



Model 6203

Reduced Oxygen Breathing
Device 3

Quick start guide

Revision 1
February 20th 2024

OVERVIEW

The third generation Reduced Oxygen Breathing Device (ROBD3) is a computerized gas-blending instrument. The system uses Thermal Mass Flow Controllers (MFC) to mix breathing air and nitrogen to produce the sea level equivalent atmospheric oxygen contents for altitudes up to 34,000 feet. The MFCs are calibrated on flow standards traceable to the National Institute of Standards and Technology (NIST). NIST is a federal agency whose mission is to develop and promote measurement, standards, and technology to enhance productivity, facilitate trade, and improve the quality of life. Several safety features are built into the to prevent reduced oxygen contents below those being requested for a particular altitude. The software is Menu driven via a 12" diagonal color touch screen Human Machine Interface (HMI). Built in self-tests verify all system component functionality before the operation of the system can begin. If any self-tests fail, the system will not operate.

This quick start manual contains information and guidance for setting up and operating the ROBD3.

Step by step instructions are provided for connecting power and gas sources, running self-tests, running the self-calibration routines and running a pre-programmed sequence of altitudes on the subject under test (SUT).

A piping and instrument diagram (P&ID) is provided on the last page of the manual.

IMPORTANT: The ROBD3 operator should be certified in first-aid and CPR and have access to communication in the event of an emergency.

Prior to participation in ROBD3 training or research, the subject under test should have the equivalent to a FAA physical of any class or military flight physical and be screened for current health status prior to the run.

REAR PANEL LAYOUT

Power input

The power entry module supplies AC power to the internal power supplies. The internal power supplies convert and regulate the AC signal to the two DC voltages required by the system electronics. The power entry module has integrated EMI/RFI filtration and switch one or both hot lines dependent upon 110 or 220 VAC operation. The power entry module also has two replaceable fuses and is filtered to meet UL 544 for medical patient and non-patient care equipment.

Gas inputs

These gas inputs supply source gas to the system components. The standard fittings on these ports are ¼" NPT. The optional hoses provides quick connect fittings that are colored and keyed. The Nitrogen input is black, the Air input is yellow and the oxygen input is green. The Nitrogen and air inputs should be pressurized to a pressure between 40 and PSIG, while the oxygen input should be adjusted to a pressure of 20 PSIG.

RS232 port

One 9-pin RS232 serial port is connected to the HMI of the ROBD3 system. This port is for future expansion of the remote mode, to operate the ROBD3, and data logging. Using a host computer and communications software, it can used to download program changes to the HMI software of ROBD3; including future enhancements.

Cooling fan

The cooling fan moves approximately 36 cu/ft per minute of filtered air through the ROBD3 chassis and out the cooling vents on the top cover of the chassis. The cooling fan and the vents should not be obstructed in any way.

Service port

The service port is used for factory calibration of the thermal mass flow controllers.

Important: The SS plug must not be removed during normal operation.

Pulse oximeter connector

Plug the pulse oximeter probe into this port. Once connected the probe is latched. The probe is removed, by pressing the side tabs on the probe connector and pulling it out.

Vent port

This port vents the excess flow of gas not used during inhalation and exhalation and also limits the pilot mask pressure.

Important: A filtered vent plug has been installed into the vent port. This vent plug will provide a slight positive pressure to the breathing mask. If the absence of positive pressure is desired, remove the threaded plug. When the instrument is not being used, reinstall the plug. This vent plug should only be hand tightened. Do not install any other type of fitting into this port, as the breathing loop may become over-pressurize and cause damage to the instrument.

UNPACKING AND INSTALLATION

Transport case option W/O regulators and hoses

1. Undo all the shipping container latches and open the cover.
2. Pull the ROBD3 out by the side handles.

Installation

1. Install the system on a stable table or cart.
2. Remove all obvious shipping plugs and caps from the gas ports, including the plug in the Vent port.
3. Do not remove the silver plug in the Service port.
4. Remove the protective film on the HMI touch screen controller.

Power connection

1. Connect an appropriate electrical connect to the power cord provided.
2. Make sure the power switch that is integrated into the power entry module is turned off.
3. Connect the ROBD3 power input module to a 220-240 VAC outlet.

