens. You then aspirate the nucleus of the lens from the eye through a small incision. The continuous autotuning circuitry maximizes the emulsification efficiency for each lens density, even varying densities within the same lens. The system displays Phaco time in minutes and seconds. The convenient selection of linear or panel preset phaco power, in a variety of power delivery options (pulsed, burst, transversal), provides increased precision, and control.

The **WHITESTAR** Technology allows you to safely remove all lens types through small incisions with single-mode, single-instrument convenience.

The **WHITESTAR** Technology is a patented software program proven to change the characteristics of phacoemulsification using little or no ultrasound. The **WHITESTAR** Technology changes the thermal properties and improves control of the lens without reducing the cutting power or changing technique or efficiency.

CASE One Touch

The One Touch button simplifies the programming of the CASE function and allows you to easily define the basic CASE settings once. You can adjust the CASE function with the CASE One Touch settings on the surgical screens. When you use these controls, the CASE functionality changes to provide enhanced control or improved efficiency to suit any particular combination of cataract density, surgical technique or personal preferences.

Irrigation/Aspiration (IA)

The Irrigation and Aspiration mode allows for controlled aspiration of cortical material from the eye, while maintaining intraocular stability, by replacing the aspirated material with a balanced salt solution. A peristaltic pump provides a predictable and stable aspiration rate. “Aspiration Rate” and “Vacuum” settings allows for complete control. Irrigation is gravity-fed.

You can regulate the gravity-fed irrigation by adjusting the height of the balanced salt solution bottle. This mode gives you flexible control of each case with the independently adjustable vacuum level settings and flow rate settings.

Vitrectomy (VIT)

You use the Vitrectomy mode to remove vitreous from the eye during surgery. The **WHITESTAR SIGNATURE** System uses air pressure to drive the vitreous cutter. The wide range of user-controlled, programmable cut rates supports both anterior segment and posterior segment surgeries.

Safety Precautions

Once you have set the system up and you have verified that all the functions are operating properly, you are almost ready to use your **WHITESTAR SIGNATURE** System.

Read the following Safety Precautions and Warnings carefully before you use the **WHITESTAR SIGNATURE** System in surgery.

1. The **WHITESTAR SIGNATURE** System comes equipped with 3-prong power plug which you must plug into an outlet with a ground receptacle.

   If the plug does not fit the outlet, contact an electrician. DO NOT modify or remove the ground pin.

2. Do not use extension cords with your system.

3. Do not overload your electrical receptacle (outlet).

4. If there is damage to the cord or the plug, do not use the instrument. A damaged cable can cause an electric shock to the user or a fire hazard to the system. Call AMO customer service to order a new cord.

5. The instrument has ventilation openings at the rear of the console to allow ambient air intake and the release of heat generated during operation. Do not block the openings; as heat build-up can cause system failures which can result in a fire hazard.

6. Do not try to move the **WHITESTAR SIGNATURE** System cart on deep pile carpets or over objects on the floor such as cables and power cords.

7. Take care not to trip over power and foot pedal cords.

8. Do not try to lift the **WHITESTAR SIGNATURE** System cart.

9. Do not place the instrument on uneven or sloped surfaces.

10. Only use disposables, accessories, or other surgical instruments designed for this system. For optimum performance of the system and safety, use only parts recommended by AMO.

11. Do not operate the **WHITESTAR SIGNATURE** System in a condensing environment. Take care to protect the instrument from fluid sprays or fluid buildup.

12. To protect the patient from contaminated fluids or handpieces, use only:

13. sterile tubing packs

14. sterile irrigation fluid

15. sterile handpieces

16. Use caution when you extend, retract, or swivel the Mayo stand articulating arm. Stay clear of the hinged hardware.

17. Use caution when you use handpieces with sharp edges or pointed tips.

18. Always replace the tubing pack between cases.

19. Wrap the excess power cord neatly around the cord wrap on the back of the console.

Changing Irrigation Flow

Use extreme caution when you lower or raise the balanced salt solution bottle to decrease fluid flow or increase fluid flow, and fluid pressure. If you lower the bottle too much it can cause the anterior chamber to collapse. If you raise the bottle too high it can cause the anterior chamber to deepen. To make sure that the bottle height does not go too high, you can set the maximum bottle height on the Diagnostics screen.

Note: Use a new bottle of balanced salt solution at the start of each case.

Phacoemulsification without Adequate Irrigation

Operating phacoemulsification without an adequate irrigation flow can result in an elevated temperature of the tip and subsequent damage to the eye tissue or could cause the chamber to collapse. Confirm that there is irrigation flow before you initiate phacoemulsification. A tight wound or the angle of the needle next to the wound can also constrict the irrigation flow. Pinching the coaxial irrigation sleeve assembly on the needle of the phaco handpiece causes the constriction.

Power Failure during Surgery

If there is a loss of power during a procedure, you need to:

- Withdraw the handpiece from the eye
- Release the foot pedal to Position 0

When power is restored:

- Select Prime/Tune to reprime the fluids and tune the phaco handpiece. Use Bypass to reduce the length of prime time.
- Select the mode that was in use when the system lost power (Phaco, IA, Vitrectomy, or Diathermy)

Connecting Handpieces

It is very important that the electrical connectors on the handpieces are completely dry before you connect the handpiece to the **WHITESTAR SIGNATURE** System receptacles. You can receive a “Handpiece Ground Fault Error” message if the connector is wet.

Handling the Phaco Handpiece

The phaco handpiece is a very delicate instrument and you must handle the handpiece with EXTREME care. If you drop the handpiece or the handpiece receives any other significant impact, the handpiece will not work properly. The ultrasonic titanium phaco tip must never touch any solid material while in use.

Always clear the handpiece of fluid immediately following surgery.

See cleaning instructions in Chapter 9, “Care and Cleaning”.

Handpieces can be extremely hot immediately after sterilization. Use care and caution when handling.

Phaco and Vitrectomy Operation

Do not activate the phaco handpiece and the vitrectomy cutter with the tips exposed to air. Do not activate the tips in the air, as this reduces the useful life of the handpiece and the cutter. When you introduce power to the phaco handpiece or the vitrectomy cutter, the tips must be in a test chamber filled with a balanced salt solution, in a container of balanced salt solution, or in the patient's eye.

Vitrectomy

Failure to properly attach the tubing to the appropriate vacuum source or pressure source can affect the vitrectomy cutter operation. Be sure to read the vitrectomy cutter package insert for the correct assembly procedures and connection procedures.

Diathermy

When you select the Diathermy mode, you hear an audible tone. Also, you will hear an audible tone when you apply diathermy power.

You must check the diathermy cable periodically for damage. If the cable shows signs of damage, replace the cable immediately with the same type of cable. Use of other types of cables can affect the diathermy performance.

During surgery, the diathermy output power must be as low as possible for the intended purpose. AMO recommends the 30% setting to start.

You must position the diathermy cable in such a way that the cable avoids contact with the patient or other leads. When you use diathermy, grounded or ungrounded metal parts must not come in contact with the patient.

For proper operation of the diathermy, replace the handpiece with the same type.

Programmable IV Pole

Do not exceed the maximum weight of two 500 ml balanced salt solution bottles on the IV pole bottle holder.

Wireless Remote Control, Wireless Foot Pedal, and Battery Management System

This device complies with Part 15.19 of the FCC (Federal Communications Commission) Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by AMO can void the user's authority to operate the equipment. (FCC Part 15.21)

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15.105 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Warnings

WARNING: All personnel who might operate this equipment must read and understand the instructions in this manual before they use the system. Failure to do so might result in the improper operation of the system. Only a trained licensed physician can use this device

WARNING: The surgical nursing staff must monitor the fluid level in the balanced salt solution bottle. The result of a low bottle or an empty bottle affects the fluid balance and the intraocular pressure (IOP) while aspirating. The low or empty bottle can result in:

- The inadvertent chamber shallowing or collapse
- The aspiration of tissue
- An ultrasonic wound heating commonly called wound burn (extreme case)

The surgical staff must monitor the fluid level at all times.

WARNING: DO NOT attempt to use the system if the system fails to perform properly as stated in this manual.

WARNING: DO NOT use the system in the presence of any of the following as a fire can result:

- flammable anesthetics
- other flammable gases
- flammable fluids
- flammable objects

oxidizing agents.

WARNING: Make sure that the patient does not have a cardiac pacemaker as this unit might interfere with any cardiac pacemaker; therefore obtain qualified advice prior to such use.

WARNING: The patient must not come into contact with grounded metal parts or metal parts that have appreciable capacitance to ground. AMO recommends the use of an antistatic mat for this purpose.

WARNING: Use proper handling and disposal methods for biohazards when you dispose of the tubing pack, mayo stand drape, and monitor drape.

WARNING: Place monitoring electrodes or other types of equipment as far from those of the **WHITESTAR SIGNATURE** System as possible. **AMO** recommends high current limiting devices for the protection of such systems. Do not use needle monitoring electrodes.

WARNING: Keep the diathermy cord away from the patient and other handpieces or leads (for example, monitoring electrodes).

WARNING: The output power selected must be as low as possible for the intended purpose.

WARNING: This unit complies with all Electromagnetic Interference (EMI) standards and requirements. It is possible that interference provided by the operation of the HIGH FREQUENCY (HF) SURGICAL EQUIPMENT can adversely influence the operation of other electronic equipment.

WARNING: Do not have skin-to-skin contact on the patient. For example, between the arms and the torso. Insert dry gauze to avoid contact, as appropriate.

Note: The unit does not contain any neutral electrode.

Note: The diathermy output is bipolar.

Note: **AMO** recommends that you check the condition of all interconnecting and handpiece cables on a regular basis.

WARNING: Risk of burns and fire. Do not use the system near conductive materials such as metal bed parts, inner spring mattresses, or similar items. Replace electrode cables on evidence of deterioration.

WARNING: Hazardous electrical output. This equipment is for use only by qualified personnel.

WARNING: Disconnect the power before you service the equipment.

WARNING: Remove the power cord from the power outlet when the equipment is not in use.

WARNING: Do not obstruct the power outlet so you can readily remove the power cord.

WARNING: Not recommended for use in condensing environments. If exposed to a condensing environment, allow the system to equilibrate to typical operating room conditions prior to use.

WARNING: You do not need to use a NEUTRAL ELETRODE with this HIGH FREQUENCY (HF) SURGICAL EQUIPMENT.

WARNING: Failure of the HIGH FREQUENCY (HF) SURGICAL EQUIPMENT could result in an unintended increase of output power.

WARNING: DO NOT try to replace the wireless remote control batteries. Call your **AMO** Technical Service representative to replace the batteries.

WARNING: Sterility assurance is the responsibility of the user. You must sterilize all nonsterile accessories prior to use.

WARNING: Prior to using any invasive portions of the handpiece assembly, examine under the microscope for any obvious damage, oxidation, or the presence of foreign material. You must note any questionable characteristics; use a backup handpiece for surgery. Use of contaminated or damaged system accessories can cause patient injury.

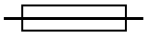
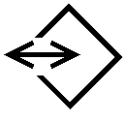
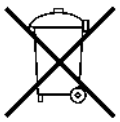
WARNING: Do not use non-**AMO** approved products with the **WHITESTAR SIGNATURE** System, as this can affect overall system performance. **AMO** cannot be responsible for system surgical performance if you use these products in surgery.

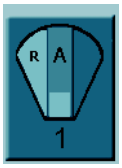
Symbol Definitions

The following symbols appear on the **WHITESTAR SIGNATURE** System front and back panels and in the software:

Table 1.1 – Symbol Definitions

Symbol	Definition
	Symbol on the power switch indicates power is on.
	Symbol on the power switch indicates power is off.
	Indicates there is a possible danger to the user. In the manual, the symbol indicates information the user must read.
	Indicates that there are important operating and maintenance instructions included in the Operator's Manual.

Symbol	Definition
	Indicates the presence of uninsulated high voltage inside the instrument. Risk of electric shock. Do not remove the instrument cover.
	Indicates fuse.
	Single phase alternating current.
	Indicates isolation of the patient applied part from earth ground.
	Indicates grounding of the patient applied part OR no involvement of direct electrical energy.
	Foot pedal connection.
	Communications Port
	Programmable IV Pole
	Diathermy Receptacle
	Phaco Handpiece Receptacle
	Vitrectomy Cutter Connection
	Potential Equalizer
	Indicates compliance with the Medical Device Directive.
	Indicates the authorized European Union representative.
	Separate Disposal/Collection Required
	Indicates manufacturer of the **WHITESTAR SIGNATURE** System.

Symbol	Definition
	Environment Friendly Use Period in Years (RoHS)
	Indicates compliance with IEC 60601-1-2:2001, "Electromagnetic Compatibility Requirements and Tests for Medical Electrical Equipment."
	ETL Listed Mark issued to those products that have met the requirements of product safety standards for the United States and Canada. (ETL formerly Edison Testing Laboratory)
	Universal Serial Bus (USB) Port Note: Use only **AMO** recommended USB stick drives.
	Federal Communications Commission (FCC) The FCC regulates interstate and international communications by radio, television, wire, satellite, and cable under the FCC's jurisdiction.
	**FUSION** Mode button used to open the CASE settings screen.
	Standard foot pedal icon. Shows the current position of the foot pedal asyou press the foot pedal. The number changes when the position of the foot pedal changes.
	Advanced Control Pedal icon. Shows the current position of the foot pedal as you press the foot pedal. The number changes when the position of the foot pedal changes. The letters indicate the location of Aspiration (A), Irrigation (I), Phaco (P), Reflux (R), **WHITESTAR** Increment/ Decrement (WS) and Switch (S).
	**WHITESTAR** Technology is on.
	**WHITESTAR** Technology is on and ICE Pulse Shaping is on.
	**ELLIPS** Technology is on.
	**ELLIPS FX** Technology is on.
	The reload button cycles through the surgeon's programs.

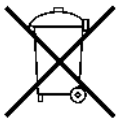
Symbol	Definition
	Continuous Irrigation. Used to turn continuous irrigation on or off.
	Volume Control, when pressed cycles through the volume settings.
	Save. Used to save changes made to settings during surgery.

System Disposal

WEEE

The electronic components of the **WHITESTAR SIGNATURE** System are subject to the European Union Directive 2002/96/EC on Waste Electrical and Electronic Equipment. This directive applies to all electronic equipment in the European Union only.

The disposal to municipal waste is prohibited for electronic equipment subject to this directive; this equipment must be treated or recycled. Each component that is subject to this regulation is marked on the component itself with this symbol:



In some cases where the component's size prohibits marking (such as handpieces) the marking can be found on the directions for use and the warranty. Treatment and/or recycling of the electronic equipment are provided at no cost to you. Please see the contact information below for disposition of unwanted AMO electronic equipment.

For disposal of your unit, contact your local AMO subsidiary or the AMO service center nearest you.

Belgium	**Denmark**
Contact De Ceunynck Medical nv/sa Kontichsesteenweg 36 B-2630 AARTSELAAR Belgium	Distributor AMO Denmark ApS c/o Abbott Medical Optics Norden AB Kanalvagen 3A SE 19461 Upplands Vasby Sweden

Finland AMO Norden AB Vantaa/Finland Rajatorpantie 41 C, 3 krs FIN-01640 Vantaa Finland Phone: +358 9 8520 2192	**France** AMO France SAS Greenside 15, 750 Avenue de Roumanille 06410 Biot France Phone: +33 4 93 00 11 95
Germany AMO Germany GmbH Rudolf-Plank Strasse 31 D-76275 Ettlingen Germany Phone: +49 7243 729 444 (Hotline)	**Ireland** AMO Ireland Block B Liffey Valley Office Campus Quarryvale, Co. Dublin, Ireland
Italy AMO Italy Srl Via Pio Emmanuelli, n.1 00143 Rome Italy Phone: +39 06 51 29 61	**Netherlands** AMO Netherlands B.V. Kantoorgebouw La Residence Weverstede 25 3431 JS Nieuwegein The Netherlands Phone: +31 (0)30 600 8787
Norway Distributor AMO Norway AS c/o Abbott Medical Optics Norden AB Kanalvagen 3A SE 194 61 Upplands Vasby Sweden	**Poland** Distributor Oko-Vita Polska sp.z o.o. ul Marywilska 34, 03-228 Warsaw, Poland
Portugal Abbott Medical Optics Spain, S.L. sucursal em Portugal Praca Nuno Rodreguez dos Santos no 7, 1600-171 Lisboa Portugual	**Russia** Distributor Tradomed Ltd., Marksistskaya Str. 3, Bld 1, Moscow, 109147, Russia

Spain Abbott Medical Optics Spain, S.L. Unipersonal c/Dr. Zamenhof, n. 22, 4B 28027 Madrid Spain Phone: +34 9176 88 000	**Sweden** Abbott Medical Optics Norden AB Kanalvagen 3A SE 194 61 Upplands Vasby Sweden
Switzerland Distributor AMO Switzerland GmbH, Churerstrasse 160 B, CH-8808 Pfäffikon, Switzerland	**United Kingdom** AMO United Kingdom Ltd Jupiter House Mercury Park Wooburn Green High Wycombe Buckinghamshire HP10 0HH United Kingdom Phone: +44 1628 551600

RoHS (Restriction of Hazardous Substances)

For Chinese Regulation: Administrative Measure on the Control of Pollution Caused by Electronic Information Products.

Table 1.2 – Names and Content of Toxic and Hazardous Substances or Elements

Parts Name	Toxic and Hazardous Substances or Elements					
	Pb	Hg	Cd	Cr6+	PBB	PBDE
Housing	x	o	o	x	o	o
Power Supply	x	o	o	x	x	x
Motherboard	x	o	o	o	x	x
Rear Panel Assembly Board	x	o	o	x	x	x
Pneumatics	x	o	o	x	o	o
LCD	x	x	o	o	x	x
Base Unit	x	o	o	o	x	x
Fluidics	x	o	o	x	o	o
o: Indicates that this toxic or hazardous substance contained in all the homogeneous materials for this part is below the limit requirement in SJ/ T11363-2006						
x: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006. (Enterprises may further provide in this box technical explanation for marking "X" based on their actual conditions.)						

2 SYSTEM COMPONENTS

Receipt and Inspection Instructions

WHITESTAR SIGNATURE System Components

Receipt and Inspection Instructions

When you receive your **WHITESTAR SIGNATURE** System inspect the exterior packaging for any signs of damage that might have occurred during shipping and record this damage on the shipping documents. If there are any signs of damage, carefully unpack the **WHITESTAR SIGNATURE** System and inspect the system for damage. If any damage to the package contents has occurred, you must immediately file a claim with the transporter. The transporters accept claims only from the recipient (you), not from the shipper (AMO).

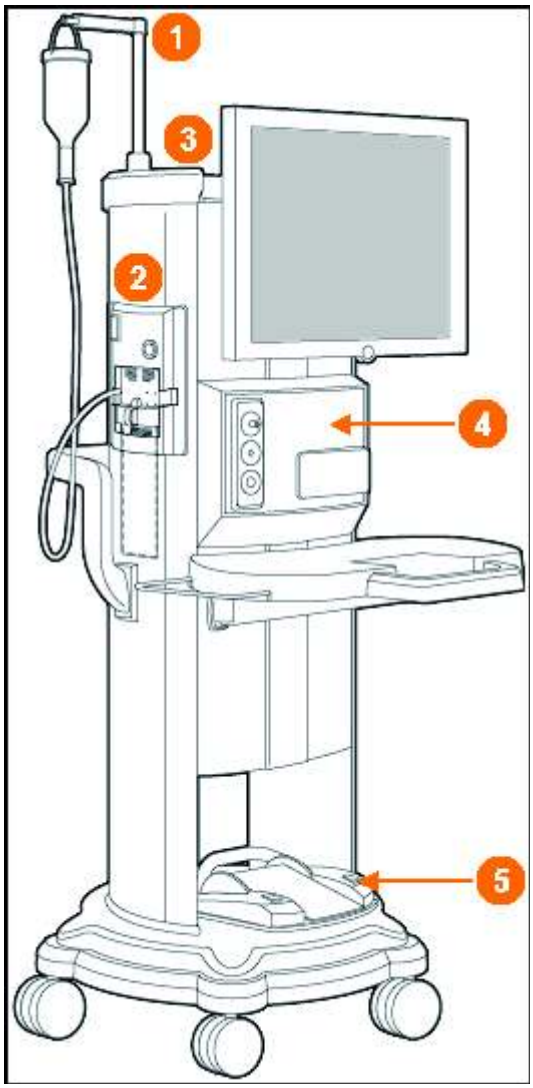
Your AMO Representative will have contacted you to schedule both the installation and the in-service training when you receive your new **WHITESTAR SIGNATURE** System. We suggest that you leave the **WHITESTAR SIGNATURE** System in the original packaging. Store the package in a cool, dry environment until the AMO installation personnel arrive to assemble, install, and test your equipment. Extreme heat, cold or moisture can damage any electronic equipment.

WHITESTAR SIGNATURE System Components

Your **WHITESTAR SIGNATURE** System consists of all or some of the following components:

- **WHITESTAR SIGNATURE** System console with a Mayo tray on an adjustable arm,detachable power cord and a programmable IV pole
- **FUSION** tubing pack (disposable)
- Foot pedal and foot pedal cable (standard or Advanced Control Pedal)
- Wireless remote control module
- Surgical Media Center (optional)
- **WHITESTAR SIGNATURE** System operator’s manual

Figure 2.1 – WHITESTAR SIGNATURE System



1. Programmable IV Pole
2. **FUSION** Tubing Pack
3. Wireless Remote Control Module (Storage bay on top of the system)
4. **WHITESTAR SIGNATURE** System console with Mayo Tray
5. Foot Pedal

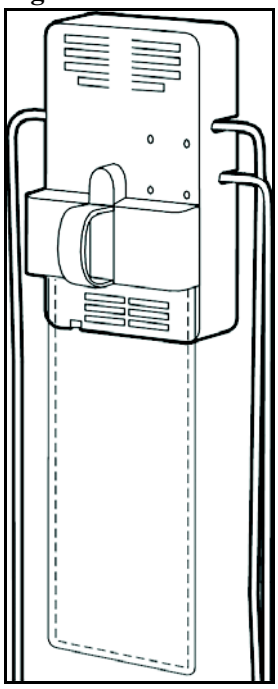
Fusion Tubing Packs

Each surgical procedure requires a disposable **FUSION** Tubing Pack for either the peristaltic pump or the Venturi pump. The **FUSION** Tubing Pack only works with the peristaltic pump used in anterior/cataract surgeries. The **FUSION** Dual Pump Tubing Pack works with both the peristaltic pump and the Venturi pump. With the **FUSION** Dual Pump Tubing Pack you can select either pump while you are in a surgical case.

The tubing pack contains the following components:

- A tubing pack with irrigation and aspiration tubing (administration set) with an attached, sealed drain bag
- Irrigation sleeve
- Test chamber – to test and prime/tune the phaco handpiece
- Mayo stand drape – to cover the Mayo tray and arm
- Monitor drape – to cover the front of the touch screen

Figure 2.2 – FUSION Tubing Pack



Use proper handling and disposal methods for biohazards when you dispose of the tubing pack, Mayo stand drape, and monitor drape.

The **FUSION** Fluidics pack (OPO70) allows an inter-connection of the irrigation line to the aspiration line, so that sterile balanced salt solution can enter the aspiration line and has no time restriction for reflux as there is no pump reversal.

The **FUSION** Dual Pump **(DP)** pack (OPO71) includes support for the vacuum tank used in the Venturi vacuum system but does not support inter-connecting the irrigation line to the aspiration line. Therefore, only previously aspirated fluid is being refluxed.

Foot Pedal

The foot pedal controls all of the **WHITESTAR SIGNATURE** System functions, therefore, it is essential that you understand the foot pedal operation.

The system software automatically detects if a foot pedal is present and what type of foot pedal is connected during power up.

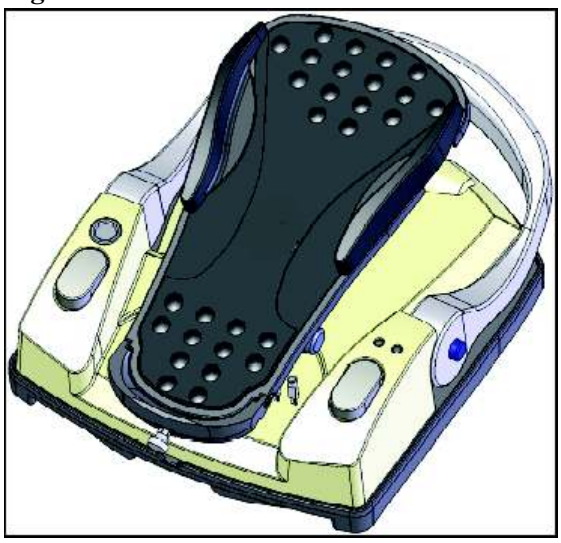
The foot pedal settings and adjustments can be selected and preset for the footpedal in the Configuration screen. Instructions for the foot pedal settings are given in Chapter 5, “Anterior Segment Surgery Operating Modes”. The foot pedal housing incorporates a handle, making the foot pedal easy to grip for repositioning and storage.

The foot pedal cable attaches to the foot pedal connector on the rear of the console The Advanced Control Pedal can also be set up with a wireless connection.

Note: You must **NEVER** handle the foot pedal by the cable.

Figure 2.3 – Standard Control Pedal

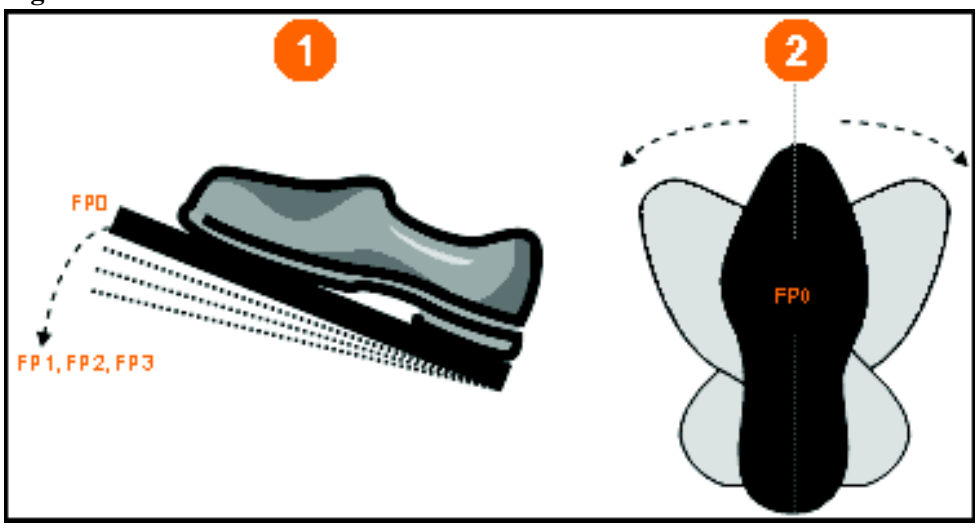
Figure 2.4 – Advanced Control Pedal



Foot Pedal Operation

The foot pedal has three active “pitch” ranges, which are referred to as Positions 1, 2 and 3. Position 0 is the off position, and position 3 is the fully pressed position. The ranges are shown below. The Advanced Control Pedal has two Yaw switches.

Figure 2.5 – Advanced Control Pedal Pitch and Yaw Positions



1. Pitch
Toe Down/Up
Configurable Ranges

2. Yaw
Toe Right/Left
Configurable Ranges

The foot pedal position determines the function that is delivered by the handpiece, which depends on the mode selected on the touch screen. When the foot pedal has been connected, place your foot on the pedal and press to the desired position. The foot pedal settings and programming are addressed in Chapter 3, “Foot Pedal Setup”.

Note: Four to six minutes after the system is shut down and power is turned off, the Advanced Control Pedal goes into a power-save mode. To turn on the Advanced Control Pedal after you start up the system, touch the **Wake-up** button (see Chapter 3, “Foot Pedal Setup”).

Reflux

Reflux is the controlled backflow of fluid through the aspiration port of the handpiece. Reflux is used to gently release or dislodge unwanted material from the handpiece tip. Reflux can also be used to “tent” the incision site to allow easier tip insertion. Reflux pressure depends on bottle head pressure (IV pole height and gravity) for the **FUSION** Fluidics pack (OPO70), and as such, is not intended to clear a clogged handpiece. However, reflux can be used to identify a blockage.

The reflux action can be programmed on any available foot pedal switch. This causes fluid to be expelled from the aspiration line into or towards the eye.

The reflux is active until the foot pedal switch is released.

Programmable IV Pole

The programmable IV pole is controlled by the up and down arrows on the upper right of the touch screen, next to the bottle height indicator. The buttons on the remote control and the switch on the side of the console can also be used to control the IV pole. These controls are used to raise and lower the pole, and the height is indicated in the **Programmable IV Pole** screen. The IV pole moves at a rate of approximately 6 cm (2 inches) per second.

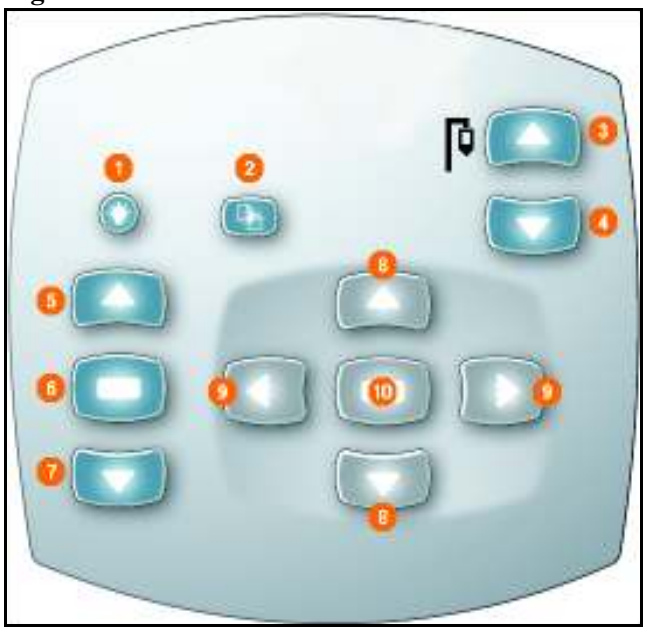
The IV pole is adjustable from 0 to 104 centimeters, and can be set for either inches or centimeters. The height measurement is relative to the distance from the irrigation valve to the center of the drip chamber. The IV pole height for each fluidic mode or submode (Phaco, IA, VIT) is saved in the **WHITESTAR SIGNATURE** System memory. A maximum IV pole height can be set on the Diagnostics screen.

When a surgery mode is selected, the IV pole automatically moves to the preset height. To manually adjust the IV pole height, use the up and down arrows on the touch screen. Manual adjustments to the IV pole can also be made by pressing the rocker switch located on the side of the console. If a maximum height has been set, the IV pole will not move above that height.

Wireless Remote Control

The wireless remote control keypad can be used to operate the **WHITESTAR SIGNATURE** System. All modes, programs, diagnostics and end case can be accessed and adjustments to the settings can be made with the remote control. The buttons on the remote keypad work the same as the controls on the **WHITESTAR SIGNATURE** System touch screen.

Figure 2.6 – Wireless Remote Control Module



1. Remote Backlight On
2. Reload
3. IV Pole Up
4. IV Pole Down
5. Mode Up
6. Mode Select
7. Mode Down
8. Navigation Up/Down
9. Navigation Left/Right
10. Select

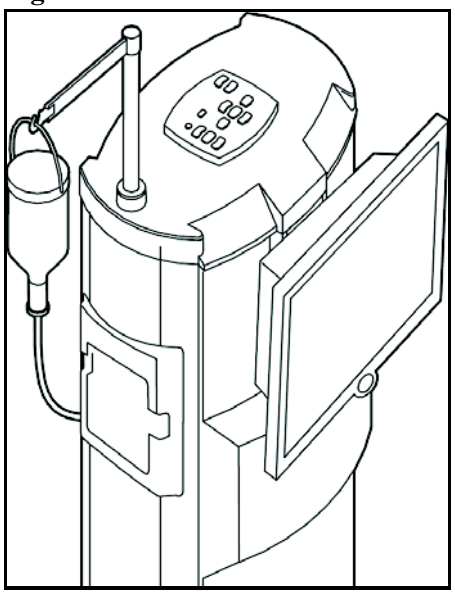
When not in use, store the wireless remote control on the top of the system to charge the batteries.

After you turn the system On, press the remote control Backlight button to activate the remote control.

Note: After four to six minutes of idle time, the remote control goes into a power-save mode. To turn the remote rontrol on, press the Backlight button.

WARNING: DO NOT try to replace the wireless remote control batteries. Call your AMO technical service representative to replace the batteries.

Figure 2.7 – Wireless Remote Control Module Storage



Surgical Media Center (SMC)

The Surgical Media Center (SMC) is used to record the surgery and the instrument settings to be viewed at a later date and time. The surgery is displayed on a monitor with the instrument settings. The SMC hardware is connected to your **WHITESTAR SIGNATURE** System communications port on the rear panel.

3 SYSTEM SETUP

WHITESTAR SIGNATURE System Setup

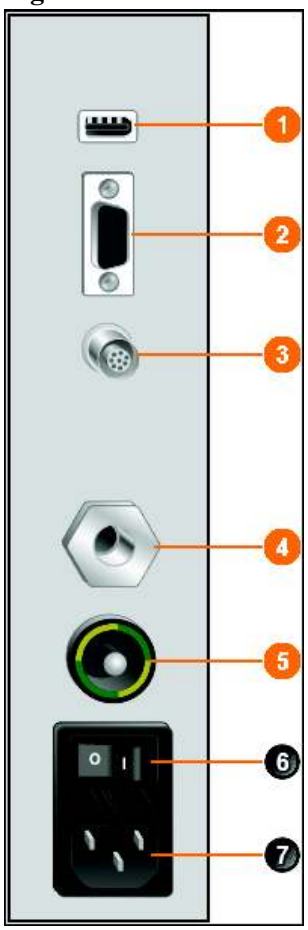
System Shutdown

WHITESTAR SIGNATURE System Setup

The following is a general overview of the steps to take to prepare the **WHITESTAR SIGNATURE** System for surgery:

1. Connect the **WHITESTAR SIGNATURE** System power cord to the rear of system. Plug the power cord into a grounded power outlet.
2. Connect the foot pedal to the rear panel receptacle.
3. Connect the compressed air line to the compressed air receptacle (optional).
4. Turn the system on at the back of the console.
5. Press the on/off button on the touch screen monitor.
6. After completion of the self test, select the surgeon and program.
7. Install the tubing pack.
8. Assemble and attach the required accessories (phaco, vitrectomy, or diathermy handpieces) and set up the tubing.
9. Prime and tune the handpieces. (Refer to Chapter 4, Equipment Operation, Prime/Tune.)
10. Perform the final test of the fluidics and the handpiece integrity with the foot pedal. (Refer to Chapter 4, Equipment Operation, Verify Irrigation/Aspiration Balance.)

Figure 3.1 – Rear Panel Connections



1. USB Port
2. Communications Port
3. Foot Pedal Connector
4. Compressed Air
5. Potential Equalizer
6. Power Switch and Power Cord Connection

Phacoemulsification Handpiece Setup

WARNING: Sterility assurance is the responsibility of the user. You must sterilize all nonsterile accessories prior to use.

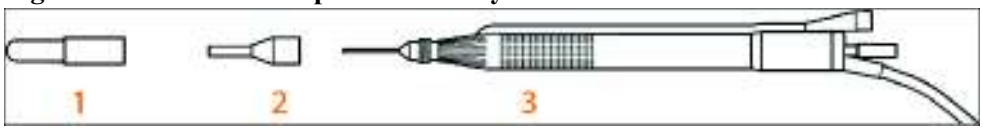
WARNING: Prior to using any invasive portions of the handpiece assembly, examine under the microscope for any obvious damage, oxidation, or the presence of foreign material. Use a backup handpiece for surgery if there are any questionable characteristics of the handpiece. Use of contaminated or damaged system accessories can cause patient injury.

1. Use caution to prevent burns when handling the handpiece directly from sterilization.
2. Remove the tubing pack and accessories from the tubing pack and place them in the sterile area.

3. Assemble the phaco handpiece as shown below. You need the handpiece, titanium phaco tip, the appropriate tip wrench, one of the irrigation sleeves and the test chamber.

CAUTION: NEVER ATTEMPT TO STRAIGHTEN A BENT NEEDLE. THIS MIGHT PRODUCE A BROKEN TIP WHEN YOU APPLY ULTRASOUND.

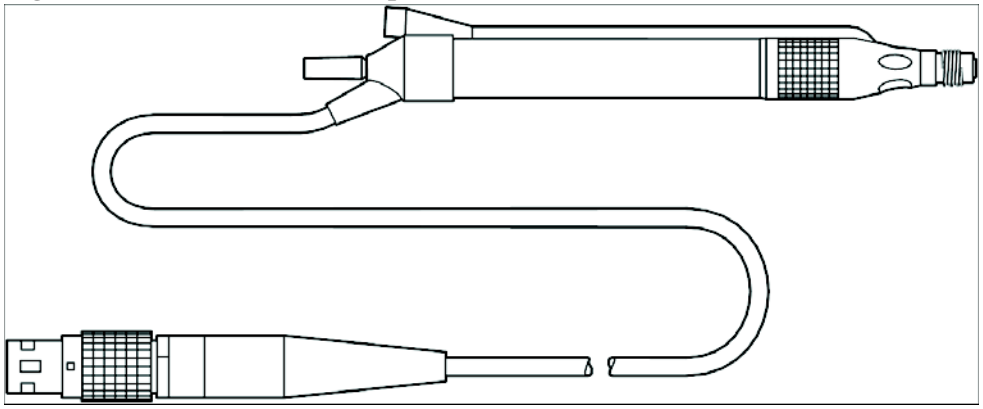
Figure 3.2 – Phaco Handpiece Assembly



1. Test Chamber
2. Irrigation Sleeve
3. Handpiece with Tip

4. Attach the connector end of the handpiece to the phaco receptacle on the front of the **WHITESTAR SIGNATURE** System. Make sure there is no moisture on the connectors prior to connecting. Moisture prevents the handpiece from operating properly.

Figure 3.3 – ELLIPS FX Handpiece



Note: You can use the **ELLIPS FX** handpiece with **WHITESTAR** Technology and **ELLIPS** Technology phaco settings.

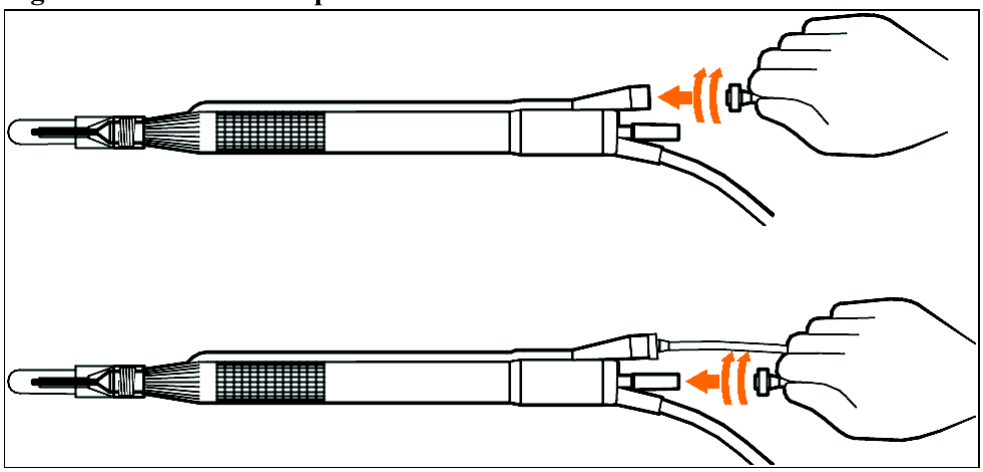
5. Insert the male luer end of the irrigation tubing into the phaco handpiece.

