

G4000
Medical Gas Outlet Analyzer

User's Guide

**Ensuring Patient Safety with Every Medical Gas Outlet,
Electrical Receptacle and Bed System Tested.**



Thank you for your purchase. National Safety Technologies, a division of Bionix since 1993, is committed to providing you with the tools to help make required testing and compliance to various regulations easier.

NST provides a one-year parts and labor warranty. Please register your product online within 30 days of purchase.

Visit www.NST-USA.com to register and for complete warranty details.

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Introduction

Welcome to the G4000 Medical Gas Outlet Analyzer, developed by National Safety Technologies. The G4000 was developed with all of your medical gas outlet testing needs in mind. No longer will you have to juggle flow meters, pressure gauges, concentration analyzers or pen, and paper. All of these features and more are incorporated into the G4000 Medical Gas Outlet Analyzer. The G4000 tests, records and arranges your data in an easy to read format with real-time results. In an instant, you know if the outlet that you are testing is good or bad. If the outlet fails, you can instantly look at the test results from that outlet and know why it failed. All testing criteria are defaulted to NFPA 99 and NST recommended standards, but you can change this criterion to match your unique medical gas outlet system. After your testing has been completed, you can export all of your results into an easy to ready report that is simply exported via a wireless data transfer or by a printer.

The NST G4000 operates via the NST MedGas Commander™ App that is available now in the Google Play Store. MedGas Commander™ controls all outlet testing and also saves, sorts and catalogs data. The NST MedGas Commander™ App can save multiple files and templates of varying size depending upon the data capacity of the Android device. Outlet information can be loaded before you test, entered as you are testing or even inserted once testing has been completed. Each test includes outlet location field information (floor, area, room number and outlet number). There are options to add your comments and to add Tester's Note to every outlet. Tester's Notes document common conditions that affect the safe operation of medical gas and vacuum outlets. This makes it easy to identify problems that need immediate attention. You can add your personal information to each data file to identify the tester, and each outlet is time and date stamped.

Creating medical gas outlet testing reports has never been easier than with the G4000. Tests are color-coded to match the color used on the outlets for easy identification. To further facilitate your medical gas outlet maintenance, test results can be sorted in a variety of ways to group data in the way that is most efficient for your needs. Preconfigured sorting options allow you to sort by location, outlet type, tester's notes and even outlet status.

The supplied shoulder straps and hand harness make carrying the G4000 easy and effortless. Simply attach the shoulder strap, click on the hand harness underneath the analyzer and test. NST has provided a portable battery back-up unit so that you can charge your tablet on the go. Simply make sure that the battery backup is charged up before you test and attach it while you test for additional Android device battery life.

The new G4000 with MedGas Commander™ is your complete solution to managing your medical gas outlets testing. Automated testing and outlet evaluation eliminate the guesswork. Program versatility allows for data collection that is customized to your facility's requirements and pre-formatted reports greatly simplify documentation.

Capabilities and Tests Performed

Expected Gas:

Once an outlet test is initiated, the MedGas Commander™ application knows what gas to expect depending upon the adapter connected to the hose.

Detected Gas:

Determined by measuring the percentage of Oxygen, Nitrous Oxide and Carbon Dioxide in the gas. The range of acceptable values for each gas are as follows:

OUTLET	PRESSURE	% O2	% N2O	% CO2
O2	over 4 psi	70 - 100	0 - 30	0 - 30
N2O	over 4 psi	0 - 10	70 - 100	0 - 10
AIR	over 4 psi	10 - 30	0 - 30	0 - 30
CO2	over 4 psi	0 - 10	0 - 10	70 - 100
N2	over 4 psi	0 - 10	0 - 30	0 - 30
VAC	over 1 in Hg	N/A	N/A	N/A
WAGD	over 1 in Hg	N/A	N/A	N/A
UNKNOWN	Any gas not falling within above limits.			
NONE	Any gas falling below the above pressure limits			

Gas Concentration:

Determined by an electro-chemical oxygen cell and an NDIR spectrometer to detect the percentage of oxygen in the gas for Oxygen, Air and Nitrogen. There is no pass or fail criteria for oxygen concentration. The application records the actual percentage of O2 that is measured in the gas.

OUTLET	Concentration Analysis	Accuracy (Full Scale)
O2	% Oxygen	± 1.0%
N2O	% Nitrous Oxide	± 1.0%
AIR	% Oxygen	± 1.0%
CO2	% Carbon Dioxide	± 1.0%
N2	% Oxygen	± 1.0%
VAC	N/A	N/A
WAGD	N/A	N/A

Non-dispersive infrared (NDIR) technology is used to detect the percentage of Nitrous Oxide in Nitrous Oxide gas outlets and the percentage of Carbon Dioxide in Carbon Dioxide gas outlets. The analyzer will record the actual percentage measured in the gas.

