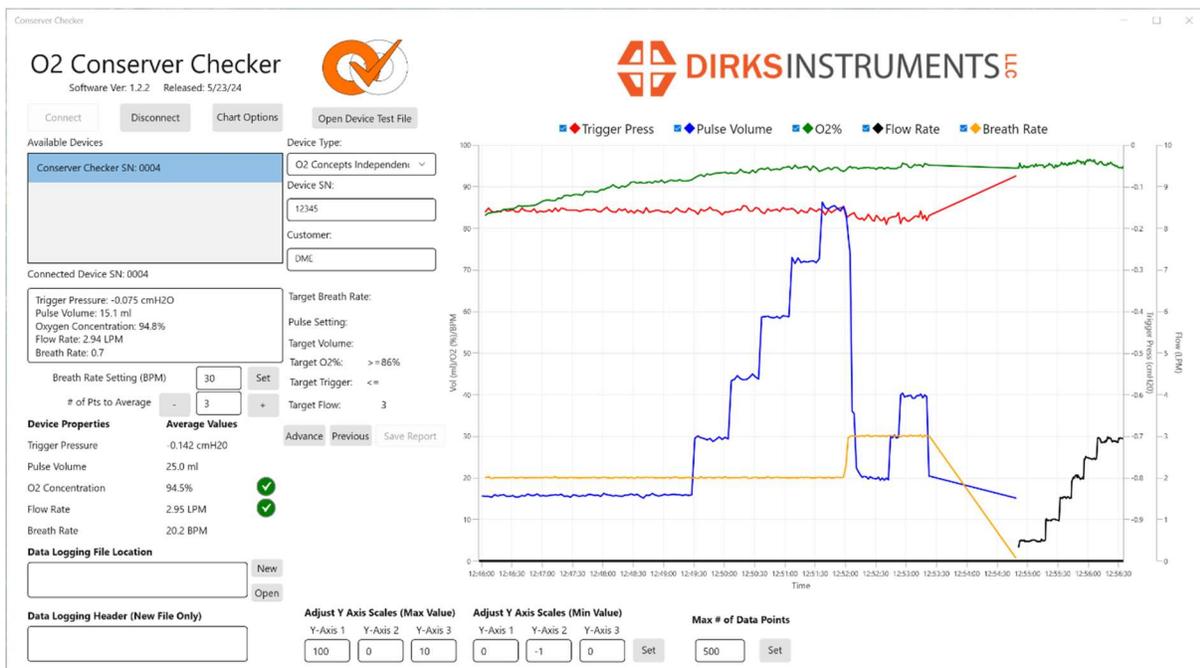# DIRKSINSTRUMENTS LLC

O2 Conserver Checker Windows Monitor User Manual

For Revision 1.2.2 or Higher

O$_2$ Conserver Checker Windows Monitor

The O$_2$ Conserver Checker transmits the measured data over a Bluetooth signal that can be monitored by computers that have Bluetooth capability. The monitor program will list all the Conserver Checkers available and you can select one to connect to and read the data. The measured data will be displayed and then shown on a graph. A data file can be opened to stream the data to a text file. The program also reads an Excel Spreadsheet that contains test parameters and pass / fail conditions for each test. I this feature is used the user will be guided on what settings to set the device to for each test and the data from each test will be entered into the spreadsheet and when the test is complete a report is generated

System Requirements
Computer running Windows 10 or 11
Bluetooth LE compatibility

License
The software is sold as an accessory and licensed to a company for use exclusively with the O$_2$ Conserver Checker product. The company may install the software on any computers that are used by the company for monitoring the O$_2$ Conserver Checker. The software is owned by Dirks Instruments LLC and must not be reverse engineered or modified in any way. No warranty is given for this software product. Updates may be available on request. A full functional demo version is available from the Dirks Instruments LLC web site at dirksinstruments.com. The demo will work for 30 days. A license for the software can be purchased by sending an email to aaron@dirksinstruments.com.

Connection to an O$_2$ Conserver Checker
One or more O$_2$ Conserver Checker devices must be powered up and running in the pulse mode. **Note that when operating in the continuous flow mode or when in the sleep mode the device will not connect to the computer.**

1) Bluetooth scanner will start automatically on launch. After approx. 30 seconds the scanner will time out and quit scanning for new devices. To start the scanner again click the disconnect button and this will restart the scanner.