6. Attach the female luer fitting end of the aspiration tubing to the phaco handpiece.

Note: To protect the patient from contamination, use only:

- sterile tubing sets
- sterile balanced salt solution
- sterile handpieces

Figure 3.4 – Phaco Handpiece Connections

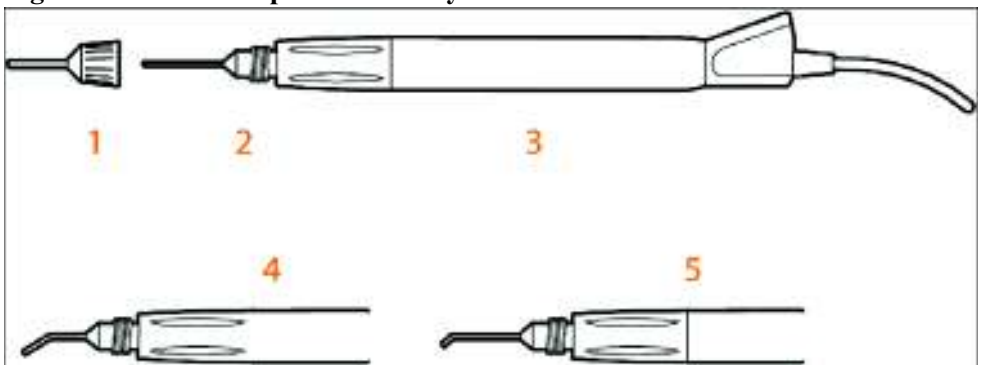


Irrigation/Aspiration Handpiece Setup

Assemble the SOLO Irrigation/Aspiration (IA) handpiece by attaching the irrigation sleeve.

Note: Both the irrigation sleeve and the test chamber are provided in the **FUSION** Tubing Pack. The **LAMINAR** Flow 20 ga. irrigation sleeves can also be used and are available with the OPOS20L or any 20 ga. **LAMINAR** Phaco Tip.

Figure 3.5 – IA Handpiece Assembly

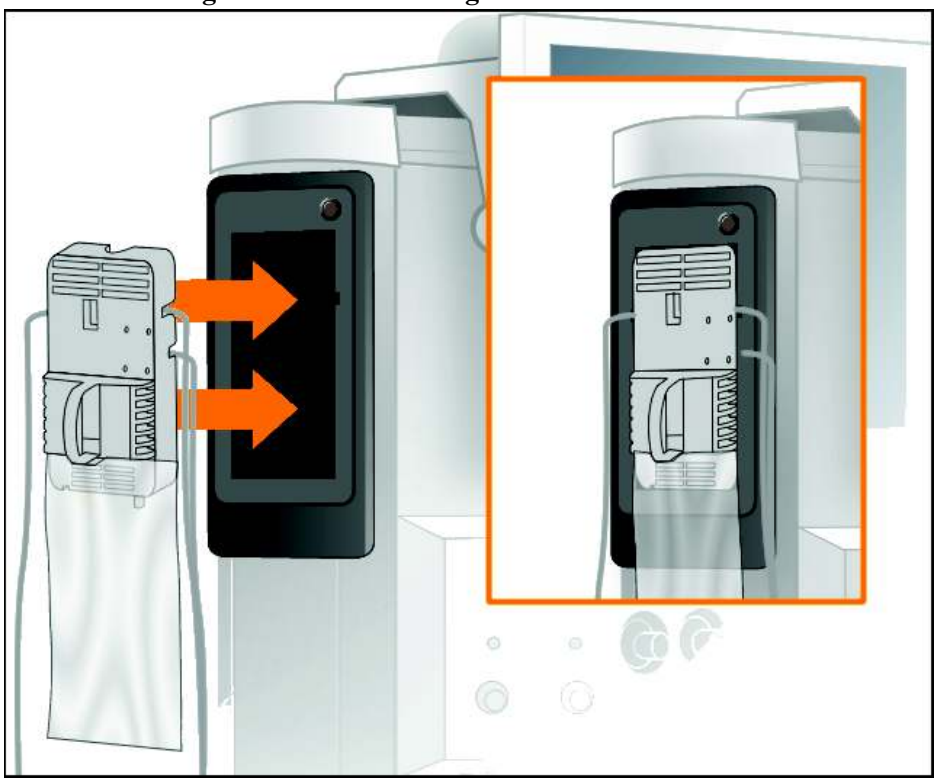


1. Irrigation Sleeve
2. SOLO Straight Tip
3. Handpiece
4. SOLO Curved Tip
5. SOLO 45o Silicone Sleeve Tip

FUSION Tubing Pack Setup

1. Open the tubing pack packaging.
2. Install the **FUSION** pack into the side receptacle, as shown below.
3. Make sure that the pack has a properly attached drainage bag.

Figure 3.6 – Loading the FUSION Tubing Pack



Note: Press the button above the pack to remove the pack.

IV Pole Setup

IMPORTANT: Before you insert the spike into the bottle, shake the irrigation drip chamber at the end of the irrigation tubing to confirm that the irrigation valve moves. If the valve does not rattle, the valve cannot operate properly and irrigation cannot flow.

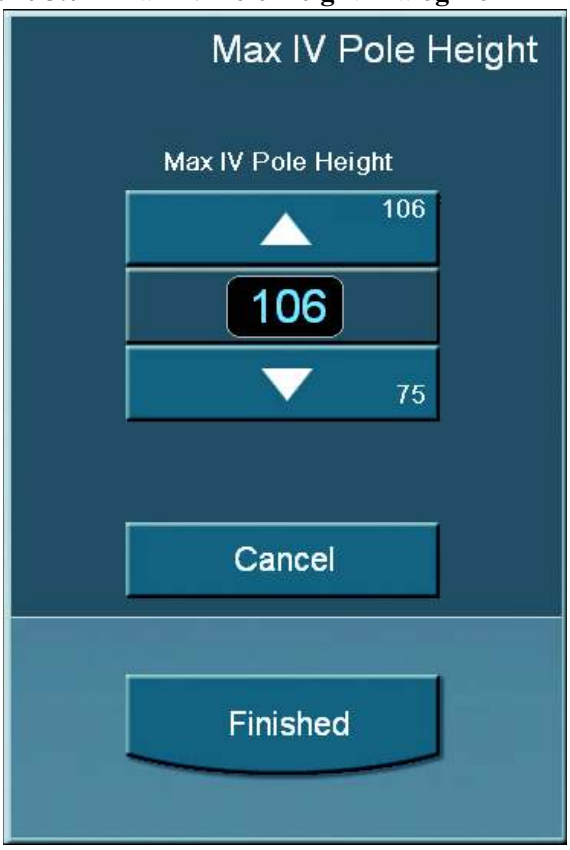
1. Hang a new bottle of balanced salt solution on the IV pole.
2. Insert the drip chamber spike into the balanced salt solution bottle.
3. Squeeze the drip chamber to fill the drip chamber with fluid to the half-full level.
4. The IV pole moves to the appropriate height automatically based on the settings of the selected surgical mode.
5. Raise or lower the pole if needed. Use the IV pole up and down arrows on the upper right of the touch screen. You can also use the up/down switch on the console.
6. Connect the IA tubing to the desired handpiece.

Setting the Maximum IV Pole Height

Follow these steps to set the maximum IV pole height.

1. Press Configuration.
2. Press System Configuration on the Configuration dialog box.
3. Press the Max IV Pole Height button.

Figure 3.7 – Max IV Pole Height Dialog Box



4. Use the up or down arrow to adjust the maximum IV pole height. You may set the maximum IV pole height in the range 75 cm to 106 cm. You may also press the numeric value shown to use a numeric keypad screen to enter the exact value you'd like to use.
5. Press the Finished button to return to the configuration screen.
6. Press Exit Settings to return to the current surgical mode.

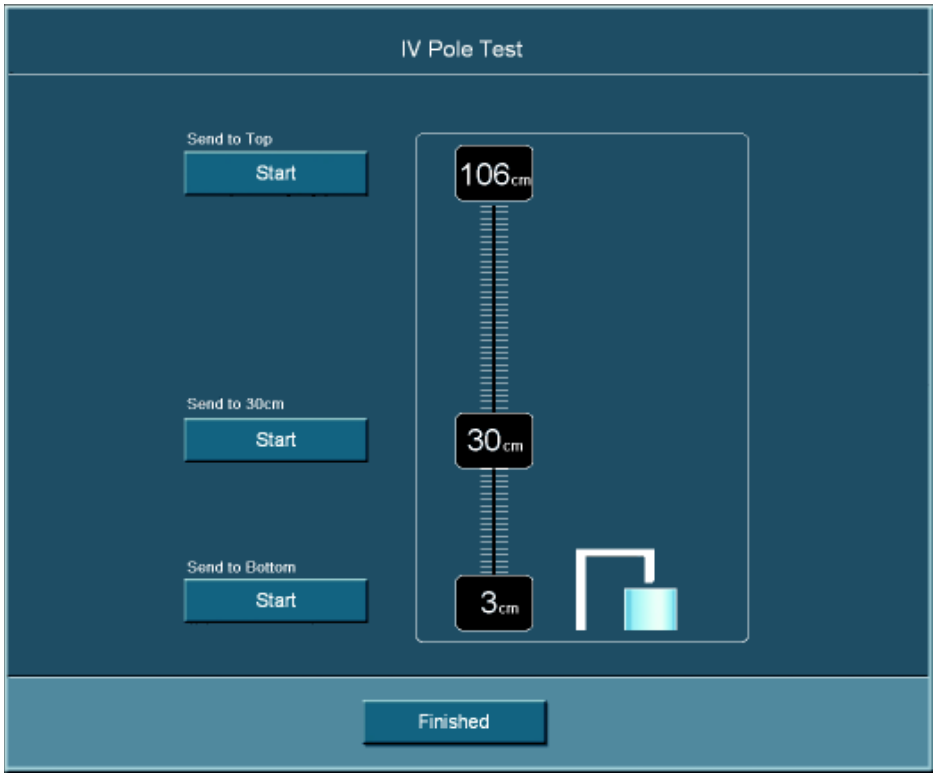
Testing the IV Pole

Follow these steps to test the IV pole.

1. Press **Configuration**.
2. Press **System Configuration** on the **Configuration** dialog box.

3. Press the **IV Pole Test** button.

Figure 3.8 – IV Pole Test

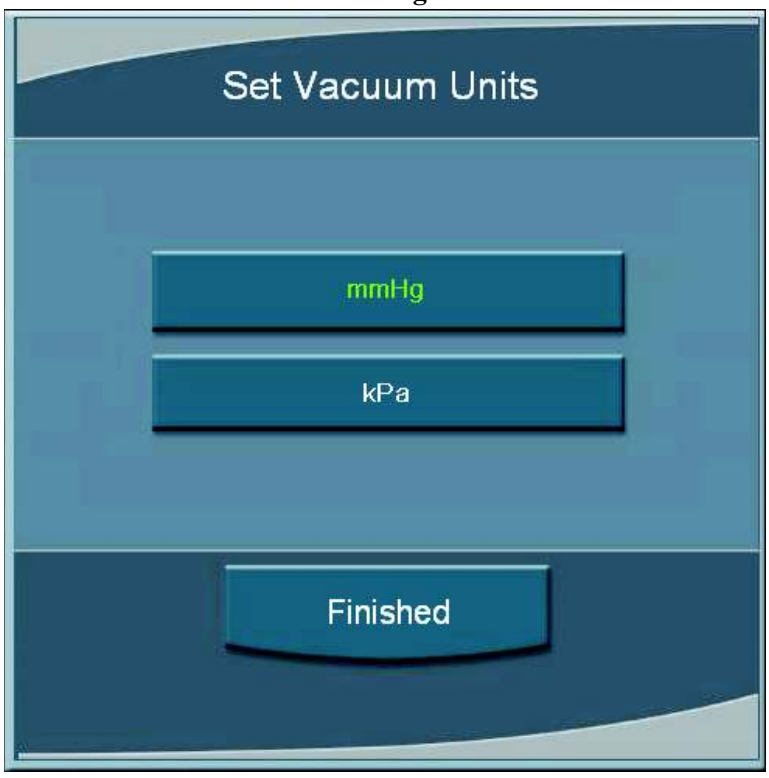


4. Press the **Start** button under **Send to Top** to test moving the IV pole to maximum height.
5. Press the **Start** button under **Send to 30cm** to test moving the IV pole to a height of 30cm.
6. Press the **Start** button under **Send to Bottom** to test moving the IV pole to minimum height.
7. Press Finished to close the IV Pole Test dialog box and return to the configuration screen.
8. Press **Exit Settings** to return to the current surgical mode.

Set Units of Measure for Vacuum

1. Follow these steps to set the units of measure displayed for vacuum settings.
2. Press **Configuration**.
3. Press **System Configuration** on the Configuration dialog box.
4. Press the **Set Vacuum Units** button.

Figure 3.9 – Set Vacuum Units Dialog Box



5. On the **Set Vacuum Units** dialog box, the current selection is highlighted in green. Press the button for the units of measure you want to use for the display of vacuum settings.
6. Press **Finished** to return to the configuration screen.
7. Press **Exit Settings** to return to the current surgical mode.

Set the System Date and Time

Follow these steps to set the system date and time.

1. Press **Configuration**.
2. Press **System Configuration** on the **Configuration** dialog box.
3. Press the **Set Date/Time** button.

Figure 3.10 – Set Date/Time Dialog Box

4. On the **Set Date/Time** dialog box, press the up and down arrows to set the day, month, year, hour and minute.

5. You may change the way the date is displayed.

   - Press the **Day/Month/Year** button to display the date in that format; for example, the date December 21, 2011 would be displayed as **21.12.2011**.
   - Press the **Month/Day/Year** button to display the date in that format; for example, the date December 21, 2011 would be displayed as **12.21.2011**.

6. You may change the way the time of day is displayed.

   - Press the **24Hr. Display** button to display the time of day in 24-hour format; for example, 2:45:43 PM would be displayed as **14:45:43**.
   - Press the **12Hr. Display** button to display the time of day in 12-hour format; for example, 2:45:43 PM would be displayed as **2:45:43 PM**.

7. Press **Finished** to return to the configuration screen.

8. Press **Exit Settings** to return to the current surgical mode.

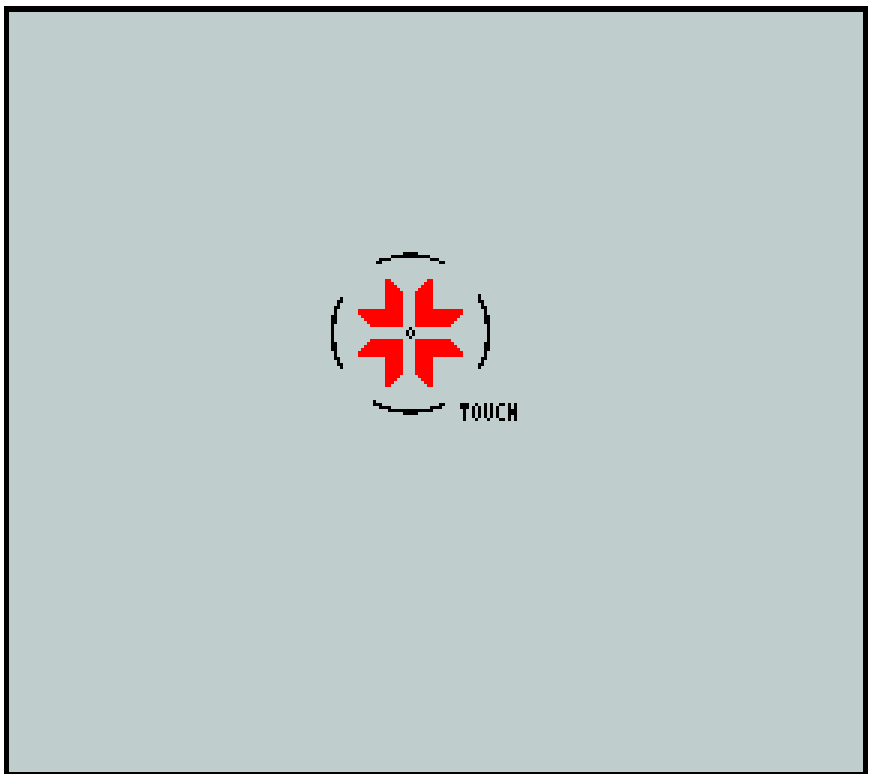
9. Calibrate the Touch Screen

10. Follow these steps to calibrate the touch screen.

11. Press **Configuration**.

12. Press **System Configuration** on the **Configuration** dialog box.
13. Press the **Calibrate Touch Screen** button.

Figure 3.11 – Touch Screen Calibration



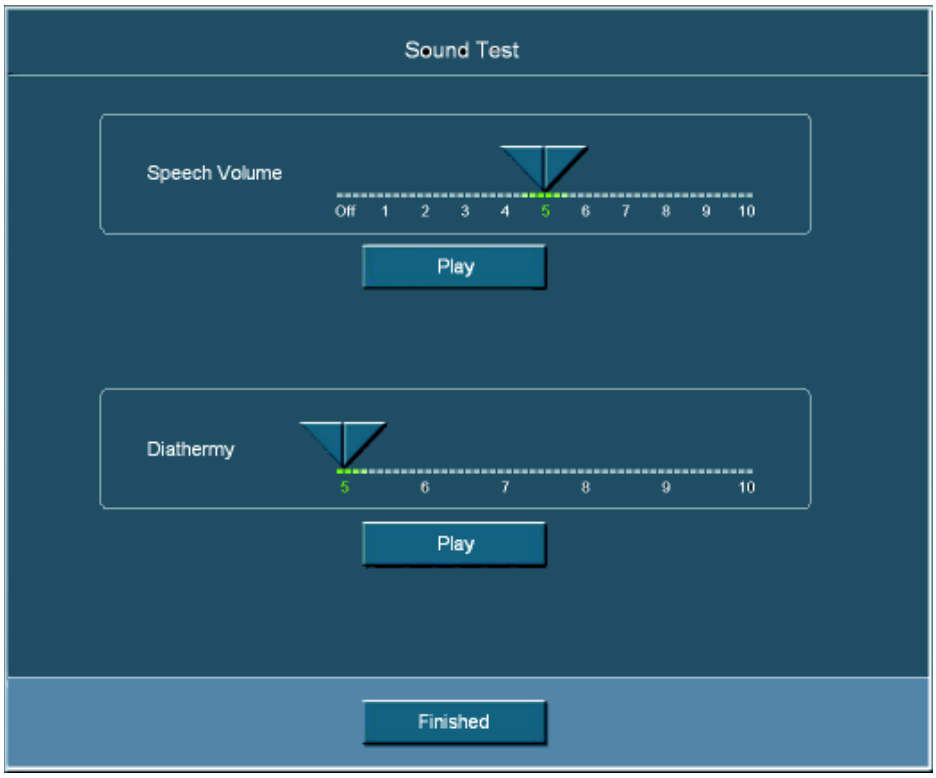
14. A calibration target screen appears. Press the center of the target circle until the **Touch** message under the circle changes to **Release**. When released, the circle moves to the next point to be calibrated.
15. Repeat step 4 for the all of the calibration points.
16. Press **Accept**.

Set and Test System Sound Levels

Follow these steps to set and test the system sound levels.

1. Press **Configuration**.
2. Press **System Configuration** on the **Configuration** dialog box.
3. Press the **Sound Test** button.

Figure 3.12 – Sound Test



4. You may set the volume level of spoken announcements. Press the **Play** button under **Speech Volume** to play the spoken value of the current volume setting for spoken announcements. Press and drag the pointer on the **Speech Volume** line to adjust the volume setting.

5. You may set the volume level of the audible signal used when diathermy is active. Press the **Play** button under **Diathermy** to play the audible diathermy signal. Press and drag the pointer on the **Diathermy** line to adjust the volume setting.

6. Press **Finished** to return to the configuration screen.

Press Exit Settings to return to the current surgical mode.

Diathermy Handpiece Setup

1. Connect the diathermy cord to the diathermy forceps or pencil.

2. Connect the diathermy cord to the diathermy receptacle on the front panel.

Figure 3.13 – Diathermy Forceps

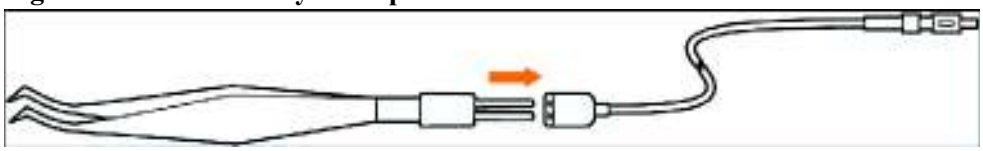
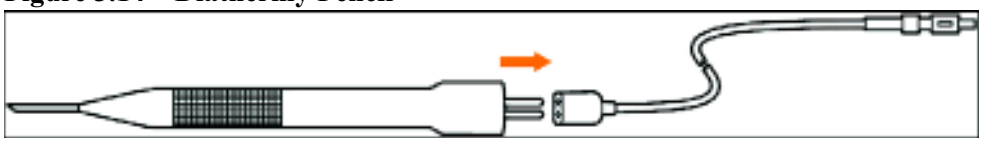


Figure 3.14 – Diathermy Pencil



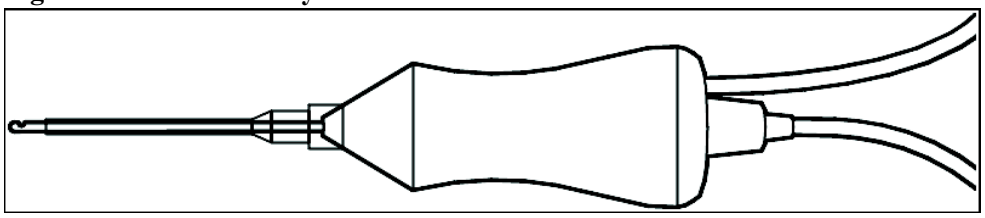
Note: Other diathermy accessories are regionally available. Contact your AMO representative.

Vitrectomy Cutter Setup

If you need to use vitrectomy during surgery:

1. Connect the vitrectomy cutter as shown below. Vitrectomy requires the following components:
   - IA Tubing (from **FUSION** Tubing Pack)
   - Vitrectomy cutter
   - Vitrectomy irrigation sleeve, or a 23 Gauge Limbal Infusion Needle, if desired.
2. Use the instructions provided with the vitrectomy cutter to assemble the handpiece.

Figure 3.15 – Vitrectomy Cutter



3. Attach the connector end of the vitrectomy cord to the vitrectomy receptacle on the front panel.

Foot Pedal Setup

This section presents the setup, calibration and testing process for your foot pedal, divided into a section for the standard foot pedal and a section for the Advanced Control Pedal.

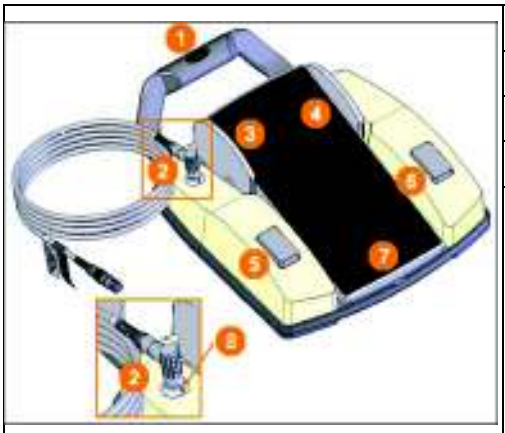
Standard Foot Pedal Setup

This section presents the following topics for setting up a standard foot pedal:

- Standard Foot Pedal Connections
- Standard Foot Pedal Switch Assignment

- Standard Foot Pedal Threshold Configuration
- Standard Foot Pedal Calibration and Testing

Figure 3.16 – Standard Foot Pedal

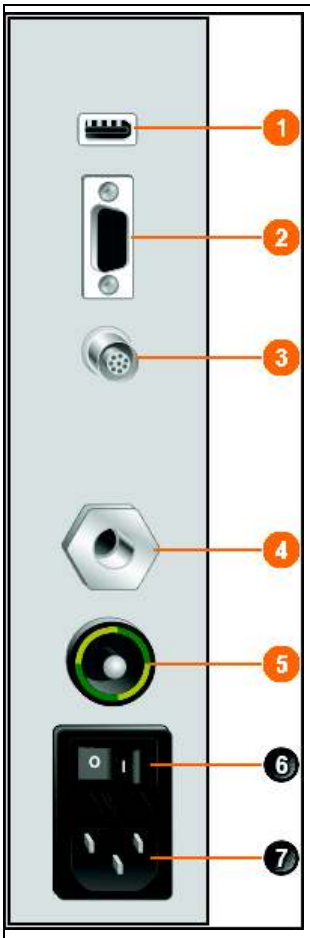


1 Handle	5 Left heel switch
2 Cable connector	6 Right heel switch
3 Left toe switch	7 Heel rest
4 Right toe switch	8 Cable connector detail

Standard Foot Pedal Connections

4. Connect the foot pedal cable to the connector on the left side of the foot pedal and connect the other end of the cable to the foot pedal connector on the rear panel of the system.

Figure 3.17 – Rear Panel Connections



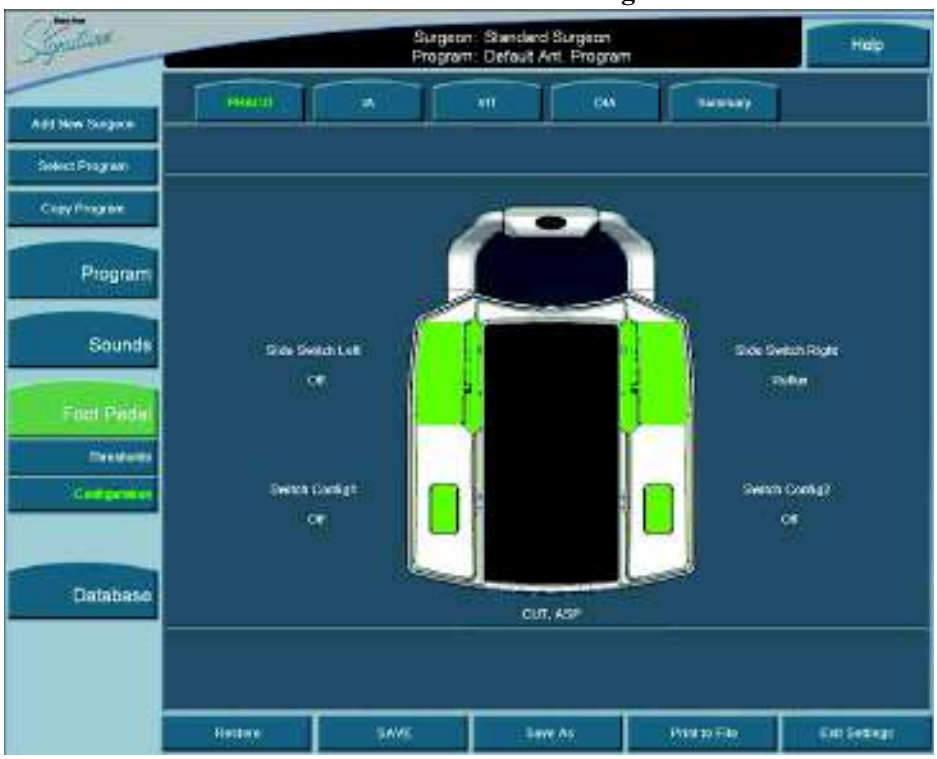
1. USB port
2. Communications port
3. Foot pedal connector
4. Compressed air
5. Potential equalizer
6. Power switch and power cord connection

Standard Foot Pedal Switch Assignment

The standard foot pedal has four switches that you may assign specific functions to. Follow these steps to assign functions to your foot pedal's switches.

1. On the main screen, press **Configuration**.
2. On the **Configuration** dialog box, press **Surgeons and Programs**.
3. On the main configuration screen, press **Foot Pedal**.
4. The system displays the foot pedal thresholds page. Press **Configuration**.
5. The system displays the **Summary** tab on the foot pedal configuration page. Each surgical type has individual settings for the foot pedal switches. For purposes of this example, we will discuss configuring the switches for phaco.
6. Press the **Phaco** tab. The system displays the foot pedal phaco configuration page.

Figure 3.18 – Standard Foot Pedal Phaco Switch Assignment



7. This page displays the settings for the pedal linear motion and each of the four switches. You may change the settings for the switches by pressing the green area that represents that switch.

8. Press one of the green areas, the system displays a **Switch Assignment** dialog box with the text of the current switch assignment shown in green. Press the button that represents your choice of switch setting.

Figure 3.19 – Standard Foot Pedal Switch Assignment Dialog Box

9. You may choose from:

Off	The switch does nothing when pressed.
Surgeon Program Up	
Surgeon Program Down	
Previous Major Mode	
Next Major Mode	
Previous Active Mode	
Next Active Mode	
Previous Sub Mode	
Next Sub Mode	
Toggle SMC Record	Toggles the state of surgical media center (SMC) recording.
Bottle Up	
Bottle Down	
Reflux	
Continuous Irrigation	Toggles the state of continuous irrigation flow.
1-Touch Up	
1-Touch Down	
Toggle CASE	Toggles the state of CASE mode.

10. Press the Finished button to accept your choice of switch assignment, close the Switch Assignment dialog box and return to the settings page. Repeat the process as desired for all switches.

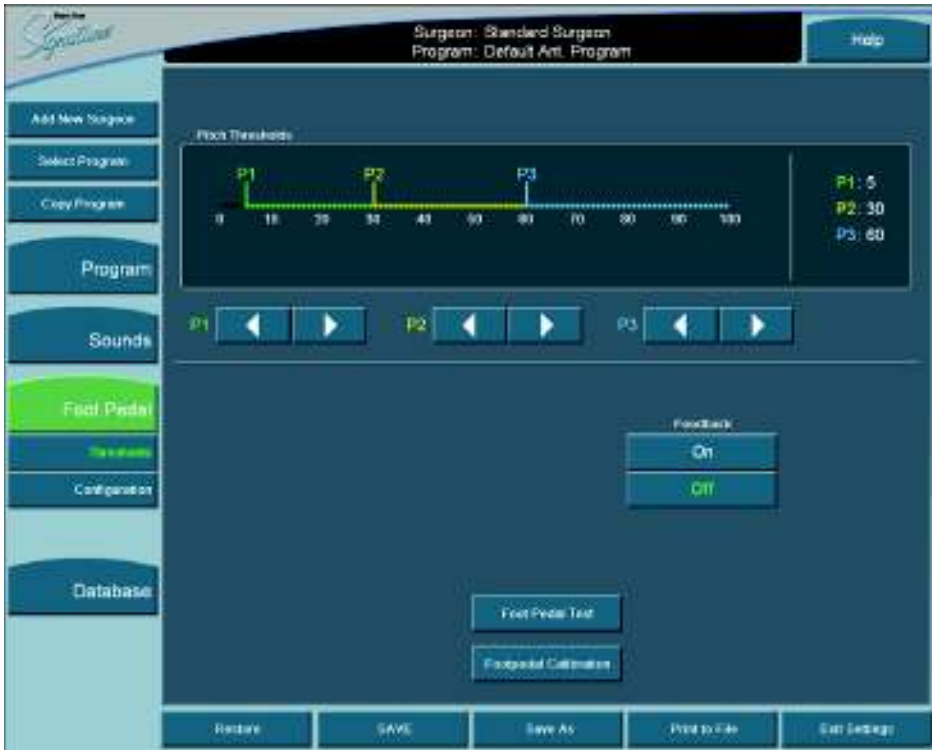
11. Press the Finished button to return to the foot pedal phaco configuration page.

Standard Foot Pedal Threshold Configuration

Follow these steps to configure the thresholds for the foot pedal.

1. Press the **Thresholds** button under **Foot Pedal**. The system displays the foot pedal thresholds page.

Figure 3.20 – Standard Foot Pedal Thresholds



2. Use the arrow buttons to set the threshold for position 1, 2, or 3. The system announces the current value.

3. Feedback is a physical and audible click as you move the foot pedal to the next or previous position. Press the **On** button under **Feedback** to enable foot pedal feedback. Your foot pedal is now ready for calibration.

4. Press the **Foot Pedal Calibration** button.

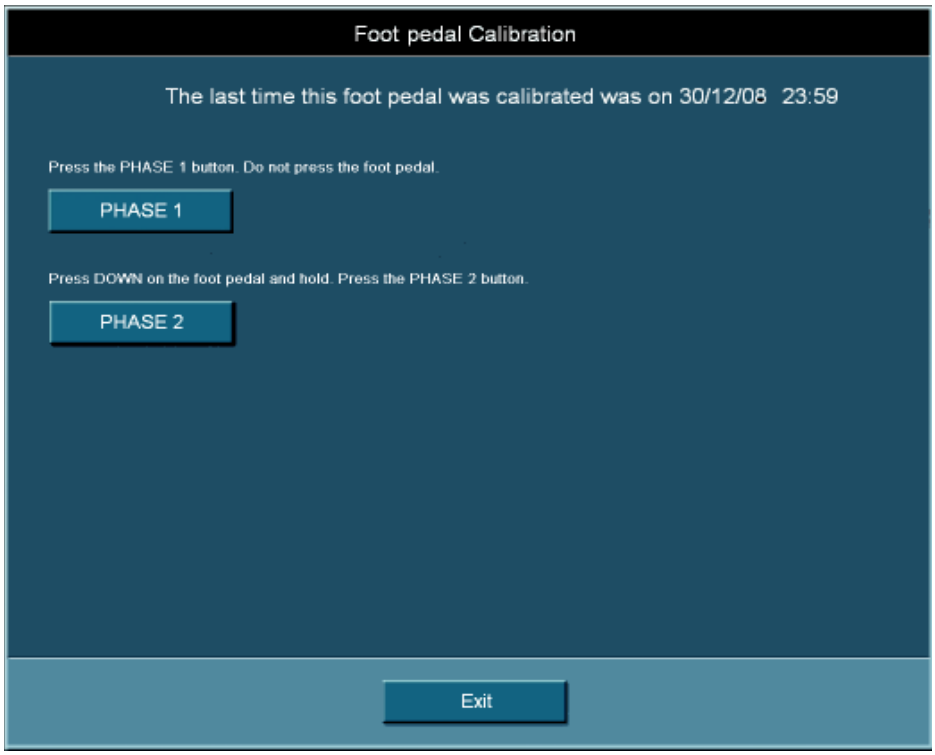
Standard Foot Pedal Calibration and Testing

Follow these steps to calibrate your foot pedal.

Note If you just completed the Standard Foot Pedal Threshold Configuration procedure, go to step 4.

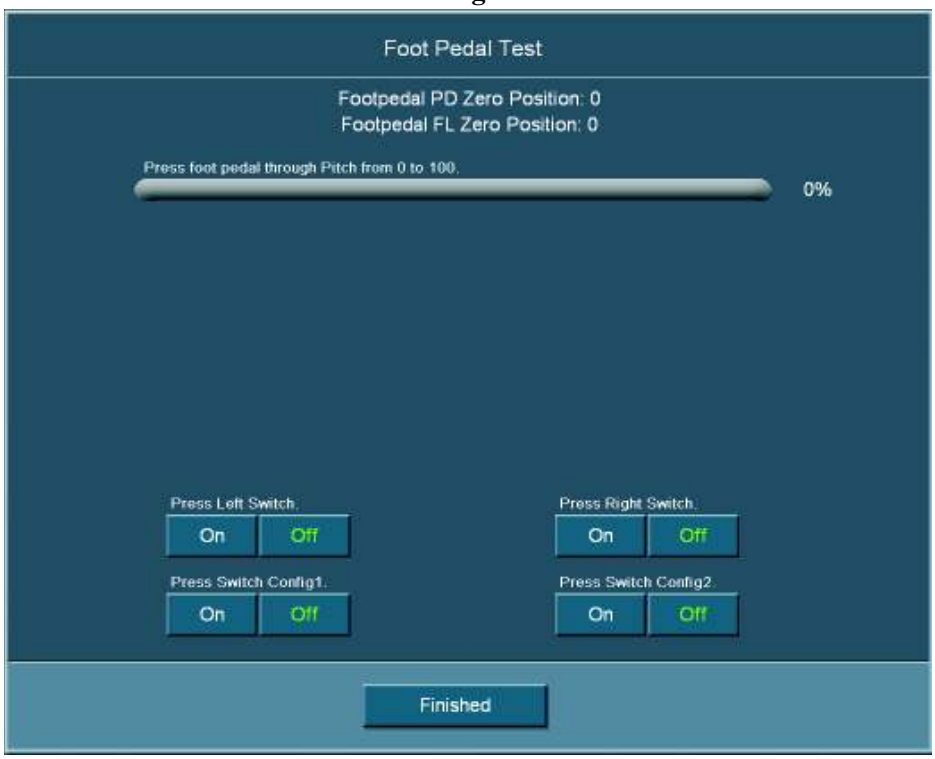
1. On the main screen, press **Configuration.**
2. On the **Configuration** dialog box, press **Surgeons and Programs**.
3. On the main configuration screen, press **Foot Pedal**.
4. The system displays the foot pedal thresholds page. Press the **Foot Pedal Calibration** button.

Figure 3.21 – Standard Foot Pedal Calibration



5. With your foot off the foot pedal, press the **Phase 1** button.
6. Put your foot on the foot pedal, press and hold the foot pedal all the way down and press the **Phase 2** button.
7. Press the **Exit** button.
8. The system automatically displays the **Foot Pedal Test** screen.
9. Press the foot pedal down fully to position 3. As the foot pedal travels through positions 1 and 2 to position 3, the progress bar shows its current state. When the pedal reaches position 3, the progress bar should be solid green.
10. Press each of the four switches. When a switch is pressed, the **On** button for that switch turns green and its **Off** button turns white. When you release the switch, the **On** button for that switch turns white and its **Off** button turns green.
11. When you've completed testing of your foot switch, press the **Finished** button.

Figure 3.22 – Standard Foot Pedal Testing

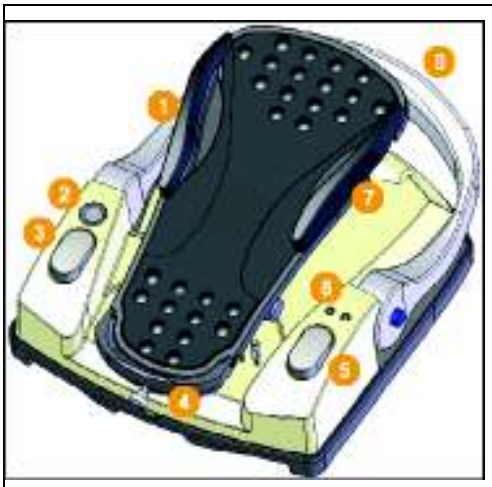


Advanced Control Pedal Setup

This section presents the following topics for setting up a standard foot pedal:

- Advanced Control Pedal Connections
- Advanced Control Pedal Switch Assignment
- Advanced Control Pedal Threshold Configuration
- Advanced Control Pedal Calibration and Testing

Figure 3.23 – Advanced Control Pedal



1 Left yaw	5 Right heel switch
2 Wake-up button	6 Lights
3 Left heel switch	7 Right yaw
4 Heel rest	8 Handle

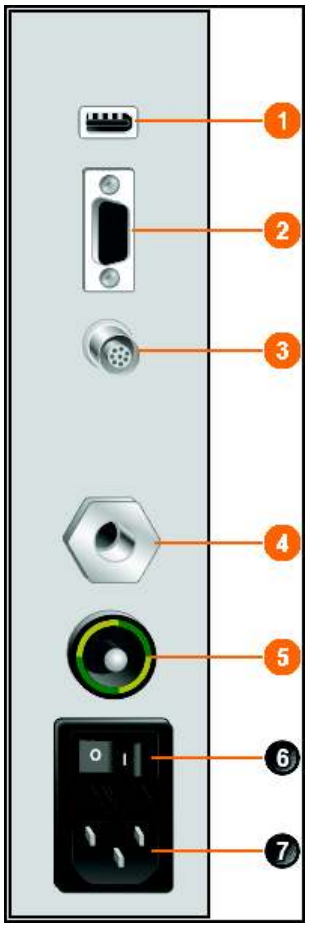
Advanced Control Pedal Connections

You may connect the Advanced Control Pedal to the system either with a cable or with a wireless BLUETOOTH connection.