Gas Connections

1. On the rear of the ROBD2, connect the air (yellow) and nitrogen (black), at a pressure of 40 PSIG, to the respective ports. For a mask flow setting higher than 50 LPM, a pressure of up to 50 PSIG may be required.
2. Connect the 100% oxygen (green) source at a pressure of 20 PSIG.
3. Connect the pilot mask to the Breathing mask connector on the front panel of the system.
4. Proceed to the *Quick start* procedure.

QUICK START PROCEDURE

1. Before Powering on the system make sure to perform the steps outlined in the section titled *Power and gas connection*.
2. Connect the pulse oximeter probe any time before or after powering on the instrument.
3. Power on the system.
4. Allow the warm-up time to elapse (10 minutes). Five beeps will be heard in succession, when warm up time has elapsed. While warm up time is counting down, flight profiles can be added or edited. (page 7)
5. Once the warm up time has elapsed, press the SELFTST function key in the option menu. Follow the self-test prompts carefully as errors in following the prompts will cause failures in the self-test. After the self-tests have run, the system will perform a self-calibration. The O₂ sensor will calibrate and test altitudes will be performed.

DANGER: During self-tests, gas will be delivered to the mask and vent port. Do not breathe through the mask during the self-test or self-calibration process.
6. From the startup screen, press the Press the RUN PROFILE button.
7. Using the arrow keys, select the program to run and press SELECT.
8. Once the program is selected, the run screen will appear (page 10).
9. At this point, changes can be made to pulse oximeter alarm values and alarm volumes (page 11).
10. Select start and connect the subjects mask. The screen will show run time information as the program steps change.
11. Select ADVANCE or ABORT buttons to perform the respective function. Advance will automatically skip to the next step in the program.
12. If the subject is at risk of becoming hypoxic, press the **O₂ DUMP** emergency switch. Once the switch is turned off (turn clockwise) the flow of 100% O₂ will stop.

PROGRAMMING FLIGHT PROFILES

1. From the main startup screen enter the Administrator mode; per email instructions provided.
2. The setup mode will be enabled.
3. Enter the setup mode and select edit flight profile at the top of the screen.
4. The screen shown below will appear.
5. If you do not wish to change any of the flight profile names, press NEXT.
6. To change or add a flight profile name, click on the field for the respective flight profile number; see below.
7. The virtual keyboard on the next page will appear.
8. Enter up to 24 characters to name the flight profile and press enter on the keyboard.
9. Press NEXT.

Edit Profile Name

1. EPISODE 1	9. FLIGHT PROFILE 9
2. EPISODE 2	10. FLIGHT PROFILE 10
3. EPISODE 3	11. FLIGHT PROFILE 11
4. FLIGHT PROFILE 4	12. FLIGHT PROFILE 12
5. FLIGHT PROFILE 5	13. FLIGHT PROFILE 13
6. FLIGHT PROFILE 6	14. FLIGHT PROFILE 14
7. FLIGHT PROFILE 7	15. FLIGHT PROFILE 15
8. FLIGHT PROFILE 8	16. FLIGHT PROFILE 16





NextExit








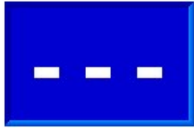
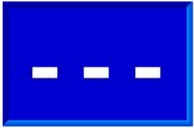



VIRTUAL KEYBOARD FOR SELECTING PROGRAM NAMES

Adding or editing flight profile steps

1. Once pressing NEXT from above, after editing the flight profile name, the following screen will appear.
2. Using the arrow keys, on the right side of the menu on the bottom of the screen, select the profile name to edit. You will see the profile number and name change, on the top of the screen.
3. Use the keys, on the left side of the screen, to edit the program steps.
4. Use the arrow keys to move the cursor and press the respective fields to toggle or enter the variable. Delete and insert are for complete steps.
5. When pressing on the two numeric variables, a numeric keypad will appear. Use the keypad to enter numeric variables for altitude and time.
6. The unit was shipped to select either minutes or seconds for each program step.
7. Once the program is complete, press SAVE.

