PAIN MANAGEMENT SYSTEMS

HALYARD

# PAIN MANAGEMENT GENERATOR SERVICE MANUAL

PMG-115 Basic

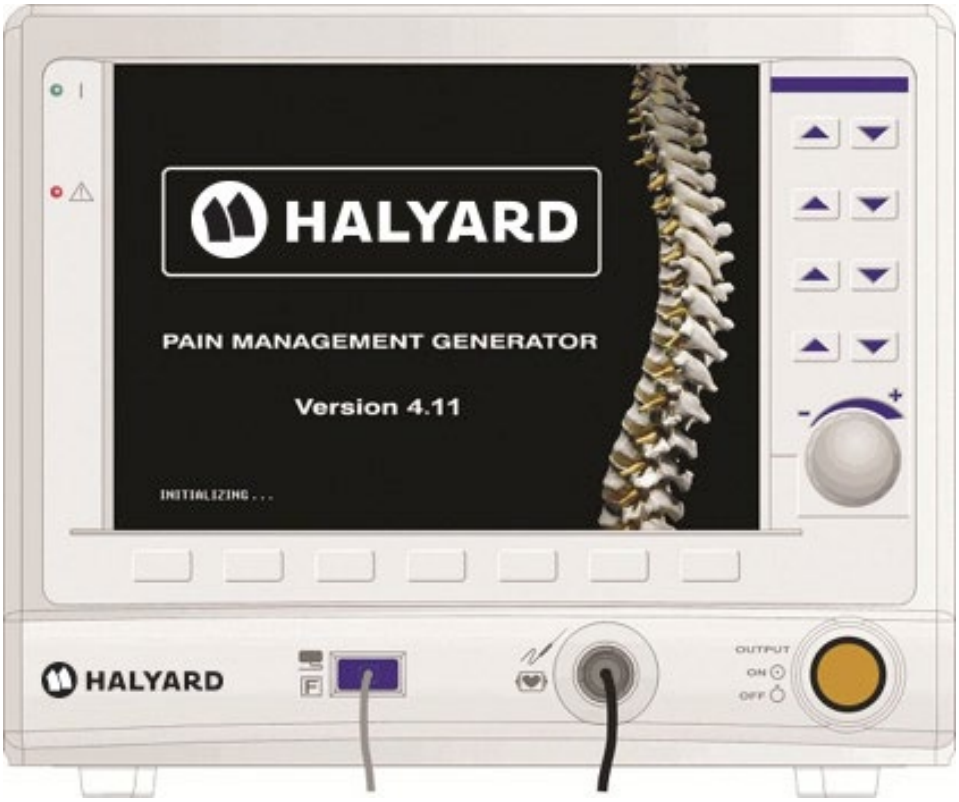
PMG-115-TD Advanced

PMG-230 Basic

PMG-230-TD Advanced

PMG-Basic

PMG-Advanced



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## 1 Introduction

Halyard Health is a medical technology company focused on preventing infection, eliminating pain and speeding recovery. Just as a halyard fuels forward movement, Halyard's clinically-superior products and remarkable service help to advance health and healthcare worldwide. Halyard sells its recognized brands and products in more than 100 countries, and holds leading market positions in multiple categories across the portfolio. Formerly part of Kimberly-Clark, Halyard became an independent company on November 1, 2014. For more information, visit www.halyardhealth.com.

The system presented in this Service Manual consists of the Halyard Health (KIMBERLY-CLARK*) Pain Management Generator (PMG) (formerly known as the Baylis Pain Management Generator). For the user's convenience, the Halyard Health (KIMBERLY-CLARK*) Pain Management Generator will be referred to in this Service Manual as the "Generator" or "PMG". This manual applies to the PMG and accessories.

NOTE: The PMG is also referred to as the Halyard Health (KIMBERLY-CLARK*) Radiofrequency (RF) Generator on the packaging labeling.

This Service Manual provides a description of the Generator, its controls and displays, a list of error messages and technical specifications.

### 1.1 Glossary of Terms

| Term | Definition |
|---|---|
| 1-Shot | A possible value for the STIM RATE in the STIMULATION modes. If selected, only one stimulus pulse is delivered when the output is turned on. |
| Cannula | A metal tube that is electrically insulated along its length, with exception to an exposed tip from which electrical currents flow. |
| COOLED RF | A group of states specifically designed to allow for the use of water-cooled probes to allow more power to be dissipated in tissue, resulting in a larger lesion at a lower temperature. |
| Dispersive Electrode | An adhesive pad with a large electrically active surface area used in monopolar RF modes, as well as in certain Placement States. Often referred to as a "grounding pad", or as a "return electrode." |
| DONE | State of the Generator when RF energy has been terminated. |
| Footswitch | A pneumatic device that connects to the back of the PMG and allows hand-free starting and stopping of RF and Stimulation output. |
| IDL | Intradiscal Lesioning |
| IFU | Instructions For Use |
| Impedance | The effective resistance to the flow of current in a circuit. |
| Lesion | A localized pathological change in a bodily organ or tissue. |
| Mode | A group of states (usually READY, ON, and DONE) that comprise the machine steps necessary to complete a procedure. The modes for this Generator include: Current Stimulation, Voltage Stimulation, Auto Temp Lesion, Manual Power Lesion, Auto Pulsed Lesion, Manual Pulsed Lesion, Cooled RF, TransDiscal, RFA, and IDL. |

| Term | Definition |
|---|---|
| Multi-RF | Multi-Radiofrequency |
| ON | State of the Generator when RF energy is applied to the probes and dispersive return electrode if applicable. |
| PDT A | The Peripheral Disc Temperature as relating to TDP A (TRANSDISCAL* Probe A) |
| PDT B | The Peripheral Disc Temperature as relating to TDP B (TRANSDISCAL* Probe B) |
| PMG | Pain Management Generator |
| POST | The state of the Generator when Power-On-Self- Tests are performed. |
| PULSE DUR | A setting that applies to VOLTAGE STIMULATION, CURRENT STIMULATION, AUTO PULSED LESION, and MANUAL PULSED LESION modes. In the STIMULATION modes, it describes the length of time of one stimulus pulse. In PULSED LESION modes (MANUAL AND AUTO) it describes the length of time of the RF pulse. |
| PULSE RATE | A setting that applies to AUTO PULSED and MANUAL PULSED modes. It describes the number of RF bursts of duration PULSE DUR and is measured in Hz. |
| Pump | Refers to Pain Management Peristaltic Pump Unit (TDA-PPU-1) |
| RAMP RATE – COOLED RF MODE | A setting that is adjustable in ADVANCED SETTINGS mode, and applies to COOLED RF mode. It is the rate at which the Generator heats to the SET TEMP. |
| RAMP RATE – IDL MODE | Setting that is adjustable in ADVANCED SETTINGS mode, and applies to IDL mode. It is the rate at which the Generator heats from the INITIAL TEMP to the SET TEMP. |
| RAMP RATE – TRANSDISCAL MODE | A setting that is adjustable in ADVANCED SETTINGS mode, and applies to TRANSDISCAL mode. It is the rate at which the Generator heats to the SET TEMP. |
| RAMP TIME – AUTO TEMP LESION AND AUTO PULSED LESION MODES | A setting that is adjustable in ADVANCED SETTINGS mode – LESION SETTINGS, and applies to the AUTO TEMP LESION and AUTO PULSED LESION modes. It is the rate at which the Generator heats to the SET TEMP. |
| RAMP TIME – RFA MODE | A setting that is adjustable in ADVANCED SETTINGS mode – RFA. It is the rate at which the Generator heats to the SET TEMP. |
| READY | State of the Generator where settings can be adjusted and other modes of operation can be chosen prior to RF application. |

## 1.1 Glossary of Terms

| | |
|---|---|
| RF | Radiofrequency |
| RFA | Radiofrequency Annuloplasty |
| RF Probe | A slender, flexible surgical instrument used to deliver stimulation and RF output to bodily organs or tissues. |
| STANDBY | State of the Generator when a valid probe must be connected prior to proceeding to the applicable READY state for the probe. |
| STATE | A function of the Generator where a basic task is performed. For instance, the READY state for any mode allows settings to be changed and allows RF energy to be initiated. The states of the Generator include STANDBY, PLACEMENT, READY, ON, DONE, ADVANCED SETTINGS. |
| STIM RATE | A setting that applies to VOLTAGE STIMULATION and CURRENT STIMULATION modes. It describes the number of stimulus pulses delivered in a second, and is measured in Hz. |
| Stylet | A fine wire that is run through a cannula, to keep it stiff or clear of debris. |
| Switching Cable | Either of TDX-BAY-TSW (TRANSDISCAL* Switching Cable) or PMX-BAY-RSW (RFA Switching Cable), used to aid in the placement of secondary probes or thermocouples. |
| TC | Thermocouple |
| TD | TRANSDISCAL |
| TDP | TRANSDISCAL* Probe |
| TDP A | TRANSDISCAL* Probe A |
| TDP B | TRANSDISCAL* Probe B |
| TEMP | Temperature |
| Thermocouple | A thermoelectric device used to measure temperatures accurately, consisting of two dissimilar metals. |
| TRUE-TX Ramp Time Extension | A feature that will maintain the time at the Set Temperature and generate a notification if probes are in a configuration that prevents the set temperature from being reached in the specified Ramp Time. |
| Y-Cable | Any of TDX-Y-TSW-TDP (TRANSDISCAL* Y-Cable), resembling the characteristic shape of the letter “Y”. |

## 2 Indicated Use

Halyard Health (KIMBERLY-CLARK*) Pain Management Generator Model PMG-115 Basic, PMG-115-TD Advanced (For Domestic Use), Model PMG-230 Basic, PMG-230-TD Advanced (For International Use) , PMG – Basic and PMG – Advanced are indicated for use to create lesions during neurological lesion procedures, and for the coagulation and decompression of disc material to treat symptomatic patients with contained herniated discs. The PMG is to be used in conjunction with separately approved probes.

