

SYSTEM OPERATION

Entering data

At various times during system operation the operator is required to enter data into the system.

Entry of numeric data is performed by using the numeric keypad. Press the number key(s) representing the desired data values and press `ENTER` to record the data in the appropriate field. If the numbers entered completely fill the field, the value is automatically accepted and the `ENTER` key is not required. Pressing an arrow key will also complete the entry and move the cursor to another field. The system automatically adds a decimal point followed by zeros to fill the rest of the field, if required.

For fields requiring alphanumeric data to be entered, the arrow keys may also be used to input data. The following listing shows the order of the alphanumeric and punctuation symbols that can be accessed by pressing the up and down arrow keys:

ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789.+-/()%#

Note that the digits **0 – 9** and **.** can also be entered directly by pressing the corresponding key on the numeric keypad.

To enter alphanumeric data, press the up/down arrow until the desired character is displayed. Then press the `ENTER` key, or use the left/right arrow keys to position the cursor in the desired location.

The `SPACE` function key is used to enter a blank space.

The `CLEAR` function key will clear all data entered.

The `ENTER` function key will complete the entry of data.

Main Screen - Ready mode

The ROBD2 was designed with emphasis on simplicity and ease of operation. The system's menu-driven software guides the operator through all operating routines. The following menu items are available to the user.



```
(DAY) (DATE) (TIME)
ENVIRONICS ROBD2
READY
START SELFTST OPTION
```

START

The START key is used to enter the Pilot Test mode. The Pilot Test mode is where all pilot testing takes place. The START key is disabled until the warmup time has elapsed, and all self-test and calibration operations have completed successfully.

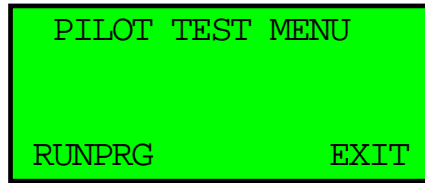
SELFTST

The SELFTST key runs the system self-test and calibration operations. These operations must be run before the START key can be used to enter the Pilot Test mode. The menu selection disappears after the Self-test process has run. Self-test and self-calibration routines can be run individually or together from the OPTION menu.

OPTION

The OPTION key is used to enter the OPTION menu, which is used to set various system options, display self-test results and run self-test and self-calibration. Also, the OPTION menu is used to set time and date, adjust display contrast and view software revision and system serial number.

START – Pilot Test mode



Standby status in Pilot Test mode

Once in this menu, the operator can select to run a program.

RUNPRG – Running a flight profile

The RUNPRG mode is used to conveniently recall one of 20 saved programs with up to 99 steps of altitude changes. The program must be setup prior to using the RUN mode (refer to the PROGRAM mode section of the technical manual). When entering the RUNPRG mode, the following screen will appear (Note: program names shown are for example purposes only).

