

**Contact UR Medicine VAD Team  
at Strong Memorial Hospital**

**1-800-892-4964**

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**MEDICINE *of* THE HIGHEST ORDER**

# Emergency Care for the HeartMate 3 LVAD

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## Table of Contents:

Assessing the Patient and Clinical Considerations	Page 3
CPR Algorithm	Page 4
Is the Patient Having a Low Flow Alarm?	Page 5
Emergency Transportation	Page 6
How to Determine if the Pump has Stopped	Page 7
LVAD Controller Change Out Guidance	Page 8
Steps to Exchanging the Controller	Page 9
Heartmate 3 Alarm Review and Power Management	Page 10 & 11
➤ Alarm review	
➤ Charging batteries	
➤ Mobile Power Unit	
Hazard Alarms Guide	Page 12
Advisory Alarms Guide	Page 13
Electrostatic Discharge (ESD)	Page 14

# Assessing the Patient and Clinical Considerations

## IMPORTANT:

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Use caution when cutting off clothing to avoid damage to the driveline

### Clinical Considerations

- The LVAD is a continuous flow device, patients:
  - May not have a palpable pulse
  - May not have a detectable BP
  - May not have a measurable pulse oximetry reading
- LVAD patients are anticoagulated
- HR and rhythm
  - External defibrillation, cardioversion and external pacing are okay
  - CPR per algorithm
- EKG
  - HM3 may interfere with EKG monitoring
- Doppler BP (if available)
  - Target MAP 70-90
- Confirm the pump is running by auscultating for a continuous humming sound over the upper left abdominal quadrant

