

4.7 Servo Controlled Oxygen

4.7.1 Servo Controlled Oxygen Service Screen

To access the service screens, hold in the override button (>37) during power up until the software revision screen appears. Release the button and the first service screen will appear. Select DOWN on the first screen to go to the second service screen. Select Servo O2 to bring up the Servo Controlled Oxygen service screen.

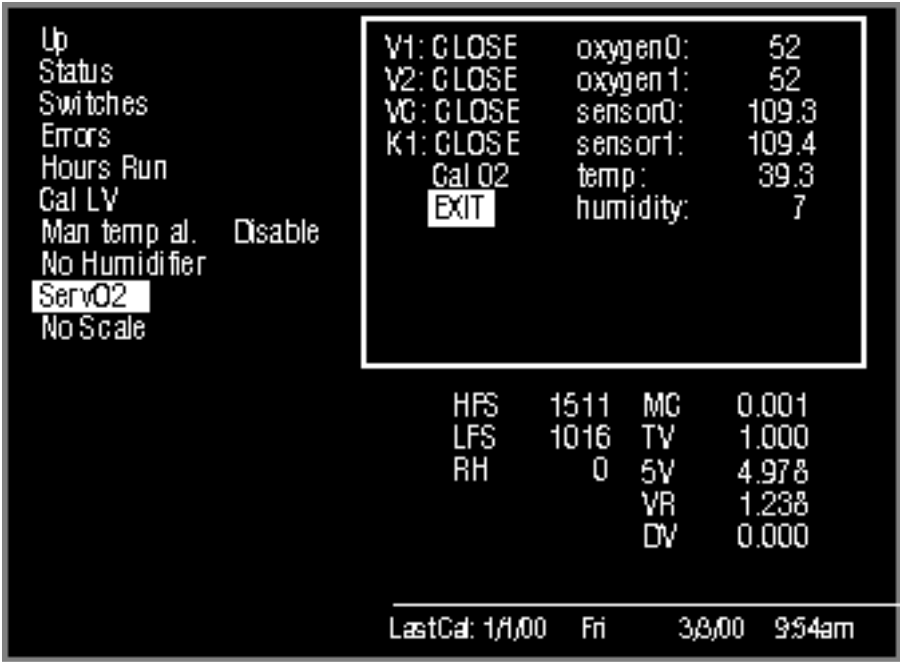


Figure 4-6 Servo Controlled Oxygen Service Screen

Item	Description
V1	Select to open or close supply valve one in the valve housing located beneath the electrical enclosure.
V2	Select to open or close supply valve two in the valve housing located beneath the electrical enclosure.
VC	Select to open or close calibration valve in the sensor housing located beneath the bed. Open is calibration position and closed is the normal operation position. The calibration fan is on and the cooling fan is off when VC is open. NOTE: The cooling fan is on whenever the Servo Controlled Oxygen service screen is selected and VC is closed.
K1	Select to open or close the relay on Relay PCB that powers the valves.
Cal O2	Initiates calibration routine.
oxygen0	Oxygen reading in percent from first sensor cell:

Item	Description
oxygen1	Oxygen reading in percent from second sensor cell:
sensor0	Voltage output in millivolts from first sensor cell.
sensor1	Voltage output in millivolts from second sensor cell. NOTE: The following information applies to the oxygen0, oxygen1, sensor0, and sensor1 values: <ul style="list-style-type: none"> For software version 1.40 or previous versions, 23 mv - 280 mv = 21% - 100% O₂. For software version 1.50 or later versions, 5 - 90 mv = 21 - 100% O₂.
temp	Temperature in degrees Celsius read from a sensor inside the sensor housing located beneath the bed. Refer to temperature to resistance curve in the Tips section 4.7.3.4.
humidity	Relative humidity in percent read from a sensor inside the sensor housing located beneath the bed.