#	NAME	TYPE
> 1	BASIC HYPOXIA	HRT
2	SIMULATOR	FSHT
	SELECT	EXIT

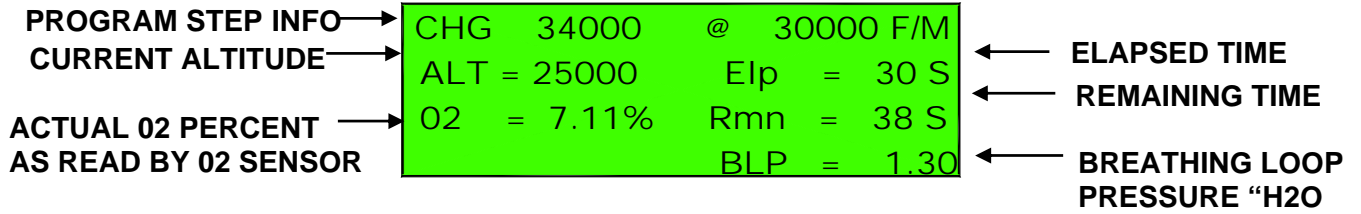
F1

F2

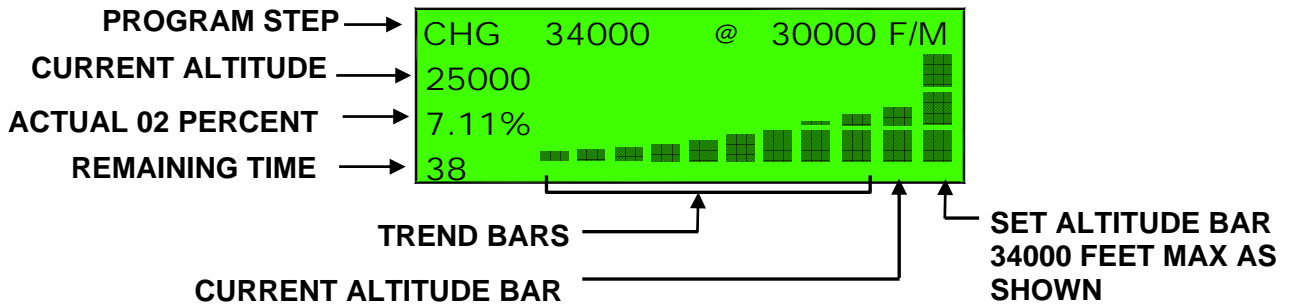
F3

Using the up and down arrow keys, select the program to run. The highlighted program will have the greater than sign to the left of the program number. NOTE: this mode requires instrument pre-programming. This programming information is in the Programming and technical manual. The following information will be seen in two separate screens. By pressing the **MENU** key and **VIEW**, the screens can be toggled.

RUNPRG SCREEN 1



RUNPRG SCREEN 2



SYSTEM OPERATION

RUNPRG EXAMPLE

- STEP 1: HOLD AT 34000 FEET FOR 2 MINUTES
- STEP 2: CHANGE TO 0 FEET AT 18000 FT/MIN
- STEP 3: HOLD AT 0 FEET FOR 1 MINUTE
- STEP 4: CHANGE TO 20000 FEET AT 30000 FT/MIN
- STEP 5: END OF PROGRAM

STEP 1:

SCREEN 1

```
HLD 34000 FOR 2 MIN
ALT = 34000 Elp = 50S
O2 = 4.4% Rmn = 70S
BLP = 1.35
```

SCREEN 2

```
HLD 34000 FOR 2 MIN
34000
4.40%
70
```

STEP 2:

SCREEN 1

```
CHG 0 @ 18000 F/M
ALT = 34000 Elp = 20 S
O2 = 4.37% Rmn = 113 S
BLP = 1.20
```

SCREEN 2

```
CHG 0 @ 18000 F/M
34000
4.37%
113
```

STEP 3:

SCREEN 1

```
HLD 0 FOR 1 MIN
ALT = 0 Elp = 10S
O2 = 21.2% Rmn = 50S
BLP = 1.25
```

SCREEN 2

```
HLD 0 FOR 40S
0
21.2%
50
```

STEP 4:

SCREEN 1

```
CHG 20000 @ 30000 F/M
ALT = 13000 Elp = 26S
O2 = 12.42% Rmn = 14S
BLP = 1.42
```

SCREEN 2

```
CHG 20000 @ 30000 F/M
13000
12.42%
14
```

SYSTEM OPERATION

While in the RUNPRG mode, pressing the **STOP** key will abort the program.

Pressing the **ADVANCE** key while in the run mode will advance the program to the next step, regardless of how much time remains in the current step.

Pressing the 02 DUMP switch will cause the program to shut down and the system will supply 100% O₂ to the SUT. O₂ will continue to flow until the dump switch is disengaged by turning it clockwise.

Pressing the MENU key while in the run mode will toggle the screens back and forth between the two run mode display screens. One screen contains the bar graph representation of desired altitude, actual altitude and a running trend of altitude. The other display screen gives more detailed information, including breathing loop pressure, elapsed step time, remaining step time, actual O₂ content as read by the onboard oxygen sensor, desired altitude, current altitude and the actual program step information.

Manual altitude override

While in the RUNPRG mode, you can manually override a program step and go directly to any desired altitude. Entering a manual altitude will pause the current program and ascend or descend to the new altitude entered.