PROFILE NUMBER: 1		PROFILE NAME: FLIGHT PROFILE 1	
STEP#	HOLD/CHANGE	ALTITUDE	HOLD/CHANGE TIME
1	HOLD AT	0 FEET	FOR 0 MINUTE(S)
2			 
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Navigation buttons:   INSERT DELETE SAVE  SELECT PROFILE TO EDIT  EXIT

	Pulse 	SpO2 	Pulse Ox Alarm Settings	
	Probe Disconnect	High 150	SpO2 100	Low 40
			 	Set Volume
LAST STEP: CURRENT STEP: HOLD AT 0 FEET FOR 2 MINUTE(S) NEXT STEP: HOLD AT 5000 FEET FOR 10 SECONDS				
		RUN TIME INFORMATION		21.00 %O2
		Actual Oxygen: 21.00 % Set Oxygen: 21.00 % Current Altitude: 0 FT Set Time: 00:02:00 Elapsed Time: 00:00:23 Remaining Time: 00:01:37 Pressure BLP: - 0.1 "		
Advance				Abort

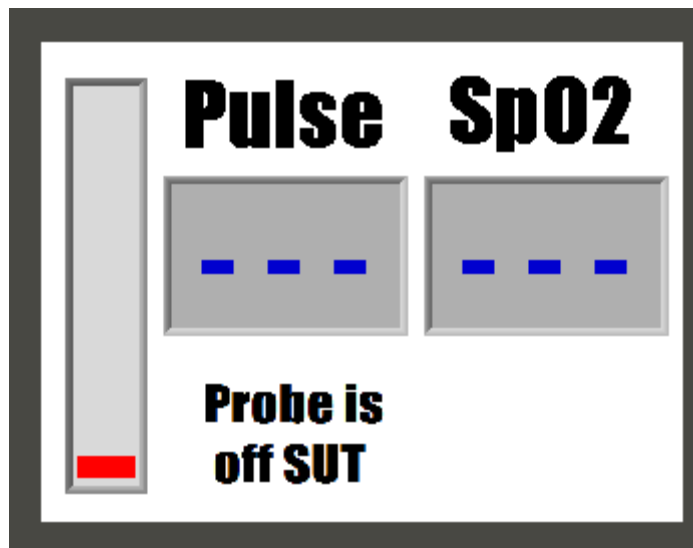
FLIGHT PROFILE RUNNING

PULSE OXIMETER OPERATION

SpO2 and Pulse Rate Displays

Like the 6202-1 pulse ox, the ROBD3 takes about 10 seconds after placing the probe on the finger to register valid data. This is inherent to the pulse oximeter electronics/firmware.

The measured SpO2 and pulse rate are displayed side by side as shown in the diagram below. The oximeter ensures that only valid pulsatile signals are processed. Bad, invalid or the absence of data causes alerts to occur and may also cause the displays to show “- - -” and “- - -” in the SpO2 and pulse rate displays.



The displays are updated every half a second as the monitor is acquiring data. The message box, in the lower left hand corner of the display, will indicate whether or not the probe is connected to the unit or if the probe is connected to the unit, but not connected to the SUT. Otherwise, when actively displaying valid data, this message box will be blank. The area in the lower right corner of the display is used for alarms and information related to the pass or fail state of the internal self-test of the pulse oximeter.