3

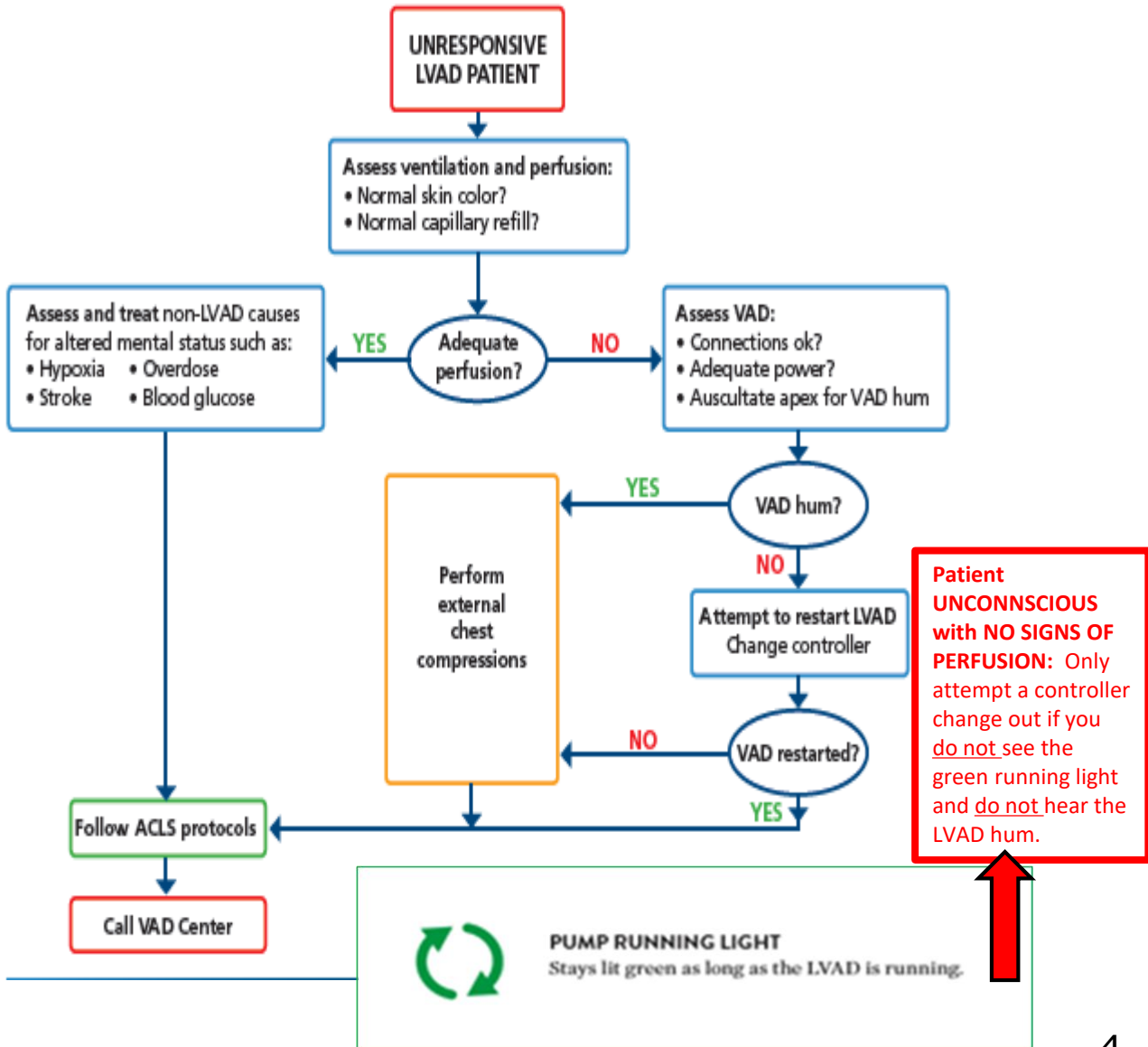
# CPR Algorithm

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## ASSESSMENT OF THE UNRESPONSIVE LVAD PATIENT



# Is the Patient Having a Low Flow Alarm?

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Flow <2.5 LPM



**Assess patient  
Check patient vitals and  
VAD parameters.**

**Hypertensive?  
MAP >90**

**YES**

**Consult the VAD team for  
further directions and  
guidance.**

**NO**

**Consult VAD team for possible  
causes and further guidance:**

- Hypotension
- Hypovolemia d/t dehydration or bleeding
- Arrhythmias

**May consider a 500cc NS bolus  
for hypotension/ hypovolemia**

5

# Emergency Transportation

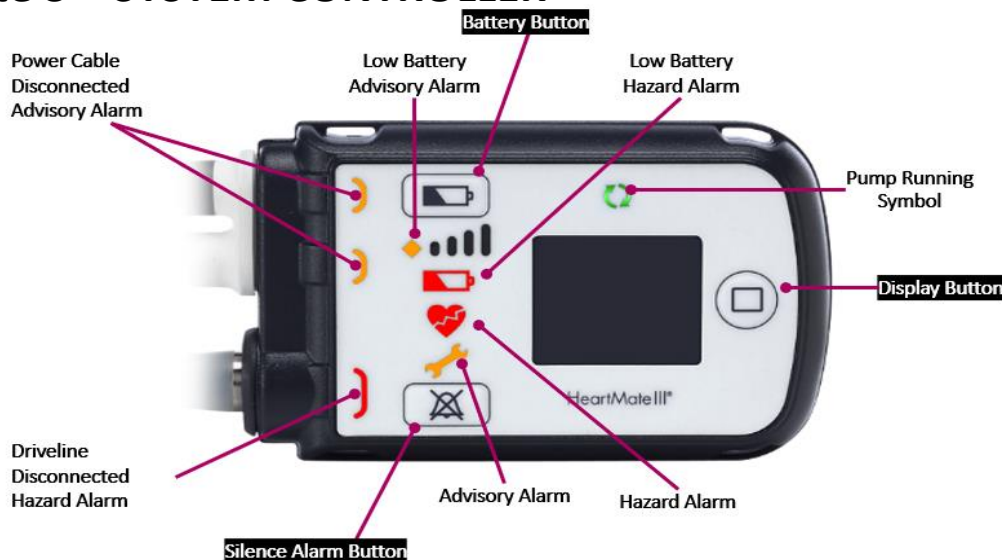
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- Any emergency transportation is ok; patients are permitted to fly.
- Avoid pulling, twisting, or kinking the driveline when strapping the patient to the stretcher.
- Be sure to bring ALL of the patient's equipment with them.
- Caregiver to remain with the patient if possible.

## HeartMate 3™ SYSTEM CONTROLLER



# How To Determine If The PUMP HAS STOPPED

- Auscultate the left upper abdominal quadrant.
- A continuous humming sound = pump running.
- Assess the controller: If the green  Pump Running symbol is illuminated the pump is running.

**PUMP NOT RUNNING **

**Step 1: Call the VAD team [1-800-892-4964](tel:1-800-892-4964) or [585-273-3760](tel:585-273-3760)**

**Step 2: Check the controller for on-screen instructions**

**Step 3: Check the connection between the controller and the driveline and all power connections. Ensure all are secure.**

**Step 4: If the pump does not restart, replace the current batteries with a fully-charged pair, or connect the patient to their mobile power unit (wall power).**

**Step 5: Press any button on the controller to try to restart the pump.**

**Step 6: If the pump does not restart, despite secure connections and adequate power, consider exchanging the controller as instructed by the VAD team at URMC.**

7

# LVAD Controller Change Out Guidance:

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Please keep in mind a controller change out is extremely rare!

A controller change out is an **emergency situation** and should be done under the guidance of an LVAD coordinator.

Never attempt a controller change out when the pump is running!