To enable manual altitude control while running a program, press the **MENU** key and then select **MANUAL**. Enter the new altitude and press **ENTER**.

You can enter new altitude values as often as desired. You can also increase or decrease the current altitude in increments of 1000 ft., but pressing the up or down arrow keys.

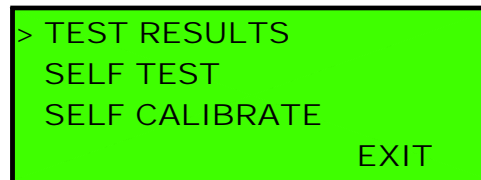
To resume the program from where it was interrupted, press **EXIT**

SYSTEM OPERATION

Option menu

The OPTION menu is used to run self-test and self-calibration functions, and to change various system settings.

Pressing the OPTION key will bring up the following display.



F1

F2

F3

The OPTION menu contains a menu with the following items:

```
TEST RESULTS
SELF-TEST
SELF CALIBRATE
ROBD FLOW RATE
ADMIN MODE
SET TIME/DATE
ADJUST CONTRAST
SYSTEM INFO
```

Select the desired function by using the arrow keys, then press ENTER.

TEST RESULTS

The Test Results function displays the results of all Self-test and Self Calibrate functions. The test item is listed on the left, with the result shown on the right. Below is a sample test result display:

```
TEST RESULTS
PULSE OXIM      - OK
O2 DUMP VALVE   - OK
O2 DUMP SWITCH  - FAIL
O2 DUMP ALARM   - OK
O2 PRESS SW     - OK
O2 SENSOR       - OK
O2 SENSOR CAL   -SKIP
ALTITUDE TEST   -SKIP
AIR MFC SHUTDN -FAIL
```

"OK" indicates that the test has been run and completed successfully.

"FAIL" indicates that the test has been run but has failed.

"SKIP" indicates that the test has been skipped and has not yet been run.

The software will not allow access to the PILOT TEST menu until all tests show "OK"

Press the EXIT key to return to the OPTION menu.

SELF-TEST

The Self-test function allows various self-tests to be run, either all at once or individually. The available menu items are shown below.

```
TEST ALL
TEST MFCS
TEST O2 SENSOR
TEST O2 DUMP
TEST O2 PRESS SW
TEST PRESS SENSOR
TEST PULSE OX.
TEST MFC SHUTDOWN
```

To run all Self-tests, position the cursor on TEST ALL and press ENTER. For each self-test, the software will ask you to confirm that you want to run the test. Select YES to run the test, or NO to skip to the next test.

SYSTEM OPERATION

To run an individual self-test, position the cursor on the desired test and press ENTER.

While a test is running, you may be prompted to perform various actions. Be sure to follow the prompts carefully, otherwise the test may fail. In the event that a test fails, you will be prompted with "TEST FAILED. REPEAT TEST?". Press YES to rerun the test, otherwise press NO.

SELF CALIBRATE

The Self Calibrate function allows self-calibration checks to be run, either all at once or individually. The available menu items are shown below.

CAL ALL
CAL O2 SENSOR
TEST ALTITUDES

To run all Self Calibrations, position the cursor on CAL ALL and press ENTER. For each test, the software will ask you to confirm that you want to run the test. Select YES to run the test, or NO to skip to the next test.

To run an individual test, position the cursor on the desired test and press ENTER.

While a test is running, you may be prompted to perform various actions. Be sure to follow the prompts carefully, otherwise the test may fail. In the event that a test fails, you will be prompted with "TEST FAILED. REPEAT TEST?". Press YES to rerun the test, otherwise press NO.

ROBD FLOW RATE

The flow rate of the 6202-1 is adjustable from 40 LPM to 80 LPM. The nominal setting is 50 LPM to provide enough gas flow to the subject under test while preserving valuable gas. However, if there is not enough flow to satisfy a subject under test, it can be increased.

NOTE: With the new flow range of 40 to 80 LPM for mask flow, adjust the pressure of O2 accordingly to match the flow of O2, during emergency oxygen delivery, to the total mask flow during a flight profile. Do not exceed 35 PSIG on the oxygen pressure setting.

