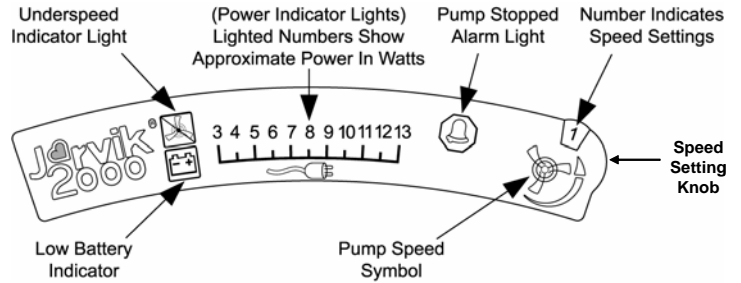


Top Panel of FlowMaker® Controller



Dial Setting	Speed Rpm	Flow L/min	Power Watts
1	8,000	1-2	3-4
2	9,000	2-3	4-5
3	10,000	4-5	5-6-7
4	11,000	5-7	7-8-9
5	12,000	7-8.5	8-9-10

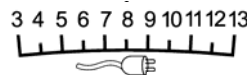
The **FlowMaker Controller** provides 1) power to the implanted blood pump, 2) user settable speeds at which the pump runs, and 3) alarms and warnings.

The FlowMaker Controller does not monitor the actual blood flow that the Jarvik 2000® Ventricular Assist Device (VAD) is pumping. In general, the higher the setting number the more blood the Jarvik 2000 VAD will pump. The tabulated flow estimates are based on research measurements in healthy animals. The actual blood flow may vary and will depend on several factors including blood pressure and the condition of the natural heart.

Speed Setting, Alarms, and Warnings



Only one control adjustment to the Jarvik 2000 VAD can be made. The **Jarvik 2000 VAD speed** can be selected by turning the knob on the side of the FlowMaker Controller. The setting number appears in the window on the top panel. The arrow indicates the direction to turn the knob to increase the speed.



Power Indicator Lights: The numbers indicate the electrical power (Watts) that the VAD is using. One, two, or three numbers may be lit at any moment, and the lights may change rhythmically with the heartbeat of the natural heart. A power measure of 13 watts or more indicates malfunction. The High Power Indicator, number 13, will light yellow. This condition should receive prompt medical attention.



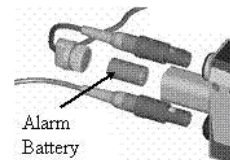
When the battery powering the Jarvik 2000 VAD is low, the **Low Battery Alarm** on the FlowMaker Controller lights yellow and the alarm sound beeps. Remaining running time with the portable Li-ion Battery is about 5-10 minutes; with the Reserve Battery/Charger for approximately 15 minutes.



If the Jarvik 2000 VAD stops or if the VAD speed drops to below 5,000 RPM for any reason, a steady alarm sound is heard and the **Pump Stopped Alarm** on the FlowMaker Controller lights red. The Pump Stopped Alarm will also sound if the intermittent low speed featured on the ILS FlowMaker Controller fails to function for any reason. Immediate attention is required. **Follow the Pump Stopped Alarm procedure for the appropriate Jarvik 2000 VAS model (Post-Auricular Cable or Abdominal Cable) which is included in the Operator Manual, the Patient Handbook, and as a separate instructions for use.**



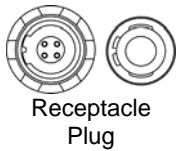
The **Underspeed Indicator** light will glow yellow when the Flowmaker Controller detects that the Jarvik 2000 VAD speed is slower than the dial setting selected. The most common reason is the battery voltage is too low. In this case, corrective actions are to: 1) Select a lower speed setting on the Flowmaker Controller and/or 2) Change the battery to a fully charged Li-ion Battery. If the underspeed indicator light is still lit, then the cause may be a fault in the system. Replace all external components; and if the underspeed light is still on after replacing all external components. Treat the situation as an emergency and seek immediate medical attention. See Patient Handbook and Operator Manual for more details.



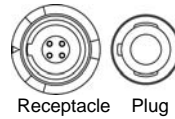
A non-rechargeable **Alarm Battery** is used to assure that the FlowMaker Controller has enough power for the alarms if the main battery fails, if the battery cable fails, or if the main battery becomes accidentally disconnected. This Alarm Battery is located in a small housing on the end of the FlowMaker Controller between the connectors for the cables.

The Quick Reference Guide is not intended to replace the Operator Manual and Patient Handbook. Please refer to the appropriate instructions for use for further details.

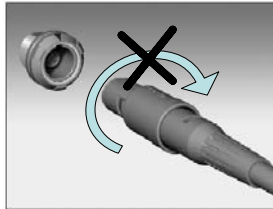




Connection from Jarvik 2000 VAD to FlowMaker Controller: The black receptacle on the FlowMaker Controller is located above the housing for the small back-up Alarm Battery. The receptacle has double key slots for a black plug. The Extension Cable and the Pedestal Cable (depending on the model of the device used) also have double key slots.