Static Pressure:

The static pressure is the pressure at the outlet when there is no flow. Pass/fail limits are adjusted by the operator at the start of a new data file. Accuracy: $\pm \frac{1}{2}\%$ of Measured Pressure

Flow Pressure or Flow Test:

The flow pressure is the pressure sensed during a flow test. The G4000 draws gas from the outlet at an increasing rate until the specified test flow rate is reached, or the pressure drops below the minimum value. Flow and pressure are then both recorded. If the test flow rate cannot be achieved, the outlet will fail, and the G4000 will display both flow and pressure readings. Accuracy: $\pm \frac{1}{2}\%$ Measured Pressure

Pressure Drop:

The pressure drop is calculated as static pressure minus flow pressure at the specified test flow rate. Accuracy: $\pm \frac{1}{2}\%$ Measured Pressure

Transient Flow:

For Medical Air and Oxygen outlets serving critical care areas, the analyzer shall allow a transient flow rate of 170LPM for 3 seconds. The flow rate is recorded. The test is performed as per NFPA 99 Health Care Facilities, 2015 edition, Section 5.1.12.3.10.5. Accuracy: $\pm \frac{1}{2}\%$ Measured Pressure

Vacuum Tests:

The G4000 has two options for testing Vacuum inlets and WAGD (Waste Anesthetic Gas Disposal) inlets:

Vacuum Flow (Performed with the Vacuum adapter with the brass flow orifice):

Vacuum flow is the flow that occurs when the inlet is opened wide. This flow occurs when the user allows flow through the orifice on the vacuum adapter when prompted by the analyzer. The small pressure drop across the orifice is measured by the analyzer and is used to compute flow. The outlet fails the flow test if the measured flow is below the pass/fail limit. Accuracy: $\pm \frac{1}{2}\%$ Measured Pressure

Vacuum Pressure (Performed with the Vacuum Pressure Only adapter):

Vacuum pressure is a test of the vacuum inlet static pressure. This test is performed while an adjacent inlet on the same zone is flowing 85LPM (3 SCFM). The flow test is set using the Vacuum Flow Regulator. The inlet fails the static pressure test if the pressure is not within the pass/fail limits. This test is labeled "ADJACENT INLET FLOW". Accuracy: $\pm \frac{1}{2}\%$ Measured Pressure

Data Collection Capacity:

Data files store test results for approximately 10,000 outlets. Data storage capacity depends on the storage capacity of the tablet being used with MedGas Commander™ to test outlets.

Environmental Operation Specifications

Condition	Specification
TMRA (Temperature Maximum Rated Ambient)	40°C
Temperature Range	0 - 40°C
Humidity Range	30 - 90%

Use the G4000 Medical Gas Outlet Analyzer only as specified in this User's Guide. Using the G4000 in a way other than specified in this guide may result in an unsafe or hazardous condition.

Components of your G4000 Medical Gas Outlet Analyzer

1. The G4000 Analyzer Interface
2. Analyzer Charger
3. Tablet for Android
4. Tablet Charger
5. Gas Hose Assembly
6. Set of Adapters
7. Rechargeable External Battery Pack
8. Shoulder/Neck Straps
9. Briefcase with specialty cut foam for storing all of your components
10. User's Guide

Contact Information

For assistance, please contact National Safety Technologies:

Technical Services Office

996 Old Eagle School Road, STE 1118
Wayne, PA 19087

Toll Free Phone: (800)678-7074

Toll Free Fax: (800)539-9319

e-mail: techservices@nst-usa.com

Or check out our website at www.nst-usa.com for technical support or product information.

Care of the G4000 Medical Gas Outlet Analyzer

Charging the Battery

The analyzer should operate for approximately 8 hours per battery charge. To charge the interface battery, plug the charging cable into the rear panel power port. An overnight charge is sufficient.

The interface can also charge the Tablet for Android while plugged in via the USB power port on the rear of the interface. The tablet will only charge from the interface when the interface charger is connected and plugged into power. There is an additional USB battery backup provided with the analyzer. This is to charge the tablet when it is getting low while you are testing. This should be charged before each testing session as well to ensure that it is ready for when it is needed.

Tablet Battery:

Please see the included Tablet for Android manual for more information regarding tablet battery life and displayed codes, colors and modes.

Power Modes

To conserve analyzer battery power and Tablet for Android lifespan, you have the option to turn off the analyzer at any time during testing. The gray button on the rear panel of the analyzer is the on/off switch. Turn the analyzer on by pressing down on the button. To turn the analyzer off, press up on the analyzer.

Tablets settings are configured by NST when shipped to customers to be at their optimal power saving state. Please be aware of this before you change any settings, i.e. display brightness or screen timeout.

Analyzer LED Codes:

The analyzer has a small LED light next to the power switch. The LED will display in different manners depending upon the condition of the analyzer.