2) If O$_2$ Conserver Checker devices are found then the device serial number will be listed in the Available Devices list. In the list of available devices select the unit you would like to connect to. Click on the name to select the device. The name of the device you selected should highlight blue.

ConserverCheckerBLE

O2 Conserver Checker

Software Ver: 1.2.2   Released: 5/23/24

[Connect]   [Disconnect]   [Chart Options]

Available Devices

| Conserver Checker SN: 0061 |

Connected Device SN: 0061

Device Connected

3) With the name selected click the connect button. After a few seconds the connected device text should update with the device serial number, and the device output box should have a message that says device connected. At this point data will automatically be received as it is sent by the device. It will only update this data when a pulse is detected so it will need to be connected to a device to be tested that is operating before data will be displayed.

4) Data should begin to populate the graphs as soon as the data is received from the O_2 Conserver Checker.
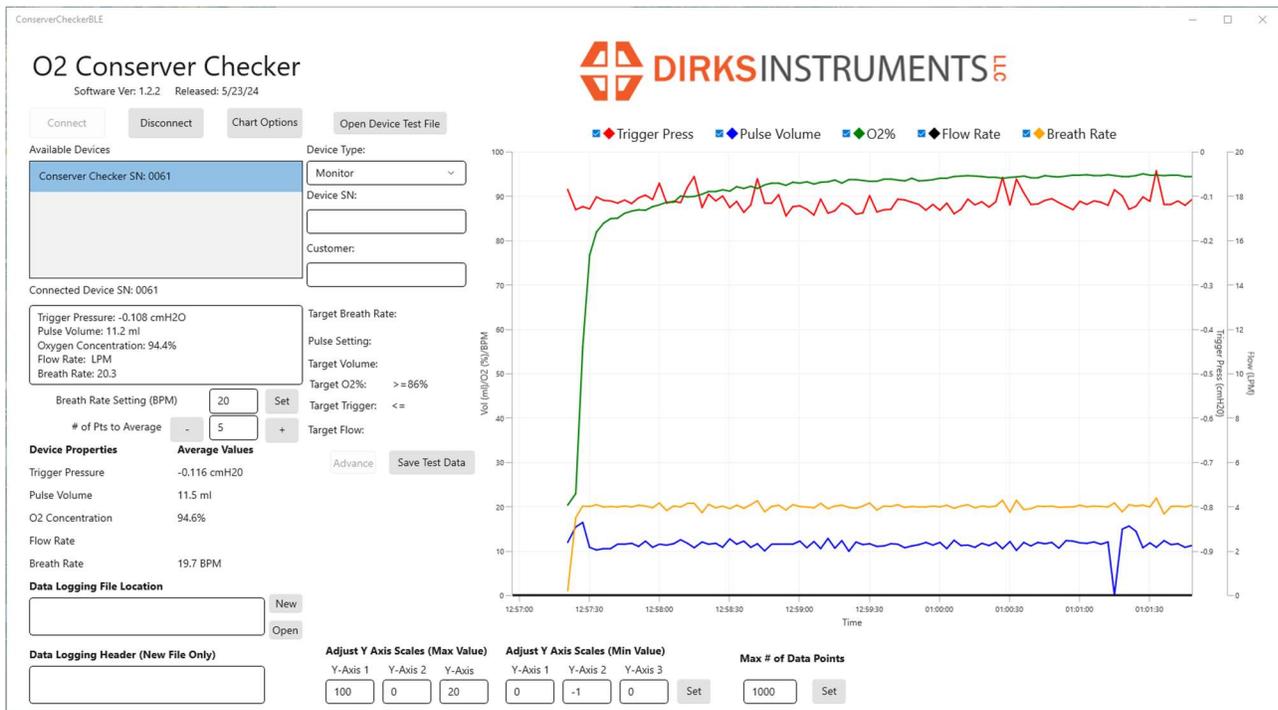
In the above picture of actual data from a portable oxygen concentrator during the initial startup period you can see the data that was captured during this startup phase of the operation. The green line indicates the oxygen concentration and you can see that the concentration starts at about 21% and then increases to 94% during this test.