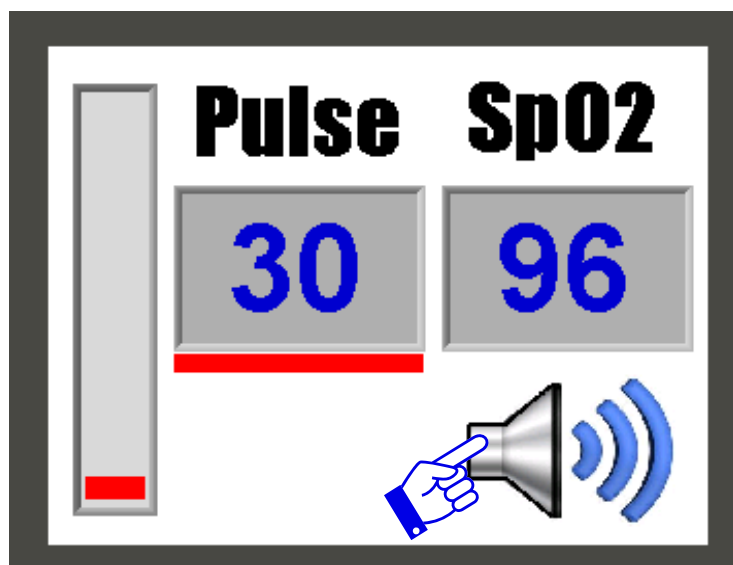
Pulse Activity Bar

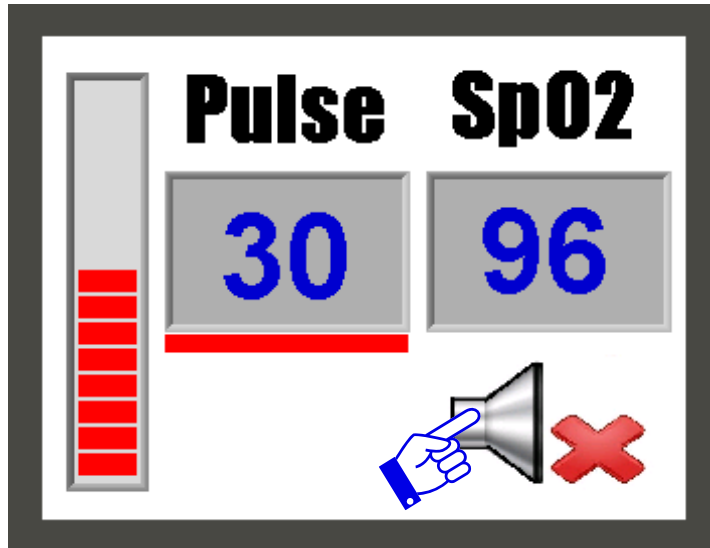
The signal bar or pulse activity bar, on the left side, is derived from the pulsatile signal that is measured by the monitor. The height of the bar, with each pulse beat, is proportional to the strength of the signal. This pulse activity bar represents the subject's pulse and should show regular rhythmic movement. Erratic or non-rhythmic movement may indicate a poorly positioned or applied sensor, or may be indicative of excessive subject movement at the sensor site.

SpO2 and Pulse Rate Alarms

Alarm Limit Violations

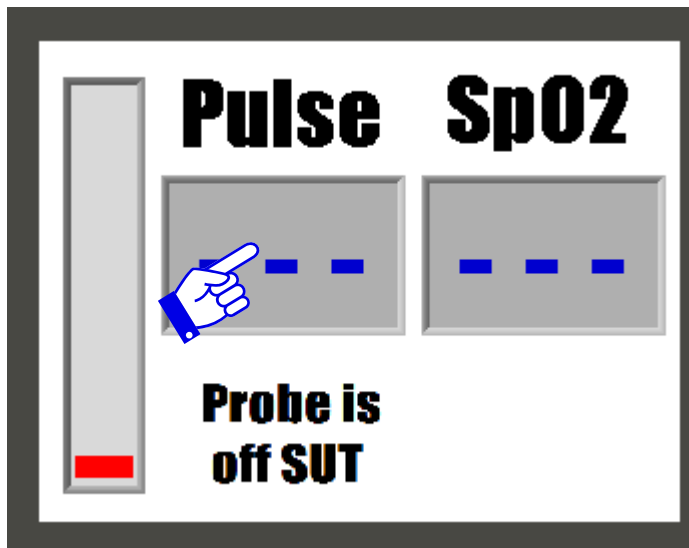
When the oximeter detects SpO2 or pulse rate values that exceed either the high or low limits, both an audible alarm tone and visual alarm are generated. The audible alarm volume can be adjusted, or an alarm can be muted. The visual alarms are the speaker icon below and the out-of-range numeric value. The numeric value, which is out-of-range, will flash when a violation is active. If the alarm condition no longer exists, the alarms will stop. An alarm bar shows up to give a quick indication of which alarm value is in violation. In the case below, it is low pulse. If it were a high alarm violation, the bar would be fixed above the value exceeded. To mute the speaker, press the speaker icon while it is active. The icon will change, as seen on the top of the following page. To mute the alarm indefinitely, set the volume of the alarm to zero.



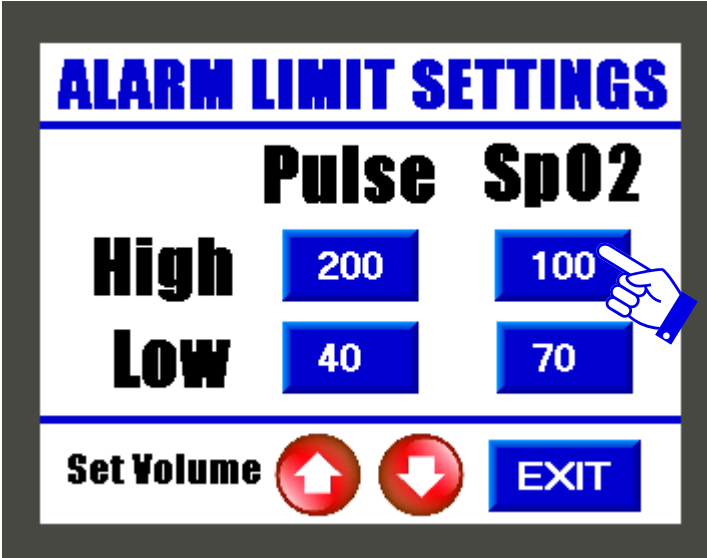


Setting SpO₂ and pulse rate alarm limits

To access the alarm setting screen, press the pulse or SpO2 display windows shown below. For touchscreen variables either a finger or stylus can be used.