AC/DC Power	LED Color	LED State	Power Switch State	Battery State	Battery Power
PLUGGED IN	GREEN	SOLID	ON	CHARGING	FULL CHARGE
PLUGGED IN	GREEN	SOLID	OFF	CHARGING	FULL CHARGE
UNPLUGGED	GREEN	SOLID	ON	DISCHARGING	ADEQUATE CHARGE
UNPLUGGED	GREEN	BLINK	ON	DISCHARGING	APPROACHING LOW CHARGE
UNPLUGGED	RED	SOLID	ON	DISCHARGING	LOW CHARGE
UNPLUGGED	RED	BLINK	ON	DISCHARGING	VERY LOW CHARGE
PLUGGED IN	RED	BLINK	ON	CHARGING	LOW CHARGE
PLUGGED IN	RED	BLINK	OFF	CHARGING	LOW CHARGE
PLUGGED IN	RED	SOLID	ON	CHARGING	APPROACHING ADEQUATE CHARGE
PLUGGED IN	RED	SOLID	OFF	CHARGING	APPROACHING ADEQUATE CHARGE

Routine Maintenance

- Ensure that both the tablet, battery backup and the analyzer have a full charge before every test session
- Check to see if there is a new MedGas Commander™ application in the Google Play Store before every use. This will ensure that you have the most current software version and optimize your testing results and experience.
- Be aware of the annual calibration date for your analyzer and send it to NST when it is due. Keeping up on annual calibration will insure that your analyzer has its O2 sensor changed yearly, that it has the most current analyzer firmware and that all gas line and electrical connections are secure and functional.

Annual Calibration

NFPA requires that medical gas safety test instruments shall be tested periodically, but not less than annually for acceptable performance as per NFPA 99 Health Care Facilities 2015 edition, Section 6.3.3.1.5.

Your new G4000 will arrive ready to use. To ensure proper operation, we strongly recommend that the analyzer is returned to NST for yearly evaluation, cleaning and calibration. The analyzer may also be sent to NST if malfunctions are suspected.

Steps to send your analyzer to NST for calibration:

1. Place all of the analyzer components in the briefcase. The briefcase should be packed in a box with ample padding. To ensure optimum performance, the analyzer should be calibrated with its components including gas hose and adapters.
2. Include the name and phone number of the person who should be contacted if there are any questions regarding the calibration of the analyzer.
3. Ship the package to:

National Safety Technologies
RE: Calibrations
996 Old Eagle School Road, Ste 1118
Wayne, PA 19087
4. We recommend insuring the package for the full purchase price.
5. Allow 2-3 weeks for the calibration and return of the analyzer.

Technical Support

If you encounter any difficulty with the G4000, please don't hesitate to contact the NST Technical Services office at 800-678-7074.

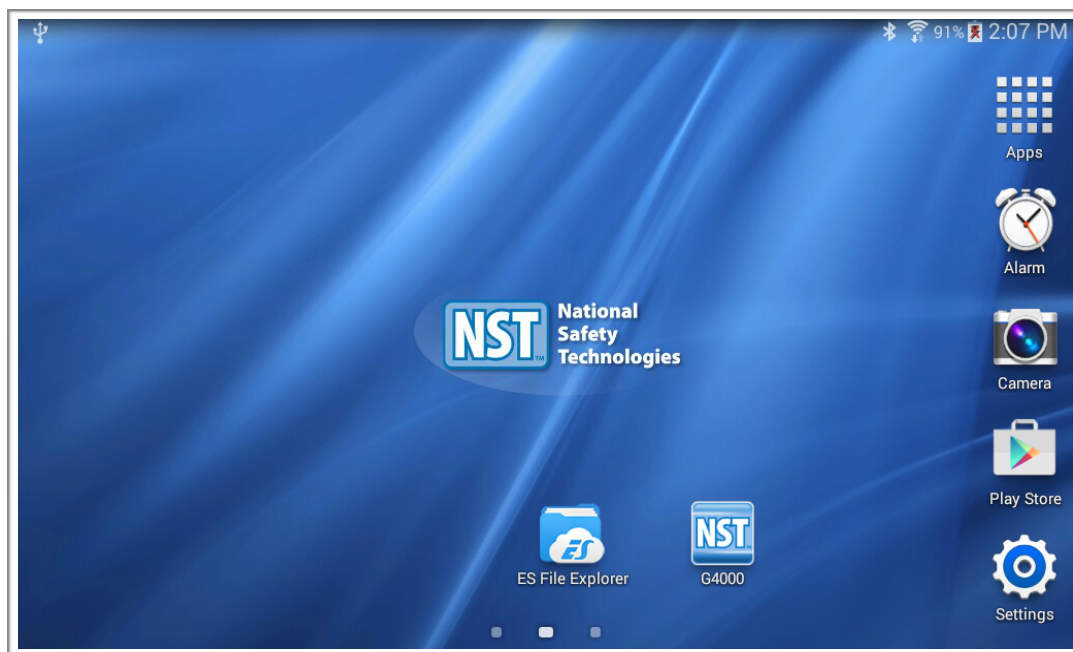
Getting started with your G4000 Medical Gas Outlet Analyzer

Turn on the gas analyzer interface by pushing down on the gray toggle switch on the rear of the analyzer.