Connecting the Advanced Control Pedal with a Cable

Connect the foot pedal cable to the connector on the rear of the foot pedal and connect the other end of the cable to the foot pedal connector on the rear panel of the system.

Figure 3.24 – Rear Panel Connections



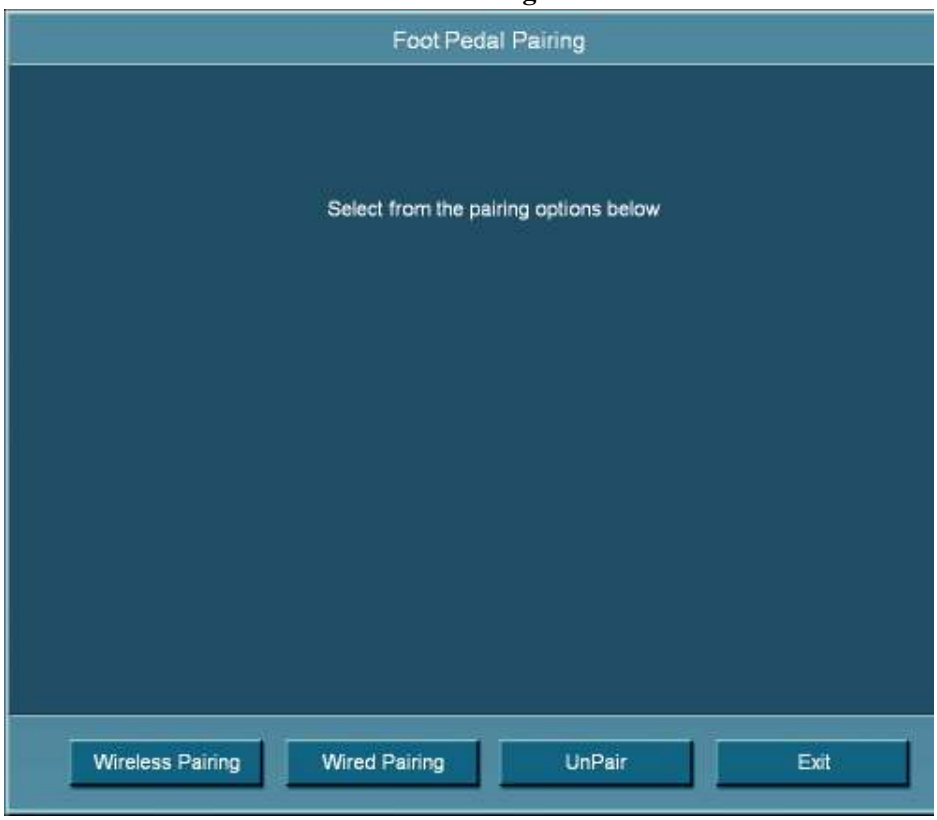
1. USB port
2. Communications port
3. Foot Pedal connector
4. Compressed air
5. Potential equalizer
6. Power switch and power cord connection

Connecting the Advanced Control Pedal Wirelessly

Follow these steps to connect the Advanced Control Pedal to the system with a wireless BLUETOOTH connection:

1. Make sure the Advanced Control Pedal is connected to the system with the cable.
2. On the main screen, press **Configuration**.
3. On the **Configuration** dialog box, press **System Configuration**.
4. On the main configuration screen, press **Wireless Setup**.
5. On the **Wireless Setup** dialog box, press **Foot Pedal**.

Figure 3.25 – Advanced Control Pedal Pairing

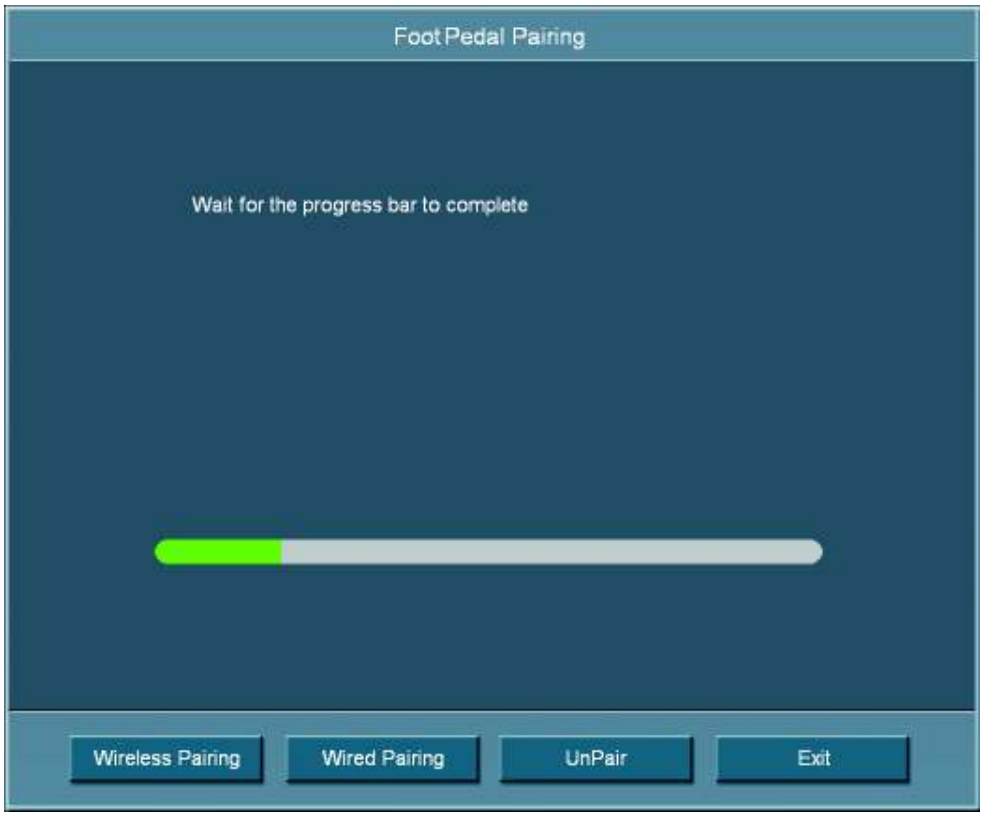


6. On the **Wireless Setup** dialog box, press **Foot Pedal**.On the **Foot Pedal Pairing** screen, press the **Wired Pairing** button.

7. The system displays the message **Make sure that the cable is attached to the foot pedal**. Press the **OK** button.

8. The system quickly communicates the appropriate data between itself and the Advanced Control Pedal then displays the message Remove the cable from the foot pedal.The system displays a progress screen. When pairing completes, the progress screen closes and the system displays the message The foot pedal is now paired with the system.. Press the Exit button to close the Foot Pedal Pairing screen and return to the main configuration screen.

Figure 3.26 – Advanced Control Pedal Pairing Progress

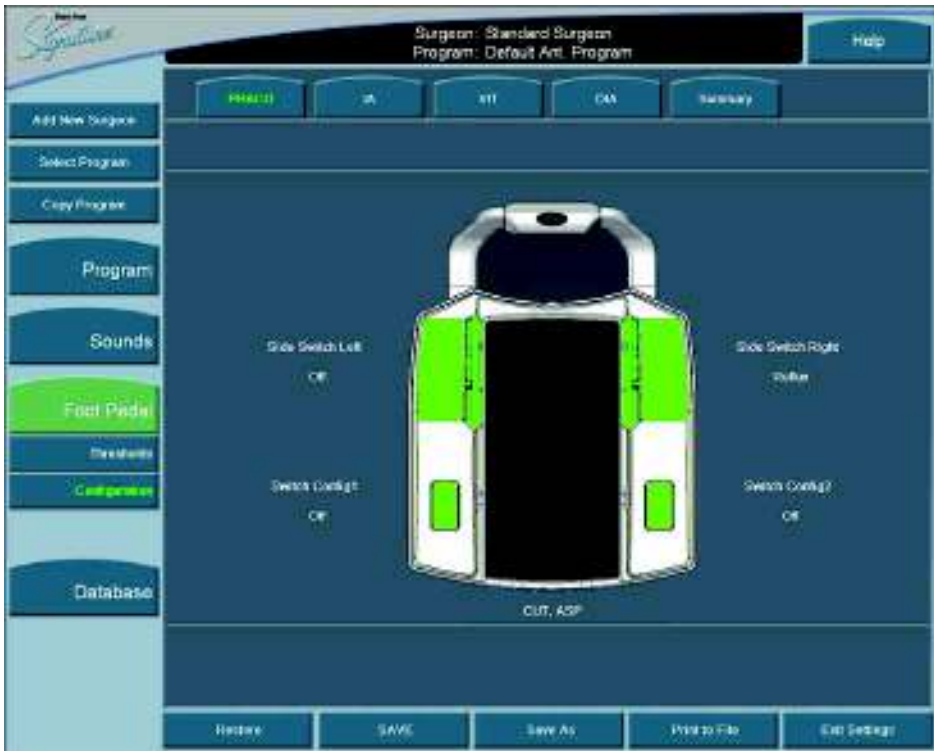


Advanced Control Pedal Switch Assignment

The Advanced Control Pedal has four switches that you may assign specific functions to. Follow these steps to assign functions to your foot pedal's switches.

1. On the main screen, press Configuration.
2. On the **Configuration** dialog box, press **Surgeons and Programs**.
3. On the main configuration screen, press **Foot Pedal**.
4. The system displays the foot pedal thresholds page. Press **Configuration**.
5. The system displays the **Summary** tab on the foot pedal configuration page. Each surgical type has individual settings for the foot pedal switches. For purposes of this example, we will discuss configuring the switches for phaco.
6. Press the **Phaco** tab. The system displays the foot pedal phaco configuration page.

Figure 3.27 – Advanced Control Pedal Phaco Switch Assignment



7. This page displays the settings for the pedal linear motion and each of the four switches. You may change the settings for the switches by pressing the green area that represents that switch.

8. Press one of the green areas, the system displays a **Switch Assignment** dialog box with the text of the current switch assignment shown in green. Press the button that represents your choice of switch setting.

Figure 3.28 – Advanced Control Pedal Switch Assignment Dialog Box

You may choose from:

Off	The switch does nothing when pressed.
Surgeon Program Up	
Surgeon Program Down	
Previous Major Mode	
Next Major Mode	
Previous Active Mode	
Next Active Mode	
Previous Sub Mode	
Next Sub Mode	
Toggle SMC Record	Toggles the state of surgical media center (SMC) recording.
Bottle Up	
Bottle Down	
Reflux	
Continuous Irrigation	Toggles the state of continuous irrigation flow.
1-Touch Up	
1-Touch Down	
Toggle CASE	Toggles the state of CASE mode.

WhiteStar Increment	
WhiteStar Decrement	
Vacuum Boost	
Power Boost	
ASP + VAC	
Phaco	

Note The shaded lines in the table above are only displayed when assigning functions to the left and right yaw switches.

9. Press the **Finished** button to accept your choice of switch assignment, close the **Switch Assignment** dialog box and return to the settings page. Repeat the process as desired for all switches.

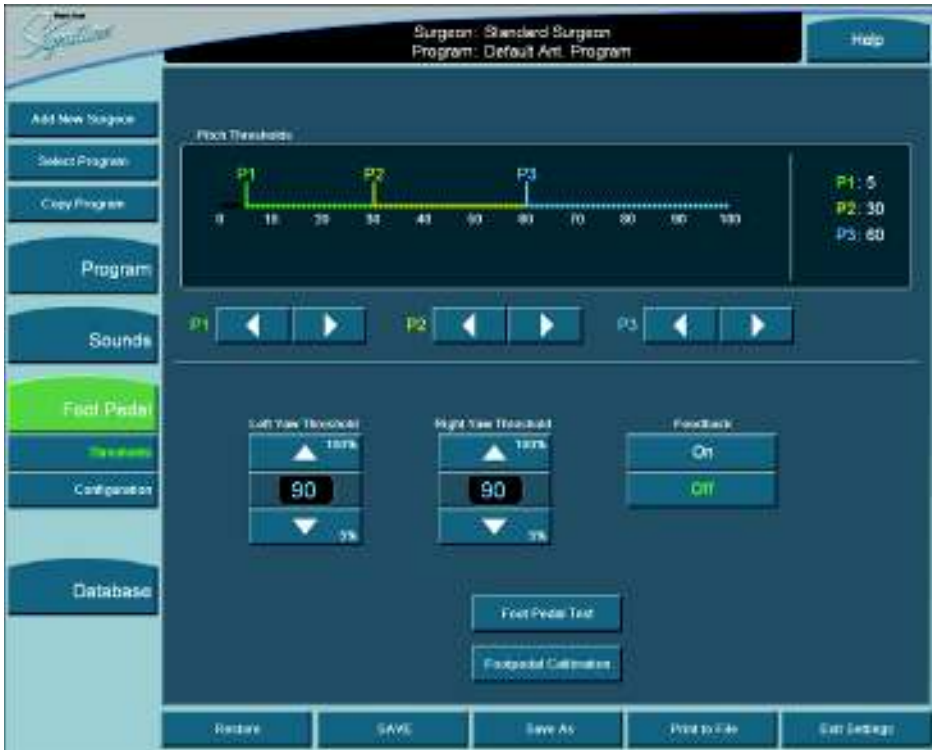
10. Press the Finished button to return to the foot pedal phaco configuration page.

Advanced Control Pedal Threshold Configuration

Follow these steps to configure the thresholds for the foot pedal.

1. Press the **Thresholds** button under **Foot Pedal**. The system displays the foot pedal thresholds page.

Figure 3.29 – Advanced Control Pedal Thresholds



2. Use the arrow buttons to set the threshold for position 1, 2, or 3. The system announces the current value.

3. Use the arrow buttons to set the threshold for the left and right yaw controls.

4. Feedback is a physical and audible click as you move the foot pedal to the next or previous position. Press the On button under Feedback to enable foot pedal feedback. Your foot pedal is now ready for calibration.

Advanced Control Pedal Calibration and Testing

Follow these steps to calibrate your foot pedal.

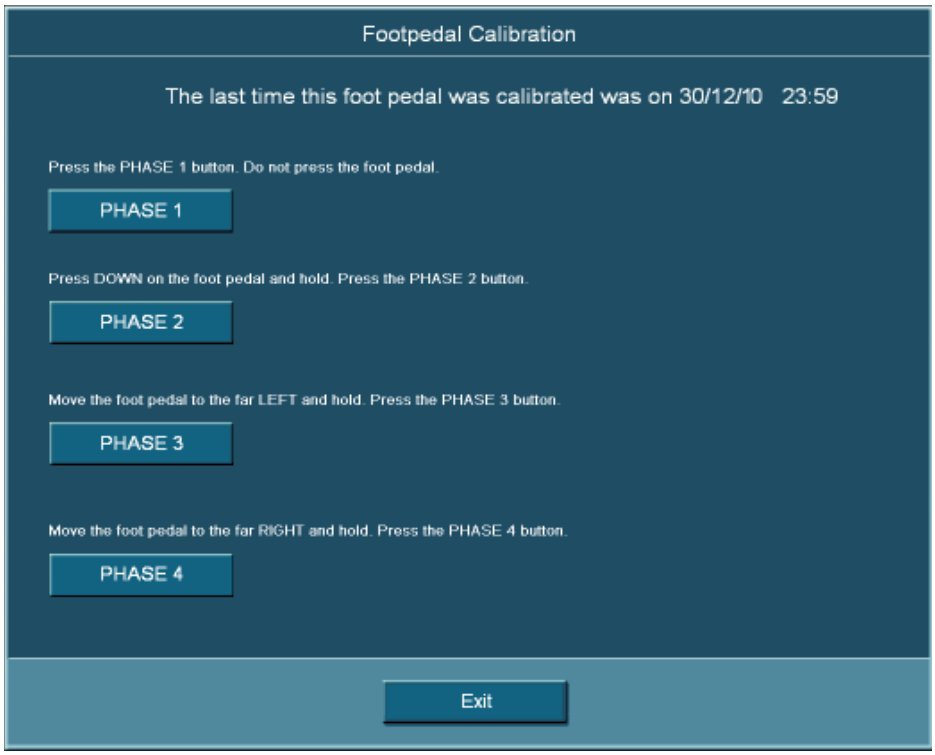
1. On the main screen, press Configuration.

2. On the **Configuration** dialog box, press **Surgeons and Programs**.

3. On the main configuration screen, press **Foot Pedal**.

4. The system displays the foot pedal thresholds page. Press the **Foot Pedal Calibration** button.

Figure 3.30 – Advanced Control Pedal Calibration



5. With your foot off the foot pedal, press the Phase 1 button.

6. Put your foot on the foot pedal, press and hold the foot pedal all the way down and press the Phase 2 button.

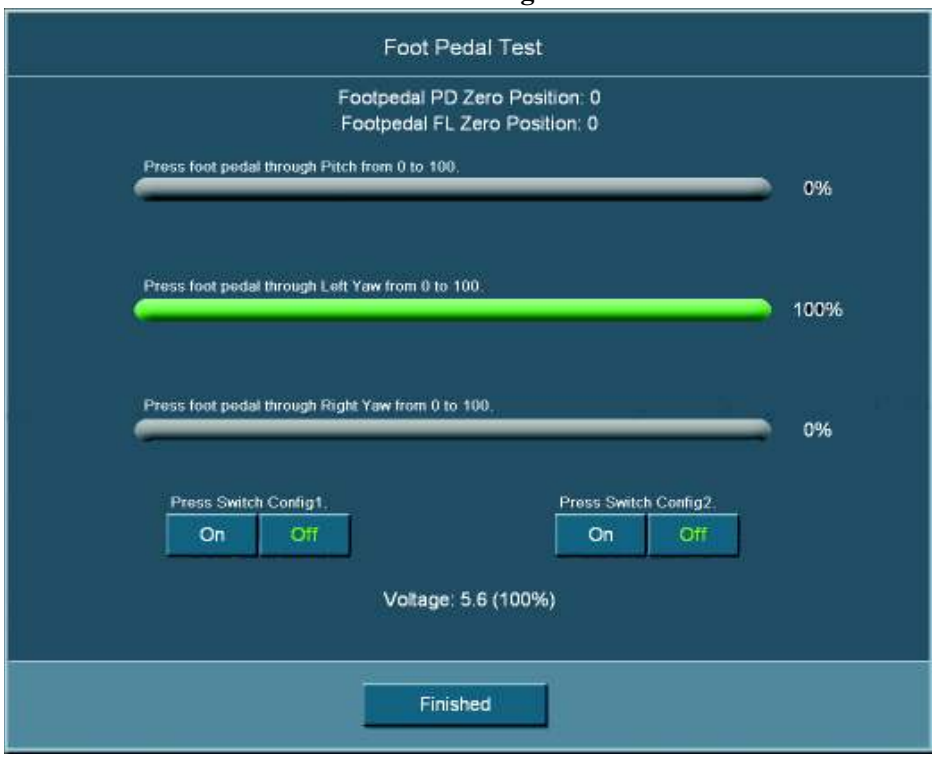
7. Move the pedal to the far left and press the Phase 3 button.

8. Move the pedal to the far right and press the Phase 4 button.

9. Press the **Exit** button.

10. The system automatically displays the **Foot Pedal Test** screen.
11. Press the foot pedal down fully to position 3. As the foot pedal travels through positions 1 and 2 to position 3, the progress bar shows its current state. When the pedal reaches position 3, the progress bar should be solid green.
12. Press each of the four switches. When a switch is pressed, the **On** button for that switch turns green and its **Off** button turns white. When you release the switch, the **On** button for that switch turns white and its **Off** button turns green.
13. When you've completed testing of your foot switch, press the **Finished** button.

Figure 3.31 – Advanced Control Pedal Testing

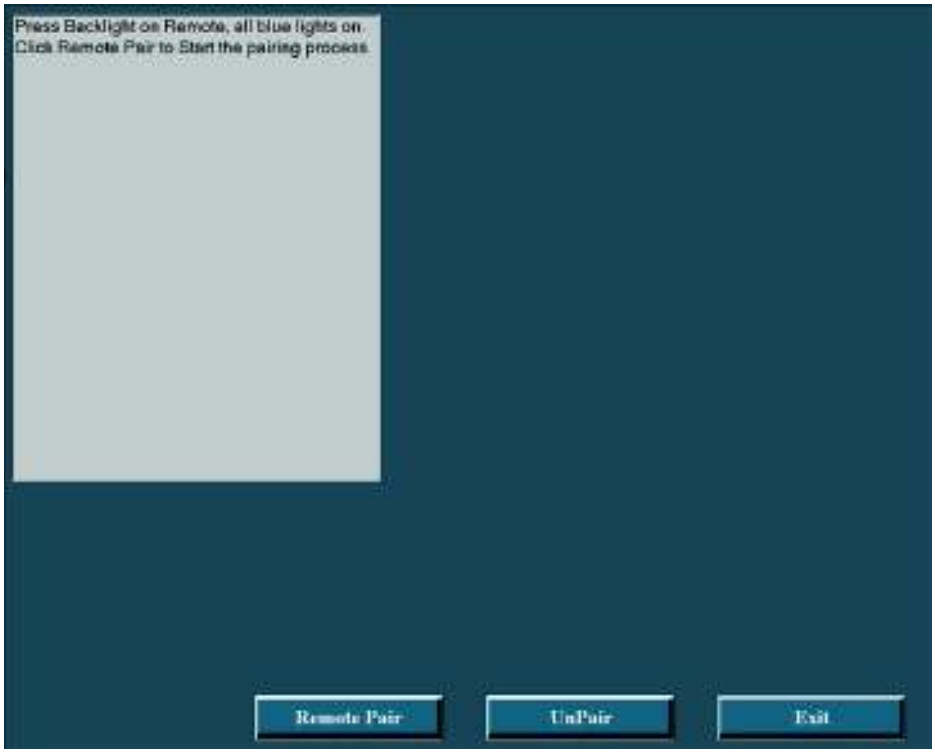


Wireless Remote Control Setup and Testing

Note: Make sure that the Backlight feature for the wireless remote control is off before you start the wireless setup process.

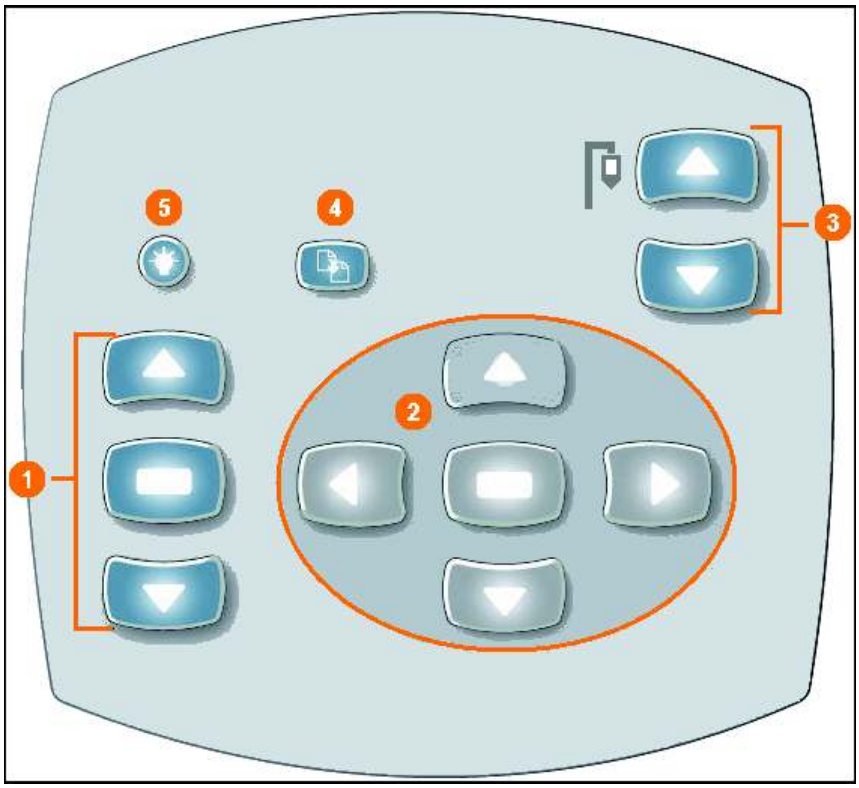
1. On the main screen, press **Configuration.**
2. On the **Configuration** dialog box, press System Configuration.
3. Press **Wireless Setup**.
4. Select **Remote Control**.
5. Press **Remote Pair**.

Figure 3.32 – Wireless Remote Pair Screen



6. Follow the messages shown on the screen.
7. Press the corresponding buttons on the wireless remote control as prompted. If remote pairing fails, follow the instructions on the screen.

Figure 3.33 – Wireless Remote



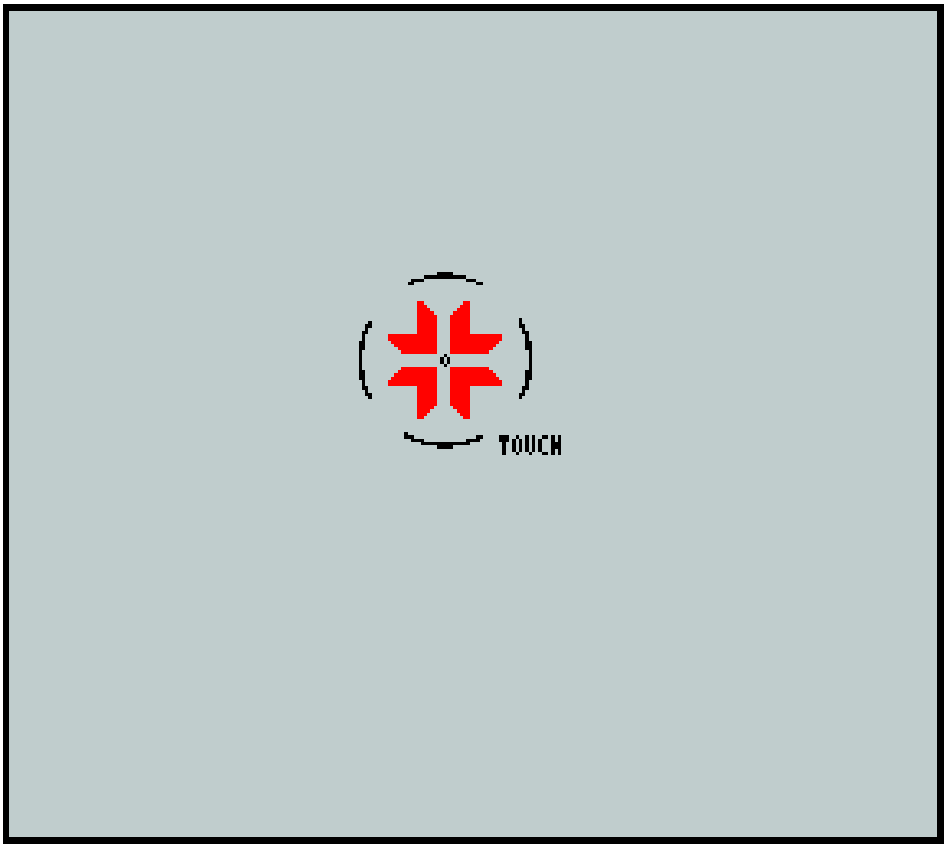
8. Follow the messages shown on the screen.
   - Press the buttons on the wireless remote control.
   - Verify for each button that the corresponding button on the screen lights. If the button does not light on the screen, the test fails. If the test fails contact **AMO** for technical service.
9. Press **Exit** to close the window.

Calibrate Touch Screen

You must calibrate the system touch screen as part of the system setup. Follow these steps to calibrate the touch screen.

1. On the main screen, press **Configuration.**
2. On the **Configuration** dialog box, press System Configuration.
3. Press **Calibrate Touch Screen**.Press the center of the target circle until the **Touch** message changes to **Release**.

Figure 3.34 – Touch Screen Target Circle

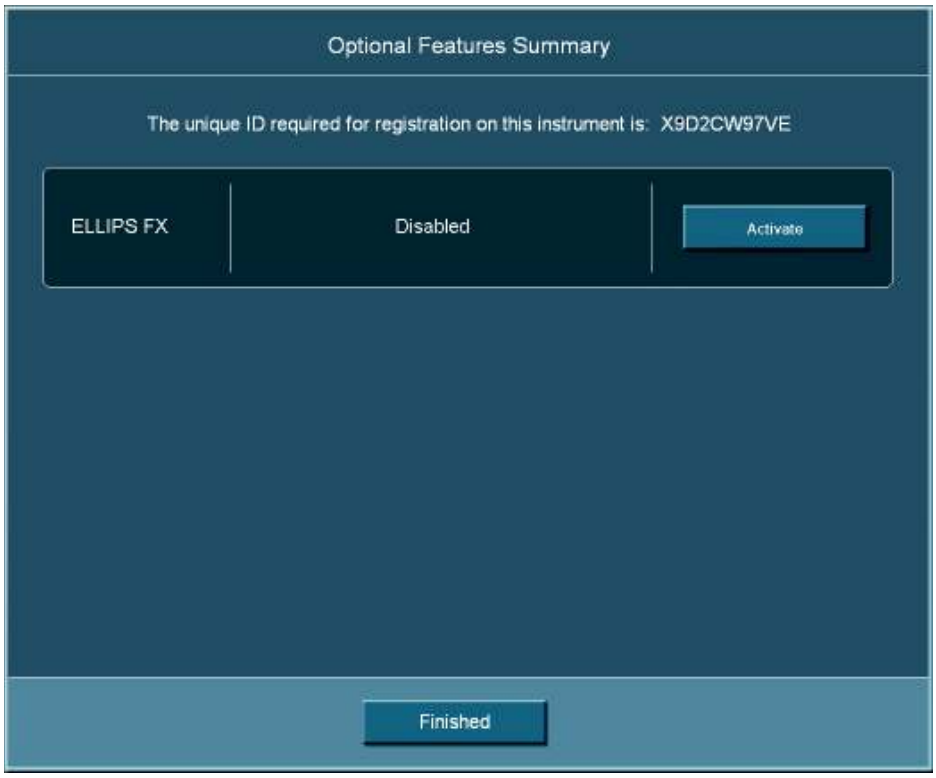


4. When released, the circle moves to the next calibration point.
5. Repeat Step 3 for all the calibration points.
6. Press **Accept** at the completion of the calibration process.

Feature Installation

1. Follow these steps to install a new feature:
2. Press Configuration.
3. Press System Configuration.
4. Press Feature Installation.
5. Press Activate.

Figure 3.35 – Feature Activation



6. Enter the feature activation key string.

Figure 3.36 – Feature Activation Key String

7. Press Enter.
8. Press Finished.
9. Press Exit Settings.

Pre-Operative Sterilization

Prior to each surgical case, sterilize the **WHITESTAR SIGNATURE** System instruments identified in Chapter 9, “Care and Cleaning” Instrument Sterilization Procedures. The recommended sterilization techniques, times and temperatures are given in Chapter 9, “Care and Cleaning”. AMO recommends that you follow the sterilization guidelines to maximize the life of your **WHITESTAR SIGNATURE** System instruments.

Surgical Media Center (SMC) (Optional)

The Surgical Media Center (SMC) is used to integrate and record the videoimage from the surgical microscope and the surgicaloperating data to be viewed at a later date and time. The surgery is displayed on a separate monitor with the instrument settings. The SMC hardware is connected to your **WHITESTAR SIGNATURE** System Communications port on the rear panel. (See Figure 3.1 Rear Panel Connections.)

Note: If you select Configuration during surgery, the Program Settings screen opens directly. The Configuration dialog box only shows when you are not in a case. If you need to access the System Configuration screens, you must select End Case, Next Case and then select the Configuration button.

1. To configure the Surgical Media Center, press:
   - Configuration
   - System Configuration
   - SMC

Figure 3.37 – Surgical Media Center Dialog Box

2. The system displays an SMC dialog box. Press the appropriate button to choose one of the three options then press the **Finished** button to accept the change and close the SMC dialog box. You may choose from:
   - **Off** - The surgical media center function is disabled.
   - **On** - The surgical media center function records continuously, even between cases.
   - **Automatic** - The surgical media center function records only during cases, not between them.

   Note: A foot pedal switch can be set up to activate the surgical media center record function.

System Check-out

The purpose of the check-out procedure is to verify that installation of the system is complete and the system is operating properly. You must perform the check-out procedure prior to the first case of the day and any time you changed program settings, as outlined in the following steps. You test the IA mode and handpiece, then the phaco mode and handpiece, so that the phaco handpiece (used first) is ready for surgery.

If any of the check-out steps fail, you must repeat the steps. 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.

Setup 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.

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 foot pedal 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 foot pedal 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.
12. Phacoemulsification check-out is complete.

Irrigation and Aspiration

13. Connect the tubing to the IA handpiece.
14. Select **IA** mode.
15. Hold the test chamber near the handpiece tip, press and hold the foot pedal in Position 1.
16. Observe the irrigation flow.

Diathermy

CAUTION: IF YOU DO NOT HEAR A TONE WHEN YOU PRESS THE FOOTPEDAL 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 foot pedal. You should hear a tone when you press the foot pedal.

Vitrectomy

1. Attach the irrigation tubing and aspiration tubing of the pack together.
2. Press **Prime** on the **Prime/Tune** screen.
3. Press the **VIT** button to access the **VIT** mode.
4. Follow the instructions on the screen.
5. Observe that the:
6. irrigation fluid flows
7. aspiration tubing is full and clear of air
8. the vitrectomy cutter motor activates (slight sense of motion of the handpiece)
9. cutter blade operates
10. Press **Start Vit Prime**. The screen closes automatically after the handpiece primes.

Vitrectomy check-out is complete.

System Shutdown

The following is a general overview of the steps to be taken to shut the system down after surgery:

1. Select **End Case**.
2. Select **Shutdown**. At the prompt, select **Yes**.
3. Wait for shutdown sequence to complete.
4. Turn the system off at the back of the console.
5. Unplug the power cord from the power outlet.
6. Wrap the excess power cord neatly around the cord wrap on the back of the console.
7. Place the foot pedal in the chargingcradle on the console to charge. The foot pedal batteries are charged from the system battery while the foot pedal is stored in the charging cradle.
8. Place the wireless remote control in the charging cradle on top of the console to charge. The wireless remote control batteries are charged from the system battery while the wireless remote control is stored in the charging cradle.
9. Refer to Chapter 9, “Care and Cleaning”, Cleaning Procedures for additional information.

4 EQUIPMENT OPERATION

Display Screens and Controls

Language Selection

Startup

Select Program and Install the FUSION Tubing Pack

Prime/Tune

Verify Irrigation/Aspiration Balance

Priming for Vitrectomy

Selecting and Changing Mode Parameters

Display Screens and Controls

The design of the touch screen gives you visual indication of the status for the control systems at all times. When you select a mode (DIA, Phaco, IA, or VIT), the you see current settings on the screen. As you make adjustments to the settings, the screen shows the changes. The screens and controls are shown below.

Each Anterior segment surgery mode and submode has its own distinct screen setup:

- Irrigation/Aspiration
- Phaco without occlusion mode
- Phaco with occlusion mode and/or CASE (**FUSION** MODE)
- Phaco with **ELLIPS** technology
- Vitrectomy
- Diathermy

Figure 4.1 – Phaco Screen

Additionally, there are screens or sub-screens for:

- Prime/Tune
- End Case
- Program
- Sounds
- Foot pedal

- Database
- Diagnostics

Language Selection

The **WHITESTAR SIGNATURE** System features a 29-language user interface. Before you proceed, select one of the languages for your touch screen controls. (English is the default language).

Note: If you select Configuration during surgery, the Program Settings screen opens directly. The Configuration dialog box only shows when you are not in a case. If you need to access the System Configuration screens, you must select End Case, Next Case and then select the Configuration button.

1. To access the Select Language screen, from the main screen, select:
   - Configuration
   - System Configuration
   - Language
2. Select the desired language from the listing (for additional languages, press the **Next List** button).
3. Press **Yes** at the confirmation pop-up. The screen automatically changes to the selected language.
4. Press **Exit Settings** to proceed with the selected language.

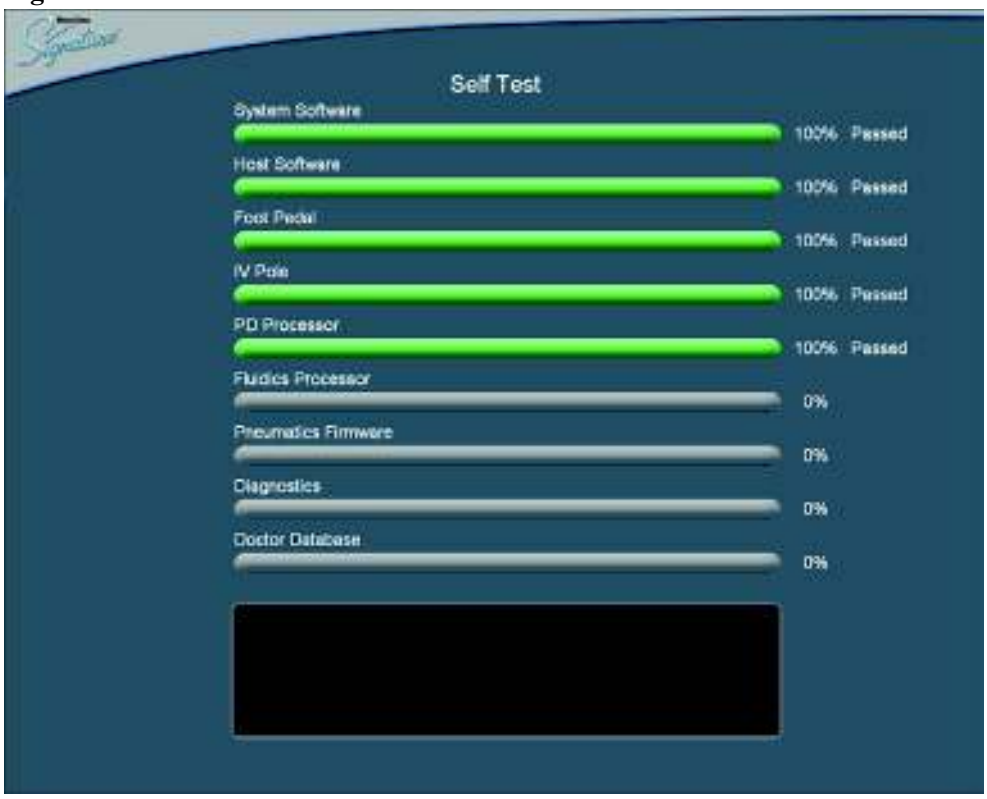
Figure 4.2 – Language Screen

Note: On any screen, if you press the screen about 25 times, the system changes to the default language (English). You must press the same spot on the screen.

Startup

After you have turned on the **WHITESTAR SIGNATURE** System, the system performs a series of self tests.

Figure 4.3 – Self Test



After start up, the screen shows the available surgeons and programs.

You can now select a surgeon and a program. A program (or surgeon name) is a set of pre-established operating settings for each operating mode. The **WHITESTAR SIGNATURE** System allows you program up to a maximum of 50 surgeon names, and 20 customized surgeon setups (programs) for each surgeon.

Figure 4.4 – Select Surgeon Screen

If Standard Surgeon is the only surgeon, you do not see this screen, and the system proceeds immediately to the tubing pack installation screen.

From the Main Menu you can:

- Select a **Surgeon/Program** and begin surgery based on the values of that program
- Access the **Settings** (Configuration) page, where you can edit, add, or delete programs and setup operating parameters
- Access the **End Case** screen (refer to Chapter 5, Anterior Segment Surgery Operating Modes, End Case).