ADMIN MODE

The ADMINInstrator MODE allows access to Administrator level functions, which include programming of test routines (PROG mode) and system functions (SYSTEM mode) such as MFC calibration.

To enter ADMIN mode, select ADMIN MODE from the menu and press ENTER. If there is an Administrator password, you will be prompted to enter it. If there is no password, the system will automatically switch to ADMIN mode.

To exit ADMIN mode, select ADMIN MODE from the menu, and press ENTER. The system will disable administrator mode, regardless of any password setting.

When the system is in Admin mode, "ADMIN" will be displayed on the main menu screen.

SET TIME/DATE

The SET TIME/DATE function allows you to set the Time and Date displayed on LCD screen. Three fields to display the day, date and time will appear.

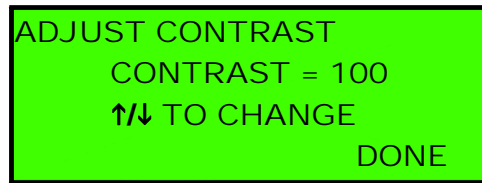
With the left/right arrow keys, move the cursor to the desired date or time field to be changed and press the up and down arrow keys to set the correct time and/or date. Note: the day of the week is calculated by the system automatically.

When the correct time and date are entered, press the EXIT function key to return to the OPTION menu.

ADJUST CONTRAST

The contrast of the LCD display is affected somewhat by the angle at which the display is viewed as well as the ambient temperature. To adjust the contrast for optimum results:

1. Using the up and down arrow keys, move the pointer cursor down to the line that reads **ADJUST CONTRAST** and press the `ENTER` key. The following screen appears:



2. Press the up arrow to increase the contrast on the screen. When increasing the contrast, the contrast number will increase to a maximum 100. Use the down arrow to decrease the contrast on the screen. When decreasing the contrast, the contrast number will decrease to a minimum value of 0. The numerical value is shown for reference since the user may not detect a change in contrast on the screen. The contrast value will change in increments of five.
3. After reaching the desired contrast setting, press `DONE` to return to the `OPTION` menu.

SYSTEM INFO

Selecting System Info will bring up a display of the system model number, serial number and software version.

SAFETY FEATURES

There are a number of built-in safety features to either alert the operator or stop the operation of the system and go to a “safe” mode of operation.

Oxygen dump switch

An emergency Oxygen Dump switch has been provided to supply 100% oxygen on demand as the subject under test (SUT) becomes hypoxic. The emergency switch is activated by depressing it, which starts the flow of oxygen. Once the SUT has recovered as determined by pulse oximeter analysis, turning the switch clockwise will stop the flow of 100% O₂.

When the O₂ dump switch is pressed, the following screen appears, assuming a program is running. Data displayed will be dependent upon altitude

```

===TEST ABORTED===
ALT=28000      EIp=4S
OXYGEN DUMP PRESSED
DELIVERING 100% O2

```

F1

F2

F3

The concentration of oxygen read by the internal O₂ sensor will be displayed. If the concentration of oxygen is not above 90% within 5 seconds, an internal alarm will sound. Also, if the concentration of O₂ drops below 90% after 5 seconds, the alarm will sound. The alarm is deactivated at the time the O₂ dump switch is disengaged and the system will go into standby status in the pilot Test Menu.

NOTE: With the new flow range of 40 to 80 LPM for mask flow, adjust the pressure of O₂ accordingly to match the flow of O₂, during emergency oxygen delivery, to the total mask flow during a flight profile. Do not exceed 35 PSIG on the oxygen pressure setting.

Oxygen pressure switch

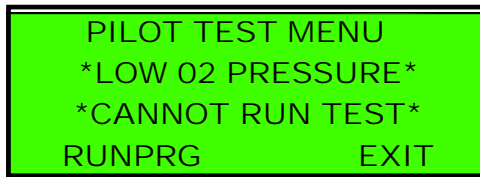
The oxygen pressure switch monitors the input pressure on the oxygen port. This prevents operation of the system if there is insufficient pressure to supply enough O₂ to the SUT when the O₂ Dump Switch is activated.