- The Generator supplies up to 50 Watts of Radiofrequency energy at 460 kHz under power, voltage, or temperature control while continuously monitoring and displaying actual power and voltage delivered, measured probe temperature(s), time of power duration, and measured impedance. The use of a dispersive return electrode is specified in the accompanying IFUs of probes and cables.

The Generator is also intended to stimulate nerve cells by delivering low-frequency pulses in either voltage or current controlled modes to aid in probe placement.

The Generator is rated as Class 1, Type CF (rated for continuous operation) as per IEC-60601-1:2005.

**Caution!**

Rx Only: Federal (U.S.A) law restricts this device to sale by or on the order of a physician.

## 3 Warnings and Precautions

The safe and effective use of RF energy is highly dependent upon factors under the control of the operator. There is no substitute for a properly trained operating room staff. It is important that the operating instructions supplied with the Generator be read and understood before use.

### 3.1 Warnings

- **Read before use:** Read the User Manual and refer to this Service Manual for additional information where necessary.
- **Improper line voltage selection may cause malfunction or damage to the instrument:** The Voltage Selector and Fuse Drawer must BOTH be set to the same voltage. They are located on the rear panel of the instrument (the fuse drawer is located in the power entry module). An improper voltage setting may result in Generator malfunction and potential instrument damage. The Voltage Selector is factory set and should not be changed by the user. (V4.1 and older units).
- **Risk of Electric Shock:** To avoid risk of electric shock, this equipment must only be connected to supply mains with protective earth.
- **Risk of Fire:**
  - Do not use in the presence of flammable anesthetics, other flammable gases, near flammable fluids (such as skin prepping agents and tinctures), flammable objects or with oxidizing agents. Observe appropriate fire precautions at all times.
  - Do not use this device in oxygen-enriched atmospheres, nitrous oxide ($N_2O$) atmospheres, or in the presence of other oxidizing agents.
- **Risk of RF burns to the patient:**
  - While using this device during a procedure, the patient should not be allowed to come into direct contact with grounded metal objects such as surgical table frame, the instrument table, etc. The use of antistatic sheeting is recommended for this purpose.

- Place monitoring electrodes as far away from the treatment site as possible, to avoid burns or interference with other equipment. The use of needle monitoring electrodes (or other small-area electrodes) during RF output is not recommended. In all cases, monitoring systems incorporating HIGH FREQUENCY current limiting devices are recommended.
- Use only with a Halyard Health (Kimberly-Clark) or Baylis Pain Management Dispersive Electrode. Always select a dispersive electrode designed to be compatible with the available contact quality monitor.
- Unless a compatible Monitoring Dispersive Electrode is used with a Contact Quality Monitor, loss of safe contact between the Dispersive Electrode and the patient will not result in an auditory alarm.
- Skin-to-skin contact (for example between the arms and body of the PATIENT) should be avoided.
- Failure of the Generator or accessories could result in an unintended increase of output power.
- Do not use the Multi-RF Module with the Halyard Health ( Kimberly-Clark) Pain Management Brain Lesion Probe (PME-B), Cordotomy Probe (PME-C), or DREZ Probe (PME-D).
- Do not use the Multi-RF Module with the Halyard Health (Kimberly-Clark) or Baylis Pain Management Bipolar Adaptor (PMA-BP).
- **Interference with active implants:** During RF output, implanted devices such as pacemakers may be affected. Qualified advice should be obtained as necessary, to minimize the risk of injury from implanted device malfunction.
- **Interference with other equipment:** During RF output (lesion modes), the conducted and radiated electrical fields may interfere with other electrical medical equipment.
- **Unintended Neuromuscular Stimulation:** The use of RF energy can produce unintended neuromuscular stimulation during ablation. Appropriate precautions, including the use of lower power settings and continuous monitoring of the patient during treatment, should be taken to minimize the risk of patient injury.
- **User Modifications:** User modifications to the PMG can result in safety hazards. No user modification of the equipment is allowed.

### 3.2 Precautions

- Do not activate the output of the Generator until the probe is properly positioned in the patient.
- In STIMULATION, LESION, COOLED RF, TRANSDISCAL and RFA modes, ensure that the dispersive return electrode is connected to the Generator and properly attached to the patient.
- In Multi-RF STIMULATION mode, connect one probe at a time to the Multi-RF module to display individual impedance readings for placement purposes.
- The entire area of the neutral electrode should be reliably attached to the patient's body

and as close to the operating field as possible.

- The PMG may be used without a dispersive return electrode in some modes. Please refer to accompanying IFUs for related probes and cables.
- The activation tone and light are important safety features. Do not obstruct the activation light. Do not disable the activation audible tone.
- Do not remove the cover of the Generator, as there is a potential for electrical shock. Refer to authorized personnel for service.
- The mains power cord of the Generator must be connected to a properly grounded receptacle. Extension cords and/or adapter plugs must not be used.
- Do not wrap instrument cable around metal objects. Wrapping cables around metal objects may induce hazardous currents.
- The cables to the surgical electrodes should be positioned in such a way that contact with the PATIENT or other leads are avoided. Temporarily unused ACTIVE ELECTRODES should be stored in a location that is isolated from the PATIENT.
- Avoid high frequency output settings where the Maximum Output Voltage may exceed the rated accessory voltage.
- The output power should be as low as possible for intended purpose (applies to Manual modes).
- The application of the Neutral Electrode and its connections to be checked before selecting a higher output power.
- For surgical procedures where the high frequency current could flow through parts of the body having a relatively small cross sectional area, the use of BIPOLAR techniques may be desirable in order to avoid unwanted tissue damage.
- Perform regular inspections of all accessories, including electrosurgical cables and probes, for damage to insulations.
- Associated Equipment and Active Accessories should be selected that have a Rated Accessory Voltage equal to or greater than the Maximum Output Voltage.
- For information on the connection and disconnection of detachable parts and accessories, refer to the Instructions for Use for the corresponding probe or cable.
- Care should be taken to avoid the danger of ignition of endogenous gases.
- The PMG needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in this document.
- Electronic equipment, including portable and mobile RF communications equipment, can affect the operation of the PMG. Operating non-essential equipment in the vicinity of the PMG should be avoided, if possible.
- The PMG should not be used adjacent to or stacked with other equipment. If the PMG must be operated adjacent to or stacked with other equipment, the PMG should be observed to verify normal operation in that configuration.
- Use of accessories, transducers and cables other than those specifically approved by Halyard Health for use with the PMG may result in increased electromagnetic emissions or

decreased electromagnetic immunity of the PMG.

- In Multi-RF Auto Temp mode, and in Multi-Cooled RF Auto Temp mode, maintain a minimum distance of 10 mm between probe tips and ensure that the probe tips do not touch.
- When using the PMG with the pump unit accessory (TDA-PPU) refer to the pump IFU for information on proper setup and operation.

## 4 Installation

Inspect the Generator for any signs of physical damage to the front panel, chassis or cover. If any physical damage is found, DO NOT USE THE GENERATOR. CONTACT (Halyard Health) Kimberly-Clark for a replacement. (Halyard Health, formerly Kimberly-Clark Health Care) must approve all returns.

### 4.1 Preparing the Generator for Use

- The Generator may be placed on a mounting cart or on any sturdy table or platform.
- Provide at least 10-15 cm of space behind the rear panel of the Generator for forced air-cooling. Do NOT obstruct the vents on the underneath of the Generator. Under continuous use for extended periods of time, it is normal for the top and rear panel to be warm.

### 4.2 Mains Power Cord

- The Generator is shipped with an approved hospital-grade mains power cord.
- Do not use extension cords or three-prong to two-prong adapters. The mains power cord assembly should be periodically checked for damaged insulation or connectors.

### 4.3 Generator Cleaning and Disinfection Instructions

- Use a mild detergent and damp cloth to clean the Generator cover, front panel, and power cable. The Generator cannot be sterilized. Do not allow fluids to enter the chassis.
- The Generator may be disinfected using a standard hospital alcohol solution applied with a cloth.
- Do not spray or pour liquids directly on the Generator.
- Non-flammable agents should be used for cleaning and disinfection wherever possible.
- Flammable agents used for cleaning or disinfecting, or as solvents of adhesives, should be allowed to evaporate before the application of high frequency surgery.

