

5.5 Gas Module 3 Pneumatic Leakage Test

This test does not require any extra equipment. It is recommended that this test be performed prior to each use.

1. Start the multigas system and occlude the gas sample inlet of the water trap.
2. Verify that the Gas Module 3 reports occlusion and enters purge mode.
3. Wait 10 seconds for stabilization.
4. Verify that the gas flow reported by the Gas Module 3 is less than 7 ml/min.

NOTE: At occlusion, gas trapped in the pump may oscillate and make the Gas Module 3 flow meter report a false flow reading, even though the actual flow is 0 ml/min.

If the pneumatic leakage test fails, the pneumatic system should be carefully checked for leaks and damaged tubing, the water trap should be replaced and the test should then be repeated.

5.6 Gas Module 3 Zero Reference Valve Test

NOTE: An incorrect zero reference measurement can occur if ambient CO₂ is too high. The limits for ambient CO₂ concentration are: 300 – 800 ppm.

1. Power up the system and allow it to enter mode (10 minutes).
2. Note the CO₂ level.
3. Run gas through the system.
4. Perform a manual calibration.
5. After the calibration procedure, verify that the CO₂ level is close to the level that was noted in step 2.

5.7 Calibration

5.7.1 Passport XG Gas Calibration

Accuracy verification of the Gas Module is recommended at six (6) month intervals or whenever gas readings appear to be in error. The date of the last successful mixture calibration appears at the bottom of the "Gases" menu. The operator may elect to perform a Zero calibration (lasting approximately 10 seconds) or a Span calibration (lasting approximately 2 minutes) at any time. During the calibration session gas readings and all other gas functions are not available.

Zero calibration is a single action command that compensates all gas channels for the effects of offset drift. Zero calibration may be performed on command and also takes place automatically at preset intervals. To manually perform a Zero cal, choose 'YES' from the Zero calibration gas menu (refer to Gas Monitor Calibration section of the Passport Operating Instructions).

Span calibration is a set of prompted commands that enables the operator to align the gas display(s) to specific gas concentration(s) within the Calibration Gas canister. Span calibration can be initiated by the operator any time the gas module's readings are suspected to be inaccurate. Span calibration should be performed if after performing a Zero cal, the gas readings do not display the accurate values.

Always verify accuracy using a full canister of approved precision calibration gas, after calibration is performed. Never use calibration gas that has expired, has a different concentration, or a canister that is indicating low pressure. The pressure indicator on the gas regulator must operate in the green zone during the entire calibration session.

NOTE: The Gas Module must be fully warmed up before performing a gas calibration. For maximum accuracy, a warm-up time of 30 minutes is recommended.

1. Select Start Calibration and "Yes" within the Gas Module Menu (refer to section Gas Monitor Calibration section of the Passport Operating Instructions). The menu shown on the next page will appear:

CHANGE CAL GAS			
CalGas Selection:	Mixture		
Calibrate:	No		
Choices:	Mixture,	5%	Co ₂ ,
	55% O ₂ ,	33% N ₂ O,	2% DES
↑ = Adjust value		Exit = Quit	
↓ SELECT = Enter/move			

FIGURE 5-1 Start Calibration Menu

2. Select the calibration gas type from the choices, and “Yes” to start calibration.
3. If Mixture has been selected, the following window will appear:

CALIBRATION DATA
Co ₂
O ₂
N ₂ O
DES:
Zero In Progress
Exit = Cancel Calibration

FIGURE 5-2 Calibration Data

4. At the start of the calibration, the Gas Module will zero the gas channels. After a successful zeroing, the Gas Module will request the calibration gas.

NOTE: If the Gas Module cannot zero, a “zeroing error” will be displayed and the previous calibration data will be restored. Repeat the calibration procedure from step 1. If problems persist, call for service.

5. The message “Feed Calibration Gas” will appear. At this point, attach the calibration gas canister to the regulator and turn it on. Increasing gas values will appear in the window as the Gas Module samples the calibration gas.
6. When sampling is complete, a “Continue?” message will appear below the gas monitor’s currently measured values. Selecting “Yes” will set these currently measured values to the following specified values; 5.0% CO₂, 55% O₂, 33% N₂O, and 2.0% Desflurane. The operator must take care that the cal gas being applied matches the value that the gas monitor will set them to. If for any reason it is desirable to cancel the calibration, i.e. the cal gas does not contain the correct gas concentrations, press **EXIT** to abandon the calibration attempt. If the values are acceptable, press the **SELECT** key. The entire calibration must be accepted as a whole or not at all.

NOTE: To avoid premature emptying of the gas canister, always remove the regulator at the end of the procedure, prior to storage.

7. The message “Calibration Complete” will appear when all the channel(s) have been successfully calibrated. Any channel that has been adjusted will display “Adj”.