Select Program and Install the FUSION Tubing Pack

After you select a surgeon, you must select a program from the surgeon's available programs. When you use the system for the first time, **Default Anterior Program** is the only program that appears on the screen. The first program you create uses the **Default Anterior Program** settings as a starting point. You can modify the settings and save it as a specific program name or surgeon name. The system does not let you overwrite the **Default Anterior Program** when you press **SAVE**.

If a surgeon only has one program set up, you do not see this screen, and the system proceeds immediately to the tubing pack installation screen for the type of program for that surgeon. The system automatically recognizes the type of the installed tubing pack.

Note: An asterisk next to a program name indicates that the surgeon has selected that program as their default program.

Figure 4.5 – Select Program Screen

Figure 4.6 – Install Pack Screen

Prime/Tune

You must prime/tune:

- before each procedure

- anytime you reconnect the handpiece
- after you have inserted or replaced a tubing pack

The prime/tune process fills the IA tubing with fluid, performs a vacuum check, and tests and characterizes the phaco handpiece. You must prime and tune:

You can select **Continuous Irrigation** to allow fluid to free flow from the bottle to collect fluid.

Note: Before you prime and tune, use the cup fill feature to fill cups. Use the **up** and **down** arrows to set the amount needed, either 30, 60 or 90 cc, to fill the cup and then press **Start**. Cup fill stops when the system dispenses the selected amount or you press **Stop**. The system saves your cup fill settings. You can still use continuous irrigation to fill cups.

The design of IA Prime allows for a procedure that does not require a phaco handpiece. The design of tune allows for a quick tune of the phaco handpiece with an IA tubing set. You can use tune if you replace a phaco tip during a procedure.

You can shorten the overall prime sequence by selecting **Bypass** prime. You also reduce the time to prime the **WHITESTAR SIGNATURE** System. You can use **Bypass** if you used **Continuous Irrigation** or primed the I/A tubing.

If you do not properly prime the I/A tubing, errors can occur.

To access the prime/tune routines, press the **Prime/Tune** button. The console shows the Prime/Tune screen with all the prime and tune options.

Note: Prime/tune is a combination of tune followed by IA prime.

Figure 4.7 – Prime and Tune Screen

The **WHITESTAR SIGNATURE** System tracks the successful completion of the prime and tune cycles independently. If the system needs a retune (new tip, failed tune), you only need to select and run the tune.

CAUTION: DO NOT ACTIVATE THE PHACO HANDPIECE AND VITRECTOMY CUTTER WITH THE TIP IN THE AIR. EXPOSURE OF THE TIP TO AIR DRASTICALLY REDUCES THE USEFUL LIFE OF THE HANDPIECE. IF YOU INTRODUCE POWER TO THE PHACO HANDPIECE OR VITRECTOMY CUTTER, THE TIP MUST BE IN A TEST CHAMBER FILLED WITH BALANCED SALT SOLUTION, IN A CONTAINER OF BALANCED SALT SOLUTION, OR IN THE PATIENT'S EYE.

Suggestions for Priming the Handpieces

Always fill the test chamber completely prior to running the prime/tune cycle.

Do not lay the handpiece and the empty testchamber down and have the system fill the test chamber. When you lay down the handpiece, this allows air to collect in the test chamber and can produce an error. Point the tip of the handpiece up to reduce the amount of bubbles.

To collect the balanced salt solution:

1. Use the test chamber, a medicine cup, or similar container.
2. Use the **up** and **down** arrows to increase or decrease the amount of the fluid needed.
3. Press **Start** to turn on cup fill.
4. Use **Stop** to turn off cup fill. This stops the process before the system dispenses the requested amount of fluid.
5. Perform a full phaco prime/tune.

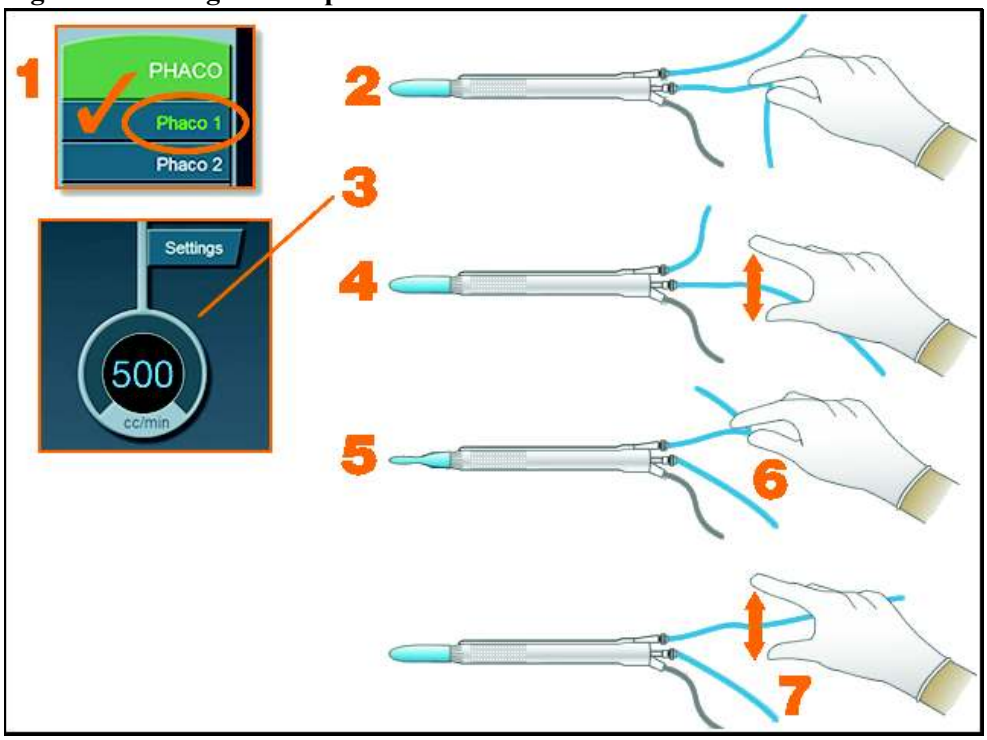
The **Prime/Tune** screen indicates the progress of the priming process.

1. Use the cup fill feature to fill the test chamber with fluid and to eliminate all air. Remember to remove the test chamber from the handpiece, if needed, before you start the cup fill process.
2. Place the test chamber over the handpiece tip and the sleeve hub.
3. Press the **Prime/Tune** button, this starts the prime and tune sequences.
   - To perform a prime only, press the **Prime** button.
   - To perform a tune only, press the **Tune** button.
4. Make sure that low ceilings do not block the movement of the IV pole.
5. Watch the fluid fill the drip chamber. The fluid moves toward the handpiece and fills the test chamber.
6. The touch screen indicates the progress of the prime and tune process.
7. As the tubing lines fill, the system software performs functional checks. The checks include:
   - Monitoring for the presence of irrigation flow (bottle height)
   - Leaks (via vacuum rise checks)
8. When you connect the phaco handpiece and you select **Prime/Tune** or **Tune**, the system automatically includes a handpiece tuning test concurrently with the prime cycle.
   - At the end of the priming sequence, the **WHITESTAR SIGNATURE** System makes an audible sound to indicate that Prime process is complete.
   - At the end of the phaco tuning test, the **WHITESTAR SIGNATURE** System makes an audible alert sound to indicate that tune process is complete.
9. To discontinue prime or tune during the process, select **Cancel**.
10. When prime and tune are complete, the system automatically proceeds to the preprogrammed submode or Phaco 1 operating mode. It is important that you verify the Irrigation/Aspiration balance prior to operating.

Verify Irrigation/ Aspiration Balance

We strongly recommend you verify that you balanced Irrigation/Aspiration properly for your settings used in surgery.

Figure 4.8 – Irrigation/Aspiration Balance Procedure



To verify irrigation/aspiration balance:

1. In Phaco 1 mode, hold the handpiece at the approximate patient eye level.
2. Occlude the aspiration line just below the handpiece, while you press and hold the foot pedal in position 2. Make sure the you connect the foot pedal. (Refer to Chapter 3, System Setup, Foot Pedal Setup.)
3. The actual vacuum level should rise to the preset level.
4. Release the aspiration line and then watch the test chamber to make sure that the test chamber does not collapse. A slight shallowing of the test chamber is normal.
5. If the test chamber collapses, raise the IV bottle height or lower the vacuum setting.
6. Pinch the irrigation tubing at the handpiece and watch for the test chamber to collapse.
7. Release the irrigation line and the test chamber should fill.
8. Press **Reset** in the upper left corner of the screen to open the **Reset Timers** dialog box. Press **Yes** to reset the timers. You are now ready to begin surgery.

Priming for Vitrectomy

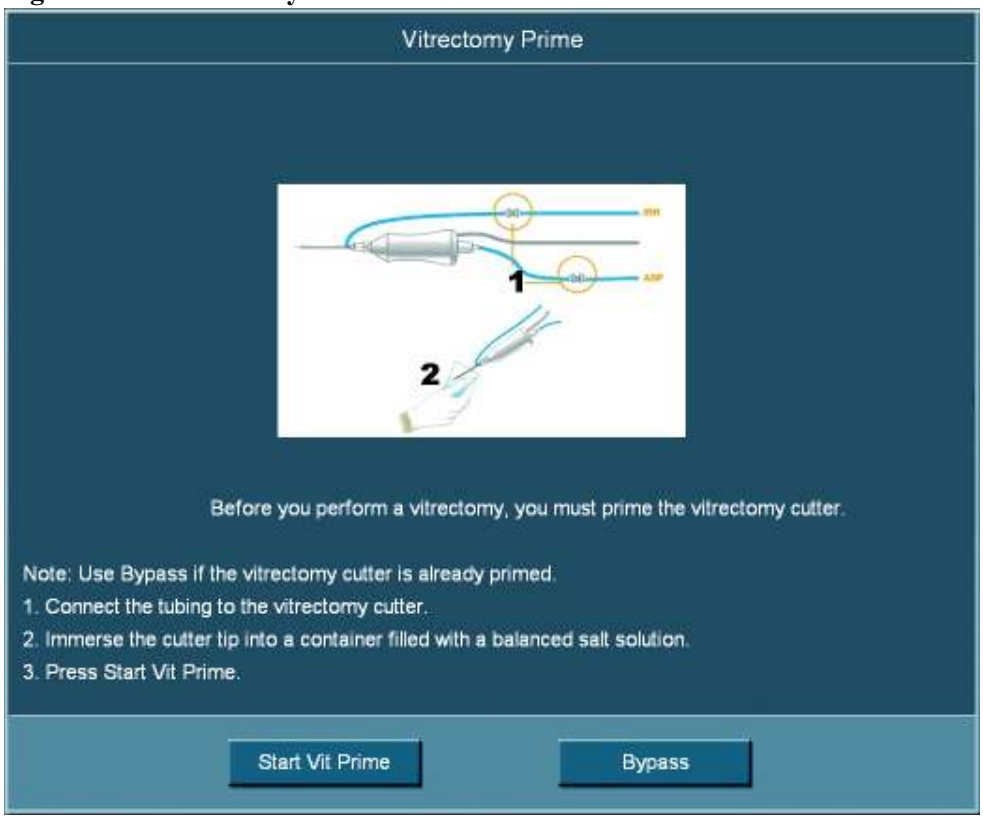
Before you perform vitrectomy, we recommend you prime the handpiece to reduce the chance of errors. Each time you select vitrectomy mode, a dialog box asks you to prime the vitrectomy handpiece. If you do not need to prime, press **Bypass**.

To prime the handpiece:

1. Attach the irrigation tubing and the aspiration tubing of the pack together.
2. Press **Prime** on the **Prime/Tune** screen.
3. Press the **VIT** button to access **VIT** mode.
4. Follow the instructions on the screen.
5. Press **Start Vit Prime**. The screen closes automatically after the system primes the handpiece.

Note: If you must perform vitrectomy in the middle of phaco surgery, perform steps 3 through 5.

Figure 4.9 – Vitrectomy Prime Procedure



Selecting and Changing Mode Parameters

The design of the system's graphical user interface (GUI) and touch screen is for ease-of-use, consistent look, and maximum informational display during all operating modes.

Your interface with the system requires only three basic steps, which apply to all the selections, settings and operations. Once you understand this basic organization, you can move quickly and easily through all the system functions and system operations.

Panels organize the text on the touch screen. The top panel shows current status, configuration options, the bottle height, and the foot pedal icon. The left-side column lists the operating modes and submodes. The main panel that dominates the screen shows current operating levels for aspiration, vacuum and power.

- To switch operating modes or submodes, press a button in the left panel. The control panels in the main panel show the operating levels for that mode.
- To make basic changes to the settings, press the **up** and **down** arrows to increase or decrease a value.

Note: Press on the number in the **Settings** control panel to open a numeric keypad and enter the required value. Press **Enter** to close the keypad window.

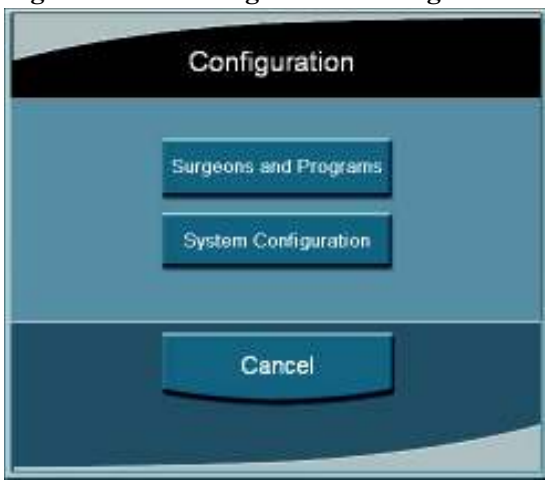
- To change other control panel settings, such as **Panel** or **Linear** power and nonzero start, press the **Settings** button on that control panel. A **Settings** window opens, and you can make your selections.

Figure 4.10 – Phaco Mode Screen

- To make overall changes to a program, press **Configuration** on the top panel.

Note: If you select Configuration during surgery, the Program Settings screen opens directly. The Configuration dialog box only shows when you are not in a case. If you need to access the System Configuration screens, you must select End Case, Next Case and then select the Configuration button.

Figure 4.11 – Configuration Dialog Box



- Press **Surgeons and Programs** to access surgeon names and their associated program setups.

Figure 4.12 – Phaco Submode Configuration Screen

5 ANTERIOR SEGMENT SURGERY OPERATING MODES

Operating Mode Descriptions

FUSION Fluidics Phaco

Programming the Modes and Settings

Surgical Mode– Recommended Settings

Occlusion Mode Phaco Settings

Passive Reflux

ELLIPS Technology

Operating Mode Descriptions

Diathermy

While the system is priming, you can select the diathermy (DIA) mode (a function which does not require irrigation and aspiration flow) and perform diathermy procedures. This process isreferred to as diathermy during prime.

Figure 5.1 – Diathermy Mode Screen

When you are in diathermy mode during prime, the screen indicates the Prime/ Tune status and any messages associated with the prime or tune.

The **WHITESTAR SIGNATURE** System provides power for bipolar coagulation or diathermy. The diathermy screen shows amount of diathermy power. Press the up or down arrows on the Power control panel to increase or decrease Panel power. If you selected the linear mode, the power is controlled withthe foot pedal up to the maximum preset value.

Note: Press on the number in the Settings control panel to open a numeric keypad and enter the required value. When you finish, press the Enter button.

Figure 5.2 – Prime/Tune in Diathermy Mode

Using Diathermy

To begin diathermy:

1. On the left panel press DIA.
2. Press the desired DIA submode button (DIA 1 is the default).

The elapsed diathermy time (DT) is in the upper left corner of the screen.

In the main panel, press the diathermy Power up or down arrows to increase or decrease the power. You can use the foot pedal to increase or decrease the linear power up to the maximum preset value.

To change the power delivery, press Settings. The Settings window opens. Set the power delivery to Panel, Linear, or Burst. Linear delivery is the default.

- **Panel** – Diathermy power delivered consistently at the power level (%) selected and indicated on the screen as Panel Maximum Power.
- **Linear** – Diathermy power delivered from 5% to the maximum selected value (Maximum Power) as you press the foot pedal.
- **Burst** – Diathermy delivered as a single 150 ms pulse, at the selected power, as you press the foot pedal.

Figure 5.3 – Diathermy Power Submode

To set the submode parameters:

1. Make the desired settings to the DIA 1 values
2. Press the **DIA 2** button to set the parameter values.
3. Change the parameter values for DIA 2.
4. After you set the submode (Program submode DIA 1, DIA 2) parameters, you can press another mode button in the left panel to program Phaco, IA, or VIT modes.
5. Press **End Case** in the top panel to access the **SAVE** buttons and save the submode settings.

Irrigation/Aspiration

Aspiration flow is necessary to remove the emulsified cataract material from the eye. An irrigation supply is necessary to replace fluid removed through aspiration of cortical material and fluid that leaked from the incision.

This fluid balance maintains the anterior chamber during surgery. Irrigation is controlled by gravity.

The height of the drip chamber (head pressure) determines the flow rate of irrigation solution through the irrigation sleeve on the phaco tip. The drip chamber hangs from the bottle on the Programmable IV Pole. **AMO** recommends that at the start of a procedure, locate the irrigation solution level in the drip chamber approximately 65–70 cm above the patient's eye level. To increase irrigation pressure, raise the IV bottle. To decrease irrigation pressure, lower the bottle.

The irrigation tubing runs through the tubing pack and irrigation is controlled by the foot pedal. When you press the foot pedal, the pinch valve opens and the irrigation fluid flows. Irrigation runs in foot pedal positions 1, 2, and 3.

To program IA submodes:

1. On the left panel, press IA.
2. Select the desired IA submode. IA 1 is the system default.
3. Press the up or down arrows in the control panels on the main panel to increase or decrease Aspiration Rate or Vacuum.

   Note: If the Venturi pump is **On**, you see only the vacuum settings. To turn the Venturi pump setting on, use the **IA Submode Configuration** screen.

   When the Venturi pump is **On**, the **Pump Ramp** button changes to **Vacuum Ramp**. Select **Vacuum Ramp** to adjust the fluidics vacuum delta time. The default setting is 5. Select **Finished** to close the pop-up.
4. Press the **Settings** button in the control panels on the main panel to change aspiration modeor vacuum mode.
5. If your system configuration has the nonzero start feature, use the up and down arrows to change the minimum parameters. (minimum vacuum is available only in Linear mode)

   Note: Nonzero start allows for greater control with the foot pedal.
6. Use the up or down arrow to change the Maximum parameters.

   Note: The maximum value can force the minimum value lower, but the minimum value cannot force the maximum value higher.

Figure 5.4 – Nonzero Start Settings

7. Press **Finished** to close the Settings window.
8. After you program all the submodes, select another mode.

9. If there are no other changes, press End Case to access the SAVE buttons and save the settings.

Figure 5.5 – Irrigation/Aspiration Mode

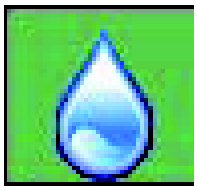
Continuous Irrigation

Continuous irrigation is designed for collection of balanced salt solution for use during the case. This function opens the irrigation valve for fluid collection independent of the foot pedal or prime cycle.

To activate continuous irrigation:

1. On the top right panel, press the **Continuous Irrigation** button. Once you select Continuous Irrigation the valve opens and starts the flow of irrigation fluid.

Figure 5.6 – Continuous Irrigation Button



2. Pressthe **Continuous Irrigation** button again to deactivate continuous irrigation.

Phacoemulsification

The purpose of phacoemulsification or phaco is to emulsify the lens material. The phacoemulsification (phaco) handpiece provides ultrasonic energy, irrigation, and aspiration simultaneously so that the handpiece can extract the emulsified lens material. The phacoemulsification handpiece has a hollow needle that vibrates longitudinally at an ultrasonic frequency or a blend of longitudinal and transversal vibration, if using the **ELLIPS FX** handpiece. The rapid movement of the needle and the resulting cavitational energy disintegrates the cataract on contact. The hollow needle (aspiration) uses suction to remove the debris. The resulting loss in volume of the anterior chamber is compensated by incoming balanced salt solution (irrigation).

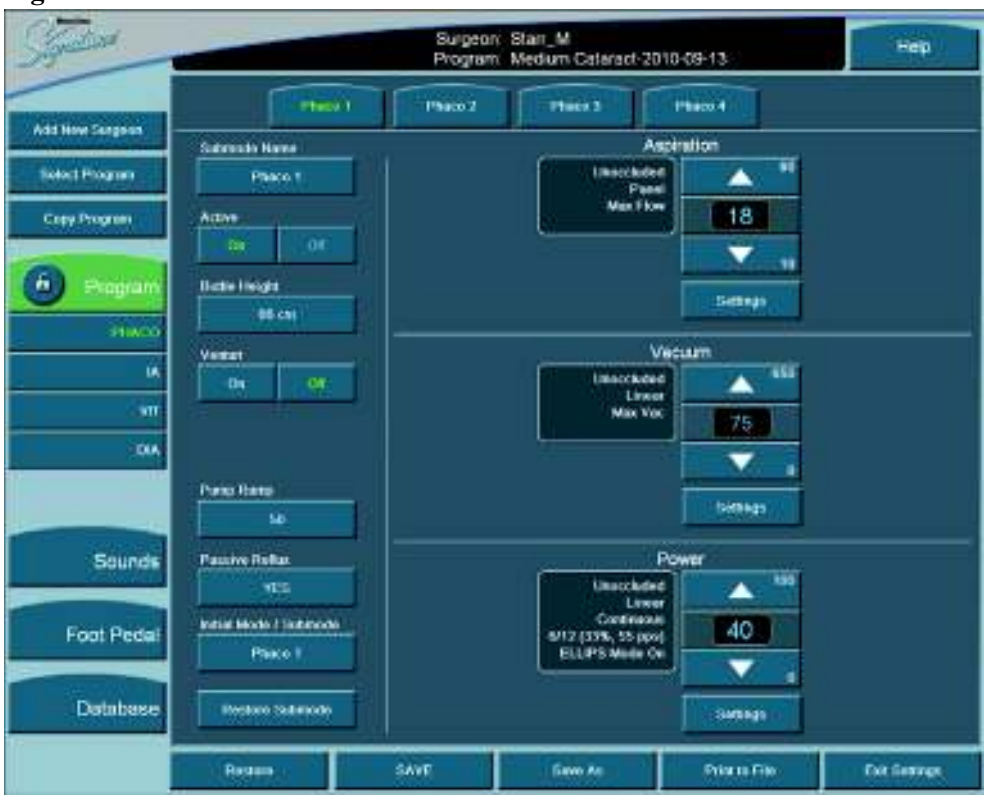
Phaco Submodes

There are four phaco submodes. Within each submode, there are programmable parameters for Unoccluded Phaco, Occluded Phaco, and CASE settings.

Phaco power is a combination of stroke length, frequency, and handpiece efficiency. A preset power setting of 30% using linear control allows you the ultimate control during phaco. Adjustments to phaco power depend on factors that include nuclear density, your preferences, and your experience.

Phacoemulsification mode lets you set four submodes with different settings. You can adjust the individual parameters of each submode.

Figure 5.7 – Phaco Submodes



For each phaco submode, you can change the following settings:

- Aspiration Rate
- Vacuum
- Power

Before phacoemulsification, you must complete the steps to verify the irrigation and aspiration balance, as recommended in the Irrigation/Aspiration section in this chapter.

Using Phaco

1. Press **PHACO**.
2. Press **Phaco 1**, **Phaco 2**, **Phaco 3**, or **Phaco 4** to select the submode. The main panel shows the settings for Aspiration, Vacuum, and Power. Each submode has different default settings.
3. Press the foot pedal to activate phacoemulsification. The Aspiration, Vacuum, and Power control panels indicate the associated levels throughout the procedure. The foot pedal icon in the upper right corner of the screen shows the position of the foot pedal.

How to Program Phaco

1. Press **PHACO**
2. Press the desired submode button. Phaco 1 is the system default.

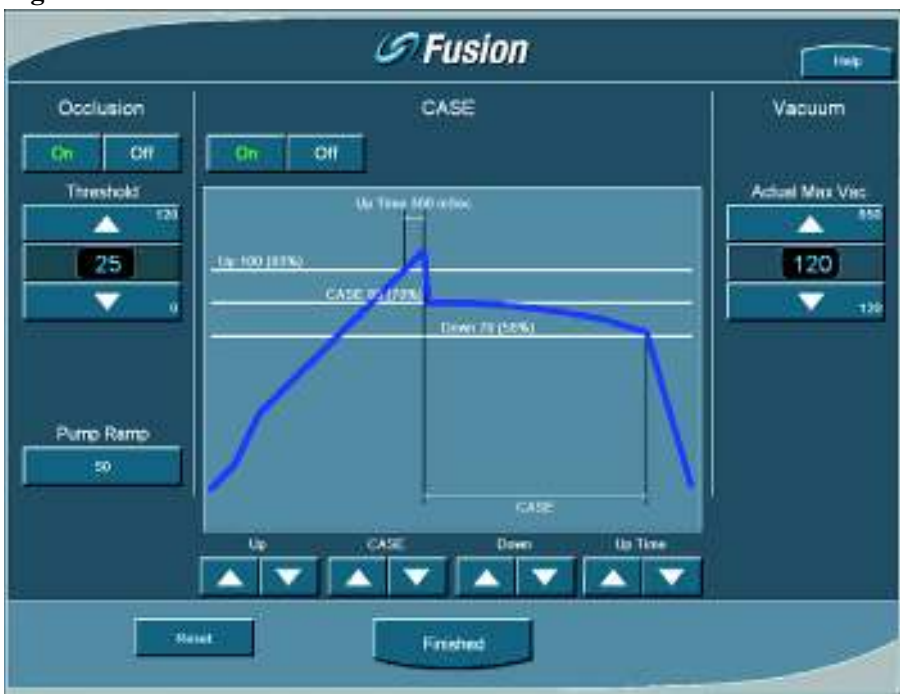
   Note: You can set your initial mode/submode on the **Phaco Configuration** screen. The initial mode/submode is then your default setting. (Refer to Programming the Modes and Settings, in this chapter.)
3. In the control panels in the main panel, press the up or down arrows to increase or decrease Aspiration Rate, Vacuum, or Power.

   Note: If the Venturi pump is **On**, you see the Vacuum Settings and Power Settings. To turn the Venturi pump setting on, use the **Phaco Submode Configuration** screen.
   When the Venturi pump is **On**, the **Pump Ramp** button changes to **Vacuum Ramp**. Select **Vacuum Ramp** to adjust the fluidics vacuum delta time. The default setting is 5. Select **Finished** to close the pop-up.Press the Settings button in the control panels on the main panel to change Aspiration Mode, Vacuum Mode, or Power settings.
4. If your system configuration has the nonzero start feature, use the up and down arrows to change the minimum parameters. (minimum vacuum is available only in linear mode)

   Note: Nonzero start allows for greater control with the foot pedal.
5. Use the **up** or **down** arrow to change the maximum parameters.

   Note: The maximum value can force the minimum value lower, but the minimum value cannot force the maximum value higher.
6. Press **Finished** to close the Settings window.
7. Repeat for each submode you want to program.
8. If occlusion mode phaco or CASE is desired, press  in the left column to activate the **FUSION** Mode screen. When occlusion mode phaco is active, the On button is green.

Figure 5.8 – Fusion Fluidics Screen



If you use CASE or occlusion mode phaco, you can set different values for both Occlusion Threshold and Max Vacuum. Refer to FUSION Fluidics Phaco for programming CASE and occlusion mode phaco modes.

After all four phaco submodes are programmed; press a mode button to select another mode.

If no other changes are needed press **End Case** to access the **SAVE** buttons and save the settings.

WHITESTAR Technology

The **WHITESTAR** Technology can be applied in any phaco power delivery mode. This technology is an advanced phacoemulsification power mode that delivers finely modulated pulses of energy interrupted by extremely brief cooling periods. This technology is available in Linear or Panel mode. When the **WHITESTAR** delivery mode is turned on, either  or  appears on the touch screen, along with the **WHITESTAR** Duty Cycle.

WHITESTAR Duty cycles are expressed as pulse time on/pulse time off, to achieve a desired duty cycle. For example, the duty cycle setting 6/12 means that the pulse time on is 6 ms, and the pulse time off is 12 ms, resulting in a 33% duty cycle.

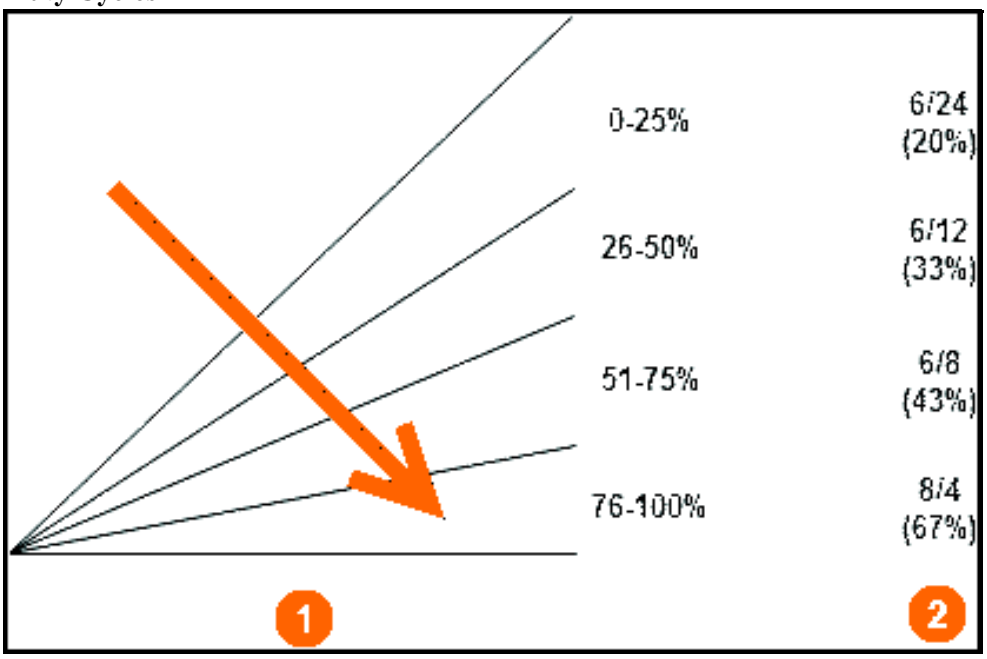
Table 5.1 – WHITESTAR Technology Parameter Settings

Setting	Pulse On Time (ms)	Pulse Off Time (ms)	Duty Cycle	Pulse Rate (pps)
6/12	6	12	33%	55
4/8	4	8	33%	83
6/4	6	4	60%	100
6/8	6	8	43%	71
8/4	8	4	67%	83
4/24	4	24	14%	35
6/28	6	28	18%	29
6/24	6	24	20%	33
8/24	8	24	25%	31
6/18	6	18	25%	41

Figure 5.9 – Duty Cycle

When the Variable **WHITESTAR** Technology is used, different duty cycles are applied as the foot pedal moves through the power delivery zone. The zone is divided into four equal size quadrants, and a different duty cycle can be applied in each quadrant.

Figure 5.10 – Variable WHITESTAR Technology Foot Pedal Positions and Duty Cycles



1. Foot Pedal Position 3
2. WHITESTAR Duty Cycle

The **WHITESTAR SIGNATURE** System maintains duty cycles to be used with Variable **WHITESTAR** . Variable WS contains the four duty cycles that are used in the different quadrants. You can also use the sliding adjustments to create Custom **WHITESTAR** duty cycles for WS.

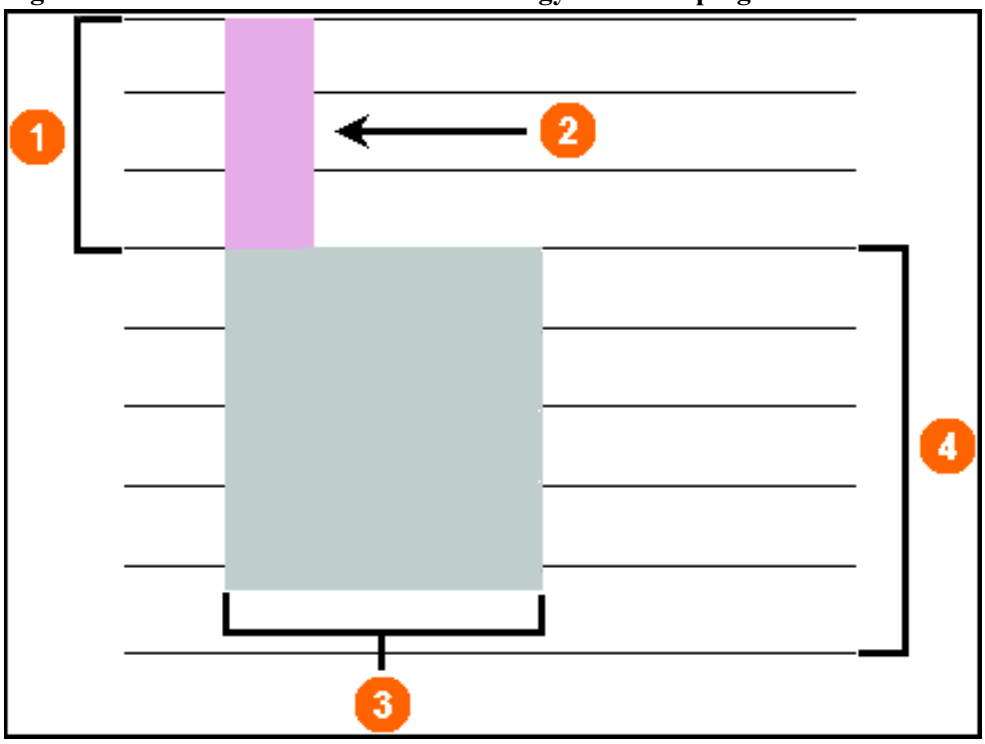
Figure 5.11 – Duty Cycles for Variable WS

WHITESTAR ICE Technology Pulse Shaping

The **WHITESTAR** ICE Technology was the next micro-pulse advance in phacoemulsification technology, which combined modulated ultrasonic power (pulse shaping) with vacuum control through the application of the Chamber Stabilization Environment (CASE).

This pulse shaping technology modified the standard “square” wave pulse, by increasing the amplitude of the first millisecond of the On Time “kick”, and then setting the remaining part of the On Time to the standard power setting. This is repeated for each On Time period, resulting in increased control and efficiency in phacoemulsification.

Figure 5.12 – WHITESTAR ICE Technology Pulse Shaping

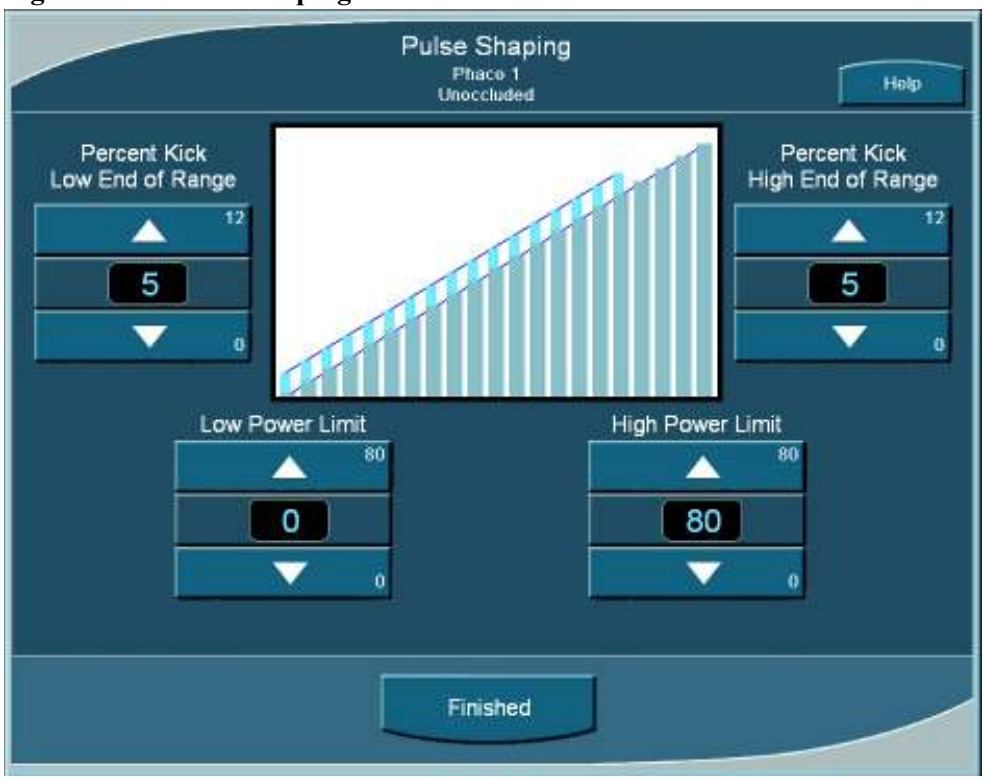


1. Kick Amplitude
2. 1 Millisecond Kick
3. Burst Width
4. Phaco Power Level

To access the **WHITESTAR** ICE Technology settings:

1. Press the **Power Settings** button.
2. Press the **WHITESTAR** mode button.
3. Press **On** for pulse shaping.
4. Press **Edit** to access the pulse shaping parameter settings.
5. Press **Finished** to close the screen. Continue to press **Finished** to return to the main screen.

Figure 5.13 – Pulse Shaping Screen



There are four settings for **WHITESTAR** ICE pulse shaping:

- Low Power Limit
- High Power Limit
- Percent Kick Low End of Range
- Percent Kick High End of Range

The **Low Power Limit** and **High Power Limit** settings define the range of the applied pulse shaping. When the applied phaco power is outside these limits, there is no pulse shaping.

The **Percent Kick** settings determine the amplitude, or amount of the applied phaco power "kick" in the first millisecond of phaco power, either in the low end or the high end of the power range. As the phaco power increases from the Low Power limit to the High Power Limit, the percentage of kick interpolates for the power ranges in between the two limits.

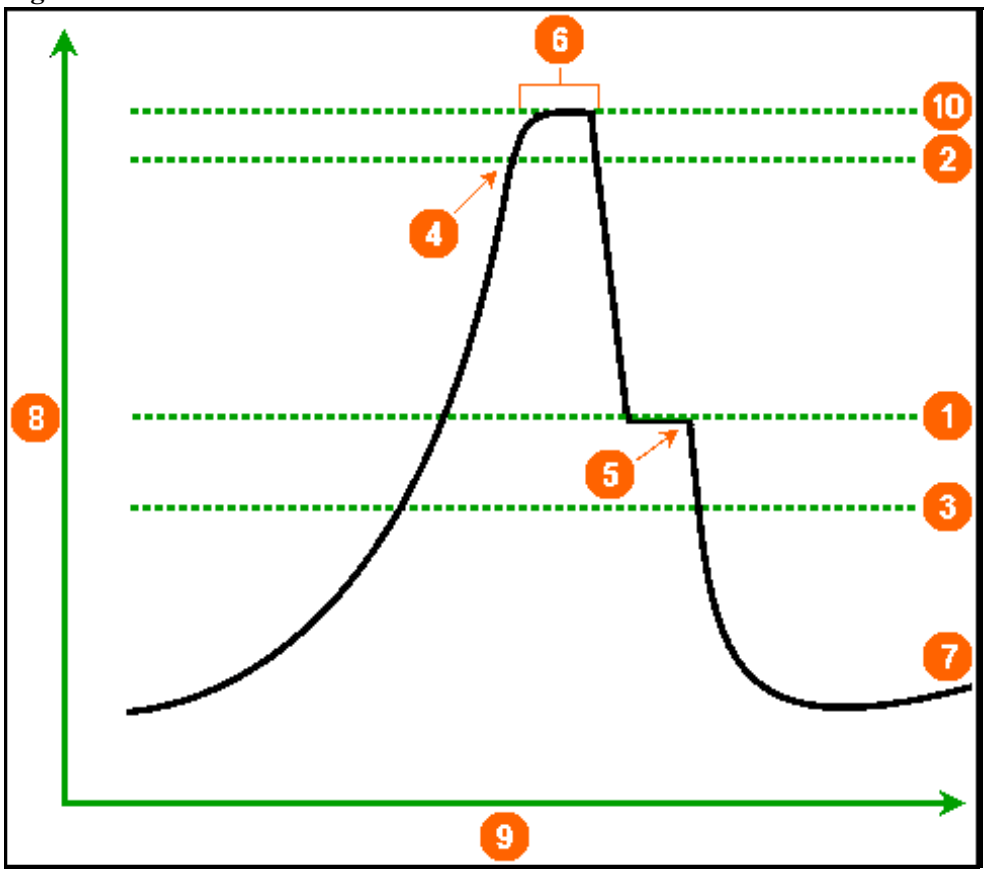
As an example, if you establish small kick setting for the low end of the range and establish a large kick setting for the high end of the range, the kick percentage gradually increases as the phaco power increases. When the percent kick at the low end is the same as the high end, then the kick remains constant throughout the low to high range.