To disconnect from this O_2 Conserver Checker click on the Disconnect button and then after a few seconds the list of available devices will be displayed. Select the device to connect to by clicking on the name of the device. Changing devices will clear the graphs.

Setting the Breath Rate

Just below the immediate data box is a control that displays the current breath rate setting for the O_2 Conserver Checker and you can also use this control to change the breath rate. Breath rate control is only available for units with software version 3.2 and above.

To change the breath rate, enter a new breath rate value between 10 and 40 and then click on the Set button to send this new breath rate to the Conserver Checker. Note that if you increase the breath rate by a large amount the device being tested may not properly track this new breath rate. People do not normally change breath rate in large steps so when increasing the breath rate you may need to change in smaller steps of 1 to 3 BPM and then let the device adjust to this new breath rate for a few breaths before making an additional increase. Going down in breath rate is generally not a problem so you can reduce the breath rate by a larger number and generally not have a problem with the device tracking the new breath rate.

The measured breath rate should match the new setting breath rate. If it does not then this indicates that the device being tested is not properly tracking this new breath rate.

Measured Data

In the box beneath the list of Conserver Checkers that are available to connect to is a display of the current measured values. This list will be updated with each pulse or steady flow measurement. The trigger pressure is a measure of the pressure required to trigger a pulse of oxygen. The pressure is measured in cmH2O and typically runs between -0.1 and -0.6 cmH2O. Smaller numbers indicate a more sensitive device. A more sensitive device will trigger pulses more reliably when the user is breathing very shallow or if the cannula is not well placed. The pulse volume value is the volume of oxygen delivered with each breath. This value will only be updated when the system is operating in the pulse mode. Oxygen concentration is the percent of oxygen in the pulse or steady flow stream. The flow rate value is the measured flow when in the continuous flow mode. This value will be updated when continuous flow is detected or it may be measured when a pulse is very long. Breath rate is the delivered pulse rate as measured by the time between pulses of oxygen. This value should be very close to the trigger breath rate set on the Conserver Checker. Each of these values are shown on the graph.

The list of measured values just below the received data is used to calculate an average of the last several measurements. Select the number of samples to average by clicking on the + or – button to change the number of points to average. The values displayed will then be the average of the latest number of samples selected.

Graph Settings

There are several ways to adjust the graph display and select what data is viewed. The colors of the lines can be changed, graph lines can be turned on and off and the scales can be adjusted. The things that are most commonly changed can be set from the main window and additional settings are available by clicking on the Chart Options button. All of the settings for the graph will be saved when you exit the program and will be restored when the program is started again.

Legend

Above the graph is a legend that shows the name of each data variable and a color diamond that shows the color of the line for that variable. Next to the color diamond is a small checkbox. The checkbox is used to turn on and off the display for the selected variable. Data is always accumulated even if the display for the variable is turned off so data is not lost when the variable is not visible.

Axis Scales

Up to three different Y axis can be displayed. This allows for a range selection for each variable that can be more easily viewed. Just below the graph are boxes where the maximum and minimum values for each axis can be set. These values can be changed at any time. After making a change to an axis range you must click on the Set button for the new value to take effect. Multiple variables can be displayed on one axis so selecting the axis to use for a variable and the range of the axis will be important for good visibility of the variables of interest. The axis label will show the measured values that are currently set to use the axis. Note that the value for the trigger pressure must be a negative number.