# Steps to Exchanging the Controller



## Step 1 Set-up

- Place the backup controller within reach
- Have the patient sit or lie down
- Unlock the safety lock on the controller connected to the patient



## Step 2 Replace System Controllers and Close Safety Lock

- Connect the white power source to the backup controller
- Promptly, move the driveline from the controller connected to the patient to the back up controller.



- Unlock and expose the red button
  - To remove the patient's driveline from their controller press the red button as you pull out the driveline



- Align driveline arrow/ alignment mark with the arrow controller.



- Firmly insert the driveline until it snaps into place.
- Slide the safety lock over the red button to close the door



**\*\* Important:** If the safety lock door does not close, the driveline is not connected.

- VERIFY THE PUMP RUNNING SYMBOL IS LIT 

## Step 3 Finish

- Put the old, replaced controller into "Sleep" mode, to stop it from alarming. Hold down the battery button for 5 seconds.



# HM 3 Alarm Review and Power Management

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- **Alarm Review:** View the last 6 alarms on the controller by pressing and releasing the silence alarm button and the display button at the same time. Then press the display button to scroll through the alarms.



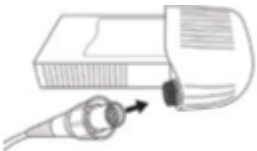
- **Changing Batteries:**



**Always change one power lead at a time!**



Align red arrows and insert battery until it clicks into place.



Connect the controller power lead to the battery:

- 1) Align the half-moon shapes to make a whole circle and engage.
- 2) Firmly push together the 2 connections.
- 3) Securely hand tighten the connector nut.



# HM 3 Power Management continued

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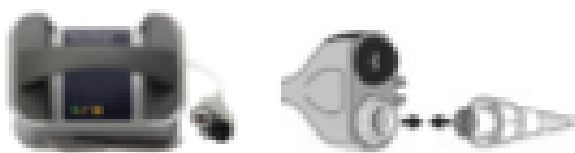
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## Connecting the Mobile Power Unit (MPU) aka Wall Power:

- Ensure the MPU is plugged into the wall outlet.
- Connect power cables one at a time.

### **(white to white/ black to black)**

- Align the half-circle shapes to make a whole circle and engage.
- Firmly push together the 2 connections
- Secure and hand tighten the connector nut
















**Mobile Power Unit**

# Hazard Alarms Guide

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Priority	System Controller Screen	Active Symbols	Alarm Means	To Resolve Alarm
H A Z A R D	Call Hospital Contact + Low Flow ☎ :07 + ☎ :03	 + 	<b>Pump is off. The Pump Running symbol is black.</b>	<ol style="list-style-type: none"> <li>1. Check if the fixed speed setting is below 4,000 rpm AND the System Controller's backup battery is not installed. Under these conditions, the pump can only be started from the System Monitor's Clinical or Settings screen by pressing the Pump Start button. Otherwise, press any button on the System Controller to attempt pump start.</li> <li>2. Switch to the backup System Controller and attempt to restart the pump.</li> <li>3. Clinically evaluate the patient.</li> </ol>
	Call Hospital Contact + Low Flow ☎ :07 + ☎ :03	 + 	<b>Low flow, flow is less than 2.5 lpm</b>	<ol style="list-style-type: none"> <li>1. Ensure that the Driveline is connected to the System Controller.</li> <li>2. Ensure that a power source is connected to the System Controller.</li> <li>3. Clinically evaluate the patient.</li> </ol>
	Connect Driveline ☎ :02	 +  + 	<b>Driveline is disconnected. The Pump Running symbol is black.</b>	<ol style="list-style-type: none"> <li>1. Immediately reconnect the Driveline to the System Controller and move the Driveline safety lock on the System Controller to the locked position. Also check that the Modular inline connector is secure.</li> <li>2. If the alarm persists after reconnecting the Driveline, press any button on the System Controller to attempt pump start.</li> <li>3. If the alarm still persists, check if the fixed speed setting is below 4,000 rpm AND the System Controller's backup battery is not installed. Under these conditions, the pump can only be started from the System Monitor's Clinical or Settings screen by pressing the Pump Start button.</li> <li>4. If the Driveline is connected and the alarm persists, replace the System Controller with a configured backup System Controller.</li> </ol>
	Connect Power Immediately + Backup Battery ☎ :05 + ☎ :01	 +  + 	<b>Both power cables are disconnected.</b>	Immediately connect to a working power source (Power Module, Mobile Power Unit, or two HeartMate® 14 Volt Lithium-Ion batteries).
	Call Hospital Contact Controller Fault	 + 	<b>System Controller Hardware Fault (Microcontroller Failure)</b>	<p>No active symbols (constant audio tone).</p> <ol style="list-style-type: none"> <li>1. Immediately switch to the backup System Controller.</li> <li>2. Provide the patient with a new System Controller.</li> </ol>
	Low Battery + Replace Power Immediately ☎ :06 + ☎ :02		<b>Low Battery, Power Input is extremely low with less than 5 min. remaining.</b>	Immediately connect to a working power source (Power Module, Mobile Power Unit, or two fully-charged HeartMate 14 Volt Lithium-Ion batteries).

