LivaNova
Advanced Circulatory Support

LifeSPARC Circuit Emergency Guide

24/7 Clinical Support 800 373 1607

Customer Service 800 373 7421

Office 620 Alpha Dr, Suite 2
Pittsburgh, PA 15238

Visit LivaNova.com

IM-7100219-ACS

Controller Critical Failure

Possible Presentation

- Continuous audible controller alarm
- Critical failure icon on main display

Immediate Action

- **Do not turn off controller**
- **DO NOT DISCONNECT OR STOP THE PUMP** unless determination has been made to discontinue support
- Confirm that the pump is running and that the pump speed is being maintained as displayed on the secondary display LED lights
- Controller replacement will be necessary to re-establish full functionality
- Contact LivaNova for additional guidance and support
  - Local representative
  - **24/7 CLINICAL SUPPORT:** 800-373-1607

Next Steps

- Notify physician in charge and appropriate team members
- Perform LifeSPARC controller exchange
- *Refer to LifeSPARC Operations Manual for detailed instructions*

Pump Failure

Possible Presentation	• Rule out patient factors, ensure controller is on and functioning appropriately • Potential controller alarms • "Pump stopped", "Low Flow", "Pump current high" • Patient deterioration • Low flow or no flow through the circuit
Immediate Action	• Clamp both inflow & outflow limbs of circuit • Support patient • Hemodynamic & ventilator support as needed • Notify physician in charge and appropriate team members

Next Steps	• Prepare for pump or circuit exchange
	• Contact LivaNova for additional guidance and support
	  • Local representative
	  • **24/7 CLINICAL SUPPORT:** 800-373-1607

Unintentional Decannulation

Possible Presentation

- Rapid decline in flows and patient deterioration
- Massive hemorrhage or rapid swelling & discoloration at cannulation site
- Cannula visibly out of insertion site

Immediate Action

- "3C rule"
  - **CLAMP** both inflow & outflow limbs of circuit, stop flow & pump
  - **CALL** for help
  - **COMPRESS** firmly proximal to cannula insertion site

Next Steps

- Support patient
  - Hemodynamic & ventilator support as needed
  - Massive transfusion
- Notify physician in charge and appropriate team members

Mitigations

- Verify appropriate placement and securement of all cannulas regularly and prior to mobilization
- Monitor and record insertion depth of all cannulas
- Verify patient bed and circuit are secure and in appropriate position

Mossadegh, C. and Combes, A., 2017. Nursing care and ECMO. 1st ed. Springer, pp.45-70. Stentz MJ, et al. Checklists Improve Team Performance During Simulated ECMO Emergencies: A Randomized Trial. Crit Care Explor. 2021;3(4), (supp).

Erratic Flows / Suction Event

Possible Presentation

- Sudden, large fluctuations in flows despite no change in RPMs
- (+/-) chattering present in venous drainage line
- Patient deterioration

Immediate Action

- Attempt to stabilize flows – decrease RPMs until stable flow achieved
- Complete circuit check: venous drainage cannula position, kinks, bleeding, thrombus
- Notify physician in charge and appropriate team members
- Consider volume challenge if hypovolemia suspected

Next Steps

- Identify and treat underlying cause
  - Potential patient causes: hypovolemia, hemorrhage, tamponade, excessive intraabdominal or intrathoracic pressure
  - Potential circuit causes: cannula malposition, circuit kinking, unnecessarily high RPMs, or clot in circuit

Mitigations

- Ensure adequate patient volume status
- Rapid diagnosis and treatment of hemorrhage, tamponade, excessive intraabdominal, intrathoracic pressure
- Regular monitoring of circuit and verification of cannula placement

Eckman PM, et al. VA ECMO for Cardiogenic Shock: An Introduction for the Busy Clinician. Circulation. 2019;140(24):2019-2037. Mossadegh, C. and Combes, A., 2017. Nursing care and ECMO. 1st ed. Springer, pp.45-70. Stentz MJ, et al. Checklists Improve Team Performance During Simulated ECMO Emergencies: A Randomized Trial. Crit Care Explor. 2021;3(4), (supp).

Air Entrainment

Possible Presentation	• Air trapped in top of oxygenator • Visible air in tubing or pump head • No flows due to air-locked pump
Immediate Action	• Clamp both inflow & outflow limbs of circuit • Place patient in Trendelenburg position if air delivered to patient • Support patient • Hemodynamic & ventilator support as needed • Notify physician in charge and appropriate team members
Next Steps	• De-air the circuit or complete circuit exchange
Mitigations	• Minimize number of circuit access sites • Ensure all connections proximal to pump are occlusive and secure • Verify appropriate placement and securement of all cannulas regularly • Ensure proper care when accessing central lines

Eckman PM, et al. VA ECMO for Cardiogenic Shock: An Introduction for the Busy Clinician. Circulation. 2019;140(24):2019-2037. ELSO Guidelines for Cardiopulmonary Extracorporeal Life Support Extracorporeal Life Support Organization, Version 1.4 August 2017, Ann Arbor, MI, USA. Mossadegh, C. and Combes, A., 2017. Nursing care and ECMO. 1st ed. Springer, pp.45-70. Stentz MJ, et al. Checklists Improve Team Performance During Simulated ECMO Emergencies: A Randomized Trial. Crit Care Explor. 2021;3(4), (supp).

Cardiac Arrest

Possible Presentation	• Cardiac arrest or arrhythmia

Immediate Action	• **VV ECMO:**
	  • Initiate CPR
	• **VA ECMO:**
	  • Maximize ECMO pump flow (may require volume)
	  • Initiate CPR if unable to maintain adequate flow

Next Steps	• Evaluate for and treat underlying cause of cardiac arrest
Mitigations	• Monitor for and treat electrolyte imbalances, acid base abnormalities, hypoxia, bleeding/hypovolemia, cardiac tamponade, tension pneumothorax, etc.

Brogen Thomas. ECMO Specialist Training Manual. S.l.: ELSO; 2018.

LivaNova

Advanced Circulatory Support

Manufactured by CardiacAssist, Inc

620 Alpha Drive, Pittsburgh, PA 15238, USA

412-963-7770

24/7 Clinical Support 800 373 1607

Customer Service 800 373 7421

Office 620 Alpha Dr, Suite 2
Pittsburgh, PA 15238

Visit LivaNova.com

IM-7100219-ACS