Connection from FlowMaker Controller to Y Cable or battery: The gray receptacle on the FlowMaker Controller is located below the housing for the small back-up Alarm Battery. This receptacle has a single key slot for the gray plug of the Y Cable, Li-ion Battery Cable, and Reserve Battery/Charger.



Note that the single and double keys on the plugs and receptacles are easily visible and must be placed in the proper rotational position, with the arrows on receptacle and plug lined up, for the connectors to go together. The connectors are attached and removed by a push-pull latch mechanism, not by a screw thread. Place the plug into the receptacle with slight pressure and gently rotate the plug until the key-way engages. Then push the connector together. The connector should click into place and should not come apart if the cable is tugged. To remove the plug, hold it close to the receptacle and pull.

- Never attempt to disconnect any connector by twisting.
- Do not attempt to pull the connector apart by the wire or by the strain relief.
- Never force a connector together. If the plug does not go into the receptacle easily, gently rotate it until it is aligned properly. When it is fully engaged, a soft click can be heard.
- If a connector is damaged or pins are bent, do not attempt to repair but replace the cable instead.

The **Y Cable** for the Jarvik 2000 VAS is used to allow battery changes without removing power from the Jarvik 2000 VAD. Before unplugging a discharged battery, a recharged battery should be plugged into the Y Cable. If the battery cable is unplugged prior to attaching a charged battery to the other end of the Y Cable, the Jarvik 2000 VAD stops, but the natural heart continues to beat. If this occurs, the beeping tone of the alarm will change to a steady tone, indicating that the Jarvik 2000 VAD is stopped. After the used battery is replaced with a fresh one, always remove the discharged battery from the Y Cable.



The portable **Li-ion Battery** will run the Jarvik 2000 VAS for 7-12 hours under usual conditions. The Li-ion Battery has an indicator with 5 lights that indicates how much power is remaining. Depress the black button to turn on the indicator lights:

Indicator	Approximate Remaining Time
All 5 LEDs lit	8-12 hours
4 LEDs lit	6-10 hours
3 LEDs lit	5-8 hours
2 LEDs lit	3-5 hours
1 LED lit	5 minutes - 2 hours

Li-ion Battery Charger

When the Li-ion Battery Charger is first connected to wall power, the green light next to the vertical green bar will turn on. The second light will simultaneously turn on green for approximately 1-3 seconds, followed by the startup sequence below:

- Flashing yellow for approximately 18-24 seconds
- Solid green for approximately 1-3 seconds
- Off

The Li-ion Battery Charger is not required to go through the startup sequence each time it is connected to a Li-ion Battery. It will only occur when wall power is first applied to the Li-ion Battery Charger.

Never connect the Li-ion Battery to the Li-ion Battery Charger while the second light is green. If a connection is made during this brief period of time, the Li-ion Battery will not charge.

When disconnecting the Li-ion Battery Charger from a fully charged Li-ion Battery, always wait for the second light to turn off before connecting another Li-ion Battery.

The **Reserve Battery/Charger** has both a battery and a charger built into a single unit; however, they are not electrically connected to each other. A fully charged Reserve Battery/Charger has enough power to run the Jarvik 2000 VAD for over 24 hours. If the Reserve Battery/Charger is used for under 12 hours and then recharged, it will last for more than 1000 recharge cycles. If it is not recharged until it is fully discharged, it will last for fewer than 200 recharge cycles.

The Reserve Battery/Charger has a long cord with a gray plug that plugs into the Y Cable (which is then connected to the FlowMaker Controller) or plugs directly into the FlowMaker Controller without a Y Cable.

Charging the Reserve Battery/Charger:



Disconnect the gray plug from the Y Cable or FlowMaker Controller and plug it into the gray receptacle on the Reserve Battery/Charger.

A yellow light next to the Charge label on the Reserve Battery/Charger will turn on to indicate charging. When the Reserve Battery/Charger is fully charged, the yellow light will turn off.

The green light next to the Power label on the Reserve Battery only indicates that wall power is connected to the charger section of the unit. The green light does not indicate the Reserve Battery/Charger is fully charged.

The Reserve Battery/Charger is fully charged only if the Charge light is off and the gray cable is plugged into the gray receptacle on the unit.

If the gray cable is not plugged into the receptacle on the Reserve Battery/Charger while the unit is also plugged into the wall, the Reserve Battery/Charger will not charge.

It is not possible to run the Jarvik 2000 VAS from wall power even if the Reserve Battery/Charger is plugged into wall power. It is also not possible to charge the Reserve Battery/Charger while the same Reserve Battery/Charger is being used to run the Jarvik 2000 VAD. At all times, the Jarvik 2000 VAD is run only from battery power.