- When the machine is powered on, it will beep quickly five times.
- The analyzer sensors need to warm up before it can test. Depending upon environmental conditions, this process can take upwards of five to ten minutes.
- When the analyzer is warmed up, it will sound a 6th and final lone beep. This indicates that the analyzer is ready to test.
-

Power on your Android device. Please consult the manufacturers users manual for more information regarding the features of the Android device.

The NST MedGas Commander™ Application should be on the home screen of your Android device. Select it once to open the application. If you are using an Android device that does not have MedGas Commander™ installed on it, you can easily find it in the Google Play Store app for download.

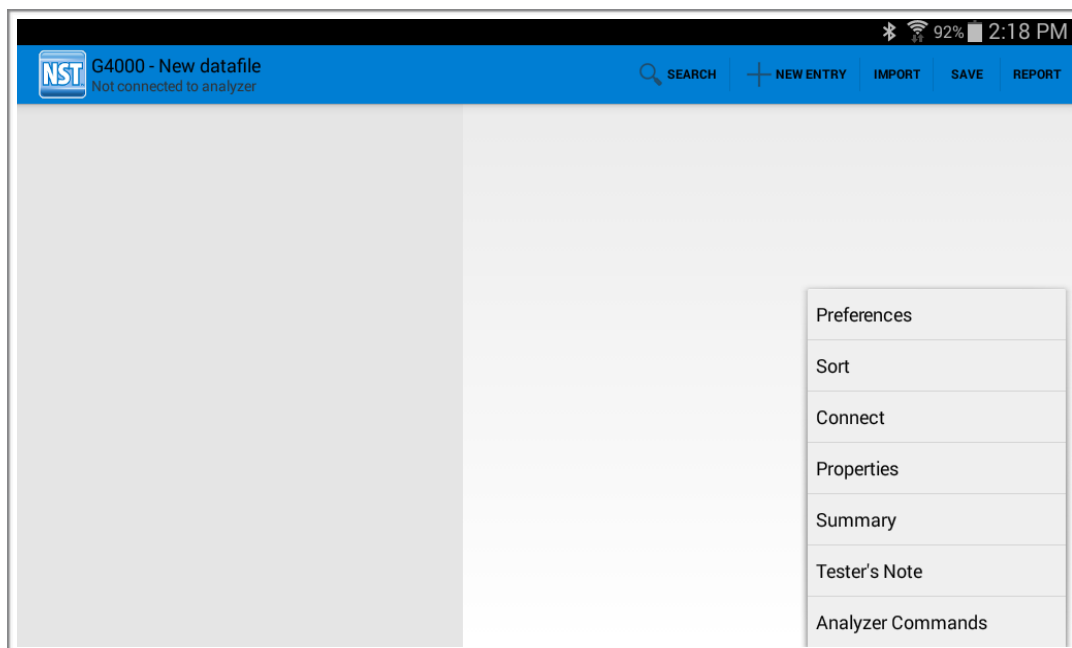


MedGas Commander™ App

The MedGas Commander™ Application is an Android based software program that sends commands and receives data from the G4000 Medical Gas Outlet Analyzer interface. The app records the results of medical gas outlet testing to a data file which can be exported into a PDF format. The MedGas Commander™ Application is the main logic center of the G4000 Medical Gas Outlet Analyzer. The analyzer interface cannot conduct any medical gas outlet tests without the MedGas Commander™ Application.

Main Menu

The MedGas Commander™ Application's main menu can be found by selecting the Android device menu button. The position of this button can vary from device to device.



Preferences:

Shows the data files information including Tester's name, Department, Phone Number and Comments. You can also find the data files testing limits here.

Sort:

Data in the data file can be sorted by several different preset options. You can also arrange the order in which your data will display in either ascending or descending.

Connect:

Select this option to connect to the analyzer. If your analyzer hasn't been paired to the tablet that you are using then select the '*Scan for analyzers*' option to pair.

Properties:

Shows the following information: Firmware Version, Software Version, Serial Number, Calibration Date, Battery Life, Bench Zero after N2 tests, 3-foot or 6-foot Hose type, and Gas Outlet Color.

- **Firmware Version**

The analyzer interface software version.

- **Software Version**

NST Android application version.

- **Serial Number**

G4000 Analyzer Serial Number.

- **Calibration Date**

The calibration date of the NST G4000 Medical Gas Outlet Analyzer.

