

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

**1-800-892-4964**

**585-273-3760**



**MEDICINE *of* THE HIGHEST ORDER**

# Emergency Care for the HeartMate II

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VAD Team at Strong  
Memorial Hospital  
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# 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
- 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

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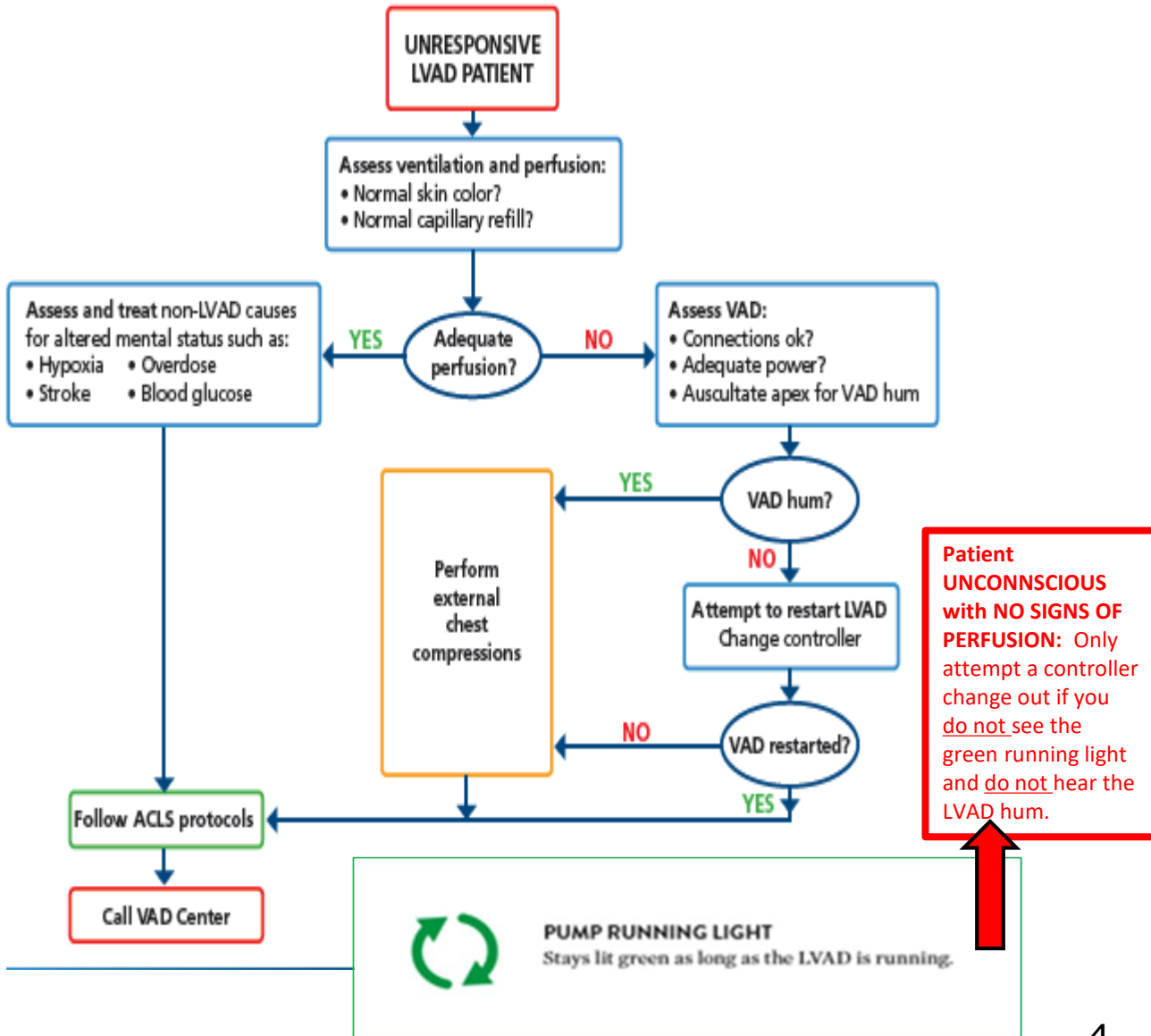
# CPR Algorithm

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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**