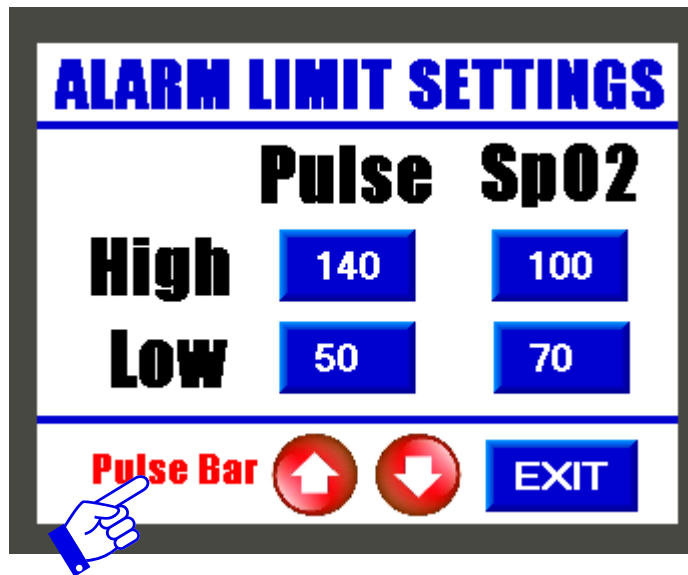


Press on one of the four blue limit buttons and a virtual numeric keypad, shown below, will appear. Enter the new value and press the enter key. This will accept the new value back into the screen below and save it indefinitely. If an alarm becomes active, access to the alarm setting screen is denied until the alarm condition clears. If an alarm condition becomes active while in the alarm setting screen, the HMI will jump to the main pulse oximeter screen.



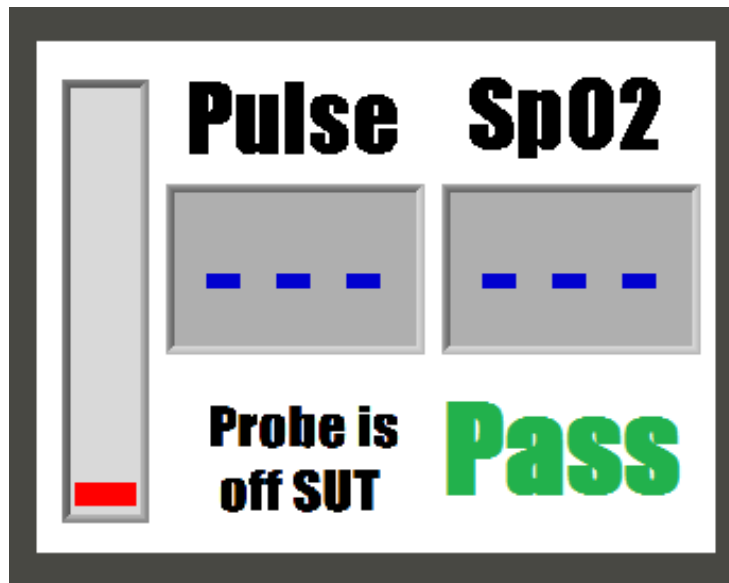
Adjusting the alarm and pulse bar volume