4.7.2 Servo Controlled Oxygen Alarm Messages

Alarm Message	Meaning	Cause	Action
Low Oxygen	Sensor1 reading is > 3% below the oxygen set point 7 minutes after a set point change.	Low O ₂ supply pressure or flow.	Be sure supply is greater than 45psi (310 kPa) and flow rate is greater than 45 L/min. If flow rate is <45 check that the inlet screen in the regulator is not occluded.
		Inlet screen occluded.	Clean or replace screen.
		Air leaks into infant compartment.	Be sure all doors and portholes are closed
		Supply Valve not opening.	Check supply valves. Refer to the Tips section 4.7.3.1.
		End cap safety valve not opening.	Check valve and spring assembly. Refer to the Tips section 4.7.3.
		Calibration valve is not closing.	Check the calibration valve. Refer to the Tips section 4.7.3.2.
		Infant compartment vents occluded.	Check to be sure that the two vents in the infant compartment under the bed are not occluded.
High Oxygen	Sensor1 reading more than 3% above set point	Oxygen set point recently lowered.	Allow time for oxygen level to drop.
		Supply valve(s) not closing.	Check supply valves and kinked hoses. Refer to the Tips section 4.7.3.1.

Alarm Message	Meaning	Cause	Action
Oxygen Probe Failure	One of the sensors is reading out of range (23-280 millivolts) or the difference between the two O2 sensors is above 3%.	Defective Sensor(s)	In service mode sensor0 and sensor1 should be 23-280. If outside this range replace the sensors. If in range ensure oxygen0 and oxygen1 read within 3% of each other or replace the sensors.
		Leak or occlusion in sensor housing area.	Be sure sensor housing is seated properly and the retaining screws are tight. Be sure sensor gaskets are in place and the tubing is seated correctly in the connectors. Check to be sure that the two vents in the infant compartment under the bed are not occluded.
		Defective cable or connection.	Measure the voltage at J85.8-J85.7 (sensor0) and J85.6-J85.7 (sensor1) and compare them to displayed sensor0 and sensor1. If the measurement is the same as the displayed, check the cable and sensor contacts.
		Defective Servo O2 board.	If the measurement is not the same as the displayed, replace the Servo O2 board.
O2 Cal Lost-No O2	Servo oxygen unit has never been calibrated. Unit will not operate until initial calibration is performed.	Perform oxygen calibration.	Run calibration.
	Cell voltage less than 33 mV.	Earlier software versions did not store voltages this low.	Replace display software with 1.62 or higher.

Alarm Message	Meaning	Cause	Action
Oxygen System Failure 1	The sensor plug thermistor temperature reading is out of the range: 15C-55C.	Unit is cold: <15 degrees C.	Allow unit to warm up.
		Cooling fan is not running when the sensor housing temperature gets above 50 degrees.	Test the cooling fan. Refer to the Tips section 4.7.3.3.
		Defective sensor plug thermistor or cable.	Disconnect the cable and measure the resistance of the thermistor between J85.4 and J85.5. Refer to R/T chart in the Tips section 4.7.3.4. If sensor is shorted, open, or values don't agree with the R/T chart, replace the sensor plug assembly or the cable.
		Defective servo O2 board.	If resistance is in range replace the servo O2 board.
Oxygen System Failure 2	The RH reading is out of valid range: 1-99. When out of range it displays 0 in service mode.	Defective sensor plug.	Measure the humidity sensor voltage between J85.2 and J85.1. If the voltage is outside the range of 0.7V- 4.0V, replace the sensor plug assembly.
		Defective servo O2 board.	If it is in the correct range, replace the servo O2 Board.
Oxygen System Failure 3	The checksum test performed during power up testing failed.	Defective Microcontroller.	Replace microcontroller U6 on the Servo O2 board.
Oxygen System Failure 4	Analog to digital converter circuit self test failed. The reading of Vtest is out of the valid range: 1.216V-1.254V.	Defective Servo O2 board.	Replace servo O2 board.
Check O2 supply	After calibration, both supply valves are opened and after approximately 20 seconds, sensor1 reading is not greater than 23%.	O2 supply is not connected.	Verify O2 supply, minimum 45psi (310kPa) is connected to the inlet.

