**Part 2: Priming 3/8” 5.0 HLS Module. CRYSTALLOID AND BLOOD PRIMING**

1. **Remove yellow de-airing cap!**
2. Turn on CardioHelp console and activate “global override”. (While holding down the  safety button, press global override.)
3. Open the clamp on the quick priming line and drain off excess prime back into plasmalyte bag – **do not drain below demarcation line on bottom LEFT of priming bag**. Re-clamp quick priming line.
4. Turn **pump to 1000 RPM**s (flow approximately 1LPM).
5. Add **50 ml of 25% albumin** to the priming reservoir via either 2-way stopcock at the top of the priming bag and circulate for a few minutes.
6. Fill CardioQuip water heater with **4L of sterile water** (waterline needs to be well above mesh). Ensure that both the lid AND the body of the heater are plugged in.
7. Turn on and prime the water heater: ***SEE CARDIOQUIP GUIDELINE****.* Verify flow and make sure there are no leaks and that you do NOT see water entering the oxygenator!
8. Confirm that the sweep gas line is connected to the oxygenator and blender.
9. Turn **pump to ZERO RPMs.**
10. Clamp venous line out of priming reservoir using 2 white large clamps (2-thumb technique), and confirm clamp is closed to the priming line.
11. Clamp the arterial line immediately above the 1-way valve using a 3/8” metal clamp.
12. Add 3 units of PRBCs to priming reservoir via the spike on the quick priming line or via the 2-way stopcock at top of priming bag – **make sure to run blood through a pall filter**.
13. Add **400 units of Heparin** to the priming reservoir and mix manually.
14. Add **400 mg CaCl** to the priming reservoir and mix manually.
15. Place ¼" metal clamp (yellow) and a 1L waste bag on the quick priming line to collect the crystalloid prime as it is displaced by the blood.
16. Move the 3/8” clamp on the arterial line from above the 1-way valve to the arterial tubing immediately as it exits the priming bag (above the “Y” connection to quick prime line).
17. With ¼" metal clamp in place, open the white clamp on quick prime line.
18. Open the white venous clamps and allow circuit to blood prime via gravity – modulate the speed of the blood prime by slowly opening and closing the metal clamp on the waste bag line.
19. **Continue to watch the priming bag closely. Do not allow it to empty below the demarcation line.**
20. Once most of the plasmalyte returns to waste bag and blood has made its way to at least the “Y” of the waste bag, clamp off the waste bag. If time permits, let it run until blood gets down to the demarcation line of priming bag.
21. To limit blood spillage, move the 4 white clamps on the red and blue lines close to the quick-action couplings and close all (4) white large clamps (two hand technique).
22. Separate the priming bag from the table set bowl by disconnecting the quick-action couplings. **Using airless technique, connect the red line to the blue line of the table set (clam shell).** Also connect the red and blue lines of the priming bag together.
23. **De-activate the “Global Override” mode**  **, and unclamp the 2 white clamps on the arterial and venous lines of the table set**.
24. Turn up **RPMs to 1000**.
25. Turn on the sweep gas to **0.3L, 21%.**
26. Add **15 mEq NaHCO3** to the pre-oxygenator pigtail port.
    * *Caution: adding and removing fluid from closed circuit will affect pressures. If P-art and P-int are too high (>350), remove some blood from the circuit until pressures are <350. If P-ven is too negative, add some fluid back to the circuit.*
27. Draw an ACT, ABG with lytes and iCa from the post-oxygenator pigtail. Add additional NaHCO3 and Ca as needed.
28. Turn the **sweep gas off** after any final adjustments made to circuit meds. (Turn on again prior to patient going on).
29. **The set is now ready for connecting to the cannulas**
30. When surgeon is *ABSOLUTELY* ready, **clamp the venous inlet tubing and arterial outlet tubing** with 3/8” metal clamps on the clamp symbols near the HLS module. *At this point, the circuit is clamped resulting in* ***blood stasis****, therefore the cannula connection process needs to proceed efficiently!*
31. Open the table set bowl (clam shell) and have the surgeon clamp the red and blue lines before and after the quick-action couplings or on the clamp symbols using **4 sterile 3/8” clamps**.
32. The surgeon will then separate quick connects and place sterile tubing onto sterile field – you will discard remainder of table set (clam shell).
33. The surgeon will make cannula connections by cutting off quick connect ends (if present) and attaching circuit to the cannula connectors airlessly (arterial to red line; venous to blue line)
34. Ask the surgeons to remove the clamps on their end.
35. Adjust the sweep gas to half of anticipated ECMO flow rate and 80% FiO2.
36. **You are now ready to go on ECMO - increase RPMs to 1500**
37. When confirmed with the surgeon, remove the venous clamp above the bridge and then slowly remove the arterial clamp above the bridge – making sure no air is seen.
38. **Increase flows to achieve 100-150 ml/kg.**
39. Sweep gas flow should be changed to match blood flow 0.5-1:1
40. Once the patient is on ECMO, connect the venous probe correctly to the venous shelf on the HLS module. **Please DO NOT force probe onto shelf, since this may break off connecting pin**.
41. **Transfuse 20 ml/kg (if patient < 15kg) or 1 unit (if patient > 15kg) of platelets to the patient**.
42. Confirm that you are **NOT on Global Override**.
43. **Confirm ALARMS**: venous pressure -60; Arterial pressure > 350; Delta P pressure ³ 25; Low flow alarm at 500 ml/min;

**Confirm Interventions are on**: ARTERIAL BUBBLE SENSOR – **pump stops**, venous pressure >100 – pump slows down

1. Confirm the water heater is on and set to 37 degrees and running in **low power mode**.
2. Obtain cannula placement CXR/ECHO as needed. If cannulas are in good position, secure the ECMO cannulas to the bed.
3. After cannulas are sutured in place, secure to christmas tree with paper tape. **Tie-band ALL new connections**.
4. Obtain ACT, first round of gases and labs (CBC, coags), correlating with SVO2 monitor.
5. Begin **heparin infusion at 25 units/kg/hr when ACT < 350.** 
   * For post-op Cardiac patients, determine with CT surgeon whether or not heparin will be immediately started.
   * For adult sized pediatric patients:
   * ***Max initial heparin bolus is 5000 units***
   * ***Max starting heparin drip is 1000 units/hr***.
6. Adjust sweep gas FiO2 to achieve post-oxygenator PaO2 200-300.
7. **Replace the yellow cap on the de-airing port *loosely* to allow air to escape**.