### 4.4 When you get a new Generator

When you open a box, you will find:

- Generator
- Power Cord

- User's Manual
- PMX-BAY-19-14 Adaptor Cable

### 4.5 Generator Maintenance Schedule

- The Generator verifies calibration integrity during the Power-On-Self-Test (POST); maintenance is not required.
- For Cleaning and Disinfection Instructions, refer to 4.3 Generator Cleaning and Disinfection Instructions.

### 4.6 Compatible Accessories

- The PMG has been approved for use with all Halyard Health (KIMBERLY-CLARK) and Baylis accessories, transducers, and cables. This includes the PMX, PMP, PMC, PMF, TDX, TDP, TDI, TDA, CRX, and CRP line of products.

## 5.User Interface Overview

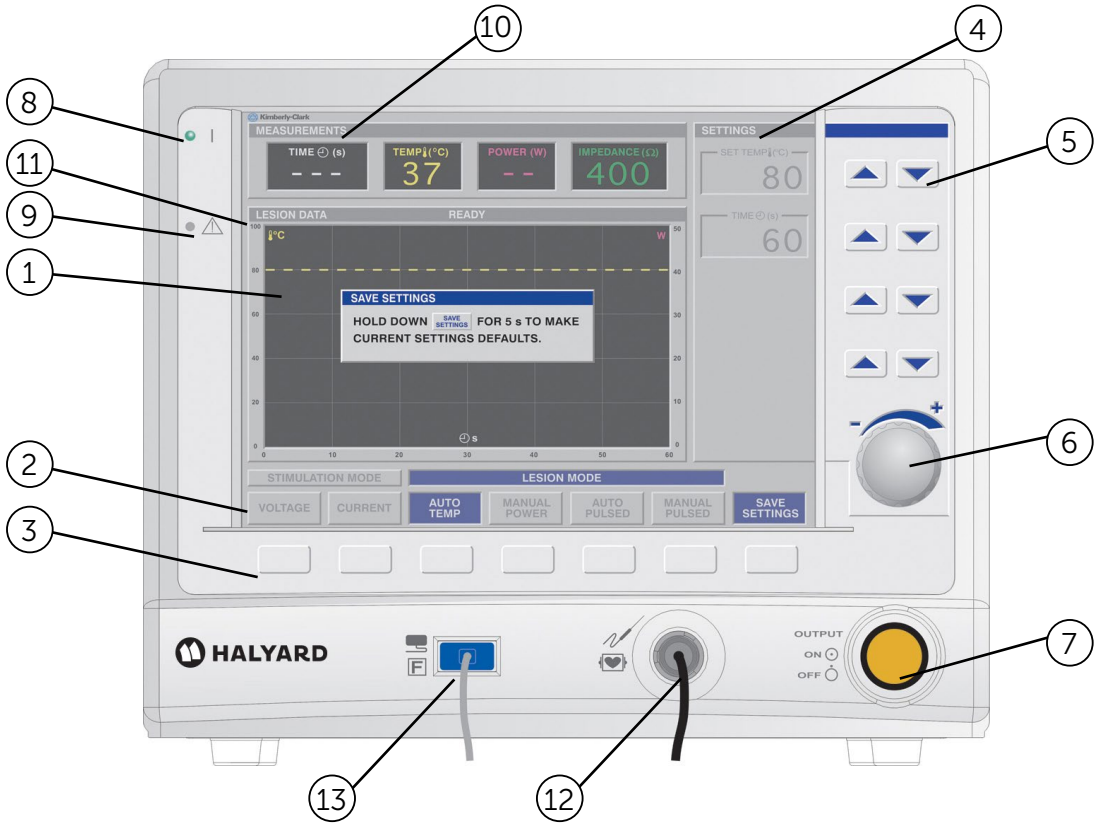


Figure 5-1 Generator front panel

### 5.1 Front Panel Displays, Controls, and Connections

Note: The picture above depicts a typical PMG 4.1 display. The display may differ per PMG

version.

› Descriptions of front panel features and their functions are given below. Please refer to Figure 5-1 for location of each item on the front panel.

1. **Status Window:** This window is used to display messages (e.g., Error, Fault, Save Settings).
2. **Mode Function Labels:** These "labels"are part of the flat panel display and indicate the function of the associated Mode Function Key. Labels highlight to indicate the current operating mode. If no label is present, the associated button is not used in the present mode.
3. **Mode Function Keys:** These keys select and change the state of operation. For Halyard Health ( KIMBERLY-CLARK*) Pain Management Thermocouple RF probes, STIMULATION or LESION states are selected with a single press. In RFA mode, PLACEMENT or TREATMENT states are selected with a single press. In COOLED RF mode, STIMULATION or AUTO TEMP states are selected with a single press. In TRANSDISCAL mode, STIMULATION, PLACEMENT, or TREATMENT states are selected with a single press. The functions of these keys may vary between modes. The Mode Function Label 2 above a key 3 always describes the key function.
4. **SETTINGS Window:** For each state (e.g., VOLTAGE STIMULATION, AUTO TEMP LESION, TRANSDISCAL TREATMENT, etc.), the adjustable settings are shown in the SETTINGS Window. Up to 5 SETTINGS are adjustable in each state, by using the Setting Adjustment Keys 5 and Rotary Encoder 6, to the right of the window.
5. **Settings Adjustment Keys:** The up ▲ and down ▼ buttons located to the right of the SETTINGS Window "4" are used for adjusting treatment settings in the upper 4 locations of the SETTINGS Window.
6. **Rotary Encoder:** This encoder is used for adjusting the bottom parameter in the SETTINGS Window. The parameter in the window depends upon the current mode.
7. **OUTPUT ON/OFF Button and Indicator:** This button controls STIMULATION, LESION, COOLED RF, TRANSDISCAL, RFA and IDL outputs. In STIMULATION modes, this button toggles the output on and off. In all other modes, this button control initiates or terminates RF output. The indicator is ON during RF delivery, and also when in the STIMULATION: ON state.
8. **POWER Indicator:** This green LED indicates that system power is on.
9. **FAULT Indicator:** This red LED indicates a system fault has occurred. System faults include: self-test failure, hardware protection (such as short-circuit shutdown), and software failure. Main power to the system must be cycled (off-on) to attempt recovery from a system fault.
10. **MEASUREMENTS Window:** Measured values for elapsed TIME, probe TEMPERATURE(S), RF POWER, RF VOLTAGE and/or IMPEDANCE are displayed during and after RF output in both STIMULATION and LESION states and during treatment states for COOLED RF, TRANSDISCAL, RFA and IDL modes. During all READY states (prior to RF output), TEMPERATURE and IMPEDANCE are displayed. In LESION READY states for AUTOTEMPERATURE, AUTOPULSED, MANUAL POWER, AND MANUAL PULSED, IMPEDANCE is displayed according to LOW/

OK/HIGH range. In PLACEMENT states for TRANSDISCAL and RFA modes, only the IMPEDANCE between the probe and the dispersive return electrode will be displayed.

11. **Graph Window:** This window is used for graphing temperature, power and voltage data acquired during RF output in lesion states for ON states when in the LESION mode and treatment states when in COOLED RF, TRANSDISCAL, RFA and IDL modes. The horizontal axis is time, corresponding to the treatment duration in the SETTINGS Window. The display will rescale if the TIME duration in the SETTINGS Window is modified. The vertical axis represents temperature (°C) and either power (W) or voltage (V).
12. **Connector Cable Connection:** This patient-isolated connection is for attachment of the connector cable for Halyard Health (KIMBERLY-CLARK*) Pain Management Thermocouple probes.
13. **Dispersive Return Electrode Connection:** This patient-isolated connection is for attachment of a Halyard Health (KIMBERLY-CLARK*) Pain Management Dispersive Electrode (PMA-GP-BAY).