The time scale can also be adjusted if you want to zoom in on a section of the graph. Along the bottom edge of the graph is a bold black line. Click on this line and the x axis scale adjustment handles will be displayed.
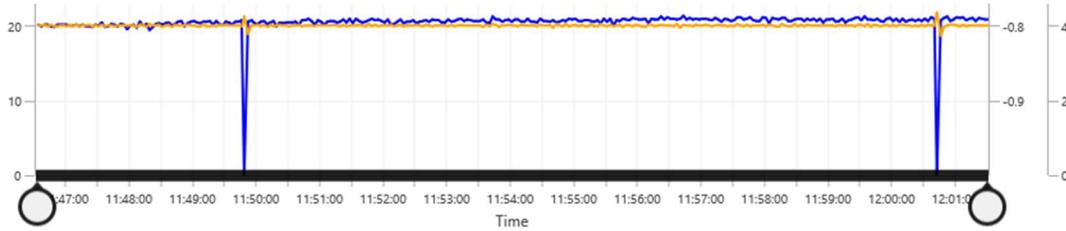
To adjust the time scale, click on one of the round circles at the ends of the graph and drag it left or right.
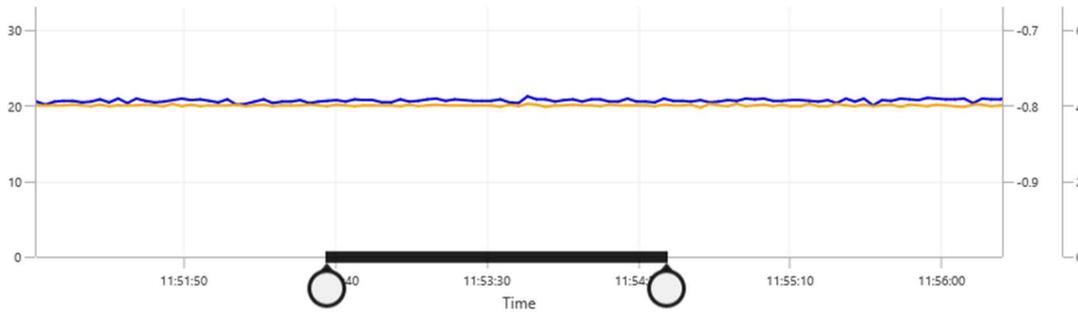
Number of Data Points

The number of data points setting controls how many data points are saved for the graph. The default is 1000 data points which normally works fine. At 20 breaths per minute this is 50 minutes of data. The value can be set up to 10,000 data points. The smallest number that can be set is 100 data points. When larger numbers of data points have been collected the program response can be very slow.

Chart Options

To open more controls for the graphs, click on the Chart Options button to open a window where you can set the line colors and select the axis to use for each measured value.

Series	Plot Axis	Line Color		
Trigger Pressure	Y-Axis 2 ⌄	Red ⌄	Set Color	
Pulse Volume	Y-Axis 1 ⌄	Blue ⌄	Set Color	
O2 Concentration	Y-Axis 1 ⌄	Green ⌄	Set Color	
Flow Rate	Y-Axis 3 ⌄	Black ⌄	Set Color	
Breath Rate	Y-Axis 1 ⌄	Orange ⌄	Set Color	
	Save & Exit	Discard & Exit		

RGB ⌄	#FFFFFF
255	Red
255	Green
255	Blue

Axis Selection

In the Chart Options window, each of the measured values is shown with a selection for picking the axis to use to scale this variable and a color for this variables graph line.

Under the Plot Axis heading is a drop-down selection for the Y Axis to use to scale the selected measurement. There are three different axes to select from. When selecting the axis to use consider the other measurements that may also use this axis. Each of the measurements on a selected axis should have somewhat similar data ranges.

You can put all the measurements on one axis if desired which will reduce confusion with multiple axes to track but it will not be possible to determine the value for all of the measurements because they have very different ranges.

Select the axis that you want to use for each of the measured values. If you make changes to the axis selection, be sure to click on the Save & Exit button.

Line Color Selection

Each of the measured values can be represented on the graph with a different color. There are two ways to select the color to use for the line. Under the Line Color heading is a drop-down list that shows a list of standard colors that can be selected.

The second way of selecting a color is to use your cursor and click on the color selector box and pick a color that you wish to use. You can drag the cursor around and see the selected color in the bar on the right. The slider at the bottom of the color selector can be used to make the color lighter or darker. Once the color that you want to use is shown in the box on the right click on the Set Color button for the measured value you want to display with this color.