- **Battery Life**

Percentage of Battery remaining in the interface

- **Bench Zero after N2 test**

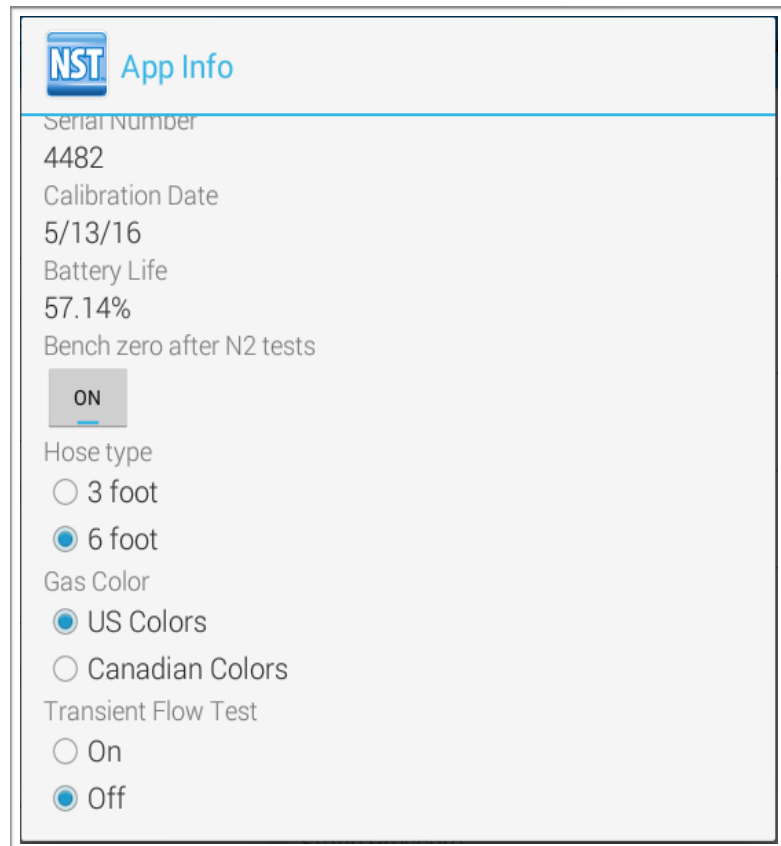
Command will recalibrate the analyzer's gas concentration automatically after an successful N2 outlet test. It is recommended to leave this ON.

- **3-foot or 6-foot Hose type**

The G4000 Medical Gas Outlet Analyzer default hose length is 3 feet, for jobs that require a longer hose connection NST offers an optional 6-foot hose. To test with the 6-foot hose, select the 6 Foot button and then the back arrow on your Android Device. If you need to return to using the 3-foot hose, go back into properties and select the 3-foot hose button.

- **Gas Outlet Color**

The G4000 Medical Gas Outlet Analyzer defaults to colors to US Outlet Colors. To change to standard Canadian Colors choose the Canadian Colors option. To change the outlet colors back to the US Outlet colors select the US Colors option.



- **Transient Flow Test**

While testing Air and Oxygen outlets, the analyzer will allow and hold a transient flow of 170LPM (6 SCFM) for 3 seconds. The Transient Flow is a required test as per NFPA 99, 2015: Section 5.1.12.3.10.5 and initiates every Air and O2 test file by default. If you would like to turn this option off, you would select the off button; you can return in the middle of testing and turn this test off and on. The only data that will record under transient flow is data accumulated while the test option is set to on.

Summary:

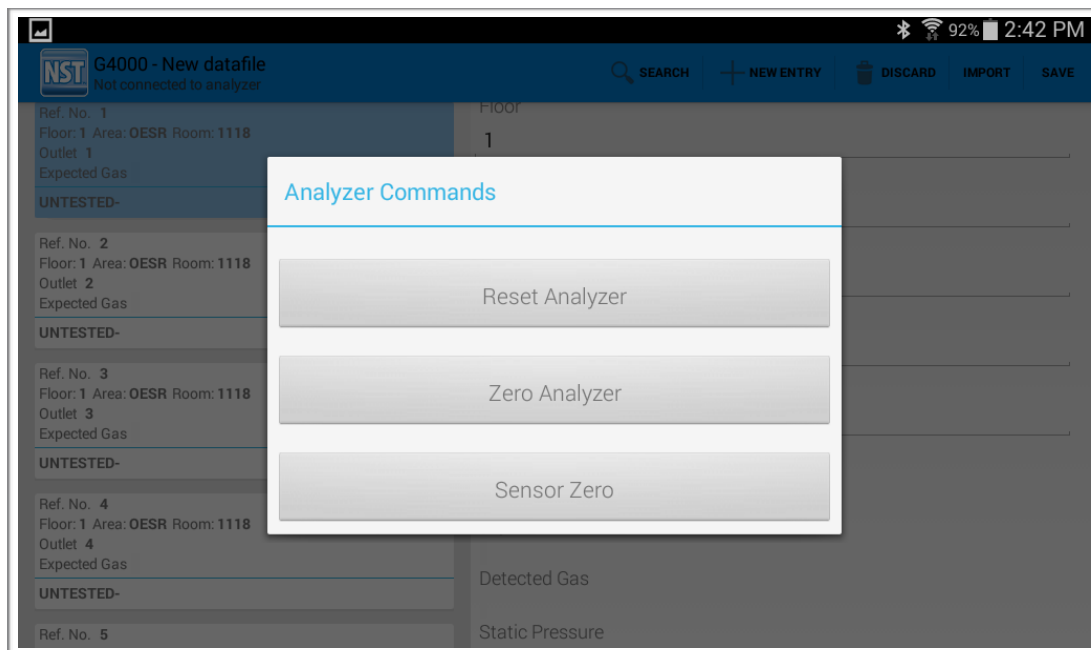
Shows the testing statistics of the currently loaded data file.