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# Emergency Transportation

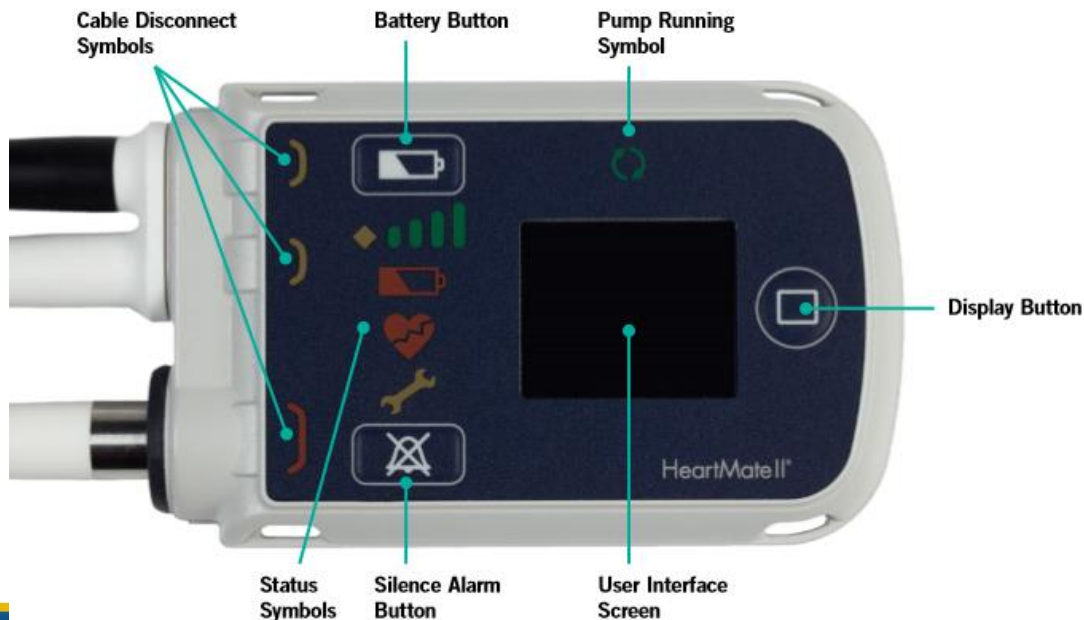
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- Any emergency transportation is ok; patients are permitted to fly.
- Avoid pulling, twisting, or kinking the driveline when strapping the patient to the stretcher.
- Be sure to bring ALL of the patient's equipment with them.
- Caregiver to remain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

## System Controller Interface




# How To Determine If The PUMP HAS STOPPED

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- 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**

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# 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 II Alarm Review and Power Management

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## Alarm Review:



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

## Changing Batteries:

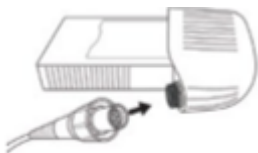
**Always change one power lead at a time!**



Align red arrows and insert battery until it 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 II Power Management Continued

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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**

NOTE: The patient may have a Power Module. This is similar to the MPU. Follow the same steps.



**Power Module**

# Hazard Alarms Guide- HMII

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Priority	System Controller Screen	Active Symbols	Alarm Means	To Resolve Alarm
H A Z A R D	<p>Low Flow</p> <p>⊕ :03</p> <p>+</p> <p>Call Hospital Contact</p> <p>⊕ :07</p>		Pump is off. The pump running symbol (⊕) is black.	<ol style="list-style-type: none"> <li>1. Check if the fixed speed setting is below 8,000 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 backup System Controller and attempt to restart pump.</li> <li>3. Clinically evaluate patient.</li> </ol>
	<p>Connect Driveline</p> <p>⊕ :02</p>	 + 	Driveline is disconnected. The pump running symbol (⊕) is black.	<ol style="list-style-type: none"> <li>1. Immediately reconnect the driveline to System Controller and move the driveline safety tab on the System Controller to the locked position.</li> <li>2. If alarm persists after reconnecting the driveline, press any button on the System Controller to attempt pump start. Otherwise, check if the fixed speed setting is below 8,000 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>3. If driveline is connected and alarm persists, replace System Controller with pre-programmed backup System Controller.</li> </ol>
	<p>Backup Battery</p> <p>⊕ :01</p> <p>+</p> <p>Connect Power Immediately</p> <p>⊕ :05</p>	 +  + 	Both power cables are disconnected	Immediately connect to a working power source (Power Module or two fully-charged HeartMate 14 Volt Lithium-Ion batteries).
	<p>Low Flow</p> <p>⊕ :03</p> <p>+</p> <p>Call Hospital Contact</p> <p>⊕ :07</p>		Low flow, flow is less than 2.5 lpm	<ol style="list-style-type: none"> <li>1. Ensure that the driveline is connected to System Controller.</li> <li>2. Ensure that a power source is connected to System Controller.</li> <li>3. Clinically evaluate patient.</li> </ol>
	<p>Replace Power Immediately</p> <p>⊕ :02</p> <p>+</p> <p>Low Battery</p> <p>⊕ :06</p>		Low Voltage, Power input is extremely low with less than 5 min. remaining	Immediately connect to a working power source (Power Module or two fully-charged HeartMate 14 Volt Lithium-Ion batteries).