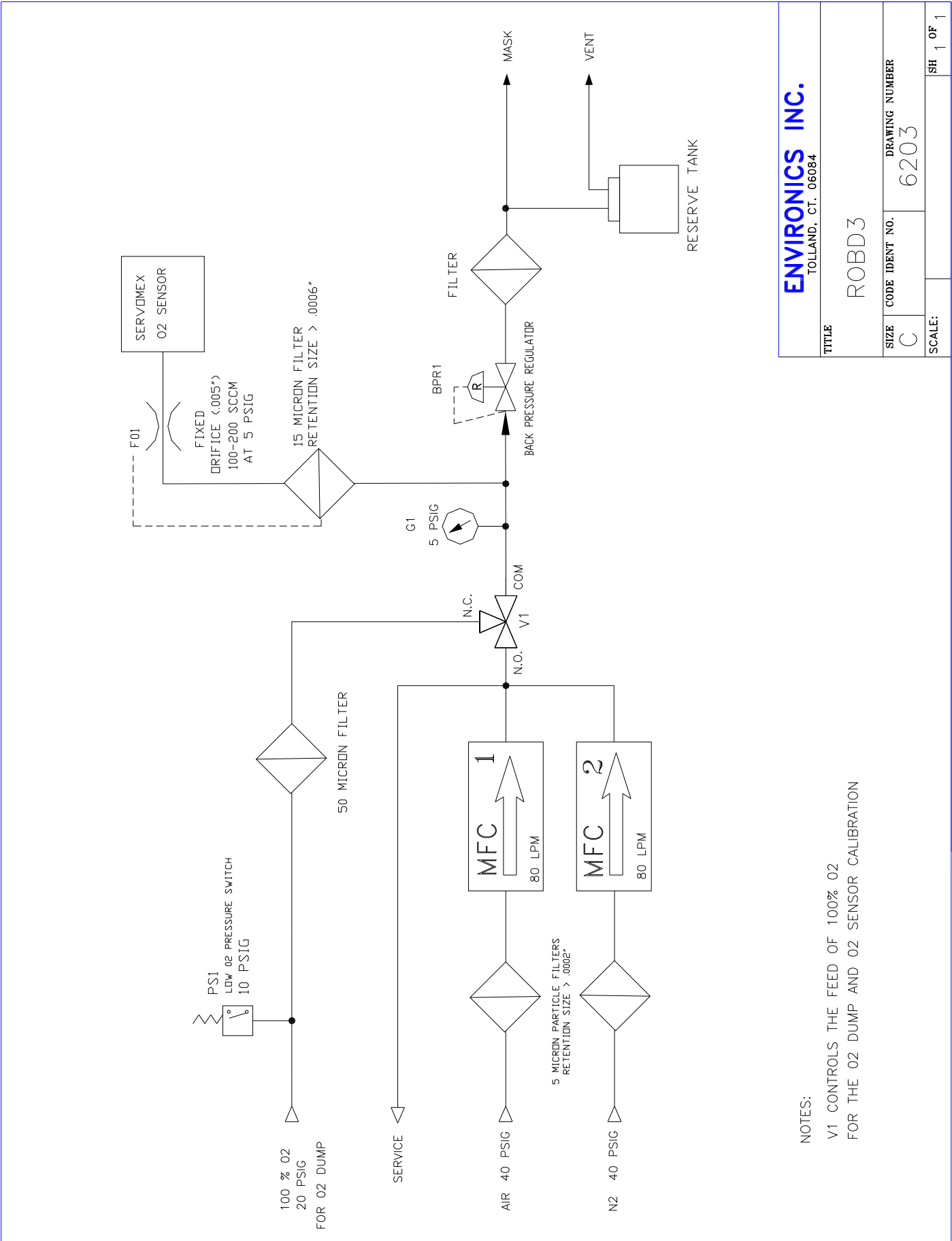
To change the pulse bar, pulse alarm, and SpO2 alarm volumes, press Set Volume. Each time that field is pressed, the new variable to adjust will appear. Once on the desired variable, press the up or down arrow key. The value setting will flash on the screen and the beeper will beep to the new volume level. To indefinitely disable the volume for either of these setting, set the volume to zero.



Pulse oximeter self-test

When the ROBD3 is powered on, the classic tone sequence of the ROBD3 pulse oximeter will be heard. After the initial sound sequence, there will be a single tone, within about 8 seconds, and the screen will flash pass in the lower right hand corner. This means that the internal pulse oximeter self-test has passed. If for some reason the internal self-test fails to pass, the word fail will appear and remain on the screen until the self-test passes. This will also prevent the ROBD3 self-test from passing as well, rendering the ROBD3 inoperable. If during normal operation, the ROBD3 computer loses its communication link with the pulse oximeter and is unable to recover, the word fail will appear.





NOTES:
 V1 CONTROLS THE FEED OF 100% O2
 FOR THE O2 DUMP AND O2 SENSOR CALIBRATION

ENVIRONICS INC. TOLLAND, CT. 06084	
TITLE ROBD3	
SIZE C	DRAWING NUMBER 6203
SCALE:	SH 1 OF 1