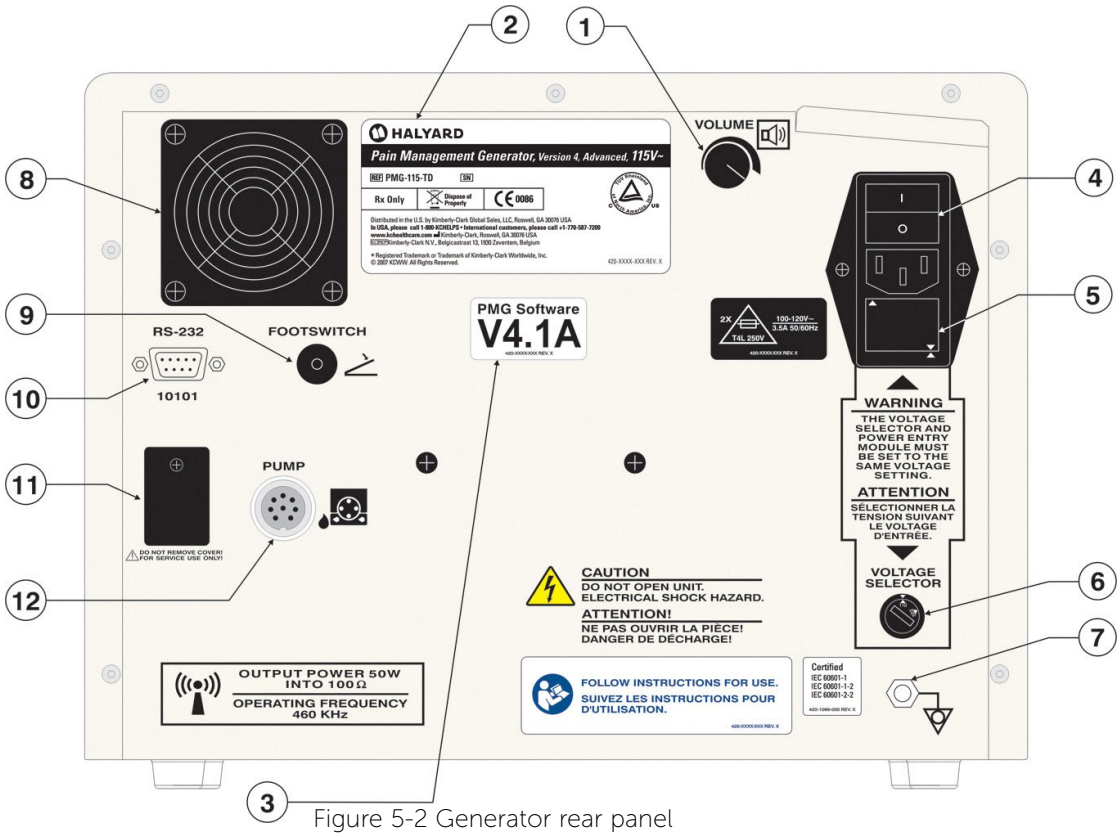


Figure 5-2 Generator rear panel

### 5.2 Rear Panel Displays, Controls, and Connections

Note: The picture above depicts a typical PMG 4.1 display. The display may differ per PMG version.

Descriptions of rear panel features and their functions are given below. Please refer to Figure 5-2 for corresponding locations on the rear panel.

1. **Volume Adjustment:** This knob adjusts the volume of the system's audio output.
2. **Device Label:** This label indicates the model number of the Generator and includes contact information for Halyard Health ( Kimberly-Clark). The unique serial number of the Generator is marked on this label.
3. **Software Version Label:** This label indicates the PMG software version.
4. **AC MAINS SWITCH:** This switch controls the initial AC power input to the system, and is part of the power entry module, which integrates the AC power inlet and Fuse Drawer.
5. **Fuse Drawer:** The orientation of the fuse drawer, in conjunction with the AC CONFIGURATION SWITCH, determines the AC input voltage range (100-120V~ or 220-240V~). For each voltage setting the proper, corresponding fuses must be used, as indicated in the rear panel labeling. (Applies only to v4.1 and older versions).
6. **AC CONFIGURATION SWITCH:** The orientation of this switch, in conjunction with the Fuse Drawer, determines the AC input voltage range (100-120V~ or 220-240V~). Do not change the position of the voltage selector while the system is plugged in. (Applies only to v4.1 and older versions).
7. **Equipotential Ground Connection:** This connector is attached to the chassis/ earth ground. It is intended for earth reference connection in environments where equipotential ground cabling is used.
8. **Fan:** A brushless DC fan is used to exhaust warm air from the Generator. The direction of airflow is outward from the rear panel.
9. **FOOTSWITCH Connection:** This pneumatic barb connects to the hose of the pneumatic footswitch. Like the OUTPUT ON/OFF switch, the FOOTSWITCH controls stimulus output in the STIMULATION modes and controls RF output in the LESION, COOLED RF, TRANSDISCAL, RFA and IDL modes. The action of the FOOTSWITCH differs from the OUTPUT ON/OFF switch: the FOOTSWITCH must be held down to continue delivery of stimulus pulses or RF energy.
10. **RS-232 Connection:** This is an isolated connection to a standard 9-pin COM port. It is provided for passive data acquisition, and cannot be used to control the system.
11. **RJ45 Connector:** Connection to be used by authorized service personnel only.
12. **Pump Module Interface Connector:** For attachment of authorized cooling pump unit only.

Note: See user manual for your specific generator version

# 6 Special Event States

## 6.1 Recoverable Errors


Figure 6-1 Recoverable Error Pop –Up Display

### 6.1.1 Display

- Yellow error indicator will display on screen
- Error text will display in the center of the screen within the status window.

### 6.1.2 Settings

- In all modes except Multi-Cool, a 10-second time-out returns device to previous READY mode. If the probe and cable have been detached the Generator returns to the STANDBY state.
- In Multi-Cool, a 60-second time-out returns device to previous READY mode. If the probe and cable have been detached the Generator returns to STANDBY state.
- Recoverable Error: measurement values are shown, and settings are greyed out.

### 6.2 Non-Recoverable Faults

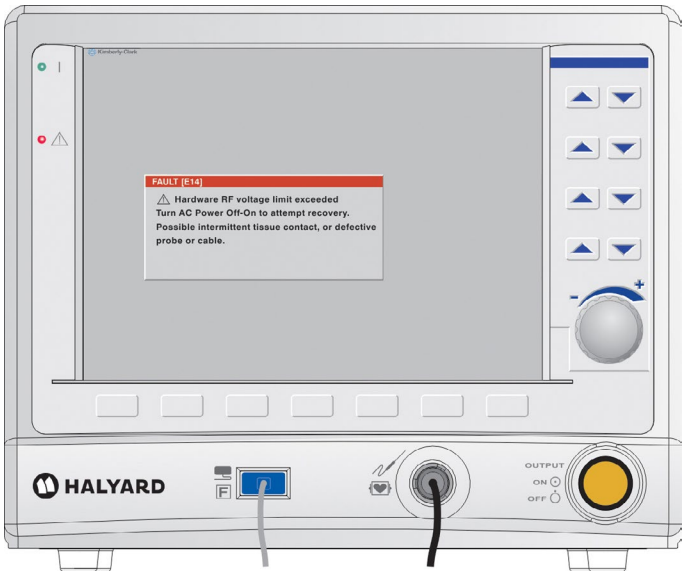


Figure 6-2 Non-Recoverable Fault Pop-Up Display

#### 6.2.1 Display

- Red "error" indicator will display on screen.
- System Fault code will display in the center of the screen within the Status window.

#### 6.2.2 Settings

- The main power On/Off switch needs to be cycled OFF then ON to attempt to clear the non-recoverable fault.

## 7 Testing Summary

The PMG is capable of a variety of self-tests which ensure patient safety and verify proper operation and set-up of equipment. When the main power of the PMG is turned on, the system undergoes Power-On-Self-Tests (POST). In addition, during operation of the System, many Continuous Tests are performed. When manufacturing of the Generator is completed, each unit undergoes a series of Final Device Tests.

### 7.1 Finished Device Testing

Every Generator undergoes a Final Test before its release. The list includes:

- Fuse and line voltage settings
- Power On Self-Test sequence
- BIOS programming
- Return connector continuity
- Serial communications and software version check
- Default settings (Advanced Settings)
- Default values
- Probe/cable detection
- Front panel controls and display
- Output on/off switch
- Footswitch function
- Volume adjust setting
- Fan function
- Electrical safety tests
- Burn-in Test
- Stimulation output function
- Stimulation over-current and open-circuit detection
- Monopolar RF output and measurement
- Multi-RF output and measurement
- RF over-current shutdown
- Low and high impedance detection
- Output waveform check
- Measurement noise immunity and broken sensor detection– thermistor and thermocouple
- Temperature measurement accuracy – thermistor and thermocouple
- Bipolar RF output
- Temperature-Controlled RF delivery and timer accuracy
- POST values

## 8 Maintenance and Servicing

No servicing is permitted at the operator level. The generator must be returned to the manufacturer for all servicing and repairs. Please note that the cover of the generator should not be removed for any reason. Also, please be aware that no preventative maintenance or calibration is required on the PMG. Refer to the PMG User Manual for Warranty Information.

Refer servicing to a qualified

Halyard Health Technician

Email: piq@hyh.com

U.S. Customers: 844-HALYARD (425-9273)

International Customers: 844-HALYARD (425-9273)

**Note:** Please request shipping address for return of Generator for servicing if not provided inside of your Loaner PMG Packaging. Upon reporting of a complaint, the PMG shall be returned for repairs as determined by your HYH representative. Additional information on the return process can be provided by contacting Halyard Health at the phone number above.

## 9 Generator Voltage Setting

9.1 Make sure the rear panel of the PMG is facing the user (see Fig 5.2).

9.2 Check power configurations. Both fuse drawer and voltage selector switch are set to facility outlet voltage (either 110V or 220V).

9.3 For a correct 110V setting, the appropriate 110-120V should be pointing downwards and the 220-240V is upside down (Fig 9-1) with an upward pointed arrow.

9.4 For a correct 220V setting, the appropriate 220-240V should be pointing downwards and the 110-120V is upside down with an upward pointed arrow.

9.5 The correct setting for the Voltage Selector shows at the top (vertically) of the switch. See Figure 9-2 for the correct 110V setting.

9.6 Contact HYH Technical Support (844-425-9273) for support.

Note: There are no serviceable parts for the Pain Management Generator.