This pressure should normally be set between 15 and 20 PSIG. If this pressure is less than 10 PSIG, the system will not allow any Pilot Test operations.

SAFETY FEATURES

If Low O₂ Pressure is detected in the Ready mode, the system will display LOW O₂ instead of READY, on the screen

In the Pilot Test Menu, if any of the Pilot Test keys (RUNPRG or PPT) are pressed during a Low O₂ Pressure condition, the system will display the following screen and prevent the system from running in the Pilot Test Menu.



The system will once again function when pressure is restored above 12 PSIG.

Oxygen alarm

The O₂ alarm will sound for two different scenarios. The O₂ alarm is only active for the O₂ dump feature. After pressing the emergency oxygen dump switch, if the O₂ has not reached 90% in 5 seconds, the alarm sounds. The alarm will remain active until the emergency switch is turned off. Also, if during an O₂ dump, the oxygen content drops below 90%, the alarm will sound.

Oxygen analysis

Using the onboard oxygen sensor, if the oxygen content, in any pilot test mode, drops below 3.8%, the system will automatically turn on the oxygen dump and display a warning message.

Overpressure detect

Using the onboard pressure sensor, if the pressure to the mask rises above 20" H₂O, the system will turn on the oxygen dump

Low air flow detect

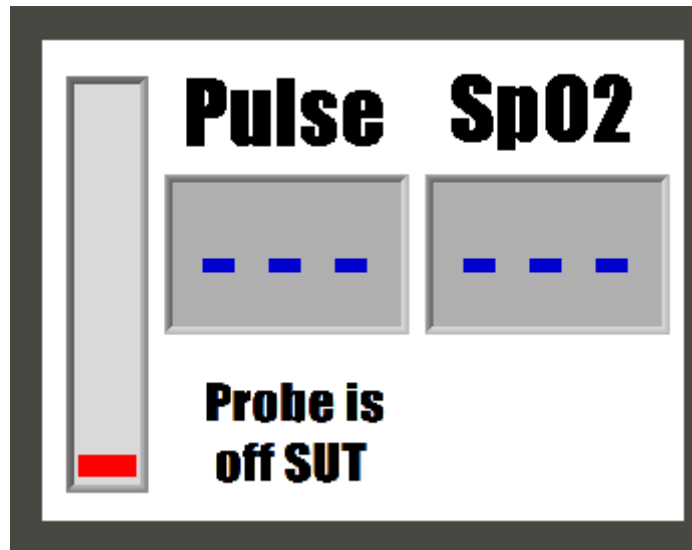
The Air MFC (MFC1) has an alarm signal that activates if the internal MFC valve opens to maximum capacity. This generally indicates that there is not enough pressure on the MFC to satisfy the required flow rate. This would lead to elevated N₂ levels in the breathing loop during normal operation. This feature uses the MFC alarm signal to stop flow and provide 100% oxygen to the breathing loop. A message appears indicated the failure.

PULSE OXIMETER

SpO2 and Pulse Rate Displays

Like the 6202 pulse ox, the 6202-1 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.