**Note: A low flow alarm can be either a preload or afterload issue. Assess if the patient is hypo or hypertensive**



**Important!** The Pump Running (  ) symbol is lit green when the pump is running.

**Thoratec Corporation** 6035 Stoneridge Drive, Pleasanton, CA 94588 Tel: (925) 847-8600, Fax: (925) 847-8574, **HeartLine: (800) 456-1477**, www.thoratec.com  
Thoratec Corporation continuously strives to provide the highest quality products for mechanical circulatory support. Specifications may change without notice. Therefore, please refer to the HeartMate 3 Left Ventricular Assist System Patient Handbook shipped with the HeartMate 3 for the most current information regarding indications, contraindications, warnings, and cautions. Thoratec, the Thoratec logo, and HeartMate are registered trademarks and HeartMate 3 and HeartLine are trademarks of Thoratec Corporation.

Rx Only











# Advisory Alarms Guide

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Priority	System Controller Screen	Active Symbols	Alarm Means	To Resolve Alarm
A D V I S O R Y	Connect Power ⊖ :04		One of the two power cables is disconnected.	Promptly connect the disconnected power cable to power source (functioning Power Module, Mobile Power Unit, or two fully-charged HeartMate® 14 Volt Lithium-Ion batteries).
	Replace Power + Low Battery ⊖ :02 + ⊖ :06		Low battery-power input is low, with less than 15 min remaining.	Promptly connect to a working or different power source (Power Module, Mobile Power Unit, or two fully-charged 14 Volt HeartMate Lithium-Ion batteries).
	Call Hospital Contact Controller Fault		System Controller Hardware Fault	<ol style="list-style-type: none"> <li>1. Switch to the backup System Controller.</li> <li>2. Provide the patient with a new System Controller (with backup battery installed).</li> </ol>
	Call Hospital Contact Comm Fault		Communication Fault (Comm Fault)	<p>Contact Thoratec Corporation to determine best next steps. Use the System Monitor to silence the alarm while awaiting resolution, if needed.</p> <p><b>Note:</b> The alarm must be active to access the extended alarm silence for this situation.</p>
	Call Hospital Contact Backup Battery Fault		System Controller Backup Battery Fault	<p>Replace the 11 Volt Lithium-Ion backup battery.</p> <p><b>Note:</b> If replacing the battery does not resolve the alarm, the System Controller may need to be replaced or additional steps may be required. Call Thoratec Corporation with questions.</p>
	Call Hospital Contact Backup Battery Fault		System Controller Backup Battery Not Installed	<ol style="list-style-type: none"> <li>1. Install the 11 Volt Lithium-Ion backup battery in the System Controller.</li> <li>2. Obtain a new backup battery replacement kit.</li> </ol> <p><b>Note:</b> If replacing the battery does not resolve the alarm, the System Controller may need to be replaced or additional steps may be required. Call Thoratec Corporation with questions.</p>
	Call Hospital Contact Driveline Power Fault		Driveline Power Fault	<p>Contact Thoratec Corporation to determine best next steps. Use the System Monitor to silence the alarm while awaiting resolution, if needed.</p> <p><b>Note:</b> The alarm must be active to access the alarm silence for this situation.</p>
	Call Hospital Contact Driveline Comm Fault		Driveline Communication Fault (Driveline Comm Fault)	<p>Contact Thoratec Corporation to determine best next steps. Use the System Monitor to silence the alarm while awaiting resolution, if needed.</p> <p><b>Note:</b> The alarm must be active to access the alarm silence for this situation.</p>

**Important!** The Pump Running (  ) symbol is lit green when the pump is running.

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## What you will see and hear on the controller

- Excessive exposure to static electricity can cause power loss to the MPU and potential power loss the pump.
- This only may happen when the patient is on the MPU.
- May happen without the patient noticing, the pump will stop but then turn back on.



Fig 1



Fig 2

The System Controller will display the No External Power Alarm. You will see flashing yellow lights next to the power cables, a flashing red battery and the pump running symbol is green. You will hear a loud, constant alarm tone. The display screen will show two messages: Connect Power Immediately (Fig. 1) and Backup Battery (Fig. 2).



Fig 3



Fig 4

The System Controller will display the No External Power Alarm. You will see flashing yellow lights next to the power cables, a flashing red battery, a flashing red heart and the pump running symbol will be off (black). You will hear a loud, constant alarm tone. The display screen will show two messages: Connect Power Immediately (Fig. 3) and Backup Battery (Fig. 4).

**What You Should Do:  
Connect to battery  
power immediately!**

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