CALIBRATION DATA		
Co ₂	5.0%	ADJ
O ₂	55%	ADJ
N ₂ O	33%	ADJ
DES:	2.0%	ADJ
Calibration Complete		
Exit = Quit		

FIGURE 5-3 Calibration Completed

NOTE: If any channel cannot be calibrated due to a sampling error, the "Sampling Error" message will appear under the "Continue?" message and "ERR" will be displayed next to any channels with a sampling error. Pressing select will calibrate only those channels that do not have a sampling error.

If any channel fails calibration, the gas value will be "XXX". These channels will appear as "XXX" in the normal run mode as well. Repeat procedure from step 1. If problems persist, call for service.

5.7.2 Expert Gas Module Calibration

Accuracy verification of the Gas Module is recommended at six (6) month intervals or whenever gas readings appear to be in error. The date of the last successful mixture calibration appears in the Gas Calibration menu. The operator may elect to perform a Zero calibration (lasts approximately 10 seconds). During the calibration session gas readings and all other gas functions are not available.

Zero calibration is a single action command that compensates all gas channels for the effects of offset drift. Zero calibration may be performed on command and also takes place automatically at preset intervals. To manually perform a Zero calibration, press the gas numeric window, then press the Start zeroing button.

Always verify accuracy using a full canister of approved precision calibration gas, after calibration is performed. Never use calibration gas that has expired, has a different concentration, or a canister that is indicating low pressure. The pressure indicator on the gas regulator must operate in the green zone during the entire calibration session.

NOTE: The Gas Module must be fully warmed up before performing a gas calibration. For maximum accuracy, a warm-up time of 30 minutes is recommended.

1. Select System Config. from the main menu. Press the Pre-Set button followed by the Gas Calibration button. The following menu will appear.

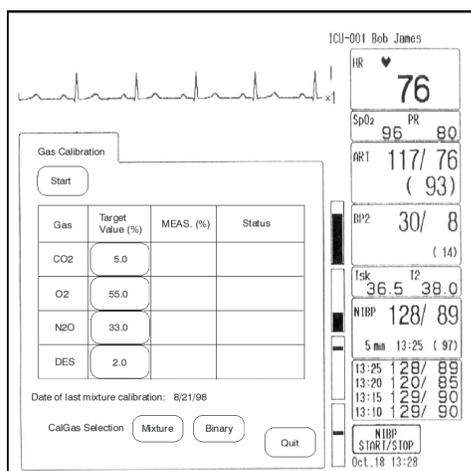


FIGURE 5-4

2. Select either Mixture or Binary (individual gases). If Binary is selected, press the appropriate gas to be calibrated.
3. Press Start to begin the gas calibration routine.
4. At the start of the calibration, the Gas Module will zero the gas channels. After a successful zeroing, the Gas Module will request the calibration gas.

NOTE: If the Gas Module cannot zero, a “zeroing error” will be displayed and the previous calibration data will be restored. Repeat the calibration procedure from step 1. If problems persist, call for service.

5. The message “Feed Calibration Gas” will appear. At this point, attach the calibration gas canister with regulator to the Gas Module trap and turn it on. Increasing gas values will appear in the window as the Gas Module samples the calibration gas.
6. When sampling is complete, a “Continue?” message will appear. If the values are acceptable, press the YES button. If for any reason, it is desired to cancel calibration, press NO to re-install the previous calibration values. The entire calibration must be accepted as a whole or not at all.

NOTE: To avoid premature emptying of the gas canister, always remove the regulator at the end of the procedure, prior to storage.

7. The message “Calibration Complete” will appear when all the channel(s) have been successfully calibrated. Any channel that has been adjusted will display “Adj”.

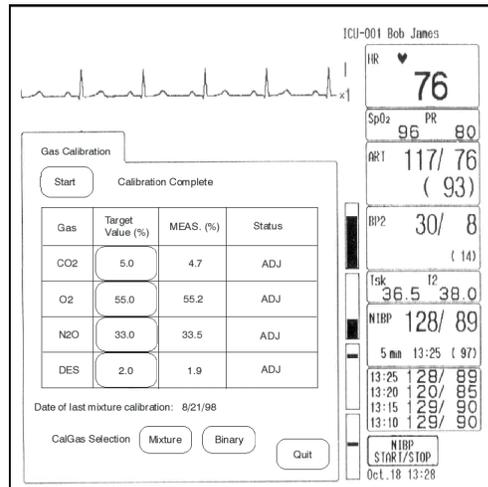


FIGURE 5-5

NOTE: If any channel cannot be calibrated due to a sampling error, the “Sampling Error” message will appear and “ERR” will be displayed next to any channels with a sampling error. Pressing YES will calibrate only those channels that do not have a sampling error.

If any channel fails calibration, the gas value will be “XXX”. These channels will appear as “XXX” in the normal run mode as well. Repeat procedure from step 1. If problems persist, call for service.