Fig 9-1
(Fuse Drawer)

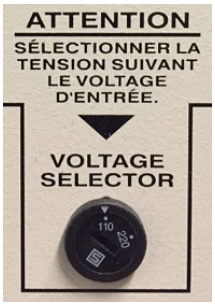


Fig 9-2
(Voltage Selector)

## 10 Error/Fault/Warning Codes

If an error/fault/warning condition should occur, a pop-up message will display an error /fault/ warning code in the center of the screen. The error/fault/warning event, text message displayed, error/fault/warning code, and suggested actions are listed in Table 10-1 below. Warning codes are not errors and a user could override a warning code by pressing the output on/off button (not recommended). In the case of any error/fault/ warning event, contact HYH technical support if the problem persists.

Note: For recoverable faults, the error code is displayed for approximately 10 seconds (NOTE: 4.1 and 4.11 multi-cool); the Generator will automatically transition back to the previous READY state, or to the POST-COOLING state if generated from the TRANSDISCAL TREATMENT ON state. Warning messages will clear when proper conditions are met. Error/Fault/Warning messages and display time may differ with PMG version and treatment.

Table 10-1

| Table of Error, Fault & Warning Codes | | |
|---|---|---|
| **Code** | **Message** | **Recommended Action (Complete List)** |
| FAULT [H01] | ▲ **Self-test failure: Power Generation/Measurement** Turn AC power OFF-ON to attempt recovery. | 1. With unit "ON" allow 30-60 minutes for generator to acclimate to ambient temperature.<br>2. Turn AC power OFF-ON to attempt recovery.<br>3. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| FAULT [H02] | ▲ **Self-test failure: Impedance Measurement** Turn AC power OFF-ON to attempt recovery. | 1. Verify voltage selector and fuse configuration match (NOTE: see section 9)<br>2. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| FAULT [H03] | ▲ **Self-test failure: RF Voltage Generation/Measurement** Turn AC power OFF-ON to attempt recovery. | |
| FAULT [H04] | ▲ **Self-test failure: RF Current Generation/Measurement** Turn AC power OFF-ON to attempt recovery. | 1. Turn unit "OFF" then "ON" to attempt recovery<br>2. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| FAULT [H05] | ▲ **Self-test failure: Watchdog Timer** Turn AC power OFF-ON to attempt recovery. | |

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| FAULT [H06] | ▲ **Low Power Impedance Measurement**<br>Turn AC power OFF-ON to attempt recovery. | 1. Turn unit "OFF" then "ON" to attempt recovery<br>2. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| FAULT [H07] | ▲ **Corrupted Flash Disk**<br>Turn AC power OFF-ON to attempt recovery. | |

| **Table of Error, Fault & Warning Codes** | | |
|---|---|---|
| **Code** | **Message** | **Recommended Action (Complete List)** |
| FAULT [H08] | ▲ **Self-test failure: RF Current 2 Generation/Measurement**<br>Turn AC power OFF-ON to attempt recovery. | 1. Turn AC power OFF-ON to attempt recovery.<br>2. Allow 30-60 minutes with generator in "ON" to acclimate the unit to ambient temperature.<br>3. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| FAULT [H09] | ▲ **Self-test failure: Cold Junction Reference Error**<br>Turn AC power OFF-ON to attempt recovery.<br>Operational temperature may be outside 10-40°C range. | |
| FAULT [E10] | ▲ **Internal Reference Calibration Fault**<br>Turn AC power OFF-ON to attempt recovery.<br>Contact technical support if problem persists. | 1. Turn AC power OFF-ON to attempt recovery.<br>2. Allow 30-60 minutes with generator in "ON" to acclimate the unit to ambient temperature.<br>3. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| FAULT [E11] | ▲ **Duplicate variable storage**<br>Turn AC power OFF-ON to attempt recovery.<br>Contact technical support if problem persists. | 1. Turn AC power OFF-ON to attempt recovery.<br>2. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| FAULT [E12] | ▲ **Software Error Detected**<br>Turn AC power OFF-ON to attempt recovery.<br>Contact technical support if problem persists. | |

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| FAULT [E13] | ▲ **Multiple Hardware RF Limits Exceeded**<br>Turn AC power OFF-ON to attempt recovery. Check probe and cable connections. Possible poor tissue contact, or defective probe or cable. | 1. Carefully reposition and stabilize cannula or introducer<br>2. Check probes, cables and grounding pad connection<br>3. Swap out probe, cable and grounding pad as appropriate<br>4. Try new probe(s) and cable(s)<br>5. Turn unit "OFF" then "ON" attempt recovery<br>6. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| FAULT [E14] | ▲ **Hardware RF Voltage Limit Exceeded**<br>Turn AC power OFF-ON to attempt recovery. Possible intermittent tissue contact, or defective probe or cable. | |
| FAULT [E15] | ▲ **Hardware RF Current Limit Exceeded**<br>Turn AC power OFF-ON to attempt recovery. Possible intermittent tissue contact, or defective probe or cable. | |
| FAULT [E16] | ▲ **Hardware RF Power Limit Exceeded**<br>Turn AC power OFF-ON to attempt recovery. Possible intermittent tissue contact, or defective probe or cable. | |
| ERROR [E18] | ▲ **Stimulus Voltage Limit Exceeded**<br>Contact technical support if problem persists | 1. Carefully reposition and stabilize cannula or introducer<br>2. Check probes, cables and grounding pad connection<br>3. Swap out probe, cable and grounding pad as appropriate<br>4. Try new probe(s) and cable(s)<br>5. Turn unit "OFF" then "ON" attempt recovery<br>6. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| ERROR [E19] | ▲ **Stimulus Current Limit Exceeded**<br>Tissue impedance may be too low for stimulus voltage level. Try a lower voltage | |

| **Table of Error, Fault & Warning Codes** | | |
|---|---|---|
| **Code** | **Message** | **Recommended Action (Complete List)** |
| ERROR [E20] | ▲ **Stimulus Pulse Duration Limit Exceeded**<br>Contact technical support if problem persists | 1. Turn unit "OFF" then "ON" to attempt recovery<br>2. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |

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| FAULT [E22] | ▲ **Self-test failure: Probe Type Detection**<br>Turn AC power OFF-ON to attempt recovery. | 1. With unit "ON" allow 30-60 minutes for generator to acclimate to ambient temperature<br>2. Turn unit "OFF" then "ON" to attempt recover<br>3. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| FAULT [E23] | ▲ **Self-test failure: Thermistor Reference Error**<br>Turn AC power OFF-ON to attempt recovery. | |
| FAULT [E24] | ▲ **Self-test failure: Thermocouple Reference Error**<br>Turn AC power OFF-ON to attempt recovery. | 1. With unit "ON" allow 30-60 minutes for generator to acclimate to ambient temperature<br>2. Turn unit "OFF" then "ON" to attempt recovery<br>3. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| FAULT [E25] | ▲ **Self-test failure: RF Power Offset**<br>Turn AC power OFF-ON to attempt recovery. | |
| FAULT [E26] | ▲ **Self-test failure: RF Current Offset**<br>Turn AC power OFF-ON to attempt recovery. | Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| FAULT [E27] | ▲ **Self-test failure: RF Voltage Offset**<br>Turn AC power OFF-ON to attempt recovery. Contact technical support if problem persists. | Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| FAULT [H28] | ▲ **Self-test failure: Stimulus Voltage Limit Exceeded**<br>Turn AC power OFF-ON to attempt recovery. | Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| FAULT [H29] | ▲ **Self-test failure: Stimulus Current Limit Exceeded**<br>Turn AC power OFF-ON to attempt recovery. | Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| FAULT [H30] | ▲ **Self-test failure: Stimulus Pulse Duration Limit Exceeded**<br>Turn AC power OFF-ON to attempt recovery. | Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| FAULT [H31] | ▲ **Self-test failure: SAMM Hardware Error**<br>Turn AC power OFF-ON to attempt recovery. | 1. Turn unit "OFF" then "ON" to attempt recovery<br>2. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |

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| ERROR [E32] | ▲ **Stimulus Hardware Current Limit** Turn AC power OFF-ON to attempt recovery. Contact technical support if problem persists. | 1. Carefully reposition and stabilize cannula or introducer<br>2. Check probes, cables and grounding pad connection<br>3. If problem persists, remove probe from cannula/introducer, wipe off tip and replace<br>4. Initiate new procedure and check for proper function<br>5. Swap out probe, cable and grounding pad as appropriate<br>6. Turn unit "OFF" then "ON" to attempt recovery<br>7. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| ERROR [E33] | ▲ **Stimulus Hardware Voltage Limit** Turn AC power OFF-ON to attempt recovery. Contact technical support if problem persists. | |

| **Table of Error, Fault & Warning Codes** | | |
|---|---|---|
| **Code** | **Message** | **Recommended Action (Complete List)** |
| FAULT [E34] | ▲ **Stimulus Hardware Pulse Duration Limit** Turn AC power OFF-ON to attempt recovery. Contact technical support if problem persists. | 1. Turn unit "OFF" then "ON" to attempt recovery<br>2. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| FAULT [E35] | ▲ **Software Error Detected** Turn AC power OFF-ON to attempt recovery. Contact technical support if problem persists. | 1. Turn unit "OFF" then "ON" to attempt recovery<br>2. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| FAULT [E36] | ▲ **Software Error Detected** Turn AC power OFF-ON to attempt recovery. Contact technical support if problem persists. | 1. Turn unit "OFF" then "ON" to attempt recovery<br>2. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |

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| ERROR [E80] | ▲ **Measured Temperature Exceeds Setpoint**<br>Possible high impedance or desiccated tissue at probe tip.<br>OR<br>E80 – ▲ **Temp Control Error:** Check Tmeas against Final TSET during and after ramp (v4.1 & v4.11 only) | 1. Carefully reposition and stabilize cannula or introducer<br>2. Check probes, cables and grounding pad connection<br>3. If problem persists, remove probe from cannula/introducer, wipe off tip and replace<br>4. Initiate new procedure and check for proper function<br>5. Swap out probe, cable and grounding pad as appropriate<br>6. Turn unit "OFF" then "ON" to attempt recovery<br>7. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| ERROR [E81] | ▲ **Self-test failure: Temperature Measurement**<br>Check probe and cable connections. Possible high impedance or desiccated tissue at probe tip. | |
| ERROR [E82] | ▲ **Excessive RF Current Measured**<br>Possible short between electrodes, or defective probe or cable. | 1. Check power set-point<br>2. Check probes, cables and grounding pad connection<br>3. Initiate new procedure and check for proper function<br>4. Carefully reposition and stabilize cannula or introducer<br>5. Swap out probe, cable and grounding pad as appropriate<br>6. If problem persists, remove probe from cannula/introducer, wipe off tip and replace<br>7. Initiate new procedure and check for proper function<br>8. Try new probe(s) and cable(s)<br>9. Turn unit "OFF" then "ON" to attempt recovery<br>10. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| ERROR [E83] | ▲ **Excessive RF Voltage Measured**<br>Check probe and cable connections. Possible intermittent cable connection or loss of tissue contact. | |
| ERROR [E84] | ▲ **Excessive RF Power Measured**<br>Check probe and cable connections. Possible intermittent tissue contact or defective probe(s) or cable(s). | |

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| ERROR [E85] | ▲ **High Impedance Detected**<br>Check probe, cable and dispersive return electrode connections. Possible poor tissue contact. Probe or cable may be defective. | 1. Carefully reposition and stabilize cannula or introducer<br>2. Check probes, cables and grounding pad connection<br>3. Swap out probe, cable and grounding pad individually<br>4. Try new probe(s) and cable(s)<br>5. Turn unit "OFF" then "ON" to attempt recovery<br>6. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| ERROR [E85] | (PMG V4.1/4.11) Probe specific high impedance (>1000 ohms) | |

| **Table of Error, Fault & Warning Codes** | | |
|---|---|---|
| **Code** | **Message** | **Recommended Action (Complete List)** |
| ERROR [E86] | ▲ **Low Impedance Detected**<br>Possible short between electrodes or damaged cannula insulation. | 1. Check probes, cables and grounding pad connection<br>2. Initiate new procedure and check for proper function<br>3. Carefully reposition and stabilize cannula or introducer<br>4. Inject saline and re-insert probe<br>5. Initiate new procedure and check for proper function<br>6. Swap out probe, cable and grounding pad individually<br>7. If problem persists, remove probe from cannula/introducer, wipe off tip and replace<br>8. Initiate new procedure and check for proper function<br>9. Try new probe(s) and cable(s)<br>10. Turn unit "OFF" then "ON" to attempt recovery<br>11. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |

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| ERROR [E87] | ▲ **Unrecognized Probe Type**<br>See User Manual for a list of valid probes. Probe type may not be enabled. Contact technical support if problem persists | 1. Check connection of adapter and probe cables ensuring that they are dry (ensure proper autoclave drying time is observed)<br>2. See User Manual for a list of valid probes to ensure use of the correct probe<br>3. Ensure that the correct probe type on the PMG screen is enabled<br>4. Try new probe(s) and cable(s)<br>5. Turn unit "OFF" then "ON" to attempt recovery<br>6. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| ERROR [E88] | ▲ **Invalid Temperature Reading**<br>Please check probe and cable connections.<br>Possible defective probe or cable. Try new probe and cable if problem persists. | |
| ERROR [E89] | ▲ **Temperature Limit Exceeded**<br>Power setting may be too high. Try using a lower power setting | 1. Check power setting and adjust as appropriate.<br>2. Verify temperature limit setting (only applies to Manual Power)<br>3. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| ERROR [E90] | ▲ **Inconsistent Settings**<br>TIME setting less than INITIAL TIME. | See ADVANCED IDL SETTINGS and ensure INITIAL TIME is < total time |
| ERROR [E91] | ▲ **Inconsistent Settings**<br>PEAK TEMP setting less than INITIAL TEMP. | See ADVANCED IDL SETTINGS and ensure INITIAL TEMP is < peak temperature |
| ERROR [E92] | ▲ **Inconsistent Settings**<br>TIME setting less than RAMP TIME. | See ADVANCED LESION SETTINGS and ensure RAMP TIME is < total time |

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| ERROR [E93] | ▲ **High Impedance Detected**<br>Check probe and cable connections. Probe or cable may be defective. | 1. Check probes, cables and grounding pad connection<br>2. Initiate new procedure and check for proper function<br>3. Carefully reposition and stabilize cannula or introducer<br>4. Inject saline and re-insert probe<br>5. Initiate new procedure and check for proper function<br>6. Swap out probe, cable and grounding pad individually<br>7. If problem persists, remove probe from cannula/introducer, wipe off tip and replace<br>8. Initiate new procedure and check for proper function<br>9. Try new probe(s) and cable(s)<br>10. Turn unit "OFF" then "ON" to attempt recovery<br>11. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| ERROR [E95] | ▲ **Low Impedance Detected**<br>Check probe and cable connections. Possible short circuit in probe or cable. | |
| ERROR [E94] | ▲ **Invalid Temperature Reading**<br>Check probe and cable connections. Possible defective probe or cable. Try new probe and cable if problem persists | 1. Check connection of adapter and probe cables ensuring that they are dry (ensure proper autoclave drying time is observed)<br>2. See User Manual for a list of valid probes to ensure use of the correct probe<br>3. Ensure that the correct probe type on the PMG screen is enabled<br>4. Try new probe(s) and cable(s)<br>5. Turn unit "OFF" then "ON" to attempt recovery<br>6. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |

| Table of Error, Fault & Warning Codes | | |
|---|---|---|
| **Code** | **Message** | **Recommended Action (Complete List)** |
| ERROR [E96] | ▲ **Temperature Out of Range.**<br>Temp outside expected range 15-100°C ( standard RF) | 1. Check probe and cable connections<br>2. Initiate new procedure and check for proper function<br>3. Carefully reposition and stabilize cannula or introducer<br>4. Swap out probe, cable and grounding pad individually<br>5. If problem persists, remove probe from cannula/ introducer, wipe off tip and replace<br>6. Try new probe(s) and cable(s)<br>7. Turn unit "OFF" then "ON" to attempt recovery<br>8.Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| ERROR [E96] | ▲ **Temperature Difference Error**<br>Probe temperatures differ by more than 15°C for 1 sec after Ramp Completion in Multi-RF<br>(v4.1 & v4.11 only) | 1. Ensure a start temp of 30°C or above<br>2. Carefully reposition and stabilize cannula or introducer<br>3. Check probes, cables and grounding pad connection |
| ERROR [E97] | ▲ **Inconsistent Settings**<br>TIME setting less than RAMP TIME. | See ADVANCED RFA SETTINGS and ensure RAMP TIME is < than total time |
| ERROR [E99] | ▲ **Invalid Probe Type**<br>Mode not available for this probe type. Disconnect adapter cable to continue. Contact technical support if problem persists. | 1. Check connection of adapter and probe cables ensuring that they are dry (ensure proper autoclave drying time is observed)<br>2. See User Manual for a list of valid probes to ensure use of the correct probe<br>3. Ensure that the correct probe type on the PMG screen is enabled<br>4. Try new probe(s) and cable(s)<br>5. Turn unit "OFF" then "ON" to attempt recovery<br>6. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |

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| ERROR [E100] | ▲ **Incorrect Switch Position**<br>Examine external switch position, and make appropriate change. Failure detected when using TDP placement mode | 1. Check probe and cable connections<br>2. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |

| **Table of Error, Fault & Warning Codes** | | |
|---|---|---|
| **Code** | **Message** | **Recommended Action (Complete List)** |
| ERROR [E101] | ▲ **Pump Malfunction** | 1. Ensure pump lids are fully closed<br>2. Check pumps cable connections<br>3. Ensure fluid lines/tubing is properly connected and free from obstruction/kinks<br>4. Check pump cable connection from back of pump to back of PMG |
| ERROR [E102] | ▲ **Temperature Tracking Error (> 10°C for 1 Second)** | 1. Carefully reposition and stabilize cannula or introducer<br>2. Ensure fluid circuitry is properly connected and free from obstruction/kinks<br>3. Try new probe(s) and cable(s)<br>4. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| ERROR [E103] | ▲ **Dynamic Probe-Pump Mapping Failure** | 1. Ensure pump lids are fully closed<br>2. Check pumps cable connections<br>3. Ensure fluid lines/tubing is properly connected and free from obstruction/kinks<br>4. Inspect for fluid drop in burette(s) and flow from burette through the probe(s) and back to the burette. |
| ERROR [E104] | ▲ **Pump Current Limit**<br>Check pump unit and ensure cable is securely connected. Contact Technical support if problem persists. | 1. Check pump cable connection from back of pump to back of PMG<br>2. Try a new pump cable<br>3. Replace pump with a new pump<br>4. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| ERROR [E105] | ▲ **No Tubing in Pump.**<br>Check tubing for proper placement in pump. | Check pump unit and ensure tubing is properly install and securely connected |