Alarm Message	Meaning	Cause	Action
Oxygen System Failure 5	Check O2 Supply alarm has been silenced twice and the sensor1 reading is still not greater than 23%.	O2 supply is not connected.	Verify O2 supply, minimum 45 psi (310 kPa) and 45 L/min is connected to the inlet.
		Calibration valve stuck in calibration position.	Check the calibration valve, Refer to the Tips section 4.7.3.2.
		Supply valves not opening.	Check supply valves. Refer to the Tips section 4.7.3.1.
		Leak or occlusion in sensor housing area.	Be sure sensor housing is seated properly and the retaining screws are tight. Be sure sensor gaskets are in place and the tubing is seated correctly in the connectors. Check to be sure that the two vents in the infant compartment under the bed are not occluded.
Oxygen System Failure 6	The Giraffe control board cannot communicate with Servo O2 board.	Defective Servo O2 board.	Replace servo O2 board.
		Defective Cable.	Check that the cable between the Giraffe control board and the Servo O2 board is seated properly.
Oxygen System Failure 7	Power up test detected a problem with the watchdog circuit.	Defective Servo O2 board.	Replace Servo O2 board.
Calibration failed	In calibration mode, after 5 minutes, both sensors are not reading between 23 and 55 millivolts so the unit cannot calibrate.	Calibration valve is not opening or the calibration fan is not turning on.	Check the calibration valve and fan. Refer to the Tips section 4.7.3.2.
		Defective sensors.	Replace the sensors.
FiO2>26%	Elevated O2 levels but Servo O2 is not turned on.	If other sources of oxygen are not in use, leak in Servo O2 system.	Check for valve leak. Refer to the Tips section 4.7.3.

**SENSITIVE TO ELECTROSTATIC DISCHARGE CAUTION**

An Electrostatic Discharge (ESD) Susceptibility symbol is displayed to alert service personnel that the part(s) are sensitive to electrostatic discharge and that static control procedures must be used to prevent damage to the equipment.

4.7.3 Servo Controlled Oxygen Troubleshooting Tips

4.7.3.1 Check Supply Valves



Power up unit in service mode. Select Servo O2 on second page. Be sure O2 is connected. Open V1. You should hear gas flow. Close V1, open V2. You should hear gas flow. Close V2, gas flow should stop.

If both valves are not opening, test the fuses and supply valves. Disconnect J83 at the Servo O2 board. Measure the resistance on harness pin 1 to pin 2. It should be the supply valve resistance (50 to 100 ohms). If not, the fuse is opened or the supply valve is defective. Repeat for the second supply valve with pins 3 to 4. If the valves check OK, the Servo O2 board is defective.

NOTE: With one supply valve open the flow rate should be a minimum of 35 L/min. With both supply valves open, the minimum flow rate should be 40 L/min. If the flow rate is low, check that the regulator inlet screen is not occluded.

4.7.3.2 Check Calibration Valve/Calibration Fan



The calibration valve is located beneath the chassis in the sensor housing. The calibration fan is mounted in the sensor housing next to the calibration valve. Power up unit in service mode. Select Servo O2 on second page. Open VC. This should open the calibrate valve and turn on the calibration fan. Verify the calibration fan is running. If the fan is running then the Servo O2 board is OK and the calibration valve may be defective. If the fan is not running check the control signal from the Servo O2 board to verify voltage is present when VC is opened to determine if the fan or board is defective.

4.7.3.3 Check Cooling Fan



The cooling fan is mounted to the sensor housing door on the chassis cover. Power up unit in service mode. Select Servo O2 on second page. The cooling fan should be running.

If fan is not running verify 10.0 - 13.2 Volts at J86-1 to J86-2. If voltage is present the fan is defective. If voltage is not present the Servo O2 board is defective. Open VC, you should hear a click and the cooling fan should stop. If the fan does not stop the Servo O2 board is defective.