Tester's Note:

This page shows all of the tester's notes that can be used during testing and what they indicate. For information regarding tester's notes, please see page 23.

Analyzer Commands:

The MedGas Commander™ App has three manual field modes for the user to confirm sufficient analyzer operation. We recommend that you use these tools regularly to confirm the accuracy of the analyzer before and after each test session.



- **Reset Analyzer:**

All sensors and the Bluetooth connection will reset. You will need to reconnect to the analyzer after this has been completed.

- **Zero Analyzer:**

This command resets the analyzer's concentration readings. Use this command to calibrate the analyzer's ability to properly read gas concentration. The analyzer uses N2 as a reference point to reset both the O2 sensor and NDIR bench's gas concentration readings.

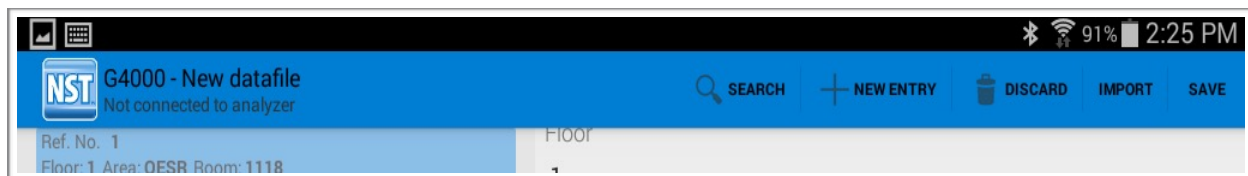
- Select Zero Analyzer and follow the onscreen instructions.
- Once the Zero has completed, your analyzer's gas concentration results should return to calibration standards.

- **Sensor Zero:**

This will reset the analyzer's pressure sensors. Do not have the analyzer connected to pressurized gas. The analyzer's internal pressure sensors will reset themselves to zero and then adjust to its factory calibration setting.

Task Bar

The task bar of the MedGas Commander™ App is located on the top of the tablet screen.



Search:

Allows the user to search the data file for a specific piece of information. For example, if you wanted to find a test entry that contains the field **OR WEST** you would write **OR WEST** into the search field and then select the search glass icon.

New Entry:

Option to add another test to a data file. The new entry can be inserted at the end of the test file or in the middle of a section of already tested outlets.

Import:

Option to start a new data file, import a previously saved data file or to create a new template from an completed data file.

Save:

Allows the user to save testing data to a data file. When selected, the option to name your file will appear. Once the file is named, select OK. Files are saved in the NST directory in your Android device's root directory.

Report:

Exports the currently loaded testing data into a formatted testing report. Opens and saves in an Adobe PDF file format.

Starting a Data File

Find the import button on the MedGas Commander™ Task Bar and select it. There are three options that you can select:

- **Import Data File:**

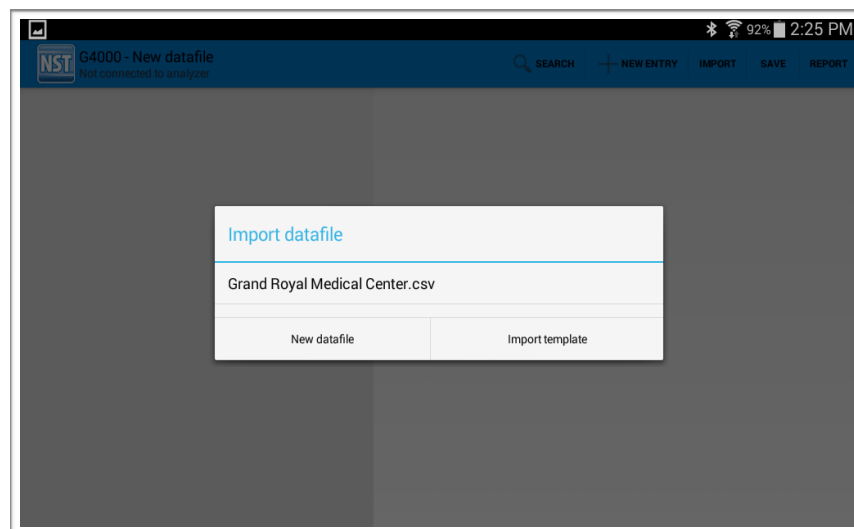
Select a file from the presented list. These are existing data files from previous testing sessions.