FUSION Fluidics Phaco

FUSION Fluidics Phaco is an intelligent vacuum monitoring system that regulates the maximum allowable vacuum that follows an occlusion of the phaco tip. When the phaco tip becomes occluded, the vacuum rises. Clearing of the occlusion while the vacuum is at a high-level can cause a post-occlusion surge. With CASE enabled, the system monitors the actual vacuum levels and when the vacuum exceeds a specific threshold for a specified duration, the system automatically adjusts the maximum allowable vacuum setting to a lower predefined CASE maximum vacuum level. When the occlusion clears, the system automatically restores to the original programmed maximum vacuum setting. It is possible to have a different maximum vacuum setting when the needle occludes than when the needle is unoccluded.

You can program the power modulation of the phaco handpiece to automatically change when the phaco tip changes from an unoccluded condition to an occluded condition.

Figure 5.14 – FUSION Fluidics Phaco

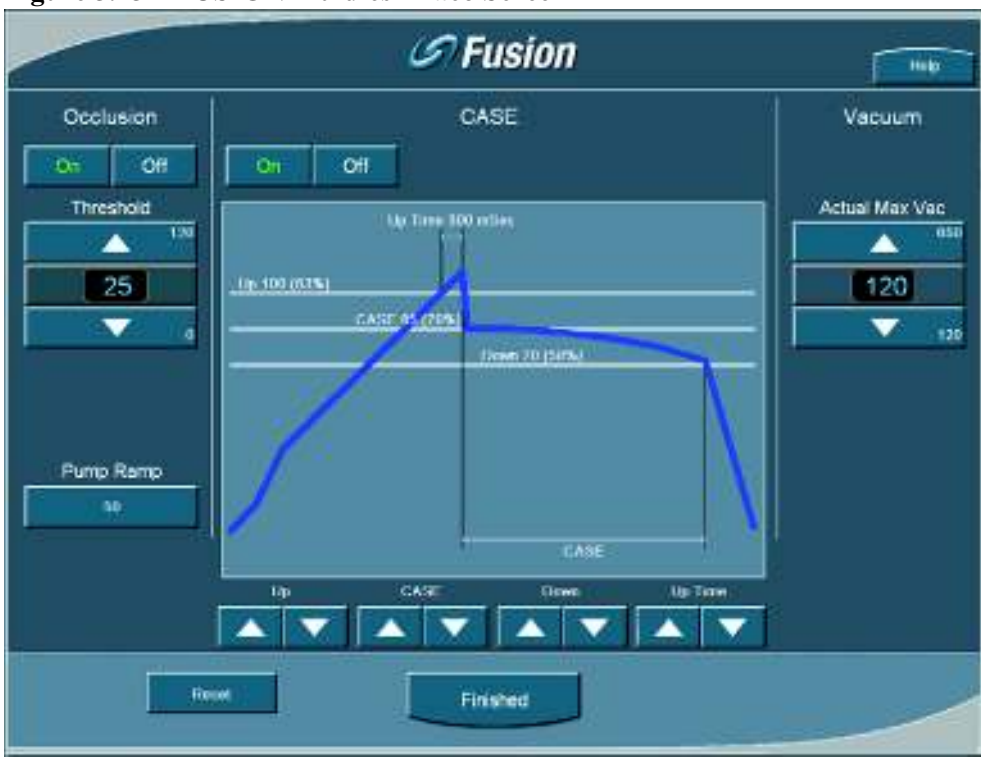


1. CASE Vacuum
2. Upper Threshold
3. Lower Threshold
4. Vacuum Level crosses Upper Threshold.
5. Phaco activated.
6. Up Time
7. Vacuum Level
8. Vacuum.
9. Time.
10. Max Vac

The CASE screen shows the settings as a graph. To access the occlusion mode phaco and CASE settings:

1. Press the button from the Phaco mode screen.

Figure 5.15 – FUSION Fluidics Phaco Screen



2. Press the On button to turn CASE mode on.

   Note: If the Venturi pump option is On, you cannot access the **FUSION** Fluidics screen. There is no occlusion mode phaco or CASE Mode with Venturi.

3. Use the up and down arrows at the bottom of the screen to adjust the:
   - **CASE Vacuum (CASE)** – This is the optimum occlusion vacuum setting
   - **Upper Threshold (Up)** – This is the maximum threshold vacuum setting. You define the amount for the Upper Threshold by the Up Time Threshold setting.
   - **Lower Threshold (Down)** – After the occlusion clears, the vacuum level drops to the lower vacuum threshold setting to allow the occlusion to safely clear, and then gradually returns to the previous levels.
4. Use the right and left arrows in the graphic to change the Up Time Threshold. The Up Time Threshold is the maximum time that the system maintains the maximum threshold vacuum.
5. Press **Finished** to close the screen

Use the **FUSION** Fluidics screen to turn occlusion mode phaco Off or On. When occlusion mode phaco is **On**, the main Phaco operating screen provides alternative Aspiration, Vacuum, and Phaco Power settings used when the system detects an occlusion.

Figure 5.16 – Phaco Screen

Vitrectomy

The **WHITESTAR SIGNATURE** System uses a pneumatic guillotine vitrectomy cutter. The handpieces are designed for cutting vitreous during anterior segment surgery and operate in conjunction with the Irrigation/Aspiration mode. You can change the cutting speed on the touch screen. There are four adjustments related to the Vitrectomy mode:

- Aspiration Rate
- Vacuum
- Cut Rate
- Foot Pedal

CAUTION: DO NOT ACTIVATE THE PHACO HANDPIECE AND VITRECTOMY CUTTER WITH THE TIPS IN THEAIR. EXPOSING THE TIP TO AIR DRASTICALLY REDUCES THE USEFUL LIFE OF THE HANDPIECE. WHEN YOU INTRODUCE POWER TO THE PHACO HANDPIECE OR VITRECTOMY CUTTER, THE TIPS MUST BE IN A TEST CHAMBER FILLED WITH A BALANCED SALT SOLUTION, IN A CONTAINER OF BALANCED SALT SOLUTION, OR IN THE PATIENT'S EYE

Using Vitrectomy

In the left panel, press **VIT 1** or **VIT 2** to select a submode. **VIT 1** is the default setting.

Note: Each time you select the vitrectomy mode there is a prompt for you to prime the vitrectomy handpiece.

Figure 5.17 – Vitrectomy Mode Screen

1. In the main panel, press the up or down arrows to increase or decrease the aspiration rate, vacuum, or cut rate.

   Note: If the Venturi pump is **On**, you see the vacuum settings and the cut rate settings. To turn the Venturi pump setting on, use the **Vitrectomy Submode Configuration** screen.
   When the Venturi pump is **On**, the **Pump Ramp** button changes to **Vacuum Ramp**. Select **Vacuum Ramp** to adjust the fluidics vacuum delta time. The default setting is 5. Select **Finished** to close the pop-up.

2. Press the **Settings** button in the control panels on the main panel to change aspiration mode, vacuum mode, or power settings.
3. If your system configuration has the nonzero start feature, use the **up** and **down** arrows to change the minimum parameters. (minimum vacuum is available only in linear mode)

   Note: Nonzero start allows for greater control with the foot pedal.

4. Use the **up** or **down** arrows to change the maximum parameters.

Note: The maximum value can force the minimum value lower, but the minimum value cannot force the maximum value higher.

5. Press **Finished** to close the Settings window.
6. To program the foot pedal, go to **Configuration**, **Surgeons and Programs**, **Foot Pedal**, **Configuration**, **VIT**.
7. Select a **Submode** to program.
8. Edit the foot pedal settings as needed.

Figure 5.18 – Standard Foot Pedal Settings Screen

Figure 5.19 – AdvancedControl Pedal Settings Screen

9. When finished, press **Exit Settings**.
10. If there are no other changes, press **End Case** to access the **SAVE** buttons and save the settings

Foot Pedal Vitrectomy Modes

You must make a the foot pedal selection for ICA, IAC, or Side vitrectomy (VIT), which determines how the vitrectomy cutter activates as you press the foot pedal from Positions 1 through 3. Use the left side switch to activate the cutter at the panel rate for Side VIT only.

Table 5.2 Vitrectomy Standard Foot Pedal Modes

Foot Pedal Positions	**Vitrectomy Foot Pedal Modes**		
	ICA	**IAC**	**Side VIT**
1	Irrigation	Irrigation	Irrigation
2	Irrigation/Cut	Irrigation/ Aspiration	Irrigation/ Aspiration
3	Irrigation/Cut/ Aspiration	Irrigation/ Aspiration/Cut	Irrigation/ Aspiration

Table 5.3 Vitrectomy Advanced Control Pedal Modes

Foot Pedal Positions	Vitrectomy Foot Pedal Modes		
	ICA	**IAC**	**Side VIT**
1	Irrigation	Irrigation	N/A
2	Irrigation/Cut	Irrigation/ Aspiration	N/A
Yaw	Aspiration	Cut	N/A

Programming the Modes and Settings

Program Configuration

The programmed settings allow for the selection of operational features and various options pertinent to general operation for each mode and submode, the foot pedal, system sounds, and the system database.

When you select the **Default Anterior Program**, all the modes and submodes have the system default settings. Although you can change these settings, you cannot save the new settings. Use the defaults as a source to your system settings. The Mode Configuration screens show all the default settings.

Figure 5.20 – PHACO Program Screen

Default Settings

Table 5.4 – WHITESTAR SIGNATURE System Default Settings

Specific to each surgeon program/setup		
Sounds	**Available Settings**	**Default Settings**
IV Pole Units	Inches, Centimeters	Inches
Phaco Tone Volume	5–10	Off
Tone Volume Level (All Other Functions)	5–10	6
Voice Volume Level (For All Functions)	5–10	6
Irrigation Tone	On, Off	On
High Vacuum	On, Off	On
Mode Change	Off, Tone, Voice	Voice On
Submode Change	Off, Tone, Voice	Voice On
Value Change	On, Off	Voice On
Activity Confirmation	On, Off	Voice On
Continuous Irrigation (When no modes selected)	On, Off	Off
Mode Select for Submodes	On, Off	On
Foot Pedal Feedback	On, Off	Off
Initial Mode	On, Off	Phaco (First enabled submode)
Vacuum	Off-10	6
Diathermy	5–10	6
Error	5–10	6
Irrigation	Off-10	3
Key Press	Off–10	6
Speech	Off–10	6
CASE Activation	0–10	5
Master Volume	0–10	5

Foot Pedal – Default Settings

The default foot pedal settings for each operating mode are on the system's Summary Screen.

Figure 5.21 – Standard Foot Pedal Summary Settings

Table 5.5 – Foot Pedal Threshold Default Settings

Foot Pedal Type	Parameter	Available Settings	Default Settings
Standard	Pitch Regions	1–100%	P1=5% P2=30% P3=60%
	Switch Position	Switch1= * Switch 2= *	Switch1=Off Switch 2=Off
		Right= * Left= *	Right=Off Left=Off
	Feedback	On, Off	Off
Advanced Control Pedal	Primary Yaw	*	Reflux
	Pitch Region	1-100%	P1=5% P2=30% P3=60%
	Yaw Position	5-100%	Left=95%

Foot Pedal Type	Parameter	Available Settings	Default Settings
			Right=95%
	Switch Position	Switch1= * Switch 2= *	Switch1=Off Switch 2=Off
	Yaw Threshold	5% - 100%	5%
	Feedback	On, Off	Off

*Switch Assignments

Surgeon Program Up	Surgeon Program Down	Previous Major Mode	Next Major Mode	Previous Active Mode
Next Active Mode	Previous Sub Mode	Next Sub Mode	Toggle SMC Record	Bottle Up
Bottle Down	Reflux	Continuous Irrigation	1-Touch Up (Phaco Only)	1-Touch Down (Phaco Only)
Toggle Case (Phaco Only)	Single Vit Cut (Vitrectomy Only)			

Table 5.6 – Diathermy – Default Settings

Parameter	Available Settings	Default Settings	
		DIA 1	DIA 2
Max Power	5–100%	30%	30%
Power Delivery Type	Linear, Burst, Panel	Linear	Burst

Table 5.7 – I/A – Default Settings

Parameter	Available Settings	Default Settings		
		IA1	IA2	IA3
Continuous Irrigation	On, Off	Off	Off	Off
Pump Selection	Venturi Peristaltic	Peristaltic	Peristaltic	Peristaltic
Bottle Height	0–104 cm 0–42 inches	76 cm 30 inches	50 cm 20 inches	50 cm 20 inches
Max Vacuum	0–650 mmHg	500 mmHg	500 mmHg	15 mmHg
Min Vacuum	0 mmHg	0 mmHg	0 mmHg	0 mmHg
Max Aspiration/ Mode (Peristaltic)	0–60 cc/min	26 cc/min Panel	26 cc/min Linear	6 cc/min Panel

Parameter	Available Settings	Default Settings		
Peristaltic Pump Ramp Threshold	10–100%	80%	80%	80%
Venturi Pump	On, Off	Off	Off	Off
Venturi Pump Ramp		5	5	5
Passive Reflux (**FUSION** Fluidics Pack)	Yes, No	Yes	Yes	Yes
Passive Reflux (**FUSION** Dual Pump Pack)	Yes, No	Yes	Yes	Yes
Fluidic Mode Type, Aspiration	Panel, Linear	Panel	Linear	Panel
Fluidic Mode Type, Vacuum	Panel, Linear	Linear	Panel	Linear

Table 5.8 – Phaco – Default Settings

Parameter	Available Settings	Default Settings			
Function		Phaco 1	Phaco 2	Phaco 3	Phaco 4
Submode Name		Phaco 1	Phaco 2	Phaco 3	Phaco 4
Continuous Irrigation	On, Off	Off	Off	Off	Off
Pump Selection	Venturi Peristaltic	Peristaltic	Peristaltic	Peristaltic	Peristaltic
Bottle Height	0–104cm 0–42 inches	66 cm 26 inches	76 cm 30 inches	76 cm 30 inches	76 cm 30 inches
Vacuum Control (Occlusion Mode/CASE Mode)	On, Off	Occlusion Mode Off CASE Off	Occlusion Mode On CASE Off	Occlusion Mode On CASE On	Occlusion Mode Off CASE On
Min Vacuum (Peristaltic & Venturi Pump)					

Parameter	Available Settings	Default Settings			
Unoccluded (mmHg)		0	0	0	0
Occluded		0 or 5 less than Occlusion Threshold Setting	0 or 5 less than Occlusion Threshold Setting	0 or 5 less than Occlusion Threshold Setting	0 or 5 less than Occlusion Threshold Setting
Max Vacuum (Peristaltic & Venturi)					
Unoccluded (mmHg)		75 mmHg (129 when CASE on)	300 mmHg	400 mmHg	350 mmHg
Occlusion Threshold		25 mmHg	140 mmHg	60 mmHg	80 mmHg
CASE Parameters					
CASE Upper Threshold (mmHg)		100	250	325	300
CASE Up Time (ms)		300	300	300	300
CASE Vacuum (mmHg)		85	225	250	250
CASE Lower Threshold (mmHg)		70	175	200	200
CASE one-touch		STD	STD	STD	STD
Peristaltic Pump Ramp Threshold (%)		50	60	50	70
Venturi Pump	On, Off	Off	Off	Off	Off
Min Flow/ Aspiration Rate (Peristaltic & Venturi)					
Unoccluded (mmHg)		10	10	10	10
Occluded		10	10	10	10
Max Flow/ Aspiration Rate (Peristaltic & Venturi)					
Unoccluded (mmHg)		18	24	18	24
Occluded		18	28	14	24
Fluidics Mode Type, Aspiration	Panel, Linear	Panel	Panel	Panel	Panel
Fluidics Mode Type, Vacuum	Panel, Linear	Linear	Panel	Linear	Linear

Parameter	Available Settings	Default Settings			
Min Power					
Unoccluded (%)		0	0	0	0
Occluded		N/A	N/A	N/A	N/A
Max Power					
Unoccluded (%)		40	20	5	30
Power Delivery		Continuous	Continuous	Continuous	Continuous
WHITESTAR Setting (Duty Cycle)		On 6/12 (33%)	On 6/12 (33%)	On 6/12 (33%)	On 6/12 (33%)
Occluded Mode (%)		40	30	10	40
Power Delivery		Continuous	Continuous	Continuous	Continuous
WHITESTAR Setting (Duty Cycle)		On 6/12 (33%)	On 6/12 (33%)	On 6/12 (33%)	On 6/12 (33%)
Power Type, Occluded & Unoccluded		Linear	Linear	Linear	Linear
Short Pulse Rate, Occluded & Unoccluded	1–14 pps	6 pps	6 pps	6 pps	6 pps
Long Pulse Rate, Occluded & Unoccluded	1–6 pps	4 pps	4 pps	4 pps	4 pps

Table 5.9 – Vitrectomy – Default Settings

Customized to Each Surgeon Program/Setup Default Settings			
Parameter	**Available Settings**	**VIT 1**	**VIT 2**
Bottle Height	0–104 cm 0–42 inches	30 cm 12 inches	30 cm 12 inches
Continuous Irrigation	On, Off	Off	Off
Pump Selection	Venturi Peristaltic	Peristaltic	Peristaltic
Min Vacuum (mmHg) (Peristaltic & Venturi)	0–650 mmHg Panel, Linear	0	0
Max Vacuum (mmHg) (Peristaltic & Venturi)	0–650 mmHg	225 mmHg	225 mmHg
Min Aspiration (cc/min) (Peristaltic Pump)	0–60 cc/min	0	0

Customized to Each Surgeon Program/Setup Default Settings			
Parameter	**Available Settings**	**VIT 1**	**VIT 2**
Max Aspiration (cc/min) (Peristaltic Pump)	0–60 cc/min	18 cc/min	12 cc/min
Fluidic Mode Type, Aspiration	Panel, Linear	Panel	Panel
Fluidic Mode Type, Vacuum	Panel, Linear	Panel	Panel
Cut Rate	50–2500 cpm	250 cpm	450 cpm
Cut Mode	ICA, IAC	ICA	IAC
Pump Ramp Threshold (%)	10 - 100%	100%	100%
Venturi Pump	On, Off	Off	Off
Passive Reflux (**FUSION** Fluidics Pack)	Yes, No	Yes	Yes

Aspiration Flow Rate

The aspiration flow rate is the speed the system removes material from the eye through the aspiration tubing. A pump provides the necessary aspiration flow to withdraw the fluid and the lens material from the eye chamber through the handpiece. With this aspiration flow system, the vacuum builds when material blocks or occludes the aspiration port. The vacuum reduces as the occlusion clears.

You can adjust the rate in 1 cc increments from 0 to 60 cc per minute. You can also choose panel or linear flow.

The flow rate decreases as the vacuum approaches maximum.

To adjust the flow rate:

1. On the **Aspiration Rate** control panel, press the **up** or **down** arrows to increase or decrease the aspiration rate from 0 to 60 cc per minute.
2. Press the **Settings** button to select **Linear** or **Panel** aspiration flow.

   The Settings panel appears.
3. Press the **Linear** or **Panel** button.

   The linear vacuum rate is linear with respect to the foot pedal position. As you press the foot pedal through Position 2, the vacuum level travels between 0 mmHg and the maximum preset level as occlusions at the aspiration port occur. The vacuum progress shown on the screen is the actual vacuum level.

   The panel vacuum rate provides a continuous evacuation at the established vacuum rate. The vacuum builds only when the foot pedal is in Position 2 and there is an occlusion in the aspiration port.
4. If your system configuration has the non-zero start feature, use the **up** or **down** arrows to change the Minimum Vacuum parameter. (Minimum Vacuum is available only in Linear mode)
5. Use the up or down arrow to change the Maximum Vacuum parameter.

   Note: Nonzero start allows for greater control with the foot pedal.
6. Press **Finished** to close the Settings window.

Vitrectomy Cutting Rates

Note: Each time you select the vitrectomy mode there is a prompt for you to prime the vitrectomy handpiece. Refer to Chapter 4, Equipment Operation, Priming for Vitrectomy for detailed information.

You can vary the rate of the vitrectomy cutter from 50-2500 CPM (cuts per minute) in increments of 50 CPM between 100–1000, and 100 CPM between 1000–2500 CPM.

Some surgeons prefer a higher rate, which allows the surgeon to perform the same amount of cutting with smaller “bites” of vitreous. This higher rate minimizes motion and is gentler on the tissue.

To adjust the cut rate

1. On the **Cut Rate** panel, press the **up** or **down** arrows to increase or decrease the cut rate.
2. Press **Settings** to select either **Linear** or **Panel** cutting methods. The **Settings** window opens.

   Note: Side vit is only available for use with a standard foot pedal.
3. Press **Linear** or **Panel** button.
4. If your system configuration has the non-zero start feature, use the **up** or **down** arrows to change the Minimum Vacuum parameter. (Minimum Vacuum is available only in Linear mode)
5. Use the **up** or **down** arrows to change the Maximum Vacuum parameter.

   Note: Non-zero start allows for greater control with the foot pedal.
6. Press **Finished** to close the Settings window.

Figure 5.22 – VIT Cut Rate

Vacuum

The vacuum is the exerted force on the aspirated fluid in the aspiration tubing. To make sure you have fluidic balance while in phacoemulsification, you can adjust the maximum vacuum from 0 to 650 mmHg (Peristaltic pump), as indicated on the Vacuum panel.

To adjust the vacuum settings:

1. To increase or decrease the vacuum force, press the up and down arrows on the **Vacuum** panel.
2. To select **Linear** or **Panel** flow, press **Settings**. The **Vacuum Settings** dialog box opens.

Figure 5.23 – Vacuum Settings Dialog Box

3. Press the **Linear** or **Panel** button.
4. Press **Finished**.

The linear flow increases from the minimum (0 cc per min) to the maximum preset flow rate as the surgeon presses the foot pedal through Position 2. A higher flow rate (as delivered from the foot pedal) results in a quicker vacuum rise time. A slower flow rate results in a slower vacuum rise time.

The panel flow provides a constant evacuation at the preset flow rate when the foot pedal enters position 2.

End Case

End Case is available in the top panel from any programming or surgical mode. **End Case** allows you terminate the programming session or surgical case. If you made changes to the program settings, **SAVE** the settings at the prompt.

Note: For ease of viewing, the EPT, EFX, and UST times are in a large font size on the **End Case** window. The EFX shows only when you connect an **ELLIPS FX** handpiece.

Program

Note: **SAVE**, **Save As**, and **Restore** have the same functions on the program configuration screens.

SAVE – Saves the changes to the existing surgeon Name/program.

Save As – Saves the program changes (made to an existing program) to a new program name when you enter a program name.

Restore – Erases any program changes and resets the values back to the last saved values.

End Case

Purge – Select **Purge** to remove all the fluid from the irrigation and aspiration tubing before you remove the tubing pack.

Next Case – Select Next Case to install a new tubing pack.

Note: Use a new bottle of balanced salt solution at the start of each case.

Figure 5.24 – End Case Screen

The timers in the upper left corner indicate Effective Phaco Time (EPT), Ultrasonic (U/S) Time in foot pedal Position 3, **ELLIPS** when **ELLIPS** Technology is **On**, and EFX when you connect an **ELLIPS FX** handpiece. Effective Phaco Time is ultrasound time as a weighted total that takes into account the amount of power being used:

- at 100% power: 1 sec. U/S Time = 1 sec. EPT
- at 50% power: 1 sec. U/S Time = 0.5 sec. EPT

Current Case

Review Case – shows the graphical history of the surgery. (Refer to Figure 5.25 Review Case Screen.)

1. Select a shorter time interval to adjust the Time Line Duration and to see greater case details. For example, 10 Sec shows more detail than 15 Min.
2. Select a longer time interval for an overview of the surgery or sessions, such as 1 hour or 2 hours. This view provides less detail, but gives you a better indication of the trends over time. Use the << or >> buttons to change the time intervals. You cannot use the arrow buttons when you view an active case.
3. Press the **Select Review Case** to select and view a specific surgical case.
4. Press **Export** to name and save the record to a USB device. Enter a name for the **Case History**.
   - Note:Use only **AMO** recommended USB stick drives.

5. Use the **Print to File** to save the data to a file format. The **Delete Record** button removes the case from the **Record** database.
6. Select **Finished** to close the window.

Figure 5.25 – Review Case Screen

Continue Case – Select **Continue Case** to return to the current case, after you selected **Review Case** or **Restore**.

Shutdown – Select the **Shutdown** button to turn the system **Off**. At the prompt, press **Yes** to complete the process.

Surgical Mode–Recommended Settings

Phaco Power

You can adjust power from 0% to 100% in 5% increments for both occluded and unoccluded phaco tips. The large number in the power panel indicates the selected maximum Phaco Power. The phaco power can be either Linear or Panel.

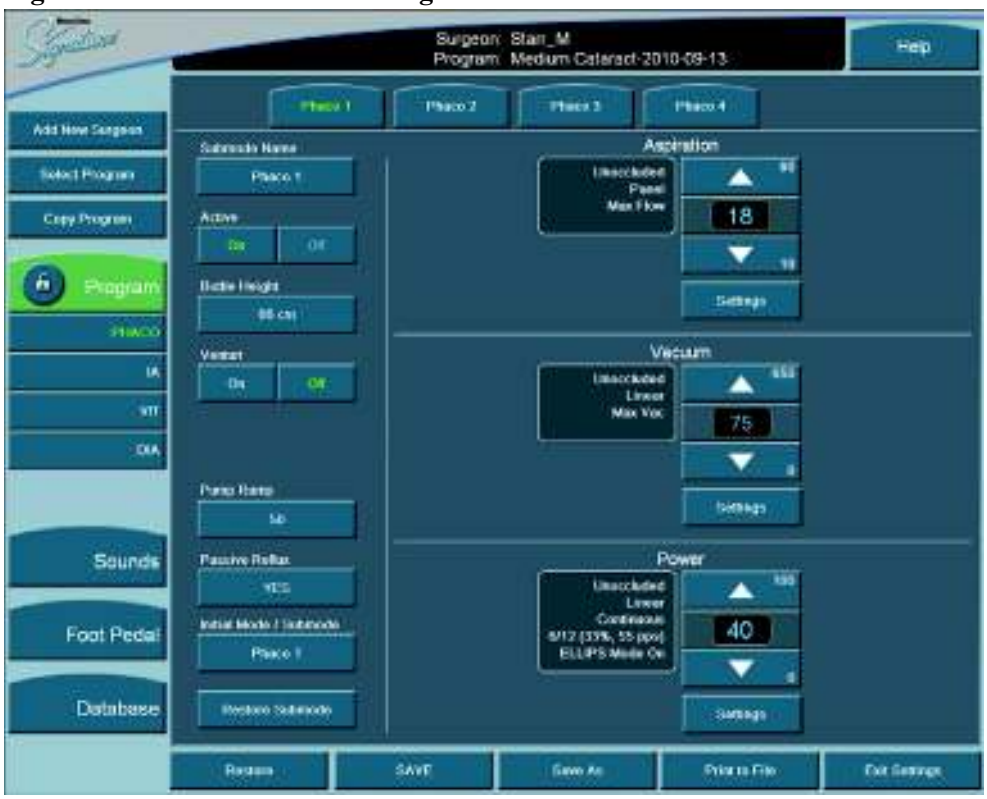
1. **Linear** – Power is controlled with the foot pedal, the power increases from 0%–100% to the maximum preset level. When you press the foot pedal completely down, the power level is at the maximum preset level. The display bar shows the power increase.
2. **Panel** – There is a consistent power delivery, as indicated by the power level (%) on the screen. The power level does not change when you press the foot pedal.

There are eight choices for delivery of phaco power:

- **Continuous**
- **Short Pulse**
- **Long Pulse**
- **Low Power Pulse**
- **High Power Pulse**
- **Single Burst** (panel only)
- **Multiple Burst** (panel only)
- **Continuous Burst** (panel only)

From the **Phaco** operating screen, press **Settings** and the **Phaco Power** selection screen appears.

Figure 5.26 – Phaco Power Settings

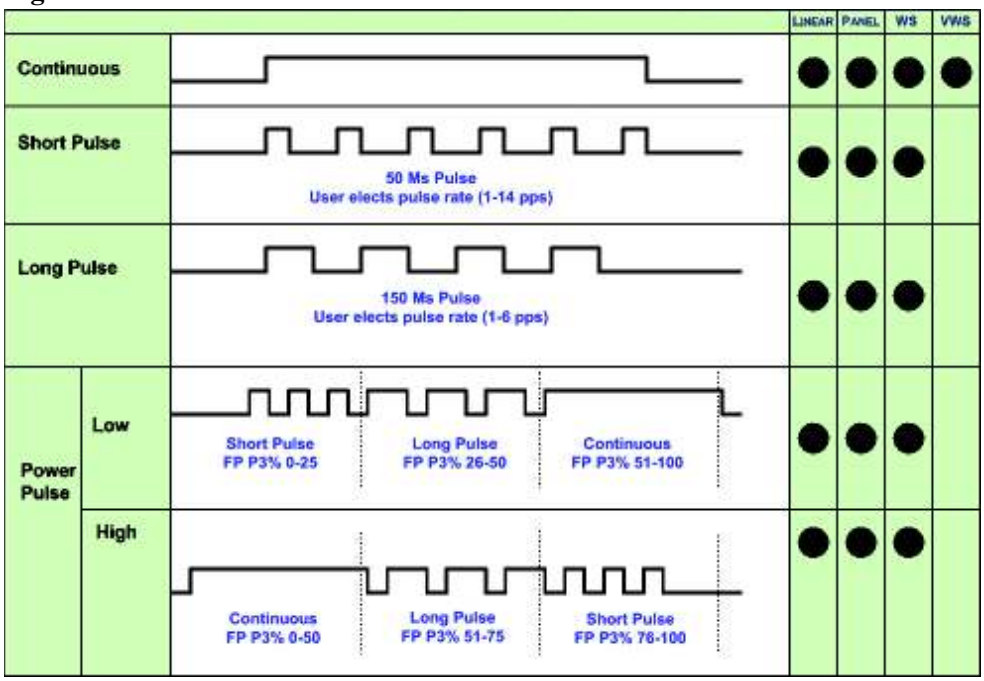


In addition to the eight phaco power modes, you can also select the **WHITESTAR Mode**. Additional **WHITESTAR** Technology information for and **ELLIPS** Technology is later in this section.

Continuous Phaco Power

Continuous phaco power delivers continuous, uninterrupted phaco power to the handpiece and requires no pulse rate setting.

Figure 5.27 – Phaco Power Modes



Short Pulse Phaco Power

Short pulse delivers phaco in pulses of 50 ms when the foot pedal is in Position 3. You can set this in a range of 1 to 14 pulses per second (pps). The actual number of pps is on the button to the right of the **Short Pulse** button.

To set the **Short Pulse** range:

1. Press the button to the right of the **Short Pulse** button. A **Settings** dialog box opens.
2. Press the **up** or **down** arrows to increase or decrease the pps from 1 to 14.
3. Press **Finished** to close the window.

Long Pulse Phaco Power

Long Pulse delivers Phaco in pulses of 150 ms when the foot pedal is in Position 3. You can set this in a range of 1 to 6 pulses per second (pps). The actual number of pps is on the button to the right of the **Long Pulse** button.

To set the **Long Pulse** range:

1. Press the button to the right of the **Long Pulse** button. A **Settings** dialog box opens.
2. Press the **up** or **down** arrows to increase or decrease the pps from 1 to 6.
3. Press **Finished** to close the window.

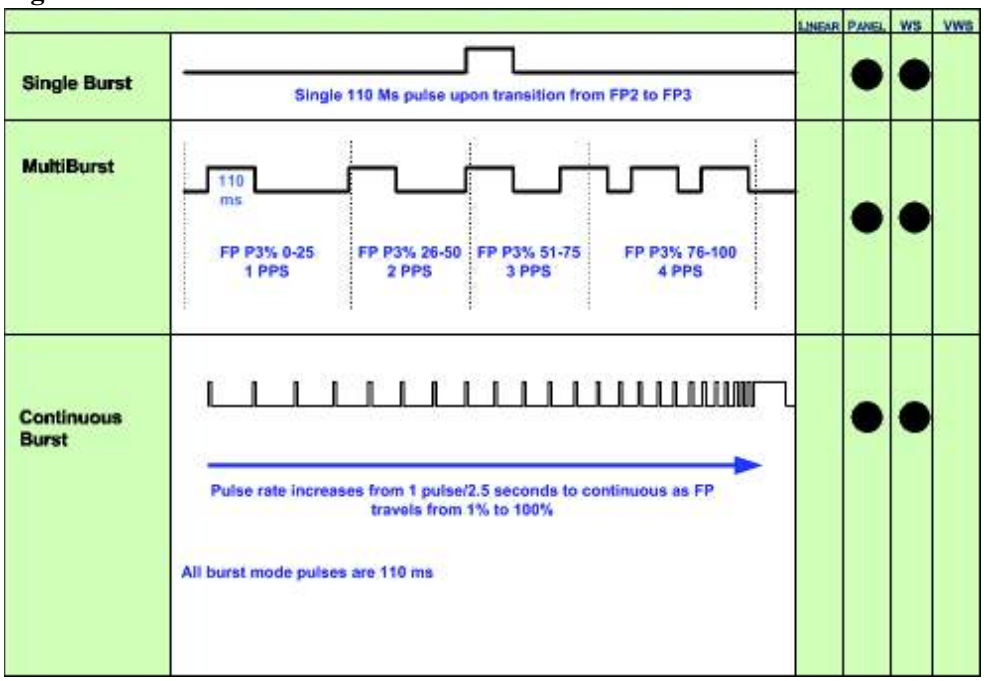
Low Power Pulse Phaco Power

Low Power Pulse generates short pulses of ultrasonic power in foot pedal Position 3. When you press the foot pedal, 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 foot pedal Position 3. When you press the foot pedal, the continuous pulse changes into long pulses and then gradually changes to short pulses.

Figure 5.28 – 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 foot pedal to Position 3. You must return to foot pedal Position 2, pause for approximately one-half (.5) second, and then press the foot pedal 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 foot pedal to Position 3.

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

Continuous Burst Phaco Power (Panel Only)

Continuous Burst delivers a 110 ms ultrasonic burst duration. As you press the foot pedal through Position 3, the bursts get closer together. At the maximum level of foot pedal 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** dialog box opens.

Figure 5.29 – Override Phaco Submode Settings

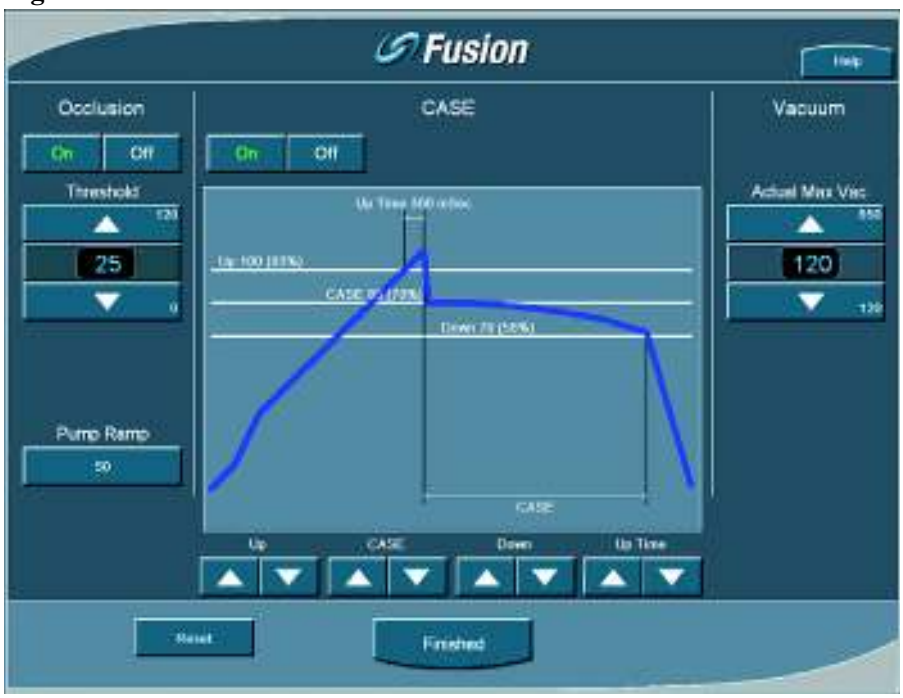
Occlusion Mode Phaco Settings

CASE Mode

To access the occlusion mode phaco and CASE settings:

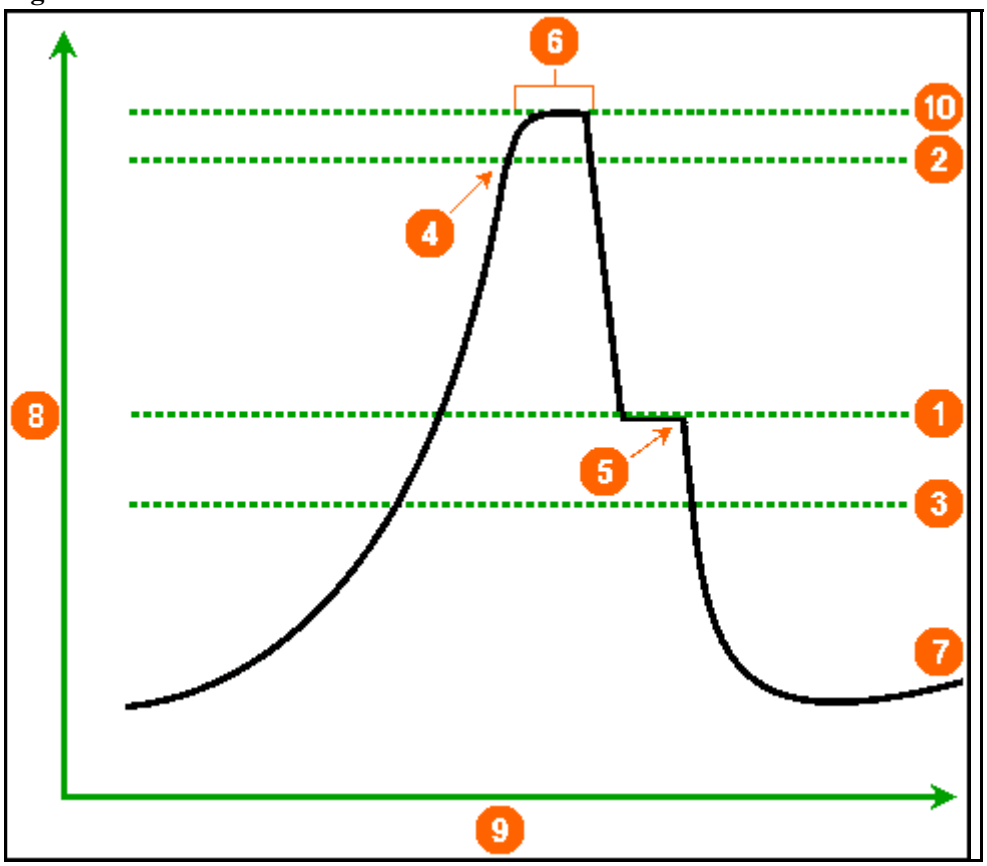
Press the  button from the Phaco operating screen.