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| ERROR [E106] | ▲ **Cooled Temperature Out-Of-Range**<br>Outside 18-34°C expected range. Probe(s), cable(s) or pump unit may be defective. | 1. Check probe and cable connections<br>2. Initiate new procedure and check for proper function<br>3. Carefully reposition and stabilize cannula or introducer<br>4. Swap out probe, cable and grounding pad individually<br>5. If problem persists, remove probe from cannula/introducer, wipe off tip and replace<br>6. Try new probe(s) and cable(s)<br>7. Turn unit "OFF" then "ON" to attempt recovery<br>8. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| ERROR [E107] | ▲ **Probe B Connected But Disabled In Advanced Settings** | 1. Disconnect TDP B/Secondary Thermocouple<br>2. If desired, enable TDP B/Secondary Thermocouple in ADVANCED SETTINGS |
| ERROR [E108] | ▲ **Probe A Not Connected**<br>Check probe and cable connections. Probe or cable(s) may be defective. (TDP A) | 1. Check probe and cable connections<br>2. If desired, enable appropriate Probe in ADVANCED SETTINGS<br>3. Try new probe(s) and cable(s)<br>4. Turn unit "OFF" then "ON" to attempt recovery<br>5. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| ERROR [E109] | ▲ **Probe B Not Connected**<br>Check probe and cable connections. If desired, enable 1 PROBE in ADVANCED SETTINGS. (TDP B) | |
| ERROR [E110] | ▲ **Probe A and Probe B Not Connected**<br>Check probe and cable connections. Probe(s) or cable(s) may be defective.<br>(TDP A AND TDP B) | |
| ERROR [E111] | ▲ **Probe A Connected to Wrong Side of Y-Cable**<br>Disconnect probe and attach to other side of Y-cable. | 1. Disconnect probe and attach to other side of Y-cable<br>2. Check probe and cable connections<br>3. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |

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| ERROR [E112] | ▲ **Secondary Thermocouple Connected But Disabled In ADVANCED SETTINGS** (RFA/IDL) | 1. Disconnect TDP B/Secondary Thermocouple<br>2. If desired, enable TDP B/Secondary Thermocouple in ADVANCED SETTINGS |

| **Table of Error, Fault & Warning Codes** | | |
|---|---|---|
| **Code** | **Message** | **Recommended Action (Complete List)** |
| ERROR [E113] | ▲ **Invalid RFA Temperature Reading** | 1. Check display settings<br>2. Check probe and cable connections<br>3. Try new probe(s) and cable(s)<br>4. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| ERROR [E114] | ▲ **Invalid Secondary Thermocouple Temperature Reading** Check probe and cable connections. Probe or cable(s) may be defective. | 1. Check Secondary Thermocouple setting in Advance Settings<br>2. Check probe and cable connections<br>3. Try new probe(s) and cable(s)<br>4. Contact Technical Support if problem persists |
| ERROR [E115] | ▲ **RFA and Secondary Thermocouple Not Connected** Check probe and cable connections. Probe(s) or cable(s) may be defective. | |
| ERROR [E116] | ▲ **CRP B Connected But Disabled In ADVANCED SETTINGS** Disconnect CRP B or, if desired, enable 2 PROBES in ADVANCED COOLED RF SETTINGS. | 1. Check Secondary Thermocouple setting in Advance Settings<br>2. Disconnect probe and attach to other end of Y-cable (if applicable)<br>3. If desired, enable both probes in ADVANCED COOLED RF SETTINGS,<br>4. Or, disconnect CRP B probe<br>5. Check probe and cable connections<br>6. Try new probe(s) and cable(s)<br>7. Contact technical support if problem persists |
| ERROR [E117] | ▲ **CRP A Not Connected** Check probe and cable connections. Probe or cable(s) may be defective. | |
| ERROR [E118] | ▲ **CRP B Not Connected** Check probe and cable connections. If desired, enable 1 PROBE in ADVANCED COOLED RF SETTINGS. Probe or cable(s) may be defective. | |
| ERROR [E119] | ▲ **CRP A and CRP B Not Connected** Check probe and cable connections. Probe(s) or cable(s) may be defective. | |
| ERROR [E120] | ▲ **CRP A Connected To Wrong Side Of Y-cable** Disconnect probe and attach to other side of Y-cable. | |

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| ERROR [E121] | ▲ **IDL Not Connected**<br>Check probe and cable connections. Probe or cable(s) may be defective. | 1. Check probe and cable connections<br>2. Try new probe(s) and cable(s)<br>3. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| ERROR [E122] | ▲ **IDL and Secondary Thermocouple Not Connected**<br>Check probe and cable connections. Probe(s) or cable(s) may be defective. | |
| ERROR [E123] | ▲ **Invalid Probe A Temperature Reading**<br>Check probe and cable connections. Probe or cable(s) may be defective. Note: Only applies to Transdiscal (TD) | 1. Check connection of adapter and probe cables ensuring that they are dry (ensure proper autoclave drying time is observed)<br>2. See User Manual for a list of valid probes to ensure use of the correct probe<br>3. Ensure that the correct probe type on the PMG screen is enabled<br>4. Try new probe(s) and cable(s)<br>5. Turn unit "OFF" then "ON" to attempt recovery<br>6. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| ERROR [E124] | ▲ **Invalid Probe B Temperature Reading**<br>Check probe and cable connections. Probe or cable(s) may be defective. Try new probe and cable(s) if problem persists. Note: Only applies to Transdiscal (TD) | |

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| ERROR [E125] | ▲ **High Impedance Detected**<br>Check probe and cable connections. Possible poor tissue contact. Probe(s) or cable(s) may be defective. | 1. Check probes, cables and grounding pad connection<br>2. Initiate new procedure and check for proper function<br>3. Carefully reposition and stabilize cannula or introducer<br>4. Inject saline and re-insert probe<br>5. Initiate new procedure and check for proper function<br>6. Swap out probe, cable and grounding pad individually<br>7. If problem persists, remove probe from cannula/introducer, wipe off tip and replace<br>8. Initiate new procedure and check for proper function<br>9. Try new probe(s) and cable(s)<br>10. Turn unit "OFF" then "ON" to attempt recovery<br>11. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| ERROR [E126] | ▲ **Low Impedance Detected**<br>Possible short circuit between electrodes, or damaged introducer insulation. | |
| ERROR [E127] | ▲ **Invalid CRP A Temperature Reading**<br>Check probe and cable connections. Probe or cable(s) may be defective. Try new probe and cable(s) if problem persists. | 1. Check probe and cable connections<br>2. Try new probe(s) and cable(s)<br>3. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| ERROR [E128] | ▲ **Invalid CRP B Temperature Reading**<br>Check probe and cable connections. Probe or cable(s) may be defective. Try new probe and cable(s) if problem persists. | |
| ERROR [E129] | ▲ **Select Probe**<br>Multiple Probes Connected. Multiple probe connectivity not supported in this mode. Disconnect extra probes to continue. | 1. Disconnect extra probes to continue<br>2. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |

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| ERROR [E150] | ▲ **Multi-RF TRUE-TX Ramp time extension limit exceeded**<br>Connect one probe at a time to Multi-RF cable and treat each site individually. | 1. Connect one probe at a time to Multi-RF cable and treat each site individually<br>2. Carefully reposition and stabilize cannula or introducer<br>3. Swap out probe(s) and cable(s)<br>4. If problem persists, remove probe from cannula/introducer, wipe off tip and replace<br>5. Try new probe(s) and cable(s)<br>6. Adjust TRUE-TX extension time limit and ramp time in ADVANCED SETTINGS<br>7. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| ERROR [E160] | ▲ **Probe Limit Exceeded on Left Pump**<br>Reduce number of probes connected on left pump to TWO or fewer. Contact technical support if problem persists. | 1. Reduce number of probes connected on left/right pump head to two or fewer<br>2. Check probe and cable connections<br>3. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| ERROR [E161] | ▲ **Probe Limit Exceeded on Right Pump**<br>Reduce number of probes connected on right pump to TWO or fewer. Contact technical support if problem persists. | |
| ERROR [E162] | ▲ **Probe A Pump Mapping Temperature Did Not Change by at least 1.5°C.** | 1. Ensure pump lids are fully close<br>2. Check pumps cable connections<br>3. Ensure fluid lines/tubing is properly connected and free from obstruction/kinks<br>4. Inspect for fluid drop in burette(s) and flow from burette through the probe(s) and back to the burette. |
| ERROR [E163] | ▲ **Probe B Pump Mapping Temperature Did Not Change by at least 1.5°C.** | 1. Ensure pump lids are fully closed<br>2. Check pumps cable connections<br>3. Ensure fluid lines/tubing is properly connected and free from obstruction/kinks<br>4. Inspect for fluid drop in burette(s) and flow from burette through the probe(s) and back to the burette. |