**Important!** The pump running (⊕) symbol is always 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










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# Advisory Alarms Guide- HMII

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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 or two fully-charged HeartMate <sup>®</sup> 14 Volt Lithium-Ion batteries).
	Replace Power ⊙ :02 + Low Battery ⊙ :06		Low Battery, Power input is low with less than 15 min. remaining	Promptly connect to a working or different power source (Power Module or two fully-charged HeartMate 14 Volt Lithium-Ion batteries).
	Call Hospital Contact Controller Fault		System Controller hardware fault	1. Switch to the backup System Controller. 2. Provide patient with a new System Controller. <b>Note:</b> This alarm will be displayed on the System Monitor and may also be displayed on the System Controller.
	Call Hospital Contact Backup Battery fault		System Controller Backup Battery fault	Replace the 11 Volt Lithium-Ion backup battery. <b>Note:</b> If replacing the battery does not resolve the alarm, the System Controller may need replaced, or additional steps may be required. Call Thoratec with questions.
	Low Speed ⊙ :03 + Call Hospital Contact ⊙ :07		Low Speed advisory warning	1. Use the System Monitor to check that the fixed speed and low speed limit have been appropriately set. 2. Replace the System Controller. 3. Clinically evaluate the patient.
	None	None	Driveline fault	Contact Thoratec to determine best next steps. <b>Note:</b> Displayed as an active alarm only when connected to the System Monitor.
	 Call Hospital Contact ⊙ :07		System Controller Backup Battery not installed	1. Install the 11 Volt Lithium-Ion backup battery in the System Controller. 2. Obtain a new backup battery replacement kit. <b>Note:</b> If replacing the battery does not resolve the alarm, the System Controller may need replaced, or additional steps may be required. Call Thoratec with questions.
	None	None	Controller Clock not set	Use the System Monitor to set the System Controller's internal clock. <b>Note:</b> Be sure the System Monitor Clock is correct. <b>Note:</b> Displayed as an active alarm only when connected to the System Monitor.

**Important!** The pump running (🟢) symbol is always lit green when the pump is running.

# Identifying an Electrical Issue with the HMII Driveline

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- Patient may present with complaints of continuous or intermittent tone alarms
- Controller alarm history may reveal:

- Low speed advisory
- Low flow
- Pump off



- Keep patient on ***battery power only***
- Stabilize the driveline
- Transport to closest LVAD center for further management

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# Common Adverse Events Seen in LVAD patients

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- Stroke
- Dehydration
- Right heart failure
- GI bleeding/Epistaxis
- Infection/Sepsis
- Arrhythmias

***Treat the patient, not the pump!***

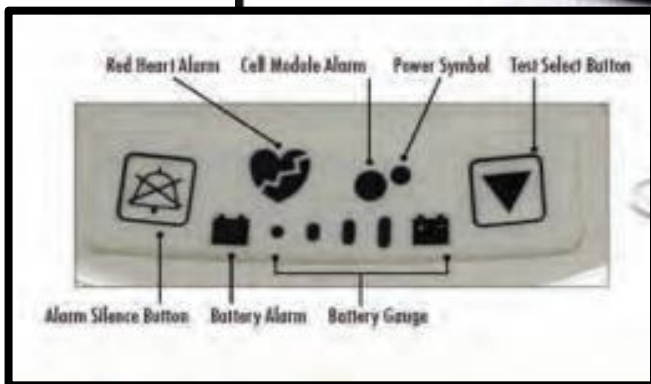
# EPC Controller (External Peripheral Controller)

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There are some patient's who may still have the older HMII controller.



**Controller Buttons**



**Driveline  
Connection**



**Red Heart Alarm**

**External Peripheral Controller (EPC):**  
A percutaneous lock is located on the side of the controller.



**Unlocked**



**Locked**

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