After making a color selection be sure to click on the Save & Exit button to save the selections. If you don't want to make a change then click on the Discard & Exit button.
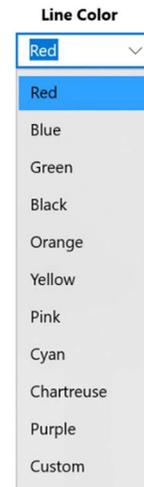
Data Files

The measured data can be streamed to a text file in a csv (comma separated) format. Data can be written to a new file or appended to an existing file.

To save data to a file click on the New button to open a new data file or the Open button to append data to an existing data file. After the file is opened the full path and file name will be displayed in the box and the button will change to Close. Click on the close button to end streaming data to this file.

The first column of the file contains the serial number of the O2 Conserver Checker that was used to collect the data. If you do not close the file you can disconnect from this conserver checker and connect to a different one and the data will continue to stream to this file. The serial number of the O2 Conserver Checker will change to the new device.

The data can easily be imported into Excel or other data analysis software. The first line will contain a header with a description of the data in each column. The time of the measurement and the measured values will all be displayed in one line. One of the columns is the steady flow value. When operating in pulse mode there will be data in the pulse volume column but not normally in the steady flow column unless the pulse is a long pulse. When operating in the steady flow mode the measured steady flow value will be sent to the data file at a regular sample rate and there should be no data in the pulse volume column. An example of a data file showing the first minute of data from a portable concentrator is shown.

	A	B	C	D	E	F	G
1	Serial #	Time	Trigger Pressure	Pulse Volume	O2 Concentration	Flow Rate	Breath Rate
2	4	10:56:47	-0.168	19.5	79.9		20
3	4	10:56:50	-0.179	19.4	79.9		19.9
4	4	10:56:53	-0.177	19.2	80.6		20.1
5	4	10:56:56	-0.177	19.2	80.6		19.9
6	4	10:56:59	-0.175	19.3	80.5		20
7	4	10:57:02	-0.175	19.3	80.5		20
8	4	10:57:05	-0.169	19.6	81.1		20
9	4	10:57:08	-0.178	19.4	82.8		19.8
10	4	10:57:11	-0.19	19.3	83.3		20.1
11	4	10:57:14	-0.17	19.3	83.2		19.9
12	4	10:57:17	-0.17	19.3	83.2		20.2
13	4	10:57:20	-0.186	19.6	83.1		19.8
14	4	10:57:23	-0.176	19.2	82.9		20.1
15	4	10:57:26	-0.173	19.3	83.3		20.1
16	4	10:57:29	-0.166	19.5	83.5		20.1
17	4	10:57:32	-0.169	19.3	84.4		20
18	4	10:57:35	-0.171	19.6	85.2		19.9
19	4	10:57:38	-0.173	19.3	85.4		19.9
20	4	10:57:41	-0.173	19.4	85.4		20
21	4	10:57:44	-0.179	20	84.9		19.9
22							

Device Testing and Report Generation

The program can also interface with an Excel spreadsheet which provides information on test parameters and target values for each test. It also includes pass and fail criteria which the program uses to indicate if the measured values for a given setting are within the specified limits. Test values are then stored in the spreadsheet file and at the end of the test a report can be created for this device.

Loading a Testing Spreadsheet

A spreadsheet with suggested tests and test limits based on the information from user manuals is provided with the program. The spreadsheet workbook contains several pages or spreadsheets with one page for each device. The spreadsheet contains the tests that are suggested for this particular model of device. Tests may include pulse mode tests and continuous flow tests.

To load a spreadsheet, click on the button at the top labeled Open Device Test File. Use the file explorer to locate the name of the spreadsheet file that you want to use and click on it to select it then click on the open button.

Select the Device to Test

In the first drop down list below the Device Type label click on the arrow at the right of the box to display a list of devices. The first device in the supplied spreadsheet is named Monitor. This is a blank spreadsheet that will clear out the testing parameters. If you have been using a different selection this will clear the settings to reduce confusion. Select the name of the device that you want to test. If the device that you are testing is not listed you can request that the device be added to the spreadsheet or you can create your own page in the spreadsheet with the data for this device. See a later section in this manual for information on how to add new or custom tests.