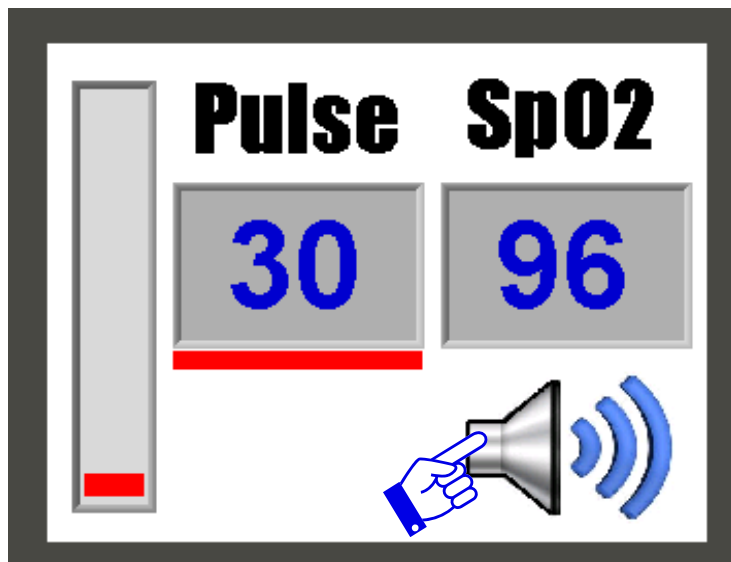
Pulse Activity Bar

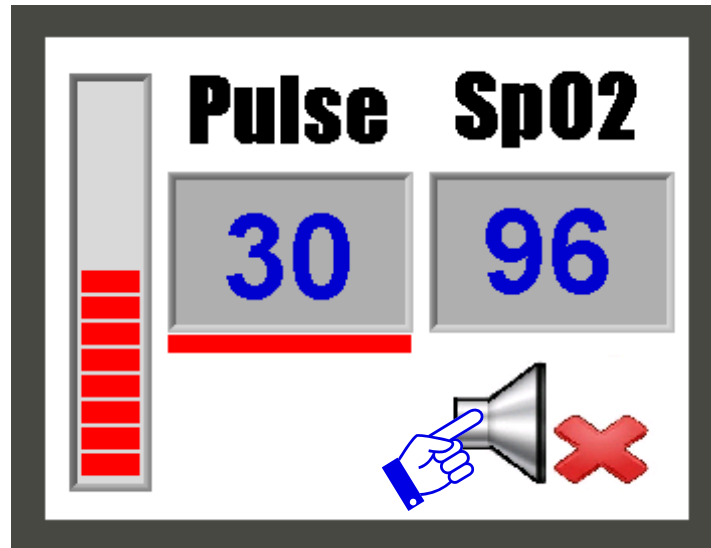
The signal bar or pulse activity bar, on the left side, is derived from the pulsatile signal that is measured by the monitor. The height of the bar, with each pulse beat, is proportional to the strength of the signal. This pulse activity bar represents the subject's pulse and should show regular rhythmic 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

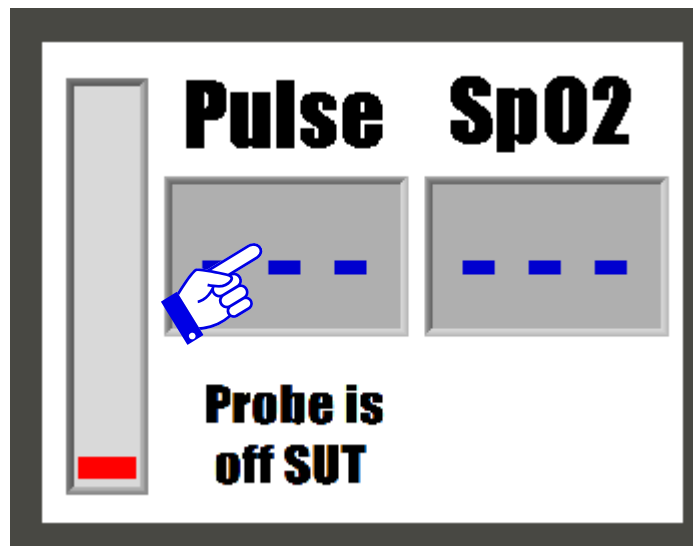
When the oximeter detects SpO2 or pulse rate values that exceed either the high or low limits, both an audible alarm tone and visual alarm are generated. The audible alarm volume can be adjusted, or an alarm can be muted. The visual alarms are the speaker icon below and the out-of-range numeric value. 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.