Figure 5.30 – 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 system detects the occlusion, the system waits long enough to allow you to grasp the particle firmly, and then reduces the vacuum to a lower level that allows the occlusion to clear safely. When you clear the occlusion, the vacuum returns to the previous vacuum level.

Figure 5.31 – CASE Occlusion Mode Phaco



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

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

- Upper and lower vacuum threshold levels
- CASE vacuum level
- "Up Time" delay; determines the maximum time of the upper threshold vacuum level.

Note: You cannot set the nonzero start value higher than the CASE up threshold or the CASE vac setting. You cannot set the nonzero start value higher than the CASE down threshold. When the current vacuum level reaches the CASE threshold, the system uses the CASE settings. When the current vacuum level goes below the CASE down threshold, the system uses the nonzero start settings as long as the system is also out of CASE mode.

CASE One Touch

To simplify the programming of the CASE function, you only need to define the basic CASE parameters once. You can adjust the CASE function quickly and easily from the CASE One Touch settings on the surgical screen. Use these controls to change the CASE functionality for greater efficiency (**up** arrow) or 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 5.32 – 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

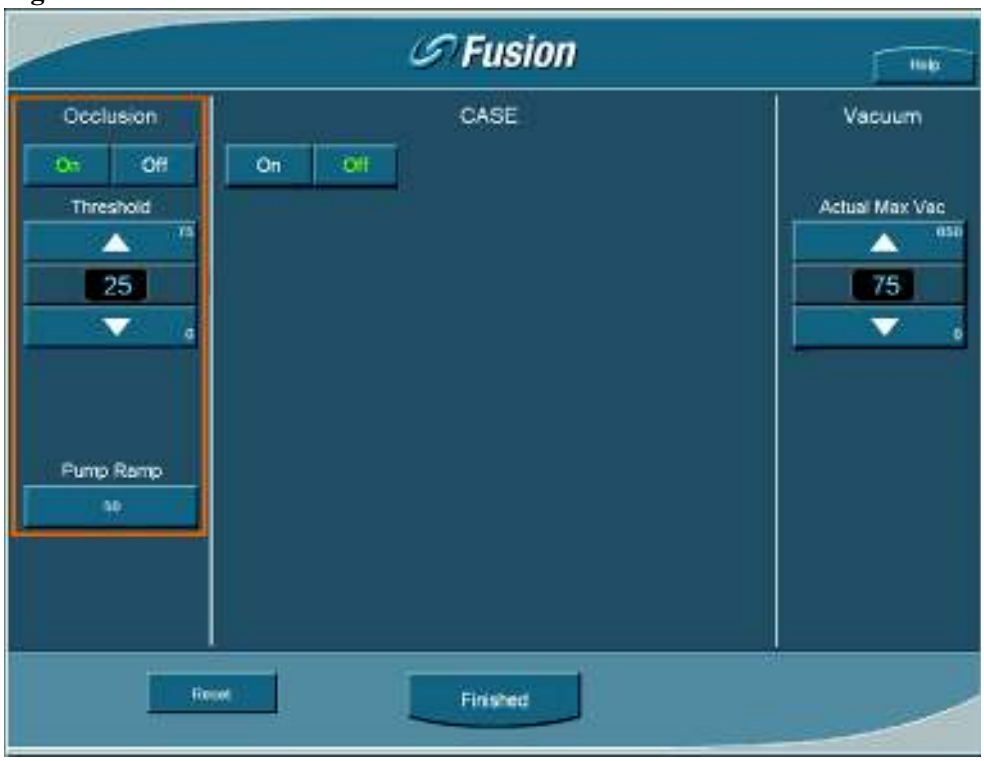
With occlusion mode phaco, you can set different aspiration rates for occluded aspiration as opposed to unoccluded aspiration.

You can set a different vacuum rise time for when the phaco tip occludes without changing the aspiration rate through an unoccluded needle.

To set the occluded aspiration rate thresholds:

1. Press **PHACO**.
2. Press **Settings** under **Aspiration**.
3. Press  on the **Aspiration Rate Settings** window..
4. On the **Fusion** window, press **On** under **Occlusion** to enable occlusion mode.
5. Use the up and down arrows to adjust the threshold/
6. Press the **Pump Ramp** button to adjust the pump ramp.
7. Press **Finished** to close the window.

Figure 5.33 – Occlusion Mode Phaco



8. 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 you decrease the threshold, the occlusion settings take effect sooner.

Occlusion Aspiration Rate

In occlusion mode phaco, you can set a different maximum 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 5.34 – Occlusion Aspiration Rate

Or

2. Press **Settings**. The **Aspiration RateOccluded** dialog box opens.

Figure 5.35 – Aspiration Rate Occluded Dialog Box

3. Press the **up** or **down** arrows to increase or decrease the occluded aspiration rate.
4. Press **Finished** to close the dialog box.

Occlusion Mode Phaco Power Settings

You can set different power levels when the phaco tip occludes.

When you are in **occlusion mode** phaco, there is an additional control panel for power.

Figure 5.36 – 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:

Note: Non-zero start parameters are the same for unoccluded and occluded settings. When the current value reaches the occlusion threshold then the system uses the occlusion settings. You cannot set the non-zero start value higher than the occlusion threshold.

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 there is a blockage or an occlusion to the aspiration port by some tissue or other material, the vacuum pressure builds up. The aspiration flow system vents to the bottle when you release the foot pedal. Another choice is that you can release the foot pedal 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 maintains the desired vacuum level when you hold the foot pedal at a constant position. The two adjustments associated with aspiration flow are Max Vac and Max Flow.

Passive Reflux

1. You can select from either **Yes** or **No**. The yes option reverses the pump to vent. The no option opens a path to the bottle pressure and allows reflux into the eye.
2. Select **Configuration**.
3. Select **Surgeons and Programs**.
4. Select the applicable operating mode and submode.
5. Press the **Passive Reflux** button to select either **Yes** or **No**. The system default is Yes.

ELLIPS Technology

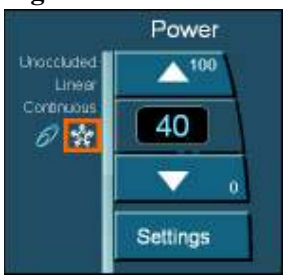
Press the **FUSION** Technology button on the Phaco Power Settings screen to activate. The  is on the Phaco operating mode screen when **ELLIPS** Technology is on. You can set the **ELLIPS** Technology for each Phaco submode.

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

When you attach the **ELLIPS FX** handpiece the system displays the **ELLIPS FX** icon  . You do not need to turn on **ELLIPS** Technology to use the **ELLIPS FX** handpiece.

Figure 5.37 – Phaco with ELLIPS Technology

Figure 5.38 – Phaco with ELLIPS FX Handpiece



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

Select Surgeon/ Program

1. When the system completes the self test routine, select a surgeon (by name) at the prompt. If the system has no surgeons defined, you do not see this screen.

   Note: If you do not see your name on the list, you can use **Standard Surgeon,** the 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 the system has no programs defined, you do not see the **Select A Surgeon Program** screen.

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 Dialog Box

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 then exit the Keyboard window. The new Surgeon now appears in the list of available surgeons.

Figure 6.3 – Keyboard Screen

7. 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

1. Use the **Select Surgeon** screen to assign your preferred or default program. The asterisk (*) indicates the selected program on the **Select Program to Begin** screen when you started the system. When you select **Next Case** the system asks if you want to return to your preferred program. If you are not in your preferred program you will receive a prompt.
2. Press **Configuration**.
3. Press **Surgeons and Programs**.
4. Press **Database**.
5. Press **Surgeon Database**.
6. Select a surgeon from the list.
7. Select Assign Default Program.

Figure 6.6 – Select Default Program Dialog Box

8. Select a program or select **None** to clear a selection.
9. Select **Finished** to close the window. An asterisk (*) indicates your preferred program on the **Select Program to Begin** screen when you start the system.

Figure 6.7 – Select a Program to Begin Screen

Create a New Program

When you create a new surgeon, the system automatically assigns the Default Anterior Program settings to that surgeon. 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 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.

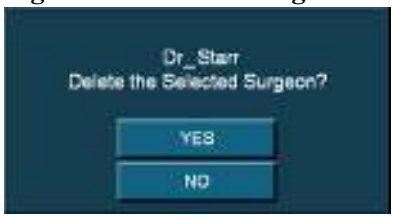
4. Press **Enter**.
5. Press **Save As** at the bottom of the screen. The Keyboard window opens.
6. Enter the new name for the program.
7. Press **Enter** to save the new program and then exit the Keyboard window. The new program now appears in the list of available programs.
8. Press **Exit Settings**.

Delete a Surgeon

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

Figure 6.9 – Delete Surgeon Confirmation Dialog Box



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 or a program 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 dialog box appears.

Figure 6.10 – Deletion Program Confirmation Dialog Box

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

Delete a Database

You can delete a database from your portable USB memory device. Contact your **AMO** service representative to delete the 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. Press **Restore All**.
3. Press the database to delete from the list.
4. Press **Delete Selection**.
5. Press **OK** at the confirmation window.
6. 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.

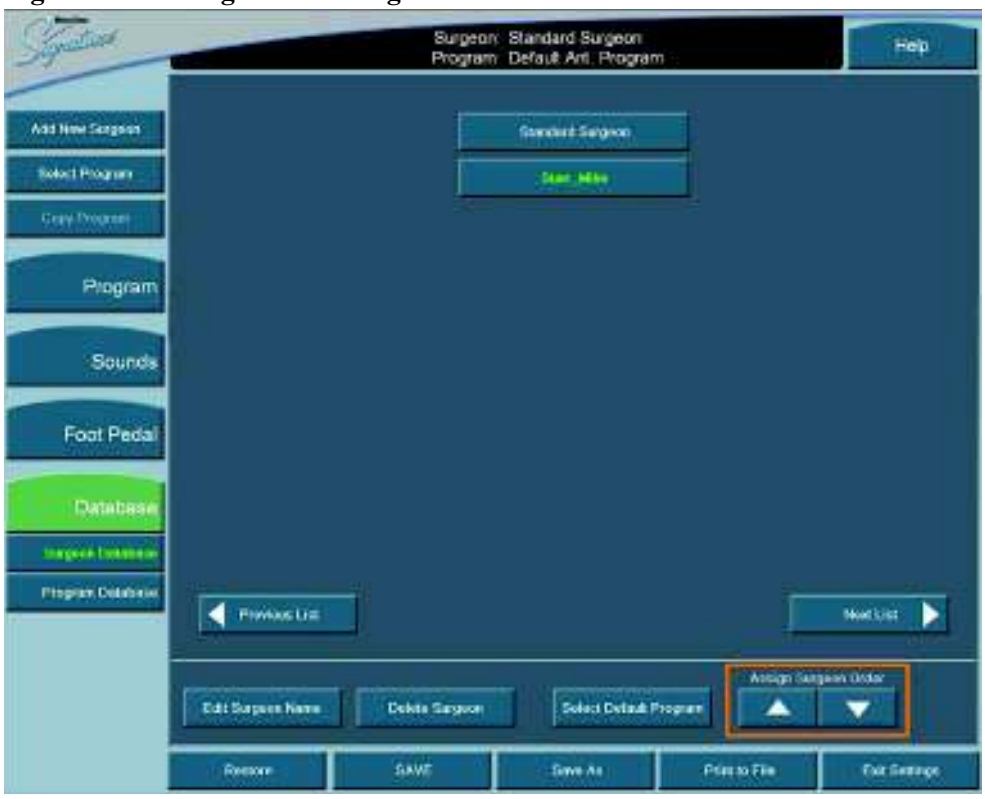
Note: Once you lock a program you cannot unlock the program. You cannot edit a locked program. To edit a locked program, use **Save As** and rename the program.

Figure 6.12 – Program Lock Button

Program – Assign Order

1. Use **Program Assign Order** to move the surgeon names up or down on the Select Surgeon window.
2. Press **Configuration**.
3. Press **Surgeons and Programs**.
4. Press **Database**.
5. Select **Program Database**. A list of programs appears.
6. Select a program.
7. Use the **Assign Program Order** up and down arrows to move the program. You can find the arrows at the bottom of the window.

Figure 6.13 – Surgeon and Program Databases



8. Repeat steps 6 and 7 until the order is to your satisfaction.
9. Select **Exit Settings**.

7 CARE AND CLEANING

Cleaning Procedures

Sterilization Procedures

WHITESTAR SIGNATURE System Cleaning and Care

Cleaning Procedures

Handle all previously used reusable items 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. You must dispose of all single use items or items which have completed their recommended useful life in accordance with accepted hospital practices and hospital procedures, and local governing ordinances and recycling plans. These items can include the following and other items: 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

You must implement the following cleaning procedures immediately after use of the phaco handpieces. 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: The handpiece can deteriorate with the use of balanced salt solutions. Balanced salt solution tarnishes and pits metal. Proper cleaning of the instruments prolongs their useful life. **AMO** recommends using sterile non pyrogenic water to clean the handpieces and accessories.

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

Perform the following cleaning procedure 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 non-pyrogenic water through the irrigation tubing of the handpiece with a syringe. Remove the syringe and fill the syringe with air. Attach the syringe and use the air clear the tube and handpiece.
2. Inject 60 cc of sterile non-pyrogenic 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 use the air to clear the tube and handpiece of the water.
3. Carefully remove the phaco tip cap sleeve and phaco tip from the handpiece for disposal or sanitization and storage.
4. Inject sterile non-pyrogenic water into the test chamber with a syringe and then empty. Repeat this step three to four times.

5. Aspirate sterile non-pyrogenic water through the phaco tip into a syringe; this clears any debris from within the tip and prevents clogging of the suction port.
6. Use distilled water to dampen a gauze pad. Gently wipe the power cable of the handpiece with the gauze pad.

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 the 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**.**

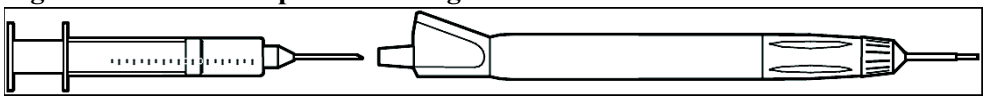
Irrigation/Aspiration Handpiece

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

   Use a 10cc syringe with sterile non-pyrogenic water and rinse 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 7.1 – I/A Handpiece Cleaning



2. Make sure IA handpieces are dry before you store the handpieces.

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.

You must clean all parts thoroughly prior to sterilization. You must validate all sterilization equipment prior to use.

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

DO NOT PLACE THE STORAGE CASES PROVIDED IN AN AUTOCLAVE.

You must use the following sterilization techniques, times, and temperatures 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 excursions 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: You must wrap the product for the cycle times to be accurate. In an emergency situation only use Flash Sterilization in accordance with ANSI/AAMI ST79:2006 Comprehensive guide to steam sterilization and sterility assurance in health care facilities. You must use the parameters for mixed porous and nonporous items.

CAUTION: AMO DOES NOT RECOMMEND GAS STERILIZATION.

You do not need to cool the handpiece prior to reassembly; however, use caution to prevent burns. Follow the handpiece assembly instructions.

WARNING: Sterility assurance is the responsibility of the user. You must sterilize all non-sterile accessories 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.

You must thoroughly clean devices undergoing sterilization 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. You must protect the handpiece nose cone tips 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).

You do not need to cool the handpiece prior to reassembly; however, use caution to prevent burns. Follow the handpiece assembly instructions.

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

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 foot pedal using a cloth dampened with a germicidal detergent and sterile nonpyrogenic water. Be careful not to saturate any part of thesystem or the foot pedal 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 foot pedal cable and power cords connected to the system to prevent loss and unnecessary wear on the electrical connectors.
5. Although the foot pedal is water-resistant, make sure that you keep the foot pedal as dry as possible.
6. Place the Advanced Control Pedal in the storage recess at the bottom of the console so that the foot pedal batteries can charge. You can attach the foot pedal 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.

8 ERROR MESSAGES TROUBLESHOOTING AND DIAGNOSTICS

Error Message Display

Fuse Replacement Procedure

Most Common User-Correctable Problems

Status, Warning and Error Messages

System Operation (Error) Messages

Troubleshooting

Error Message Display

The red error messages show at the top of the screen. Press the Help button to open the corrective action for that error. After you correct the error, press OK to clear the error message from the screen. If you clear the error message but do not correct the error, the system generates error message again.

The yellow alerts show at the top of the screen. You do not need to clear the alert, as with an error message. An alert, for example, can be: **The Remote Control Battery power level is 10 – 25% of maximum. Charge the battery.**

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 you press the power switch, and you have confirmed that you connected the power cord properly and you plugged the cord 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 the system to confirm your system voltage):

Table 8.1 – 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 8.1 – Fuse Location

1. Power Switch 2. Fuse Holder

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 you plugged the system 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 there is no damage to the phaco needle/handpiece by dropping or misuse.
- If no irrigation occurs, shake the drip chamber to confirm that the ball or the 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 to the error or recommendations to clear the error. The messages can indicate the available options if a component or subsystem fails.

The list of messages in the following pages have corrective actions that you can take 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 you cannot correct an error, 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 8.2 – Fluidic Controller Error Messages

Error Number	Message	Probable Cause	Corrective Action
14	Vacuum Parameter Check Failure.	Hardware failure or a program error.	1. Eject the **FUSION** Fluidics pack. 2. Insert the **FUSION** Fluidics pack. 3. Reprime the system. 4. f the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
15	Flow Parameter Error	Hardware failure or a program error.	1. Select End Case. 2. Select Next Case. 3. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
16	FP Yaw Parameter Error	Hardware failure or a program error.	1. Select End Case. 2. Select Next Case. 3. Disconnect the foot pedal from the system. 4. Connect the foot pedal to the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
17	FP Pitch Parameter Error	Hardware failure or a program error.	1. Perform a Foot Pedal Calibration. 2. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
18	IV Check Error	Hardware failure or a program error.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
19	Vit Cutter Check Error	Hardware failure or a program error.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
101	Fluidics communication error.	Invalid data from the IH or communication errors.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
102	Fluidics write error.	Microcontroller SPI, SPI Bus, EEPROM, or ADC is faulty.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
103	Fluidics read error.	Microcontroller SPI, SPI Bus, EEPROM, or ADC is faulty.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
104	Fluidics Reservoir Vacuum Level Error.	External air pressure low. The Venturi muffler clogged. The external air valve clogged. External air leak. Venturi vacuum path leak. A vacuum sensor not calibrated or is faulty.	1. Reprime the system. 2. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
105	Fluidics Reservoir Leak.	Venturi vacuum path leak.	1. Prime the system again. 2. Select End Case. 3. Select Shutdown. 4. Select Yes and wait for the system to power off. 5. Start up the system. 6. Replace the Dual Pump **FUSION** Fluidics pack. 7. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
106	Fluidics Tank Vacuum Level Error.	Reservoir vacuum is low. Tank vacuum path leak. A vacuum sensor not calibrated or is faulty. A vacuum regulator not calibrated or is faulty. Vacuum regulator drive circuit failure.	1. Reprime the system. 2. Disconnect the external air supply. 3. Select End Case. 4. Select Shutdown. 5. Select Yes and wait for the system to power off. 6. Start up the system. 7. Replace the Dual Pump **FUSION** Fluidics pack. 8. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
107	Fluidics Tank Leak.	Tank vacuum path leak.	1. Prime the system again. 2. Select End Case. 3. Select Shutdown. 4. Select Yes and wait for the system to power off. 5. Start up the system. 6. Replace the Dual Pump **FUSION** Fluidics pack. 7. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
108	Fluidics Pack Vacuum Level Error.	Reservoir vacuum is low. Pack vacuum path leak. A vacuum sensor not calibrated or is faulty. A vacuum regulator not calibrated or is faulty. Vacuum regulator drive circuit failure.	1. Prime the system again. 2. Disconnect the external air supply. 3. Select End Case. 4. Select Shutdown. 5. Select Yes and wait for the system to power off. 6. Start up the system. 7. Replace the Dual Pump **FUSION** Fluidics pack. 8. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
109	Fluidics Pack Leak.	Pack leak.	1. Prime the system again. 2. Select End Case. 3. Select Shutdown. 4. Select Yes and wait for the system to power off. 5. Start up the system. 6. Replace the Dual Pump **FUSION** Fluidics pack. 7. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
110	Fluidics RAM error.	Bad Microcontroller.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
111	Fluidics ROM error.	Bad Microcontroller.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
112	Fluidics Master Communication error.	Instrument Host malfunction. Bad microcontroller.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
113	Drain Pump Fault.	Droplets, bubbles, or fog on chamber walls. A bad fluid level sensor. Bad cable. Fluid level sensor drive circuits faulty. Drain pump drive circuit fault.	1. Select End Case. 2. Select Next Case. 3. Replace the Dual Pump **FUSION** Fluidics pack. 4. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
114	Fluidics DAC Fault.	Circuit failure (I2C bus, DAC, or micro).	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
115	Fluidics Evacuation Vacuum Level Error.	Reservoir vacuum is low. Evacuation vacuum path leak. A vacuum sensor not calibrated or is faulty. A vacuum regulator not calibrated or is faulty. Vacuum regulator drive circuit failure.	1. Reprime the system. 2. Select End Case. 3. Select Shutdown. 4. Select Yes and wait for the system to power off. 5. Start up the system. 6. Replace the Dual Pump **FUSION** Fluidics pack. 7. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
116	Fluidics Evacuation Leak.	Evacuation path leak.	1. Prime the system again. 2. Select End Case. 3. Select Shutdown. 4. Select Yes and wait for the system to power off. 5. Start up the system. 6. Replace the Dual Pump **FUSION** Fluidics pack. 7. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
117	Fluidics Fluid Level Sense Error.	Droplets, bubbles, or fog on chamber walls. A bad fluid level sensor. Bad cable. Fluid level sensor drive circuits faulty.	1. Check the bag and the chamber for over-inflation. 2. Select End Case. 3. Select Next Case. 4. Replace the Dual Pump **FUSION** Fluidics pack. 5. Make sure that there is no debris on the fluidics panel. 6. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
118	Fluidics Irrigation Valve error.	Valve failure. Drive circuit failure.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
119	Fluidics Pinch Valve error.	Valve failure. Drive circuit failure.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
120	Fluidics Silicone Extraction Valve Fault	Valve failure. Drive Circuit failure.	1. Turn the Venturi pump off. 2. Select End Case. 3. Select Next Case. 4. Select Shutdown. 5. Select Yes and wait for the system to power off. 6. Start up the system. 7. If the error does not clear or if the error continues to occur, document the Error Message and contact **AMO** for technical service.
121	Fluidics Pack Alignment Valve Fault.	Pump failure. Drive circuit failure.	1. Reload the Pack. 2. Connect external air supply. 3. Prime the system again. 4. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
122	Fluidics Dump Valve Fault.	Valve failure. Drive circuit failure.	1. Turn the Venturi pump off. 2. Select End Case. 3. Select Next Case. 4. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
123	Fluidics Venturi Valve Fault.	Valve failure. Drive circuit failure.	1. Disconnect compressed air. 2. Reprime the system. 3. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
124	Fluidics Rotary Vane Fault.	Pump failure. Drive circuit failure.	1. Connect compressed air. 2. Reprime the system. 3. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
125	Fluidics Pack Valve error.	Valve failure. Drive circuit failure.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. Eject the **FUSION** Fluidics pack. 6. Insert the **FUSION** Fluidics pack. 7. Insert a new **FUSION** Fluidics pack. 8. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
126	Fluidics Motor Vent Error	Vacuum chamber is blocked.	1. Select End Case. 2. Select Next Case. 3. Replace the **FUSION** Fluidics pack. 4. If the error does not clear or if the error continues to occur, document the Error Message and contact **AMO** for technical service.
127	Fluidics Valve Vent error.	Irrigation blocked.	1. Select End Case. 2. Select Next Case. 3. Reprime the system. 4. Eject the **FUSION** Fluidics pack. 5. Insert the **FUSION** Fluidics pack. 6. Select End Case. 7. Select Shutdown. 8. Select Yes and wait for the system to power off. 9. Start up the system. 10. Install a new tubing pack 11. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
128	Fluidics Pack Loading error.	Pack not properly seated.	1. Eject the **FUSION** Fluidics pack. 2. Insert the **FUSION** Fluidics pack. 3. Install a new tubing pack. 4. If the error does not clear or if the error continues to occur, document the Error Message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
129	Fluidics Proportional Valve Fault.	Valve failure. Drive circuit failure.	1. Disconnect compressed air. 2. Reprime the system. 3. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
130	Fluidics Encoder error.	Pack loading problem. Encoder is faulty. Decoder circuit is faulty. Stepper driver circuit is faulty.	1. Select End Case. 2. Select New Case. 3. Turn the system off, wait a few seconds and then turn the system on. 4. Remove the tubing pack. 5. Reinstall the tubing pack. 6. Install a new tubing pack. 7. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
131	Fluidics Mode error.	The foot pedal is in position 0 and the Fluidic Mode is a value other than 0.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. Disconnect the foot pedal from the system. 6. Connect the foot pedal to the system. 7. Run the Foot Pedal Test. 8. Replace the foot pedal. 9. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
132	Fluidics VAC regulator current is too high or too low.	The vacuum regulator is faulty. Drive circuit faulty.	1. Turn of the Venturi pump. 2. Select End Case. 3. Select Next Case. 4. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
133	Fluidics strain gauge ADC error.	ADC is faulty.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
134	Fluidics Drain Pump Rotational Error.	Pack loading problem. Encoder is faulty. Decoder circuit is faulty. Stepper driver circuit is faulty.	1. Insert a new Dual Pump **FUSION** Fluidics pack. 2. Select End Case. 3. Select Next Case and prime the system. 4. Replace the Dual Pump **FUSION** Fluidics pack with a **FUSION** pack. 5. Select Next Case and prime the system. 6. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
135	Low external air pressure.	Leak in external air supply path. Pressure regulator set too low. A pressure sensor is faulty.	1. Remove the tubing pack. 2. Check the o-ring for wear or damage. 3. Reinstall the tubing pack. 4. Reprime the system. 5. Disconnect external air supply. 6. Turn the Venturi pump Off. 7. Replace the Dual Pump **FUSION** Fluidics pack with a **FUSION** pack. 8. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
136	Fluidics VAC Regulator Vent Fault.	A blocked pinch valve.	1. Turn the Venturi pump off. 2. Select End Case. 3. Select Next Case. 4. Reprime the system. 5. Use the Reflux function. 6. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
137	Foot pedal error.	Bad foot pedal or user is pressing foot pedal.	1. Disconnect the foot pedal from the system. 2. Connect the foot pedal to the system. 3. Press and release the foot pedal at least three times. 4. Run the Self Test. 5. Replace the foot pedal. 6. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
138	The 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 Senors Disagree Error.	Leak in vacuum path. A vacuum sensor is faulty.	1. Eject the Dual Pump **FUSION** Fluidics pack. 2. Insert the Dual Pump **FUSION** Fluidics pack. 3. Reprime the system. 4. Turn the Venturi pump Off. 5. Replace pack with a new **FUSION** pack. 6. Reprime the system. 7. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
147	Reservoir vacuum is too low. The target vacuum cannot be reached.	Leak A vacuum regulator is faulty. Drive circuit faulty.	1. Select End Case. 2. Select Next Case. 3. Reprime the system.
148	Pressure to pack capture mechanism is less than 60 psi.	Leak	Reinsert the pack and reprime.

Error Number	Message	Probable Cause	Corrective Action
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. Replace the phaco handpiece.
204	Phaco handpiece error.	Wire in handpiece broken.	Retune or cycle power. Replace the phaco handpiece.
207	Incompatible Handpiece Error.	Incompatible handpiece.	1. Turn off **ELLIPS** Technology. 2. Attach the **ELLIPS** handpiece. 3. Tune the handpiece.
210	Phaco RAM error.	Chip is bad.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
211	Phaco ROM error.	Bad 196 processor.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
212	Phaco controller timeout.	Host stopped writing to the Phaco controller.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
281	Phaco communication error.	Software bug or Hardware failure.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
282	Phaco error.	Bad handpiece.	Check handpiece and retune.
283	Phaco error.	Driver failure.	Check handpiece and retune. Replace the handpiece and tune.
284	Phaco power supply error.	Bad Power Supply.	Cycle the power or call for service.
285	Check for loose handpiece and retune.	Tip is loose.	Check for loose handpiece tip and retune. Replace the handpiece and tune.
286	Phaco handpiece impedance error.	Bad handpiece.	Check handpiece and retune. Replace the handpiece and tune.
288	Diathermy error.	DIA subsystem issue.	Check handpiece. Select Next Case or cycle power.
290	Foot pedal error.	Bad foot pedal or user is pressing the footswitch.	Check foot pedal. Cycle power.

Error Number	Message	Probable Cause	Corrective Action
291	Phaco Diathermy power supply error.	Software or hardware failure.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the Error Message and contact **AMO** for technical service.
301	Pneumatics RAM error.	Microcontroller failure.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
302	Pneumatics ROM error.	Microcontroller failure.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
303	Pneumatics Master communication error.	Watchdog event. PC104 Bus failure. Micro failure. CPLD failure.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
307	Pneumatics communication error.	Received invalid data by the IH or communication error.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
308	External air pressure high/ low.	Valve failure. Drive circuit failure.	Check compressed air supply. Select Next Case.
309	Piston pump pressure high/ low.	Pump failure. Drive circuit failure.	1. Select End Case. 2. Select Next Case.
310	Vit selector valve pressure high/low.	VIT Selector Valve failure. Drive circuit failure.	1. Select End Case. 2. Select Next Case.
311	Dump valve pressure high/ low.	VIT Dump Valve failure. Drive circuit failure.	1. Select End Case. 2. Select Next Case.
312	Cut valve pressure high/ low.	VIT Cut Valve failure. Drive circuit failure.	1. Select End Case. 2. Select Next Case.

Error Number	Message	Probable Cause	Corrective Action
322	Pneumatics system pressure too low.	V1 External Air valve not open. Piston Pump not working. System leak. The dump valve is not closing. The Vitrectomy Cut valve is always on.	1. Select End Case. 2. Select Next Case.
323	Pneumatics system pressure too low.	PP1 Piston Pump not working. Piston Pump not working. System leak. The dump valve does not close. The Vitrectomy Cut valve is always on.	1. Select End Case. 2. Select Next Case.
327	Pneumatics system pressure too low at the high cut rates.	PP1 Piston Pump not working. Piston Pump not working. System leak. The dump valve does not close. The Vitrectomy Cut valve is always on. The selector valve does not change.	1. Select End Case. 2. Select Next Case.
336	Pneumatics system pressure too low at the low cut rates.	PP1 Piston Pump not working. Piston Pump not working. System leak. The dump valve does not close. The Vitrectomy Cut valve is always on. The selector valve does not change.	1. Select End Case. 2. Select Next Case.
353	IH to GUI Communication Timed Out.	Software error or hardware error.	1. Select End Case. 2. Select Next Case.

Error Number	Message	Probable Cause	Corrective Action
360	IH Fluidics – read error.	Communication error.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
361	IH Fluidics – write error.	Communication error.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
362	IH Fluidics – Comm. error.	Communication error.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
370	IH Phaco read error.	Communication error.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
371	IH Phaco write error.	Communication error.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
372	Bad Phaco long pulse.	Communication error.	1. Check program 2. Select End Case. 3. Select Shutdown. 4. Select Yes and wait for the system to power off. 5. Start up the system. 6. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
373	IH Invalid Phaco burst setting.	Communication error.	1. Check program. 2. Select End Case. 3. Select Shutdown. 4. Select Yes and wait for the system to power off. 5. Start up the system. 6. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
374	Handpiece removed during Phaco.	No connection to the handpiece.	1. Attach a handpiece. 2. Tune the handpiece.
375	Incompatible HP.	Attempted to use **ELLIPS** Phaco settings with a **WHITESTAR** handpiece.	1. Turn off **ELLIPS** Technology. 2. Attach the **ELLIPS** handpiece. 3. Tune the handpiece.
380	IH Pneumatics – read error.	Communication error.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
381	IH Pneumatics – write error.	Communication error.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the Error Message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
390	IH Diag read error.	Communication error.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
391	IH Diag write error.	Communication error.	1. Select End Case. 2. Select Shutdown. 3. Select Yes and wait for the system to power off. 4. Start up the system. 5. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
416	Foot pedal communication error.	Could not open port. The foot pedalis not responding. The foot pedal is not connected. The foot pedal is connected but no communication. The foot pedal was on the charging cradle when the system was started.	Make sure the foot pedal is not on the charging cradle. 1. Check the foot pedal connection to the connector on the back of the system. 2. Select End Case. 3. Select Shutdown. 4. Select Yes and wait for the system to power off. 5. Start up the system. 6. Run the Foot Pedal test. 7. Start a new case. If the error still does not clear, replace the foot pedal cable with a new foot pedal cable and/or replace the foot pedal with a new foot pedal and repeat steps 1 through 8. If the error still does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
418	Foot pedal compatibility error.	New foot pedal firmware.	Replace foot pedal.
501	Prime excessive vacuum error.	Communication error.	Check the tubing pack. Reload or replace the tubing pack. 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 pack. Reload or replace the tubing pack. Reprime.
507	Prime EQ pressure error.	Hardware failure.	Reprime.
508	Prime low venturi vacuum error.	Hardware failure.	Reprime.

Error Number	Message	Probable Cause	Corrective Action
511	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.
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. Motor failure. A “Short” in the motor wires. Obstruction is not allowing the pole to move	Check for obstructions. Reprime the system.
601	Tune excessive vacuum error.	Hardware failure.	Check the tubing and the connections to the handpiece. Retune.
605	Tune no handpiece error.	Hardware failure.	Insert handpiece and retune.
2000	DLL CRC Error	DLL checksum does not match config.dat.	1. Press the On/Off button on the monitor for at least four seconds. 2. Wait until the system has shutdown and turn the system on. 3. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
2001	CRC Error	STR checksum does not match config.dat.	1. Press the On/Off button on the monitor for at least four seconds. 2. Wait until the system has shutdown and turn the system on. 3. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
2002	Database Self Test Error	Database file checksum does not match config.dat.	1. Press the On/Off button on the monitor for at least four seconds. 2. Wait until the system has shutdown and turn the system on. 3. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
2003	Error updating the database file.	Error when saving the database.	1. Press the On/Off button on the monitor for at least four seconds. 2. Wait until the system has shutdown and turn the system on. 3. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
2004	Error adding language.	Error during the Install Language session.	1. Press the On/Off button on the monitor for at least four seconds. 2. Wait until the system has shutdown and turn the system on. 3. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
2005	Error reading the USB memory stick.	Error during an Import or Export session.	1. Press the On/Off button on the monitor for at least four seconds. 2. Wait until the system has shutdown and turn the system on. 3. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
2006	Error loading DLL.	Cannot find or load a DLL file.	1. Press the On/Off button on the monitor for at least four seconds. 2. Wait until the system has shutdown and turn the system on. 3. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
2007	Record file save error.	Error when saving the Record database file.	1. Press the On/Off button on the monitor for at least four seconds. 2. Wait until the system has shutdown and turn the system on. 3. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
2008	Error reading Record file.	Cannot read Record database file.	1. Press the On/Off button on the monitor for at least four seconds. 2. Wait until the system has shutdown and turn the system on. 3. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
2010	IH Communication timed out.	No communication with the IH.	1. Press the On/Off button on the monitor for at least four seconds. 2. Wait until the system has shutdown and turn the system on. 3. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Error Number	Message	Probable Cause	Corrective Action
2011	Error retrieving version strings from IH.	Cannot not retrieve the IH version numbers.	1. Press the On/Off button on the monitor for at least four seconds. 2. Wait until the system has shutdown and turn the system on. 3. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
2012	IH timeout error.	No communication with IH.	1. Press the On/Off button on the monitor for at least four seconds. 2. Wait until the system has shutdown and turn the system on. 3. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.
2014	IH Selftest error.	Cannot get Selftest status from the IH.	1. Press the On/Off button on the monitor for at least four seconds. 2. Wait until the system has shutdown and turn the system on. 3. If the error does not clear or if the error continues to occur, document the error message and contact **AMO** for technical service.

Troubleshooting

Table 8.3 – Troubleshooting – General

General	
Problem	**Corrective Action**
The system does not come on when you turn the power switch to On.	1. Turn the power switch off. 2. Confirm that you connected the power cord to the console back panel. 3. Confirm that you plugged the power cord into the electrical receptacle or another power source. 4. Confirm that there is electrical power to the wall receptacle or to the power source. 5. Turn the system on. 6. If the system still does not come on, turn the power off. Check for bad fuses and replace the fuse if necessary. 7. Contact **AMO** for Technical Service.

General	
Problem	**Corrective Action**
The wireless remote control does not pair.	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. 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. 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. More than nine devices and the pairing fails. 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. Note: Always press the Backlight button before you pair the remote. 5. Only pair the remote control with one console at a time. Make sure that you did not pair the remote with another console. You must: • Unpair the remote from the console. • Shut down the console. • Pair the remote with the new console. Make sure this console is at least 40 meters away from the first console. 6. Once you pair a remote, you cannot pair the remote with another console. (You cannot pair one remote with two (2) consoles.) • Unpair the remote from the console. • Move the first remote out of range from the console. • Wait for the first remote to go into “Sleep” mode. • Pair the new remote. 7. Make sure that you fully charge the batteries before you pair the remote with the console. Low batteries can cause pairing failures. 8. Charge the batteries if pairing has failed after several attempts. 9. When the batteries are charging (the remote is in the charge cradle): • The BLUETOOTH is off. • You cannot use the remote. • You cannot pair the remote.
The foot pedal is not operating properly.	1. Go to the Diagnostics section and perform a foot pedal test. 2. Confirm that you connected the foot pedal cable at the back of the console. 3. Perform a foot pedal calibration, for either the Advanced Control Pedal or the standard foot pedal.

General	
Problem	**Corrective Action**
The Programmable IV Pole does not respond.	1. The pole might have reached the maximum or the minimum height. 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.
The Touch Screen does not respond.	Perform the touch screen calibration procedure as described in Diagnostics.
Priming Errors.	1. Check the tubing pack loading, including reloading the tubing pack. 2. Verify that there are no kinks, clogs, or loose fittings. 3. Replace the handpiece and the tip and prime. 4. Replace the tubing pack. 5. Check the test chamber for proper installation and any leaks. 6. Contact **AMO** technical service to check the vacuum.

Table 8.4 – Troubleshooting – Irrigation

Irrigation	
Problem	**Corrective Action**
No irrigation flow.	1. Make sure you selected the appropriate mode on the screen. 2. Check for kinks in the irrigation tubing. 3. Check the tubing connection to the handpiece. 4. Tap the drip chamber to make sure the valve operates properly. 5. Check the bottle height. 6. Press the foot pedal to Position 1 and check for flow. 7. Listen for the irrigation pinch valve in the tubing manifold area when you press the foot pedal to confirm that the valve operates. 8. If there is still no flow, replace the tubing pack.
Reduced/insufficient irrigation flow.	1. Check for kinks in the tubing or leaks in the tubing or the handpiece. 2. Check the bottle height. 3. Check the tubing connections. 4. Check for a pinched irrigation sleeve at the incision.
Irrigation flow continues even when foot pedal is Off (Position 0).	1. Check that there is no obstruction to the foot pedal or stuck in P 1. 2. Check the foot pedal operation. 3. Verify that Continuous Irrigation is not active.

Irrigation	
Problem	**Corrective Action**
Anterior chamber is too shallow or too deep.	1. Check the bottle height. 2. Too shallow, check for a pinched irrigation sleeve at the incision. 3. Check the pump speed (flow rate). 4. Check for obstructions to the irrigation tubing. 5. Make sure that you balanced Irrigation and Aspiration.
Using large amounts of fluid.	1. Check the bottle height. 2. Check the incision size. 3. Check the flow rate (pump speed too high). 4. Check that no fluid enters the collection bag when you do not use irrigation. 5. Reseat or replace the tubing.