Device Type:
O2 Concepts Independen ⌄

Device SN:
12345

Customer:
DME

Target Breath Rate:

Pulse Setting:

Target Volume:

Target O2%: >=86%

Target Trigger: <=

Target Flow: 3

[Advance] [Previous] [Save Report]

Enter the Device Serial Number

The report will include an entry for the serial number of the device being tested. This is not a required entry but it may be very useful when producing a printed report for record keeping.

Enter the Customer Name

The next box is where the name of the customer or any other identifying information about the device may be entered. This is not a required data field.

Running the Test

After the device to test is selected the first setting to be tested will be displayed in the area below the Customer entry box. The target breath rate is the first value displayed. The breath rate will be automatically set on the O2 Conserver Checker if it is connected and running.

The Pulse Setting shows the pulse mode setting that you need to set the device being tested to for this test. After making a change to the device setting it may take several breaths for it to adjust and settle to a stable output.

The Target Volume setting shows what the volume should be at this setting and breath rate. You can compare this to the measured value for the pulse volume.

The Target O2% will show the minimum oxygen reading for the device to be acceptable. It generally takes a few minutes for a concentrator to operate at a stable oxygen concentration after startup. It may also take a few breaths to reach a stable reading when a setting change is made.

The Target Trigger is the maximum negative pressure for the trigger pressure measurement.

The Target Flow value will be blank if the test is a pulse mode test. If it is a continuous flow test then the Pulse Setting will be blank and the Target Flow will have a value. Set the device to the continuous flow mode at the setting indicated.

When a test is running the measured values will be compared to the target values and a pass or fail indication will be displayed to the right of the measurement. The measurement that is used for the comparison is the Average Value measurement. Set the number for the average to the number of values that you want to use for the average. Note that in this picture the trigger pressure and oxygen

concentration have green checkmarks indicating that they are within the specifications for this test. The pulse volume is not meeting the specification. In this case this was because the device had not yet been set to the indicated setting so the pulse being delivered was for the previous test setting. The red X indicators shows that this value is not in specification.

The measured breath rate in the list of average values is the average rate that the pulses are detected. If for some reason the measured breath rate is different from the set breath rate by 1.5 BPM or more then the measured breath rate will have a red box around it. This will occur when the set breath rate is changed and the average breath rate has not received enough values to get a good average at the new breath rate or if the device is not triggering at the set breath rate. If there is a red box around the measured breath rate the test is not ready to accept and proceed to the next test.

Going to the Next Test

After enough breaths to allow the device to settle to a stable reading and for the average to get enough values, the pass or fail indication can be checked to see if the device is within acceptable limits for the

measurements. The graph of the measured data may also be helpful for determining if a device has been at a reasonably stable reading long enough to get a good average.

Click on the Advance button below the target values to go to the next test. This will save the data to the spreadsheet and read the next set of test values. Set the device being tested to the correct setting for the pulse for continuous flow test.

If you accidentally hit the Advance button before you wanted to or if you just want to back up to the previous test you can click on the Previous button to back up one test. You cannot back up more than one test and you can't perform a previous test if you have completed all the tests and the Save Report button is enabled.

Generating a Report

When all of the tests in the set of tests for this device are complete then the Save Test Data button will be active. Click on this button and select a file location to store at PDF of the report. After selecting a file name and location the report will be displayed. You can then print out the report you wish.

After generating a test report the test will begin again at the start of the series of tests for this device. If you want to run the same test again then you can go through the test for each setting. You can also change to a different device type if the next unit to test is different.

Device Type:

Inogen Rove 6 ⌄

Device SN:

12345678

Customer:

DME

Target Breath Rate:

Pulse Setting:

Target Volume:

Target O2%:   >=86%

Target Trigger: <=

Target Flow:

Advance   Save Test Data

Sample Test Report
When the Save Test Data button is clicked you can save the report. A sample report is shown below.