- **New Data File:**

Select this option to start a new and blank data file.

- **Import Template:**

Select this option if you want to create a template file from an existing data file. This is used if you are testing the same area again. All outlet descriptor information on the existing file will import over without test data.



Preferences

Tester Information:

Fill in your Name, Department, Phone Number and Data File Comments in this section. This information will appear on the first page of your data file report.

Test Limits:

Option to set the pass/fail criteria for this data file. Testing limits are defaulted to NFPA99 and NST recommended values.

If the standards need to be changed, you may change them in this section.

Test Limits Explanation:

- **Static Pressure: PSI/inHG:**

Pressure at the outlet when no gas is flowing.

- **Gas/VAC Flow:**

Flow rate and flow pressure.

- **Pressure Drop:**

The pressure difference between the static pressure and the flow pressure.

- **Transient Flow:**

While testing Air and Oxygen outlets, the analyzer will allow and hold a transient flow of 170LPM (6 SCFM) for 3 seconds .

- **Stable Gas Test Allowance:**

Percentage to which the analyzer sensors are stabilized before starting a test. The higher this number is, the quicker the analyzer will test but the results will be less accurate. NST recommends keeping this setting to 1.0%.

The screenshot shows the 'Preferences' screen of the G4000 Medical Gas Outlet Analyzer. The left sidebar lists five reference points (Ref. No. 1 to 5) for testing. The main area is divided into two sections: 'Tester(s)' and 'Test Limits'. Under 'Tester(s)', fields for Name (Chip Chipperson), Department (Bionix), Phone (18006787074), and Comments (Bionix) are visible. Under 'Test Limits', the 'Static Pressure' section shows a table with columns for Gas, Min PSIG, and Max PSIG. The table has two rows: O2 with values 50.0 and 55.0, and N2O with values 50.0 and 55.0.

Gas	Min PSIG	Max PSIG
O2	50.0	55.0
N2O	50.0	55.0

This screenshot shows the 'Test Limits' section of the 'Preferences' screen. A numeric keypad overlay is displayed in the foreground, allowing the user to input values for the 'Static Pressure' limits. The keypad includes digits 0-9, a 'Next' button, a 'SYM' button, and a settings icon. The background shows the same 'Test Limits' table as the previous screenshot, with O2 and N2O rows.

The screenshot shows the 'Transient Flow' and 'Stable Gas Test Allowance' sections of the 'Preferences' screen. The 'Transient Flow' section has a table with columns for Gas and Test Flow LPM, showing values of 170.0 for both O2 and AIR. The 'Stable Gas Test Allowance' section has a single input field for 'In percent' set to 1.0. At the bottom are 'Cancel' and 'OK' buttons.

Gas	Test Flow LPM
O2	170.0
AIR	170.0

*****Please note: once the data file has been created, you cannot change the Test Limits*****

New Entry

A testing entry will contain all of the data for a single medical gas outlet test. There are 5 result descriptor fields that can be filled in by the user. The remaining fields are filled with the data results received from the analyzer interface after testing. Each testing entry is given a reference number that is issued in order of testing entry creation.

Outlet Descriptors

Each testing entry has 5 data fields that are used as outlet descriptors. The data entered into these fields are done by the user prior to or after outlet testing.

Floor:

This is typically the floor of the facility that is being tested.

Area:

The area of the facility that you are testing. If you were in the NICU, for example, you would write NICU in this field.

Room:

The room number of the room in which you are testing medical gas outlets.

Outlet:

Outlet number in the sequence of testing. If you are testing in a room that has 12 outlets, the tests will have the number of the outlet in the order in which you tested it.

Comment:

Any observation or information about this outlet that you want recorded with its testing can be filled in here.