Table 8.5 – Troubleshooting – Aspiration

Aspiration	
Problem	**Corrective Action**
No aspiration.	1. Make sure you have the appropriate mode selected on the screen. 2. Check for kinks or clogs in the tubing. 3. Check the tubing connection to the handpiece. 4. Make sure there are no obstructions in the handpiece. 5. Press the foot pedal to Position 2 and check the pump function.
Poor aspiration.	1. Check the flow rate. 2. Check the foot pedal operation. 3. Check for kinks or clogs in the tubing. 4. Make sure there are no obstructions in the handpiece. 5. Check the tubing connection to the handpiece. 6. Check the IA handpiece o-rings for excessive wear. Replace the o-rings, if needed.

Aspiration	
Problem	**Corrective Action**
Not building vacuum. Pump does not turn.	1. Check the programming. If the surgeon is in "linear vacuum" as opposed to "linear aspiration", you must press the foot pedal through position 2 for the vacuum to reach the preset maximum. 2. Make sure you are pressing the foot pedal. 3. Check the tubing connection to the handpiece. 4. Check for air in the irrigation and aspiration tubing. 5. Check the system vacuum settings. 6. Replace the tubing pack. 7. Run IA Prime. 8. Check the flow rate.
Chamber shallowing or partially collapses.	1. Check the bottle height and the handpieces for correct position. 2. Check the flow rate setting. 3. Check the tubing fittings to the handpiece. 4. Check for kinks in the tubing. 5. Remove the handpiece and perform the test chamber test to make sure you have balanced the handpiece. 6. Make sure you balanced Irrigation and Aspiration.

Table 8.6 – Troubleshooting – Phacoemulsification

Phacoemulsification	
Problem	**Corrective Action**
No phacoemulsification.	1. Make sure that you selected the PHACO mode on the touch screen. 2. Make sure that the system is primed and tuned. 3. Check the foot pedal operation. 4. Make sure that you properly connected the phaco handpiece cord to the phaco receptacle on the front of the system. 5. Check the phaco power setting. 6. Make sure that the phaco tip is tight on the handpiece. 7. Check for damage to the phaco tip. 8. If there is damage to the tip, replace the tip with a new tip and retune.
Poor or intermittent phacoemulsification.	1. Check all the corrective steps above for "No Phacoemulsification". 2. Remove the phaco tip and then replace the tip. Make sure the tip is tight on the handpiece. 3. Check the phaco power delivery setting for both unoccluded and occluded (if applicable) settings. 4. Tune the phaco handpiece.

Table 8.7 – Troubleshooting – Diathermy

Diathermy	
Problem	**Corrective Action**
No diathermy or poor diathermy.	1. Make sure that you selected the diathermy mode on the touch screen. 2. Check the foot pedal operation. 3. Check the diathermy power setting. 4. Check the diathermy cord for a secure connection to the forceps and to the diathermy receptacles on the system. 5. Make sure that the diathermy cord connections are dry. 6. Try to use diathermy starting at a low power setting and gradually increase the power. 7. Replace the diathermy cord. 8. Replace the diathermy handpiece.
No sound when using diathermy.	1. Make sure the volume setting is at a level of 6 or greater in Settings. 2. Check for sounds when you push any touch screen or remote buttons. 3. Check for an audible confirmation upon completion of system start-up test (at power up). 4. Perform the sound test on the diagnostics screen.

Table 8.8 – Troubleshooting – Vitrectomy

Vitrectomy	
Problem	**Corrective Action**
No vitrectomy cutting or poor cutting.	1. Make sure that you selected the vitrectomy mode on the touch screen. 2. Verify that the surgeon is in foot pedal Position 3, if using IAC step vitrectomy. If using ICA, verify the foot pedal is in Position 2. 3. Check the foot pedal operation. 4. Check the tubing connections to the vitrectomy cutter. 5. Check the vitrectomy tubing connection to the front panel receptacle on the system. 6. Check the vitrectomy rate (CPM) setting on the touch screen. Lower the CPM, if necessary. 7. Check that irrigation and aspiration are working correctly. 8. Verify that the cutter blade moves. 9. Replace the vitrectomy cutter and try again.

9 WARRANTY AND MAINTENANCE

Warranty Statement

Warranty Statement

Abbott Medical Optics, Inc. warrants for a period of one year (12 months) from the date of installation of the **WHITESTAR SIGNATURE** System console, foot pedal, wireless remote control, the 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. In no event shall the date of installation be deemed to occur later than six months from the date of delivery of the **WHITESTAR SIGNATURE** System by Abbott Medical Optics, Inc. to the common carrier.

You are required to provide AMO with prompt written notice of any defect or defects and permit AMO to have access to the **WHITESTAR SIGNATURE** System within a reasonable time after notification of any defect. In the event that you do not provide **AMO** with prompt notification of a defect or permit access to the **WHITESTAR SIGNATURE** System within a reasonable time after notification, **AMO** is hereby released from all liability with reference to such defect and subsequent damage, if any, resulting from the inability of AMO to correct such defect.

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), which shall be returned freight prepaid to **AMO** by you and then returned to you freight collect once repaired or replaced.

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 may not be transferred. This warrant will be void if and only so long as the equipment is used in any country other than 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/USER FOR CONSEQUENTIAL, SPECIAL, INCIDENTAL, OR PUNITIVE DAMAGES, LOSS OF PROFITS OR LOSS OF USE. The liability of **AMO** for breach of this warranty shall, in any case, be limited to the total amount paid by you for the **WHITESTAR SIGNATURE** System furnished by **AMO** and any work performed by AMO in connection therewith.

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 only for those adjustments and corrective actions in the Error Messages and Troubleshooting, and Diagnostics sections of this manual. There are no user serviceable components within the console and you must not attempt to access the internal components. Any attempt to do so will void the warranty.

AMO recommends, at least annually, routine or periodic maintenance of the **WHITESTAR SIGNATURE** System by an AMO representative. 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 troubleshoot as per the procedures in this manual, then contact AMO for corrective action (1-877-AMO-4-LIFE in USA 1-877-266-4543). Please contact your local **AMO** office for region-specific phone numbers.

10 SPECIFICATIONS

Physical Specifications

Environmental Specifications

Electrical Specifications

Diathermy Specifications

Irrigation and Aspiration Specifications

Phacoemulsification Specifications

Vitrectomy Specifications

Diathermy Power Graphs

Diathermy Power versus Load Impedance

Phaco Power Graphs

Physical Specifications

Table 10.1 – System Physical Specifications

		English / U.S.	Metric:
WHITESTAR SIGNATURE System console:			
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 UL 60601-1	
Weight (including IV pole)		195 pounds	88.5 kg
Foot Pedal:			
Standard foot pedal			
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
Advanced Control Pedal			
Dimensions	Width	10.5 inches	27 cm
	Length	14 inches	36 cm
	Height	5.5 inches	14 cm
Weight		15 pounds	7 kg
Cable length		11.8 feet	36 cm
Programmable IV pole:			
Maximum travel		41 inches	107 cm
Velocity		2.4 inches/sec	6 cm/sec.
Maximum lift weight		2.43 pounds	1.1 kg
Wireless remote control			
Dimensions:	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 10.2 – Environmental Specifications

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

Electrical Specifications

Table 10.3 – Electrical Specifications

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

Diathermy Specifications

Table 10.4 – Diathermy Specifications

Diathermy Specifications		
	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 10.5 – Irrigation and Aspiration Specifications

IA Specifications		
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 10.6 – Phacoemulsification Specifications

Phacoemulsification Specifications	Phaco Power	0 to 100%, in 5% increments
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 10.7 – Vitrectomy Specifications

Vitrectomy Specifications		
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 10.8 – Diathermy Output Power (Typical) 50 Ohm

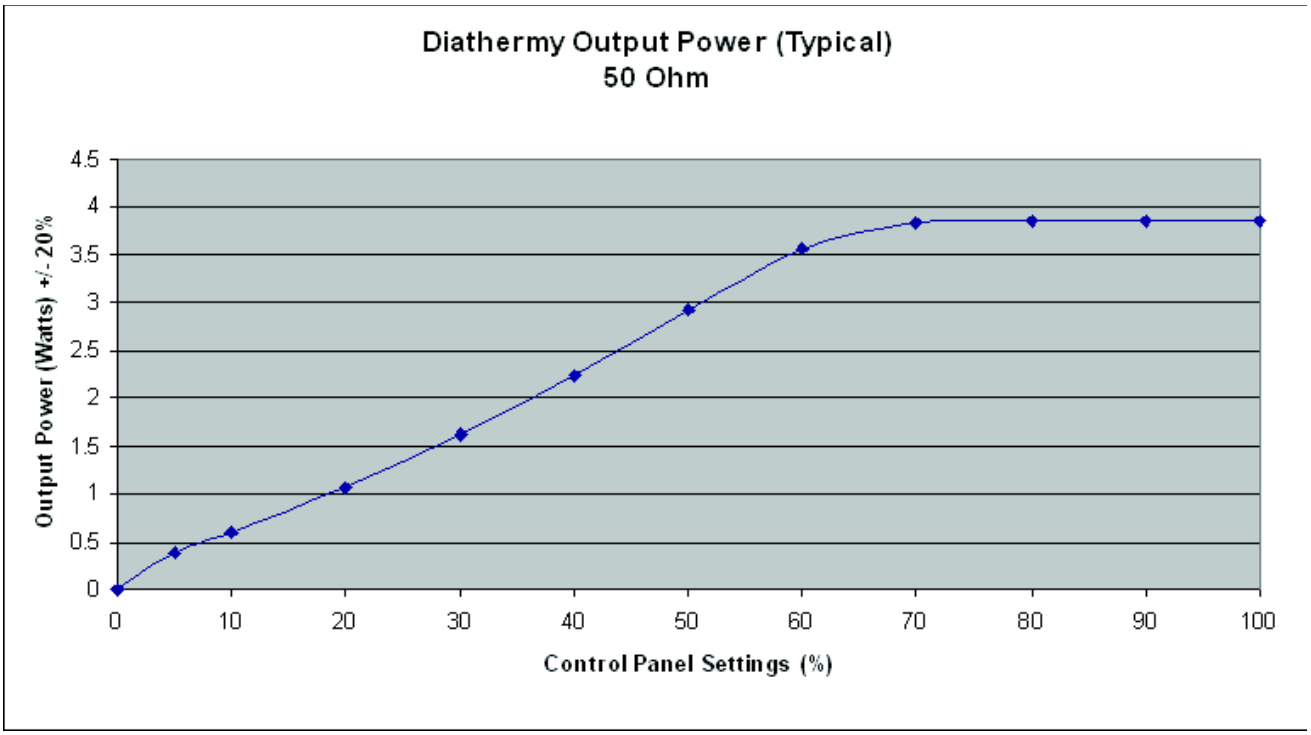


Table 10.9 – Diathermy Output Power (Typical) 100 Ohm

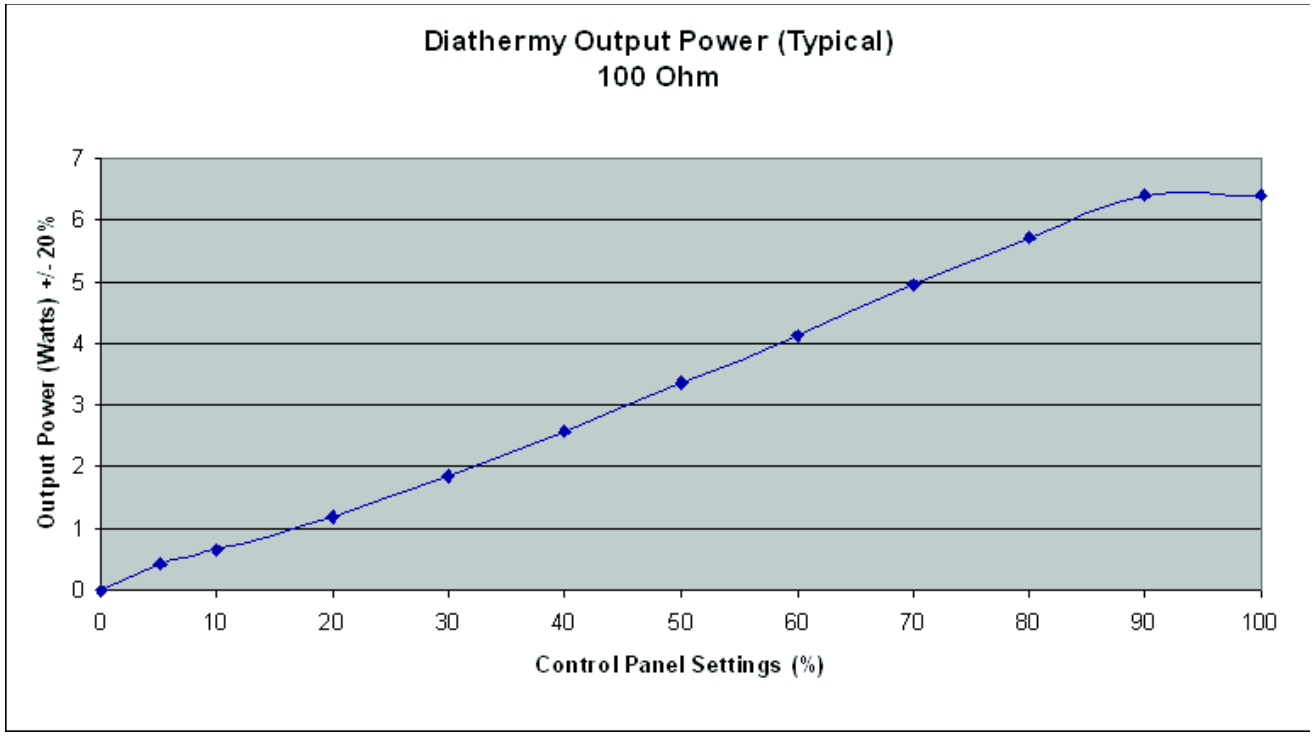


Table 10.10 – Diathermy Output Power (Typical) 200 Ohm

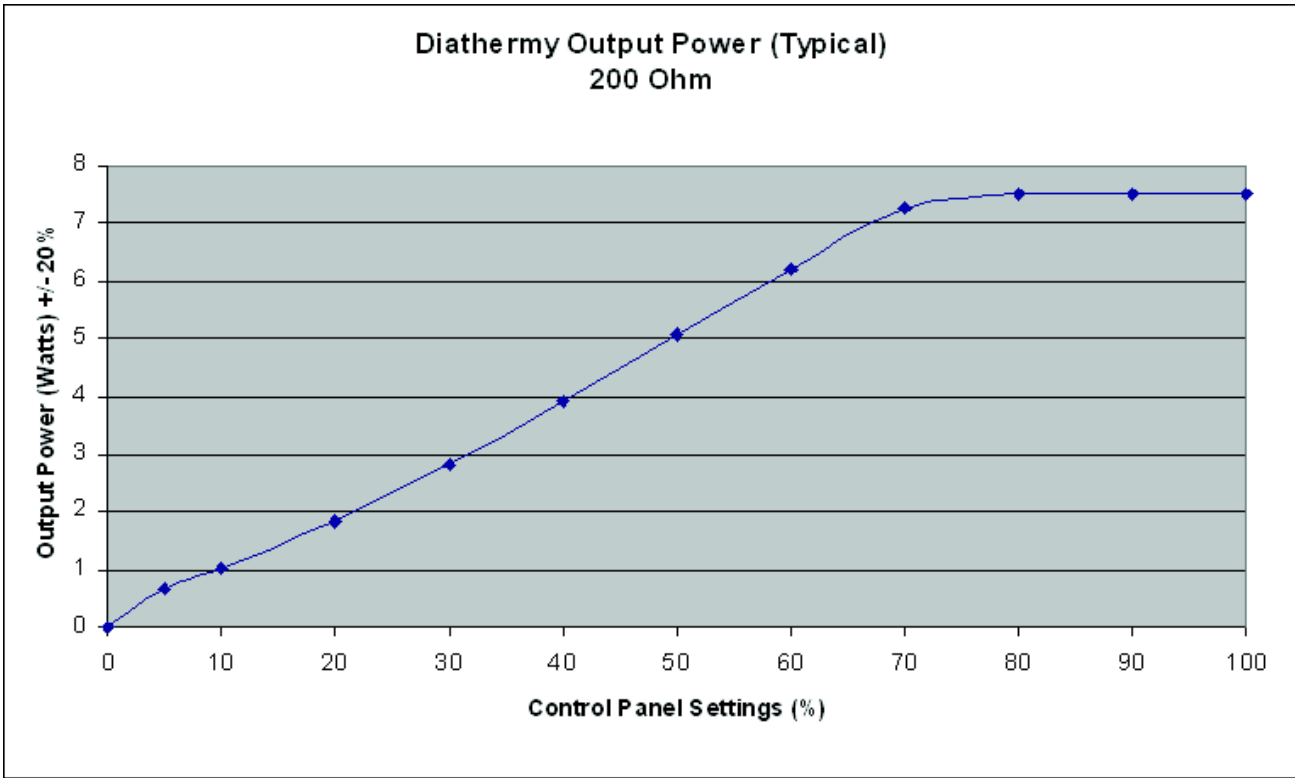


Table 10.11 – Diathermy Output Power (Typical) 500 Ohm

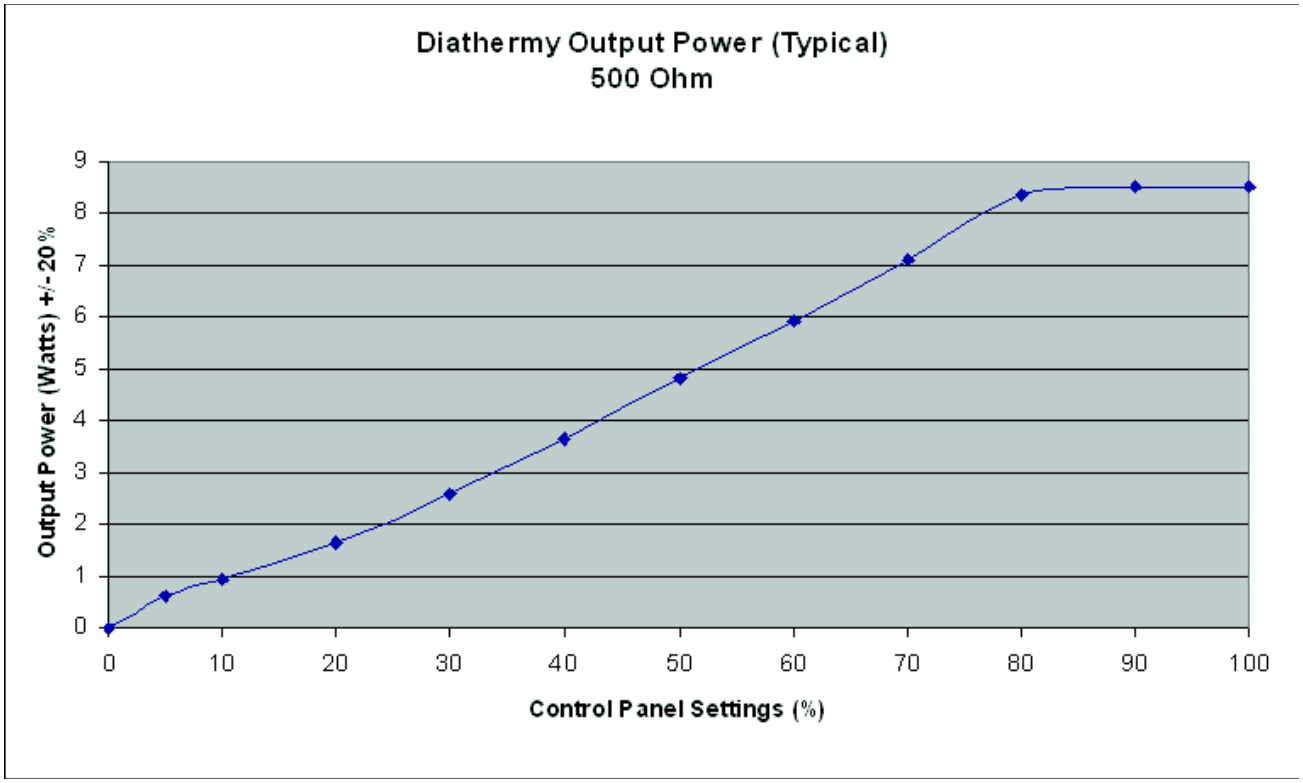
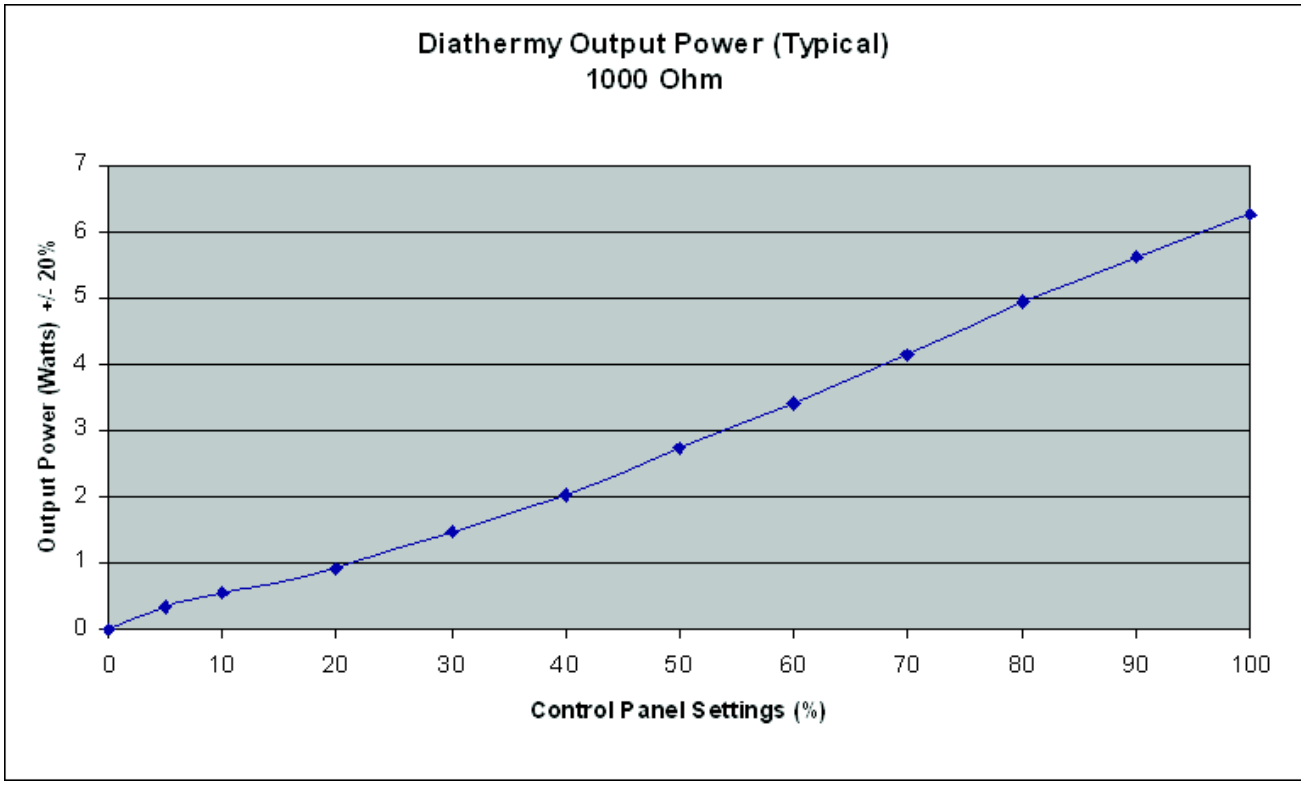


Table 10.12 – Diathermy Output Power (Typical) 1000 Ohm



Diathermy Power versus Load Impedance

Table 10.13 – Diathermy Output Power (50% Setting)

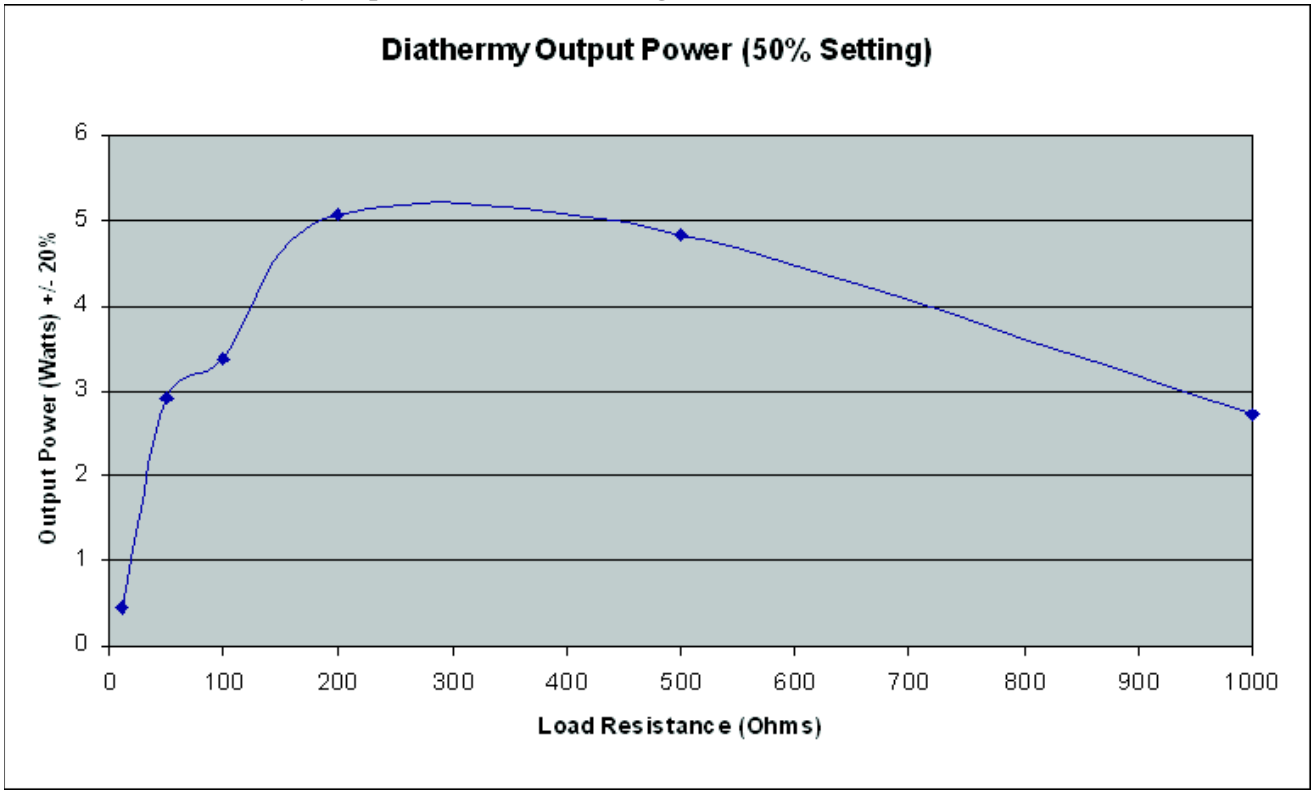


Table 10.14 – Diathermy Output Power (100% Setting)

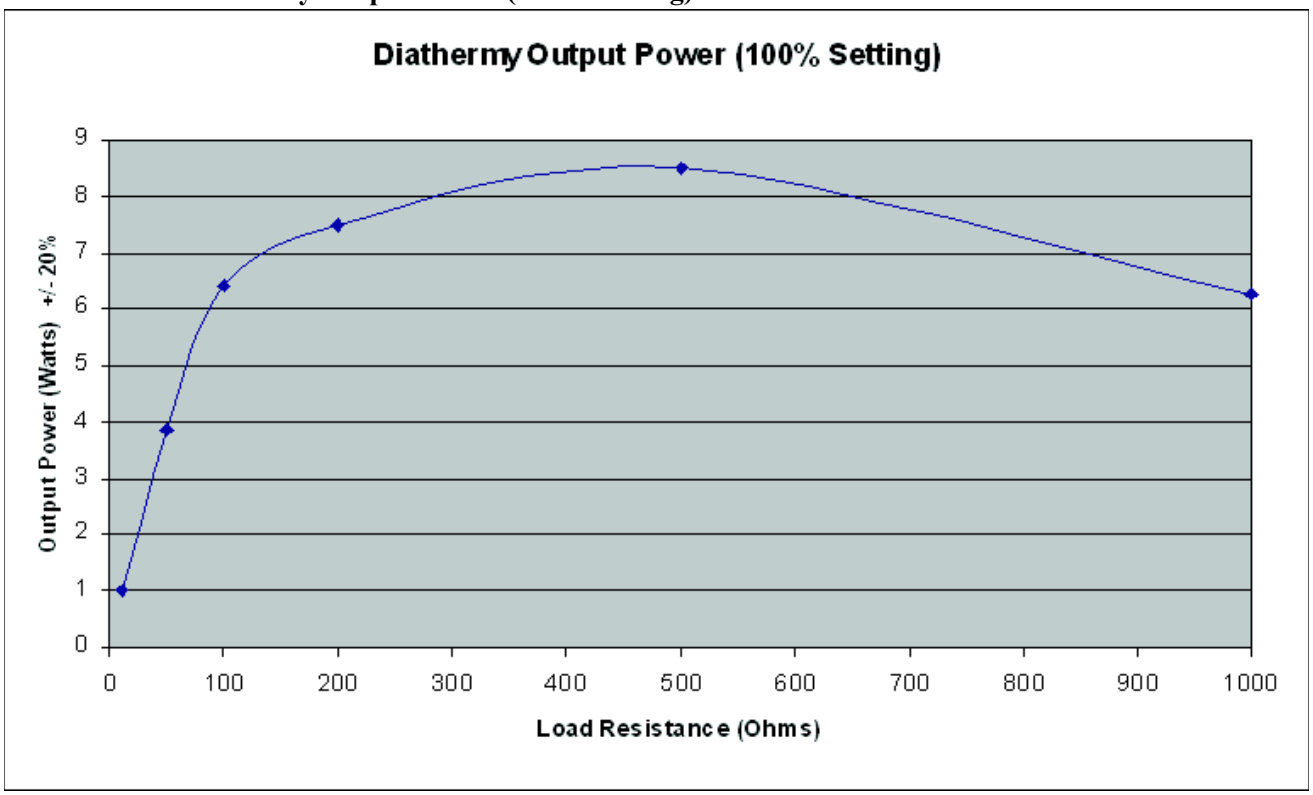
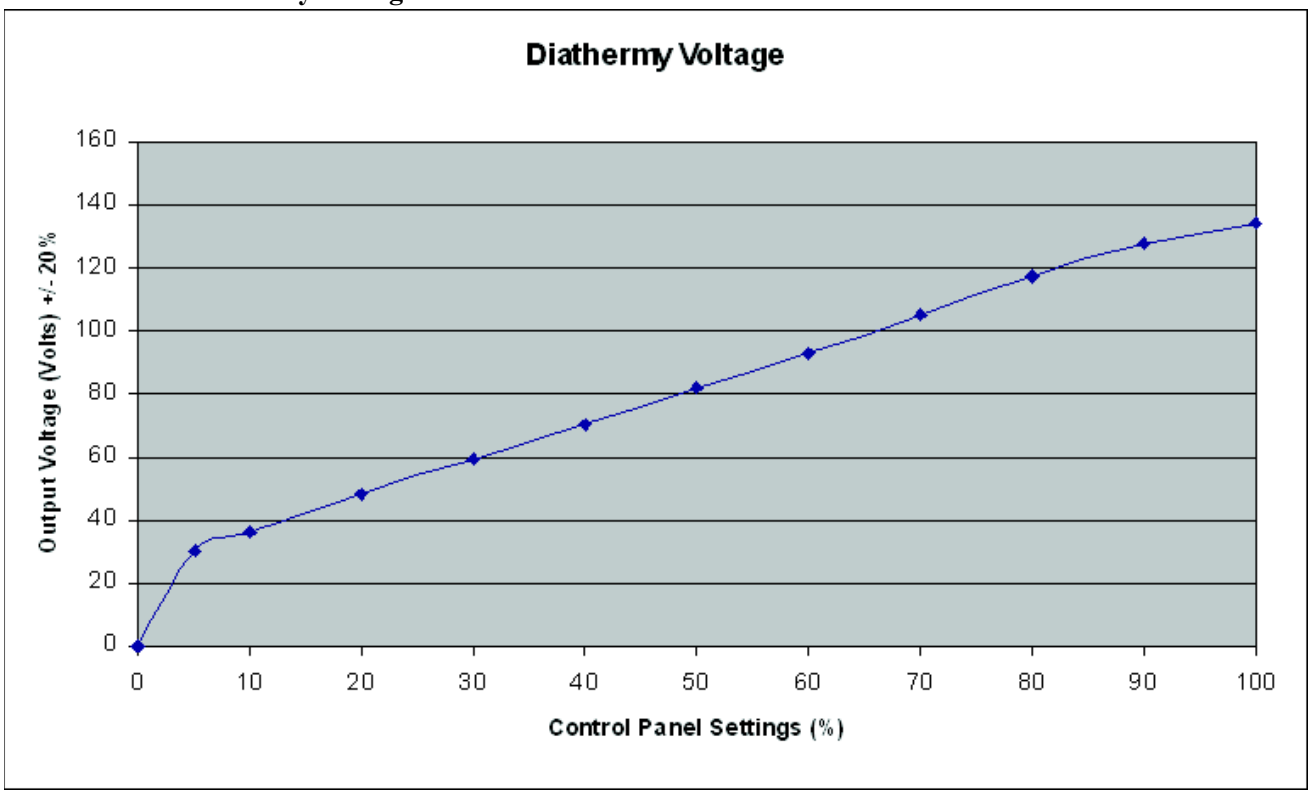