O₂ Conserver Checker

OXLIFE Independence Oxygen Concentrator

Device SN __12345__   Date __6/13/2024__

Customer __DME__   Tester SN __0004__

Pulse Mode Tests

100% O2 (Y/N)	N

Pulse Volume

BPM	Setting	Pulse Volume (ml)			Pressure cmH2O			O2 Concentration	
		Nominal	Measured	Result	Max	Measured	Result	O2%	Result
20	1	16	15.70	PASS	-0.35	-0.161	PASS	91.3	PASS
20	2	32	29.40	PASS	-0.35	-0.162	PASS	93.2	PASS
20	3	48	43.63	PASS	-0.35	-0.150	PASS	93.7	PASS
20	4	64	58.47	PASS	-0.35	-0.157	PASS	94.1	PASS
20	5	80	71.93	PASS	-0.35	-0.159	PASS	94.5	PASS
20	6	96	84.73	PASS	-0.35	-0.154	PASS	94.3	PASS
30	2	21.3	19.73	PASS	-0.35	-0.175	PASS	94.4	PASS
30	4	42.7	39.30	PASS	-0.35	-0.173	PASS	95.0	PASS

Steady Flow Tests

Flow Setting	Flow Rate (lpm)			O2 Concentration	
	Nominal	Measured	Result	O2%	Result
0.5	0.5	0.47	PASS	95.0	PASS
1	1	0.98	PASS	95.2	PASS
1.5	1.5	1.53	PASS	95.4	PASS
2	2	2.04	PASS	96.1	PASS
2.5	2.5	2.47	PASS	96.3	PASS
3	3	2.87	PASS	94.1	PASS

Test specifications from operation manual document PN: 800-1029 Rev E

Spreadsheet Requirements

The Excel spreadsheet that is used to drive the test parameters has several requirements for location of data that is important for the program to work properly. As long as these requirements are met the rest of the spreadsheet can be changed to edit the look of the report generated.

Below is a list of the required elements for the spreadsheet pages.

- The device serial number is stored in cell D7
- The date of the test is stored in cell H7
- The customer field is stored in cell D8
- In cell H10 there should be a Y if testing with 100% oxygen. This disables the oxygen test.
- The serial number of the O2 Conserver Checker is stored in cell H8
- The breath rate settings for the pulse mode start in cell B14
- The setting for the pulse mode is in column C
- The setting for the target volume is in column D
- The setting for the maximum trigger pressure is in column G
- Measured pulse volume values will be placed in column E
- PASS or FAIL is displayed in column F for pulse volume tests
- Measured trigger pressure values will be placed in column H
- PASS or FAIL is displayed in column I for trigger pressure tests
- Measured oxygen concentration values will be placed in column J
- PASS or FAIL is displayed in column K for oxygen concentration in pulse mode
- If there are continuous flow tests a flow setting value should be in column C no more than 10 rows below the last pulse setting.
- If continuous flows are to be performed before pulse flows then continuous flow values start in C14 and pulse flow settings start in column B no more than 10 rows after the last flow setting.
- If testing continuous flow settings with no pulse settings then flow settings start in cell C15.
- Measured continuous flow is placed in column E
- PASS or FAIL is displayed in column F for continuous flow tests
- Measured oxygen concentration in continuous flow mode is placed in column G
- PASS or FAIL is displayed in column H for oxygen concentration of continuous flow tests
- Pulse mode tests end on the first blank in column B (breath rate)
- Continuous flow tests end on the first blank in column D (nominal flow)
- The page name should be set to a unique name that will be shown in the device selection list.

Modifying a Spreadsheet Page

The spreadsheet pages can be modified to change the tests to be performed, the nominal test values and the PASS / FAIL conditions. You can easily add rows to a set of pulse mode or continuous mode tests. Be sure that if you add a row that you fill in the nominal value and the conditions in the pass or fail column.

The sheets can also be modified to add your own logo or header to the file as well as additional information after the test data. Be sure that if you add information that you don't move the required cells listed above.

If you make changes to a page, it is recommended that you set the print area so just what you want gets printed in the report.

Creating a New Device Page

The easiest way to create a new page is to select a page that is similar to the one that you want to create and then select all of the cells to copy then add a new page and past the copied section into the new page. Be sure to edit the name of the new page to a name that is unique since this will be what is shown in the list of available tests. Be sure that the location of the key data is in the proper cell. Then modify the test values as needed. Make sure that you enter conditions for the result cells so that the result cells have the word PASS or FAIL in them after data is entered in the measure value column. When modification is complete set the print area to the cells you want printed.