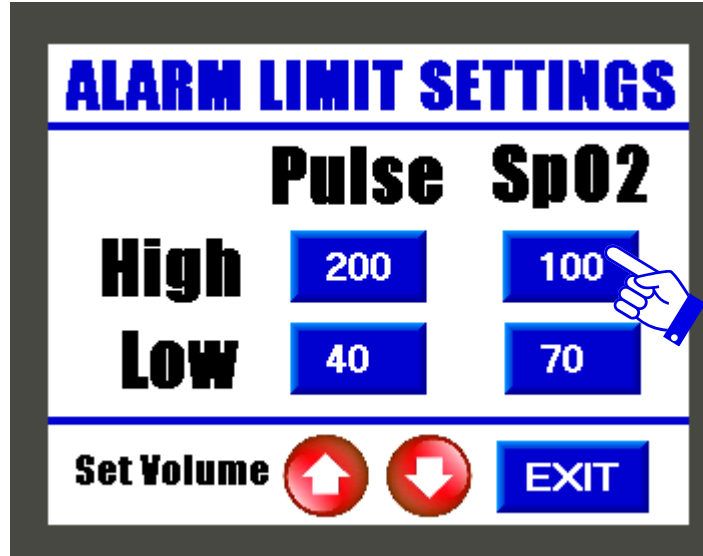
Setting SpO₂ and pulse rate alarm limits

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.



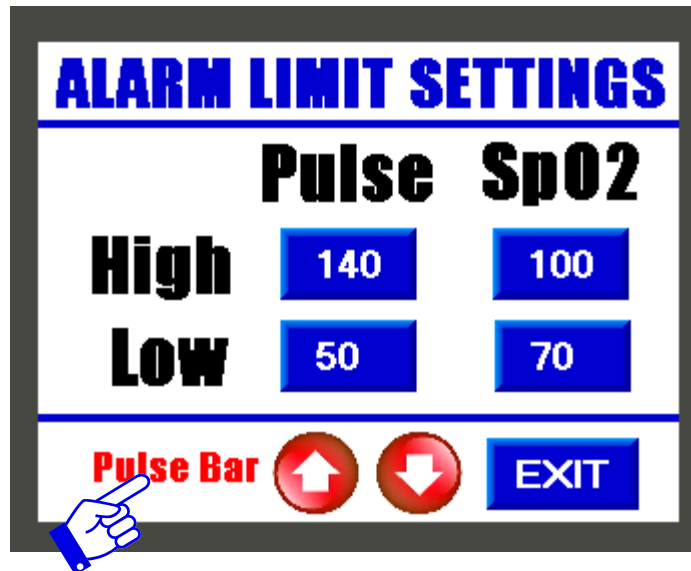
PULSE OXIMETER

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.



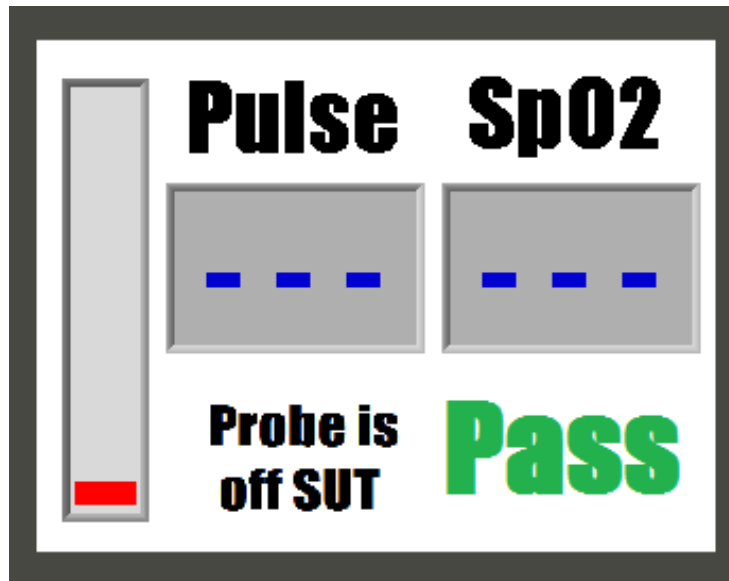
Adjusting the alarm and pulse bar volume

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. The pulse bar volume and both alarm volumes are factory set to 1; the lowest audible volume. To indefinitely disable the volume for either of these setting, set the volume to zero.



Pulse oximeter self-test

When the 6202-1 is powered on, the classic tone sequence of the 6202 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 6202-1 self-test from passing as well, rendering the 6202-1 inoperable. If during normal operation, the 6202-1 computer loses its communication link with the pulse oximeter and is unable to recover, the word fail will appear.