Table 10.15 – Diathermy Voltage



Phaco Power
Graphs

Table 10.16 – Longitudinal Phaco Power

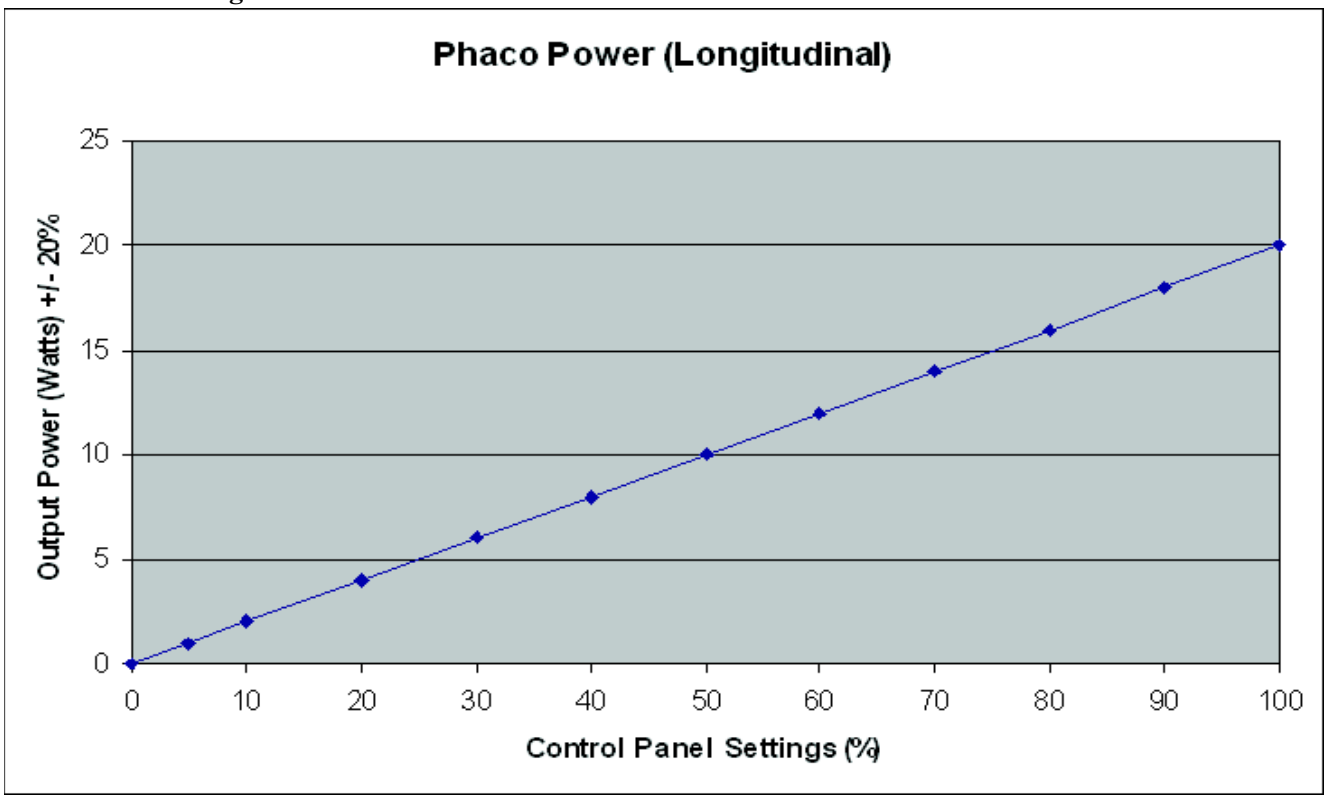


Table 10.17 – ELLIPS Phaco Power

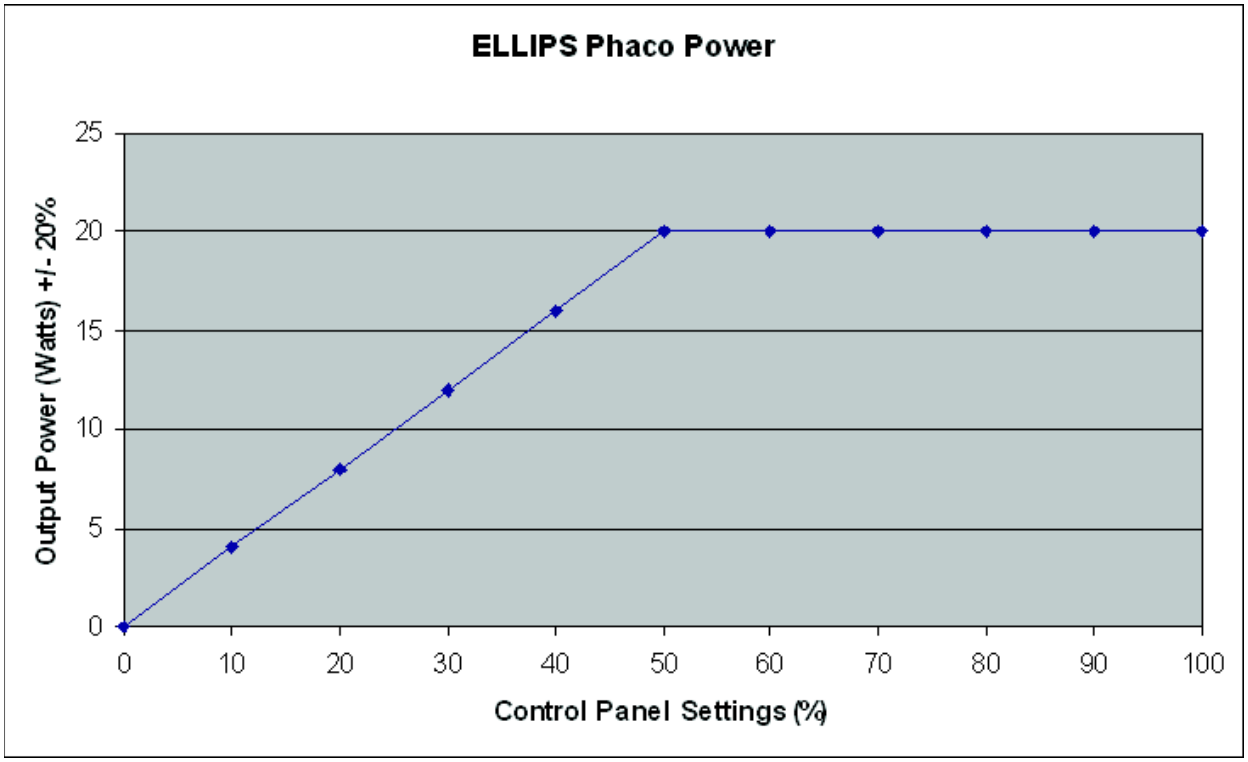


Table 10.18 – ELLIPS Phaco Power and Longitudinal Phaco Power

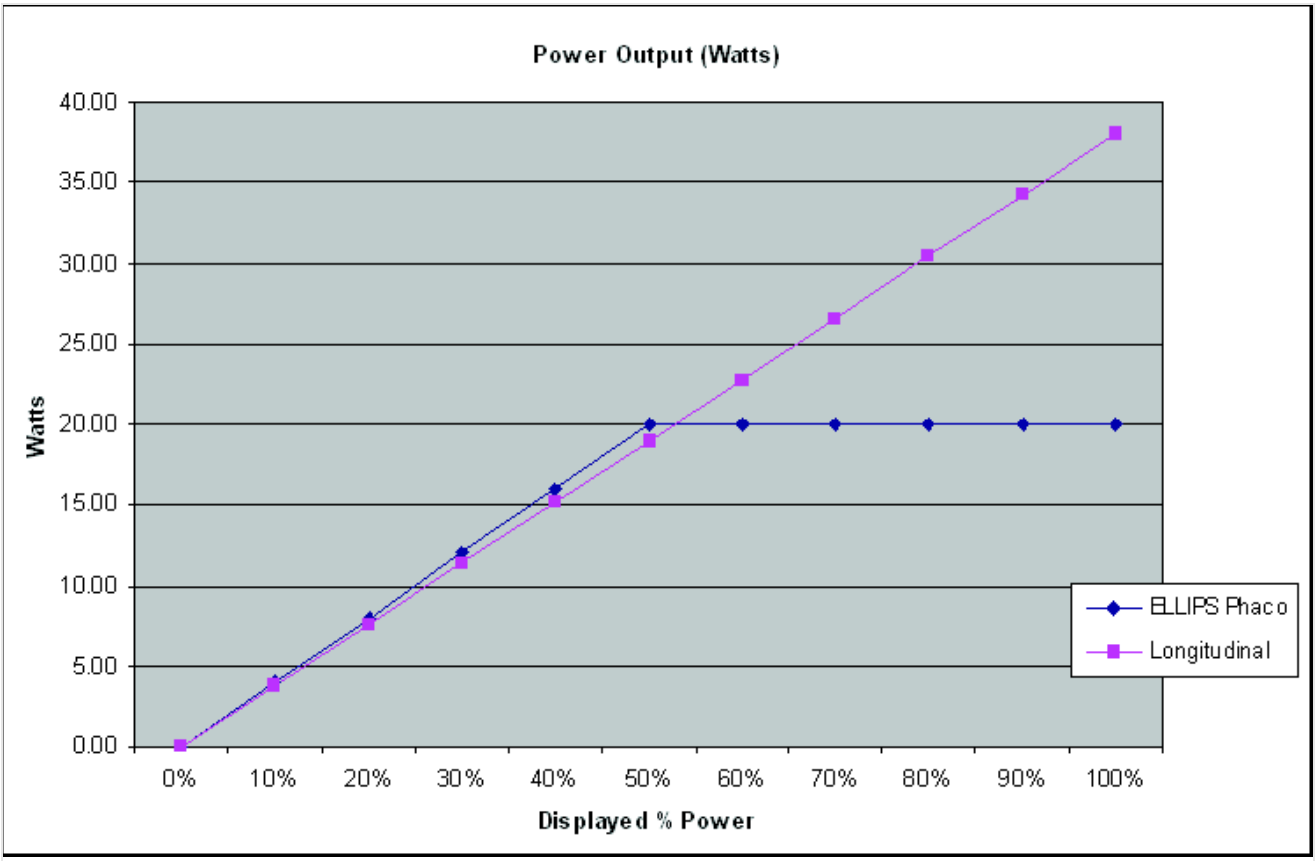


Table 10.19 – ELLIPS Phaco Power Linear Mode

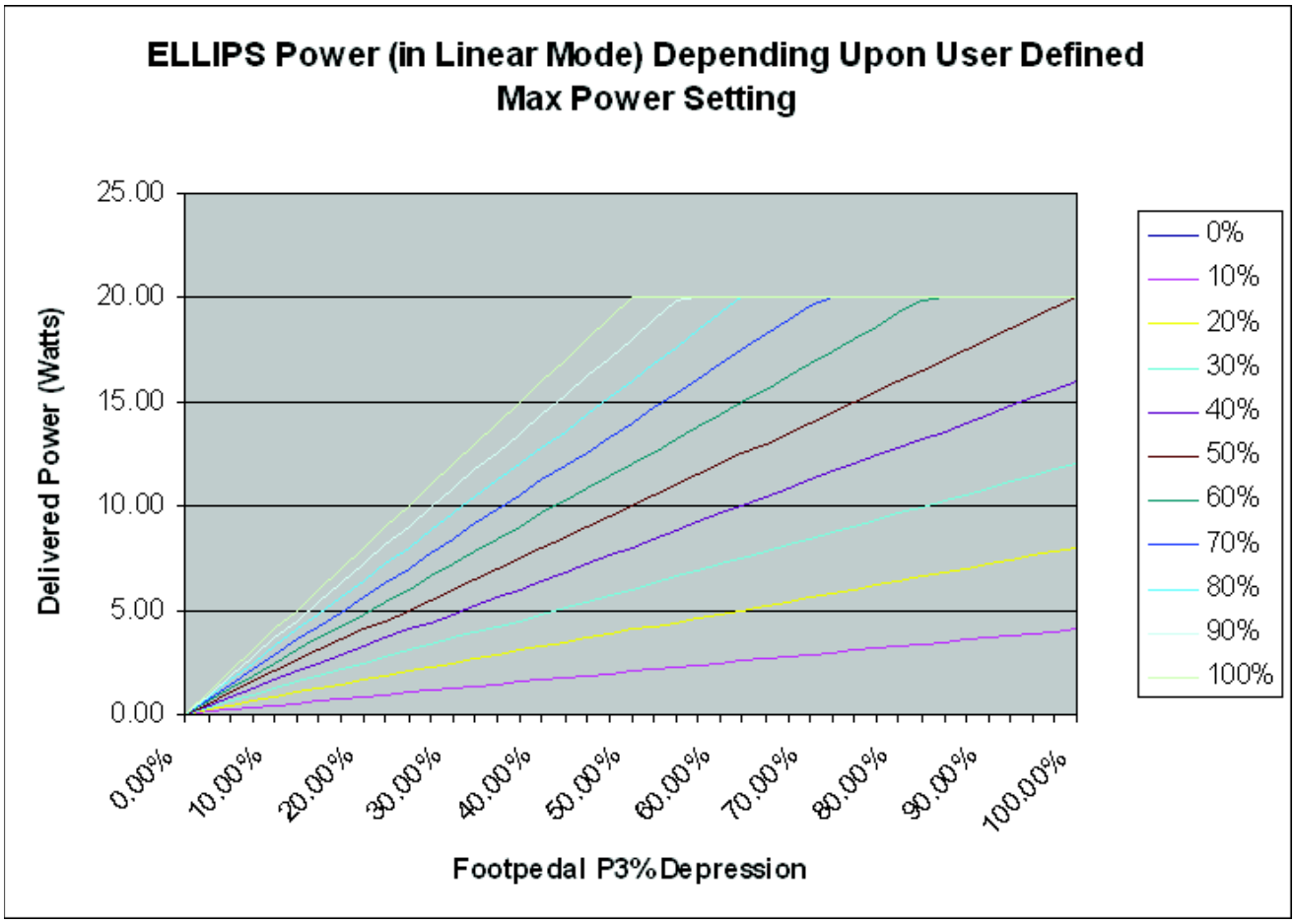
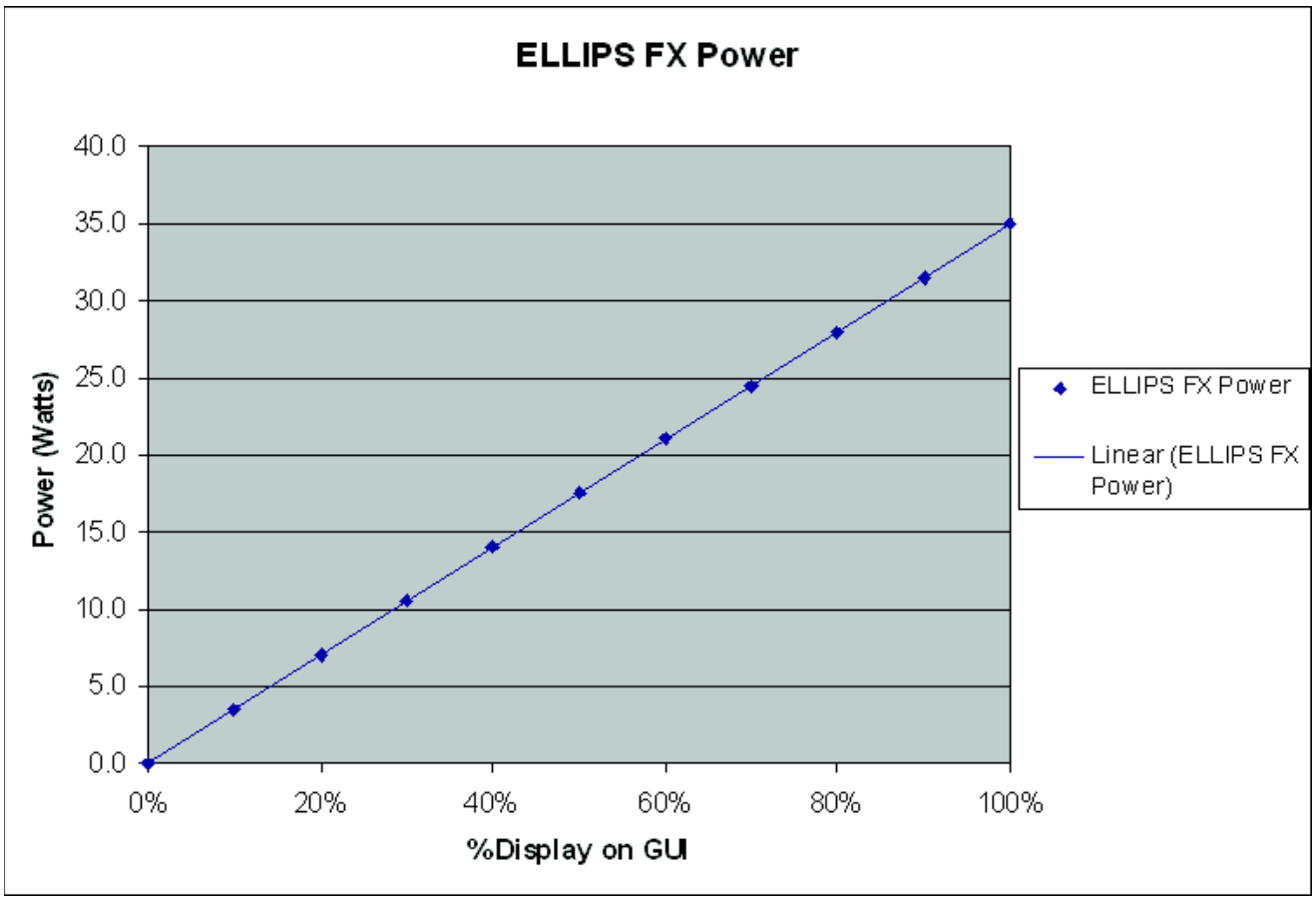


Table 10.20 – ELLIPS FX Phaco Power Linear Mode



11 ACCESSORIES AND PARTS REORDERING

Accessories and Parts List

Table 11.1 – WHITESTAR SIGNATURE System Part Number

Name	Description	Part Number
WHITESTAR SIGNATURE Console	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 your facility's volume of phacoemulsification procedures. You can order any of the items listed below through your **AMO** representative or directly through **AMO** customer service.

Table 11.2 – Accessories and Parts List

System Accessories	Description	Part Number
Phaco Handpiece	**AMO** Phaco Handpiece	SOV680290
	WHITESTAR Phaco Handpiece, Coaxial	690697
	ELLIPS Phaco Handpiece	690858
	ELLIPS FX Phaco Handpiece	690880
	19 Gauge **LAMINAR** Flow Phaco Tip, 0° Round Tip	OPOR0019L
	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

System Accessories	Description	Part Number
	19 Gauge **LAMINAR** Flow Irrigation Sleeve and Test Chamber	OPOS19L
	Disposable 20 Gauge **LAMINAR** Flow Infusion Sleeve and Test Chamber	OPOD20L
	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
I/A Handpiece	**PHACOFIT** Titanium Handle	OM055002
	PHACOFIT I/A Tip Curved 0.5 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 0.3 MM Port	OM0551011
	PHACOFIT I/A Tip Curved 0.3 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, 0.3mm Port	OM0551018
	PHACOFIT I/A Tip Straight 0.5 MM Port	OM0551019

System Accessories	Description	Part Number
	PHACOFIT Athlete I/A Tip Straight Type	OM0551020J
	PHACOFIT Athlete I/A Tip 45 Degree Type	OM0551021J
	DUET STARTER KIT, 20GA	DUA02020
	DUET ASPIRATION HANDLE	DU02100
	DUET IRRIGATION HANDLE	DU02200
	DUET 20G CURVED IRRIGATOR CLOSED END	DU02301
	DUET 20G CURVED ASPIRATION 0.3MM PORT CAP POL	DU02302
	DUET 19G FINE IRRIGATING CHOPPER	DU02303
	DUET 20G OLSON II IRRIGATING CHOPPER	DU02305
	DUET MST Aguirre Duet Tip	DU02325
	DUET MST Fine/Nagahara Tip	DU02335
Diathermy Handpiece	Bipolar Cord with Fischer Connection	K106075
	Bipolar Forceps, Curved Iris 0.5 mm Tip	K121085
	18 Gauge Straight Diathermy Pencil, reusable	K147000
Vitrectomy Cutter	20 gauge Vitreous Cutter	NGP0020
	23 gauge Vitreous Cutter	NGP0023
	25 gauge Vitreous Cutter	NGP0025
FUSION Tubing Pack	**FUSION** Tubing Pack (disposable, sterile)	OPO70
	FUSION Dual Pump Tubing Pack (disposable, sterile)	OPO71
Wireless Remote Control	**WHITESTAR SIGNATURE** System Remote Control	NGP680135
	WHITESTAR SIGNATURE System Remote Control (for software version 3.0 or higher)	NGP680136
Foot Pedal	**WHITESTAR SIGNATURE** Foot Pedal (Standard)	NGP680701
	Advanced Control Pedal for the **WHITESTAR SIGNATURE** Foot Pedal	NGP680702

System Accessories	Description	Part Number
Miscellaneous	Power Cord, Hospital Grade, 20 ft., 6.1 meters	2410-0049-L
	Foot Pedal Cable to **WHITESTAR SIGNATURE** System	0100-0055
	IA Cleaning Kit	OM05510114
	WHITESTAR SIGNATURE Dust Cover	0100-0750
	Sterilization Tray	MSR309
Operator's Manual	**WHITESTAR SIGNATURE** System Operator'sManual (Chinese)	NGP Z370333
	WHITESTAR SIGNATURE System Operator's Manual (Danish)	NGP Z370336
	WHITESTAR SIGNATURE System Operator's Manual (Dutch)	NGP Z370337
	WHITESTAR SIGNATURE System Operator's Manual (English)	NGP Z370338
	WHITESTAR SIGNATURE System Operator's Manual (Finnish)	NGP Z370340
	WHITESTAR SIGNATURE System Operator's Manual (French)	NGP Z370341
	WHITESTAR SIGNATURE System Operator's Manual (German)	NGP Z370342
	WHITESTAR SIGNATURE System Operator's Manual (Greek)	NGP Z370343
	WHITESTAR SIGNATURE System Operator's Manual (Italian)	NGP Z370345
	WHITESTAR SIGNATURE System Operator's Manual (Korean)	NGP Z370346
	WHITESTAR SIGNATURE System Operator's Manual (Norwegian)	NGP Z370349
	WHITESTAR SIGNATURE System Operator's Manual (Polish)	NGP Z370350
	WHITESTAR SIGNATURE System Operator's Manual (Portuguese)	NGP Z370351
	WHITESTAR SIGNATURE System Operator's Manual (Russian)	NGP Z370353
	WHITESTAR SIGNATURE System Operator's Manual (Spanish)	NGP Z370357
	WHITESTAR SIGNATURE System Operator's Manual (Swedish)	NGP Z370358

System Accessories	Description	Part Number
	WHITESTAR SIGNATURE System Operator's Manual (Turkish)	NGP Z370359
	WHITESTAR SIGNATURE System Operator's Manual (Bulgarian)	NGP Z370332
	WHITESTAR SIGNATURE System Operator's Manual (Croatian)	NGP Z370334
	WHITESTAR SIGNATURE System Operator's Manual (Czech)	NGP Z370335
	WHITESTAR SIGNATURE System Operator's Manual (Hungarian)	NGP Z370344
	WHITESTAR SIGNATURE System Operator's Manual (Estonian)	NGP Z370339
	WHITESTAR SIGNATURE System Operator's Manual (Latvian)	NGP Z370347
	WHITESTAR SIGNATURE System Operator's Manual (Lithuanian)	NGP Z370348
	WHITESTAR SIGNATURE System Operator's Manual (Serbian)	NGP Z370354
	WHITESTAR SIGNATURE System Operator's Manual (Slovakian)	NGP Z370355
	WHITESTAR SIGNATURE System Operator's Manual (Slovenian)	NGP Z370356
	WHITESTAR SIGNATURE System Operator's Manual (Romanian)	NGP Z370352
	WHITESTAR SIGNATURE System Operator's Manual CD, Multilingual	NGP Z370361

12 GLOSSARY

Term	Definition
Active Reflux	Reflux that occurs in response to a user request (typically by way of the foot pedal).
Active State	The state where the instrument responds to the foot pedal in all zones. All the surgical modes are operative.
Active Vacuum Vent	A controlled reversal of the peristaltic pump or by the vacuum regulator relieves the vacuum.
Advanced Control Pedal	A foot pedal for the **WHITESTAR SIGNATURE** 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 used to extract the 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 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 surges or a chamber collapse.
Pack	The tubing packs installed on the system connect the tubing on the handpieces to the vacuum and the 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.

Term	Definition
Controller	A processor or micro controller programmed to fulfill a specific task. It can be anything from a small 8-bit microprocessor to a PC-compatible system. The **WHITESTAR SIGNATURE** Systemhas the following controllers: GUI Host Processor, Instrument Host Processor, Fluidics Controller, Phaco-Diathermy (PD) Controller, Pneumatic Controller, Diagnostic Controller, IV Pole Controller, Remote Controller, Touch Screen Controller, Foot Pedal 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 with an electrical current.
DLL	Dynamic Link Library. A collection of software routines loaded on a system 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 that carry rapidly changing signals, as a by-product of their normal operation, and which induces unwanted signals (interference or noise) 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 ordrawing out fluids from the eye cavity during Phacoemulsification surgery.
Fluidics	The components and aspects of the system that involves 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 you press the foot pedal.
FUSION	The screen where you modify the occlusion mode, CASE mode, and actual maximum vacuum settings.
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 you position the IV pole 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.
IV Pole	The programmable pole used to position the irrigation solution during the phacoemulsification process.

Term	Definition
I/A	A general term for Irrigation/Aspiration, and a specific foot pedal configuration.
IAC	A vitrectomy mode that uses the irrigation, aspiration, and cutting sequences as you press the foot pedal.
ICA	A vitrectomy mode that uses the irrigation, cutting, and aspiration sequences as you press the foot pedal.
Irrigation	Causing the movement of fluid into/toward the eye by way of the irrigation line.
Irrigation Line	The fluid path within the handpiece that allows the clean balanced salt solution to travel from the bottle into the eye.
LCD	The liquid crystal display on the **WHITESTAR SIGNATURE** System.
Linear (Aspiration)	Diathermy power delivered from 5% to the maximum selected value (Maximum Power) as you press the foot pedal.
Linear Variable	Any switch on the foot pedal that you can set 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 rhreshold. The maximum value for a peristaltic pump is 650 mmHg.
Motor Venting	Used with both the **FUSION** Fluidics pack (OPO70) and the Dual Pump (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 a 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, for example the console and the remote control so that they can communicate with one another.
Panel (Aspiration)	Diathermy power delivered consistently at the power level (%) selected and indicated on the screen as Panel Maximum Power.
Pars Plana Incision	A surgical cut into the eyeball that passes through the sclera and the pars plana area of the cilary body, between the pars plans 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 use valve venting.

Term	Definition
Peristaltic	A flow based pump.
Phacoemulsification (Phaco)	The abbreviated term is 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 foot pedal.
Pneumatics	Components and aspects of the system that involve 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 caused when the phaco tip has a blockage during a procedure and then suddenly cleared. The surge can cause an imbalance of fluids that leave the eye and potential damage to the eye tissue.
Power Boost Mode	An operating mode in which you use the yaw movement of the Advanced Control Pedal to provide a temporary increase (boost) in phaco power.
Primary Venting Mechanism	A venting mechanism (valve, motor) the host software selects 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 decreases to maintain a manageable rate of vacuum rise.
Pulse Shape	A feature of **WHITESTAR** Technology which allows the user to define a "kick" of increased power at the beginning of a **WHITESTAR** pulse over a range of phaco power settings.
Reflux	Fluid that moves into/toward the eye by way of the aspiration port/ line. The reverse flow within the aspiration line 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 a method for clearing a clogged handpiece. However, use reflux to identify a blockage.
Remote Control	A user interface control for the GUI system through a wireless connection. The remote control button commands control the GUI software.
Safe State	A state where the phaco, vitrectomy, diathermy, and fluidics functions are not on, with irrigation on and the fluid vented. The instrument and the foot pedal will not work. As a result, all the surgical modes become inoperable.

Term	Definition
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.
Standard Foot Pedal	A foot pedal 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 connects 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 the software, 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	Standard vacuum is controlled via the pitch to the programmed maximum. Vacuum on the pitch can be linear or panel. Vacuum boost is an operating mode in which you use the yaw movement of the Advanced Control Pedal to provide a temporary increase (boost) above the programmed maximum setting. Vacuum boost is linear from the maximum programmed vacuum up to 650 mmHg (peristaltic) or 1.5 * programmed maximum (Venturi).
Vacuum Ramp	Allows for a slower build rate for vacuum while in Venturi mode.
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 vents through the aspiration line.
Valve Venting	Used with OPO70 pack only. Manipulation of the fluidic connections to cause fluid from the irrigation bottle to move toward the aspiration port to vent. Typically this results in passive reflux.
Variable WS	A mode where the user can define the **WHITESTAR** Technology delivery based on the foot pedal position.

Term	Definition
Venting	Relieving vacuum in the aspiration tube. Typically the system vents when the Foot Pedal moves from position 2 into position 1 or 0.
Venturi	A vacuum based pump. When you use Venturi, vacuum boost cannot exceed 600 mmHg. Therefore, if 1.5 times maximum vacuum exceeds 600 mmHg, vacuum boost is limited to 600 mmHg.
Vitrectomy	The removal of vitreous with a needle-like cutter that has fluid injection capability and suction capability.
WHITESTAR Technology	A proprietary software technology delivers finely modulated pulses of energy, interrupted by extremely brief cooling periods.
Yaw	The horizontal movement of the foot pedal that works from either the left or the right of the foot pedal.
Yaw Threshold	The allowable programmed yaw movement before the yaw switch activates on the foot pedal.

13 INDEX

A

Accessories 11-1
Active Reflux 12-1
Active State 12-1
Add a Surgeon 6-3
Adjusting
    Cut Rates 5-32
    Flow Rate 5-31
Advanced Control Pedal 1-4, 1-15, 2-5, 7-6, 10-2, 12-1
Anterior Chamber 12-1
Anterior chamber too deep 8-40
Anterior Mode 12-1
Anterior Segment 12-1
    Settings 5-37
    Surgery 3-2
Anterior Segment Surgery 5-1
Aspiration 12-1
    Specifications 10-3
    Troubleshooting 8-40
Aspiration Flow Rate 5-31
Aspiration Rate
    Occlusion 5-46
    Phaco 5-8
    Vitrectomy 5-18
Assign Order 6-14
Autoclave 7-4

B

Backlight button 8-38
Balance
    Irrigation/Aspiration 4-12
Balanced salt solution 3-6
Batteries
    Foot Pedal 7-6
    Remote control 2-9
Begin Tune 4-11
Blocked
    Aspiration port 5-49
BLUETOOTH 8-38
Bottle Height
    IA 5-26
    Phaco 5-27
    Vitrectomy 5-29
Burst 5-3
Burst Mode 12-1
Bypass 4-9, 4-13

C

Calibration
    Touch Screen 3-31
Care of the System 7-6
CASE 5-7, 12-1
CASE Mode 5-41
CASE ONE Touch 1-7, 5-44
CASE Vacuum 5-17
Cassette
    Loading 3-5
Chamber partially collapses 8-41
Changing
    Irrigation 1-8
    Mode Parameters 4-14
Charging
    Foot Pedal 7-6
    Wireless Remote Control 2-9
Check-out 3-37
    Irrigation/Aspiration 3-38
    Phacoemulsification 3-37
    Vitrectomy 3-38
Cleaning
    Handpiece 7-2

System 7-6
Common Problems 8-5
Compatible Surgeon Programs 12-1
Complete
Setup 3-6
Configuration 4-15
Connecting Handpieces 1-9
Connections
Rear Panel 3-3
Console Dimensions 10-2
Continuous Burst 5-37
Phaco Power 5-41
Continuous Burst Phaco Power 12-2
Continuous Irrigation 1-5, 4-9
Cup Fill 4-11
IA 5-26
Phaco 5-27
Continuous irrigation 5-6
Continuous Phaco Power 5-38, 12-1
Continuous Power 5-37
Controller 12-2
Controls
Screens 4-2
Copy a Program 6-10
Cup Fill 4-9, 4-11
Custom Duty Cycles 5-12
Cut Mode
Vitrectomy 5-30
Cut Rate
Adjusting 5-32
Vitrectomy 5-18, 5-30
Cuts per minute 5-32
Cutter
Vitrectomy 3-13
Cutting Rates
Vitrectomy 5-32

D

Database 4-3
Delete 6-13
Program 6-14
Restore 6-13
Default Program 4-7, 5-23
Default Settings
Diathermy 5-26
Footpedal 5-25
Irrigation/Aspiration 5-26
Phaco 5-27
Vitrectomy 5-29
Delete
Database 6-13
Program 6-12, 6-13
Surgeon 6-11
DIA time 5-3
Diagnostics 4-3, 8-1
Diathermy 1-6, 1-10, 5-2, 12-2
Default Settings 5-26
Forceps 3-12
Handpiece 7-3
Output Power 10-10
Power 10-10
Power Graphs 10-5
Specifications 10-3
Troubleshooting 8-42
Using 5-3
Voltage 10-12
Diathermy Handpiece
Part Numbers 11-4
Dimensions 10-2
DLL 12-2
Drainage bag 3-5
DT 5-3
Dual Pump 1-5
Dual Pump Pack 12-2
Duty Cycles 5-10

E

Edit
Program 6-9
Surgeon 6-5
Effective Phaco Time 5-35
Electrical
Specifications 10-3
ELLIPS Handpiece 1-4, 3-4
ELLIPS Technology 12-2
EMI 12-2
End Case 4-2, 5-33
Environmental

Specifications 10-3
EPT 5-35
Error Messages 8-2, 8-6
Evacuation 12-2
Extraction 12-2

F

Failed to pair 8-38
Feedback
Foot Pedal 5-25, 5-26
Flash Sterilization 7-4
Flow Rate
Adjusting 5-31
Fluidics 1-3, 12-2
Error Messages 8-6
Fluidics Mode
Phaco 5-28
Fluidics Pack 12-2
Foot Pedal 1-4, 2-4, 2-5, 4-2
Advanced Control Pedal 1-15
Charging 7-6
Feedback 5-25, 5-26
Modes
Vitrectomy 5-22
Part Number 11-4
Pitch 2-6
Pitch Regions 5-25
Positions 2-7, 5-11
Settings 5-25
Standard 5-20
Specifications 10-2
Standard 1-4, 2-5
Summary, Standard 5-25
Vitrectomy 5-18
Forceps 9-2
Diathermy 3-12
FPn 12-2
Fuse
Location 8-4
Replacement 8-3
FUSION 12-2
FUSION Fluidics 5-17, 5-45
FUSION Tubing Pack 2-3, 11-4

G

Gas Sterilization 5-31, 7-4
General
Troubleshooting 8-37
Graphic User Interface 1-5
Graphs
Diathermy Power 10-5
Phaco Power 10-13
Gravity Displacement Sterilization 7-4
Gravity Infusion 12-2
GUI 1-5

H

Handpiece
Cleaning 7-2, 7-3
Connecting 1-9
IA 3-5
Phaco 3-4
Priming 4-10
Ultrasonic 1-9
Warranty 9-2
Help 8-2
High Power
Limit 5-15
Pulse 5-37
High Power Pulse
Phaco Power 5-40
High Power Pulse Phaco Power 12-2

I

IA
Handpiece 3-5
Submodes 5-5
IAC 5-22, 12-3
ICA 5-22, 12-3
ICE Pulse Shaping
WHITESTAR Technology 5-15
Inspection Instructions 2-2
Install Tubing Cassette 4-7
Irrigation
Changing 1-8

Continuous 4-9, 5-6
Flow does not stop 8-39
Inadequate 1-9
Specifications 10-3
Troubleshooting 8-39
Irrigation Line 12-3
Irrigation Sleeve 2-4
Irrigation/Aspiration 1-7, 5-4
Balance 4-12
Check-out 3-38
Default Settings 5-26
IV Pole
Does not work 8-39
Programmable 1-10, 2-8, 5-4

K

Kick 5-15

L

LAMINAR Flow 3-5
Linear 5-2, 5-3, 5-31
Occluded Power 5-48
Linear Variable 12-3
Load
Impedance 10-10
Resistance 10-10
Locked Program 6-13
Long Pulse
Phaco Power 5-39
Power 5-37
Long Pulse Phaco Power 12-3
Low batteries 8-38
Low Power
Limit 5-15
Pulse 5-37
Low Power Pulse
Phaco Power 5-40
Low Power Pulse Phaco Power 12-3
Lower Threshold 5-17

M

Maintenance 4-3, 9-3
Touch Screen 3-31
Max Aspiration
IA 5-26
Vitrectomy 5-30
Max Power
Diathermy 5-26
Max Vacuum 5-10
IA 5-26
Vitrectomy 5-29
Maximum Vacuum 5-5, 5-9, 5-16, 5-19, 5-31, 5-32, 12-3
Mayo Stand Drape 2-4
Messages
Error 8-2
Minimum Vacuum 5-5, 5-9, 5-19, 5-31, 5-32
Miscellaneous Part Numbers 11-5
Mode Programming 1-6
Modes
Changing Parameters 4-14
How to program 5-23
Monitor Drape 2-4
Motor Venting 12-3
Multiple Burst
Phaco Power 5-40
Power 5-37
Multiple Burst Phaco Power 12-3
Multiple Mode Programming 1-6

N

No aspiration 8-40
No diathermy or poor diathermy 8-42
No irrigation flow 8-39
No phacoemulsification 8-41
No sound when using diathermy 8-42
No vacuum 8-41
No vitrectomy cutting 8-42
Non-zero start 5-5, 5-9, 5-19, 5-31, 5-32

O

Occluded Aspiration Rate 5-45
Occluded Phaco 5-7
Occlusion
    Aspiration Rate 5-46
    Threshold 5-10
    Vacuum Threshold 5-46
    Venting 5-49
Occlusion mode phaco
    Settings 5-41, 5-45
One Touch
    CASE 5-44, 12-3
Operating Modes 1-6, 12-3
    Anterior Segment 5-1
Operating the Equipment 4-2
Output Power
    Diathermy 10-10
Override Settings 5-41

P

Pack 12-1
Pairing 12-3
    Instructions
        Wireless Remote Control 3-30
    Wireless Remote Control 8-38
Panel 5-2, 5-3, 5-31
    Occluded Power 5-48
Parameter Settings
    WHITESTAR Technology 5-11
Parameters
    Programming 1-5
Pars Plana Incision 12-3
Parts 11-1
Passive Reflux 5-49, 12-3
Pencil Probe
    Diathermy 3-12
Percent Kick
    High End of Range 5-15
    Low End of Range 5-15
Peristaltic Pump 10-3
Phaco
    Default Settings 5-27
    Program 5-9
    Submodes 5-8
    Using 5-8
Phaco Handpiece 1-4, 1-9, 3-4, 7-2
    Part Numbers 11-2
Phaco Power 5-7, 5-37
    Continuous 5-38
    Graph 10-13
Phacoemulsification 1-2, 1-6, 1-9, 3-3, 3-37, 5-7, 8-41, 10-4
    Check-out 3-37
    Specifications 10-4
    Troubleshooting 8-41
Physical Specifications 10-2
Pitch 2-6, 12-4
Pitch Regions
    Footpedal 5-25
Poor aspiration 8-40
Poor phacoemulsification 8-41
Positions
    Foot Pedal 2-6
Post Occlusion Surge 12-4
Power
    Continuous 5-37
    Continuous Burst 5-37
    Cord Length 10-2
    Failure 1-9
    High Pulse 5-37
    Long Pulse 5-37
    Low Pulse 5-37
    Multiple Burst 5-37
    Phaco 5-8, 5-37
    Short Pulse 5-37
    Single Burst 5-37
    Switch 8-5
Power Boost Mode 12-4
Power Delivery
    Diathermy 5-26
pps 5-39
Precautions 3-37
    Safety 1-7
Preferred Program 6-6
Prevacuum Sterilization 7-4
Primary Venting Mechanism 12-4
Prime

Bypass 4-9
Prime/Tune 1-5, 3-37, 4- 2, 4-8, 4-9, 4-10, 4-11, 5-3
Priming
Handpiece 4-10
Vitrectomy 4-13
Problems
Common 8-5
Program 4-2
Assign Order 6-14
Configuration 5-23
Database 6-14
Defaults 5-23
Delete 6-12
Edit 6-9
Lock 6-13
Locked 6-13
Preferred 6-6
Select 4-5
Surgeon 6-1
Programmable IV Pole 1-6, 1-10, 2-8, 3-6, 5-4
Specifications 10-2
Programming
PHACO 5-9
Programming Mode 12-4
Pulse
Off Time 5-11
On time 5-11
Pulses per second 5-39
Rate 5-11
Shape 12-4
Pulse Shaping 5-13
Pump not working 8-41
Pump Ramp 12-4
Pump Ramp Threshold
IA 5-27

R

Rear Panel 3-3
Reduced/insufficient irrigation flow 8-39
Reflux 2-7, 12-4
Passive 5-49
Remote Control
Wireless 2-9
Remote Pair 3-30
Reordering 11-1
Replacing
Batteries 8-2
Fuse 8-3
Reset
Timers 4-12
Restore
Database 6-13
Restriction of Hazardous Substances 1-18
RoHS 1-18

S

Safe State 12-4
Screens
Controls 4-2
Secondary Venting Mechanism 12-5
Select Program 4-7
Selecting a Language 4-4
Self Test 4-5
Settings
Anterior Segment 5-37
How to program 5-23
Occlusion Mode 5-45, 5-48
Occlusion mode phaco 5-41
Override 5-41
Submode Parameters 5-4
Setup
Completion 3-6
Sequence 3-2
System 3-37
Short Pulse
PHACO Power 5-39
Power 5-37
Short Pulse Phaco Power 12-5
Shutdown
Sequence 3-39
Side VIT 5-22
Side vitrectomy 5-22
Single Burst
Phaco Power 5-40
Power 5-37

Single Burst Phaco Power 12-5
Sleep Mode 8-38
SMC (Surgical Media Center) 2-10, 3-36
SOLO Handpiece 3-5
Sounds 4-2
Specifications
  Diathermy 10-3
  Electrical 10-3
  Environmental 10-3
  Foot Pedal 10-2
  Fuse 8-3
  IA 10-3
  IV Pole 10-2
  Phacoemulsification 10-4
  Physical 10-2
  Vitrectomy 10-4
Standard Foot Pedal
  Settings 5-20
Start Vit Prime 3-38
Startup 4-5
Status 8-5
STD Surgeon 6-2
Sterilization 3-35, 7-4
  Gas 7-4
  Gravity Displacement 7-4
  Prevacuum 7-4
Storage Conditions 10-3
Submode
  IA 5-5
  Parameters 5-4
  Phaco 5-7, 5-8, 5-41
Surgeon
  Add 6-3
  Copy 6-10
  Delete 6-11
  Edit 6-5
  Select 6-1
  STD 6-2
Surgeon/Program
  Select 4-5
Surgeons and Programs 4-15
Surgical Media Center (SMC) 2-10, 3-36
Symbol Definitions 1-13
System
  Check-out 3-37
  Cleaning 7-6
  Components 2-2
  Configuration 12-4
  Console 1-5
  Default Settings 5-24
  Description 1-2
  Disposal 1-16
  Does not turn on 8-37
  Self Test 4-5
  Shutdown 3-39

T

Technical Service 8-5
Tenting the Incision 12-5
Test Chamber 2-4, 11-3
Threshold
  Vacuum 5-46
Timers
  Reset 4-12
Touch Screen
  Calibration 3-31
  Does not respond 8-39
  Using 4-14
Troubleshooting 3-37, 8-1
  Aspiration 8-40
  Diathermy 8-42
  General 8-37
  Irrigation 8-39
  Phacoemulsification 8-41
  Vitrectomy 8-42
Tubing Cassette 2-3
  Install 3-5, 4-7
Tune 4-9
  Begin 4-11

U

Ultrasonic (U/S) Time 5-35
Ultrasonic Handpiece 1-9
Unoccluded Phaco 5-7
Unpair 8-38
Up Time
  Threshold 5-17

Upper Threshold 5-17
Using
  Diathermy 5-3
  Phaco 5-8
  too much fluid 8-40
  Touch Screen 4-14
  Vitrectomy 5-19

V

Vacuum 5-33
  Maximum 5-31, 5-32
  Minimum 5-31
  monitoring 5-16
  Phaco 5-8
  pressure 5-49
  Vacuum Boost Mode 12-5
  Vacuum Ramp 12-5
  Vitrectomy 5-18
Vacuum Rate
  Linear 5-31
  Panel 5-31
Vacuum Regulator Venting 12-5
Vacuum Vent 12-1
Valve Vent 12-5
Variable WHITESTAR Technology 5-12
Variable WS 5-12, 12-5
Venting 12-6
  Occlusion 5-49
Venturi pump 5-17
Vitrectomy 1-7, 1-10, 3-13, 5-18
  Advanced Control Pedal Modes 5-23
  Check-out 3-38
  Cut Rate 5-32
  Cutter 1-9
  Default Settings 5-29
  Foot Pedal Modes 5-22
  Prime 4-13
  Specifications 10-4
  Troubleshooting 8-42
  Using 5-19
Voltage
  Diathermy 10-12

W

Wake-up 2-7
Warnings 1-7, 1-11
Warranty 9-1
Watts 10-5, 10-14
WHITESTAR ICE Technology 1-3
WHITESTAR Technology 1-3, 5-10
Wireless Remote Control 1-4, 1-10, 2-9
  Charging 2-9
  Does not pair 8-38
  Part Number 11-4
  Setup 3-30, 3-31

Y

Yaw 2-6, 12-6
  Yaw Threshold 12-6