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| ERROR [E164] | **▲ Probe C Pump Mapping Temperature Did Not Change by at least 1.5°C.** | 1. Ensure pump lids are fully closed<br>2. Check pumps cable connections<br>3. Ensure fluid lines/tubing is properly connected and free from obstruction/kinks<br>4. Inspect for fluid drop in burette(s) and flow from burette through the probe(s) and back to the burette. |

| Table of Error, Fault & Warning Codes | | |
|---|---|---|
| **Code** | **Message** | **Recommended Action (Complete List)** |
| ERROR [E165] | **▲ Probe D Pump Mapping Temperature Did Not Change by at least 1.5°C.**<br>Check probe and cable connections. Ensure fluid circuitry is connected correctly and free from obstruction. Probe(s) or cable(s) may be defective. Contact technical support if problem persists. | 1. Ensure pump lids are fully closed<br>2. Check pumps cable connections<br>3. Ensure fluid lines/tubing is properly connected and free from obstruction/kinks<br>4. Inspect for fluid drop in burette(s) and flow from burette through the probe(s) and back to the burette. |
| FAULT [E170] | **▲ Software Error Detected**<br>Turn AC power OFF-ON to attempt recovery. Contact technical support if problem persists. | 1. Wait until screen is fully visible before switching from one mode to the next<br>2. Turn unit “OFF” then “ON” to attempt recovery<br>3. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| WARNING [W200] | **▲ High Impedance Detected**<br>Probe (X) impedance higher than recommended maximum (500 Ohms). | 1. Check probes and associated cables<br>2. Check grounding pad connections<br>3. Try new probe(s) and cable(s) if problem persists |
| WARNING [W201] | **▲ Low Impedance Detected**<br>Possible short circuit between electrodes, or damaged cannula insulation. | 1. Check probes, cables and grounding pad connection<br>2. Try new probe(s) and cable(s) if problem persists<br>3. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |

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| WARNING [W202] | **▲ High Impedance Detected (IDL only)**<br>Check probe and cable connections. Probe or cable may be defective. | 1. Check probe and cable connections<br>2. Try new probe(s) and cable(s) if problem persists<br>3. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| WARNING [W203] | **▲ Low Impedance Detected (IDL only)**<br>Check probe and cable connections. Possible short circuit in probe or cable. | 1. Check probe and cable connections<br>2. Try new probe(s) and cable(s) if problem persists<br>3. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| WARNING [W204] | **▲ Invalid Temperature Reading (Standard RF only)**<br>Check probe and cable connections. Possible defective probe or cable. Try new probe and cable if problem persists. | 1. Check probe and cable connections<br>2. Try new probe(s) and cable(s) if problem persists<br>3. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| WARNING [W205] | **▲ Probe B Connected But Disabled In ADVANCED SETTINGS (TD mode)**<br>Disconnect Probe B or, if desired, enable 2 PROBES in ADVANCED SETTINGS. | 1. Disconnect probe B<br>2. Enable 2 probes in ADVANCED SETTINGS<br>3. Try new probe(s) and cable(s) if problem persists<br>4. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option |
| WARNING [W206] | **▲ Secondary Thermocouple Connected But Disabled In ADVANCED SETTINGS**<br>Disconnect Secondary Thermocouple or, if desired, enable Secondary Thermocouple in ADVANCED SETTINGS. | 1. Disconnect secondary thermocouple in RFA ADVANCED SETTING<br>2. Enable Secondary Thermocouple in ADVANCED SETTING<br>3. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |

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| WARNING [W208] | ▲ **High Impedance Detected**<br>Check stylet/probe, cable, and dispersive return electrode connections. Possible poor tissue contact. | 1. Carefully reposition and stabilize cannula or introducer<br>2. Check probes, cable, and grounding pad connection<br>3. Try new probe(s) and cable(s) if problem persists<br>4. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| WARNING [W209] | ▲ **Low Impedance Detected**<br>Possible short circuit between electrodes or damaged introducer insulation. | |
| WARNING [W210] | ▲ **High Impedance Detected**<br>Check probe and cable connections. Possible poor tissue contact. Probe(s) or cable(s) may be defective. | 1. Carefully reposition and stabilize cannula or introducer<br>2. Swap out probe, cable and grounding pad individually<br>3. If problem persists, remove probe from cannula/introducer, wipe off tip and replace<br>4. Try new probe(s) and cable(s)<br>5. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| WARNING [W211] | ▲ **Select Probe**<br>Multiple Probes Connected. Multiple probe connectivity not supported in this mode. Disconnect extra probes to continue. | 1. Disconnect extra probes to continue<br>2. Change setting to incorporate multiple probes<br>3. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |

| Table of Error, Fault & Warning Codes | | |
|---|---|---|
| **Code** | **Message** | **Recommended Action** |
| WARNING [W212] | ▲ **Impedance Variation Detected** (v4.1/v4.11) Probe Impedances differ by more than recommended maximum (200 Ohms) in Multi-Cooled AUTO TEMP Ready Mode | 1. Carefully reposition and stabilize cannula or introducer<br>2. Swap out probe, cable and grounding pad as appropriate<br>3. If problem persists, remove probe from cannula/introducer, wipe off tip and replace<br>4. Initiate new procedure and check for proper function5. Try new probe(s) and cable(s)<br>6. Press the PMG Output ON/Off button to turn off/ignore warning<br>7. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| WARNING [W213] | ▲ **Low Temperature Reading** (v4.1/v4.11) Minimum temperature (30°C) has not been reached. | 1. Keep probe(s) inserted at tissue site until PMG reads a minimum temperature of 30°C prior to procedure start<br>2. Swap out probe and cable as appropriate<br>3. Try new probe(s) and cable(s)<br>4. Press the PMG Output ON/Off button to turn off/ignore warning<br>5. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option |
| WARNING [W220] | ▲ **High Impedance** (v4.1/v4.11) Probe discontinued due to high impedance (>1000 ohms) in Multi-Cooled RF | 1. Keep probe(s) inserted at tissue site until PMG reads a minimum temperature of 30°C prior to procedure start<br>2. Swap out probe and cable as appropriate<br>3. Try new probe(s) and cable(s)<br>4. Press the PMG Output ON/Off button to turn off/ignore warning<br>5. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| WARNING [W221] | ▲ **Rising Impedance** (v4.1/v4.11) Probe was discontinued due to rising impedance (>200% of Ramp Completion Impedance) | |

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| WARNING [W222] | ▲ **Temp Control 1**<br>(v4.1/v4.11)<br>Probe Discontinuation - temperature measured is 5°C above set temp for more than 5 seconds | 1. Keep probe(s) inserted at tissue site until PMG reads a minimum temperature of 30°C prior to procedure start<br>2. Swap out probe and cable as appropriate<br>3. Try new probe(s) and cable(s)<br>4. Press the PMG Output ON/Off button to turn off/ignore warning<br>5. Contact HYH Technical Support if problem persists (844-425-9273) option 1 then option 3 |
| WARNING [W223] | ▲ **Temp Control 2**<br>(v4.1/v4.11)<br>Probe Discontinuation - temperature measured is 10°C above set temp for more than 1 second | |
| WARNING [W224] | ▲ **Under Temperature**<br>(v4.1/v4.11)<br>Probe Discontinuation - temperature measured is 5°C below set temp for more than 5 seconds | |

## 11 Technical Specifications

### 11.1 RF Output

- RF energy: 460.8 kHz ± 1 %, Quasi-sinusoidal
- Maximum power: 50 W (available into an impedance range of 60 ohms - 520 ohms, resistive.) Outside this range, the Generator reduces available power to comply with specified voltage and current limits.
- Applied part of patient circuit is not referenced to earth at high frequency.
- The maximum output of 50 W is restricted by:
  - Maximum voltage: 160 Vrms
  - Maximum current: 0.9 Arms
  - Maximum peak voltage: 254 V (under normal operating conditions)
  - Power output is available into loads of 25 ohms - 3000 ohms
  - 100 ohms is the nominal "rated" load.

### 11.2 Mechanical Specifications

- Size: 9.5 x 12.5 x 14.0" (24 x 32 x 35 cm) maximum
- Weight: 21.0 lb (9.5 kg) maximum (not including power cord or shipping box)
- Moisture protection rating: IPX0 (ordinary, per IEC601)

### 11.3 Environmental Specifications

- Operational temperature: 10°C to 35°C
- Storage & Transportation temperature: -40°C to 70°C
- Operation, Storage & Transportation Humidity: 20% to 95% non-condensing

Note: For additional details on Technical Specifications including IEC Electrical Safety please refer to the User Manual of your specific version of PMG

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For more information, please visit:
**www.halyardhealth.com**

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