PULSE OXIMETER

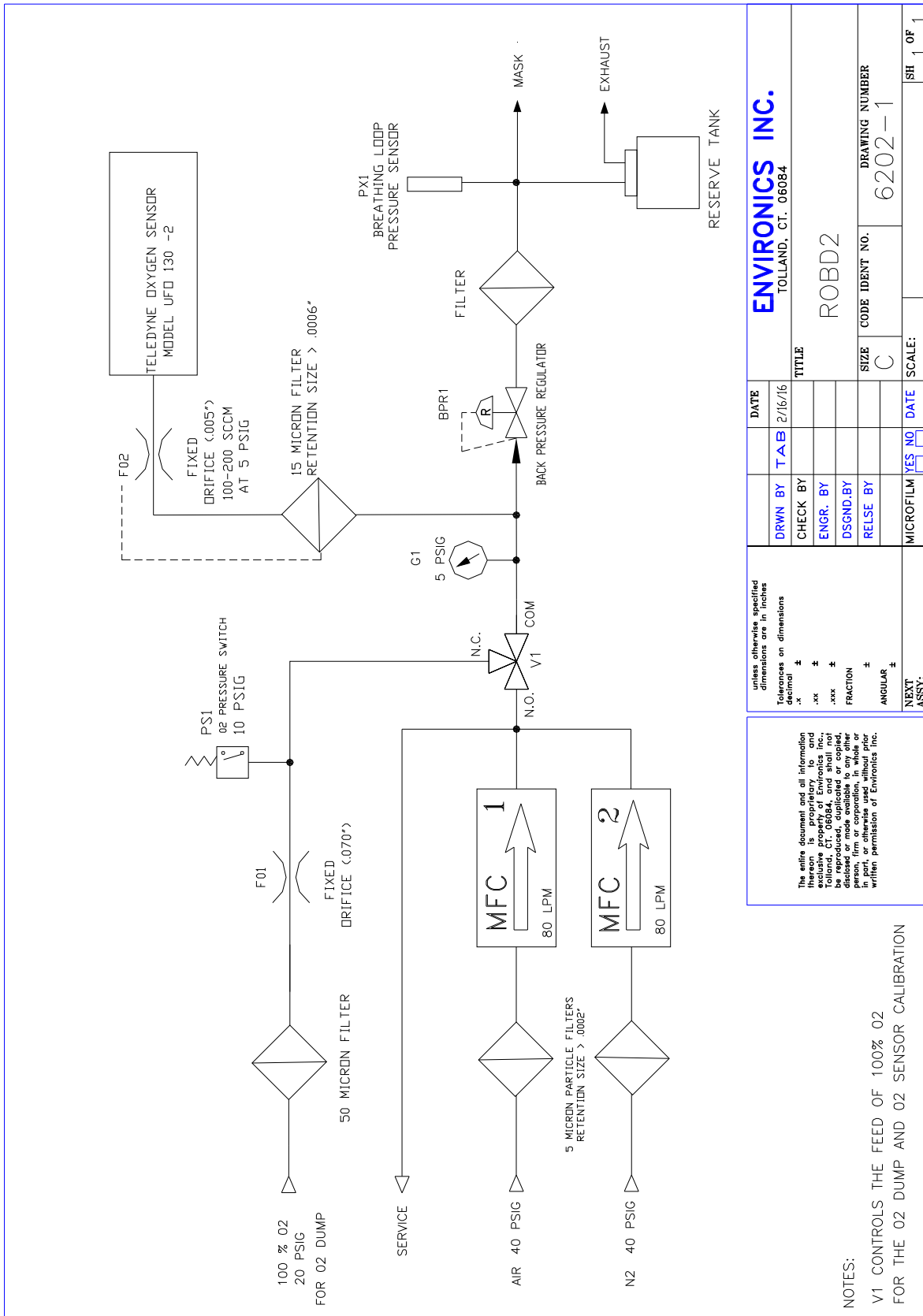


Figure 3 - P&ID