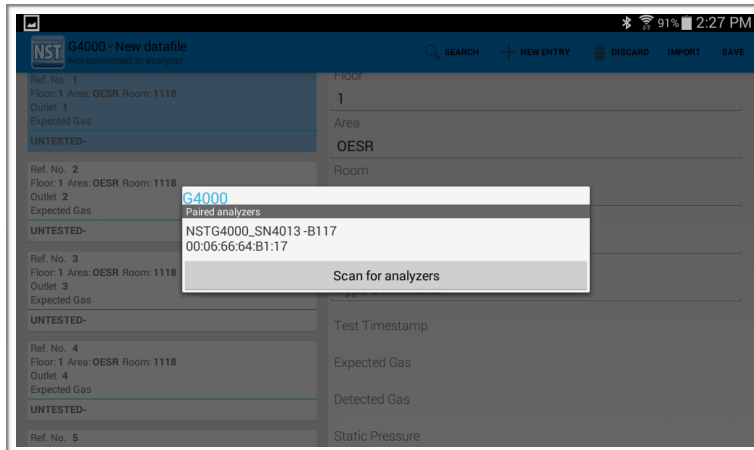
Saving a Data File

Select the SAVE option on the MedGas Commander to save a file. Name your file, once the file is named, choose OK. All files are saved in the NST directory in your Android device's root directory. Please note that the G4000 MedGas Commander app doesn't autosave testing files. NST recommends that the user saves the data file every 20 outlets.

The screenshot displays the 'G4000 - New datafile' screen of the MedGas Commander app. The interface includes a top navigation bar with 'SEARCH', 'NEW ENTRY', 'DISCARD', 'IMPORT', and 'SAVE' options. Below this, there are input fields for 'Floor' (set to 1), 'Area' (set to OESR), and 'Room' (set to 1118). A list of 'Expected Gas' is shown as 'UNTESTED-'. At the bottom, there is a numeric keypad and a keyboard for text entry. The status bar at the top right indicates a 91% battery level and the time 2:25 PM.

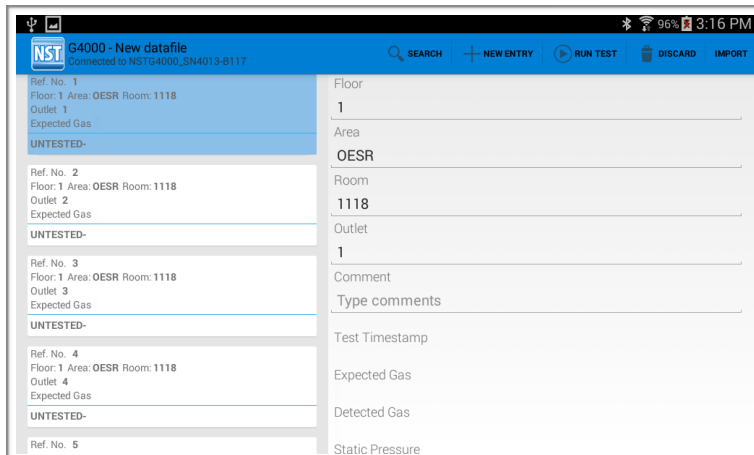
Testing Outlets with the G4000

Medical Gas Testing



To initiate a Medical Gas Outlet test you will need to connect an Android device (the tablet provided) running MedGas Commander™ to the Interface via Bluetooth. To begin, power on your analyzer interface.

On the Android device, you will need to find the **MENU** button and select it. Select **CONNECT**. If this is your first time connecting to the analyzer interface, you will need to select **SCAN FOR ANALYZERS**. Once your analyzer is found by the Android device, select it, and the analyzer should connect. You will be asked to confirm a passkey that is randomly generated between the two devices. Select **OK**.



Once you have connected, the status connection message in the upper left-hand corner will display **CONNECTED** along with the analyzer interface's serial number. If you are not connected, this message will say **NOT CONNECTED**, and you will have to try and connect again.

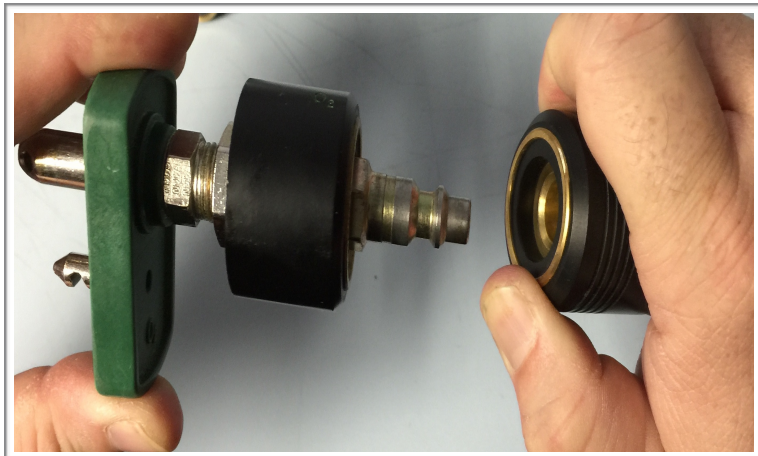
Once the analyzer interface sensors have warmed up to the optimal temperature it will sound a solid, lone beep. At that point, the **RUN TEST** option will appear in the task bar on top of the screen.

To begin testing:

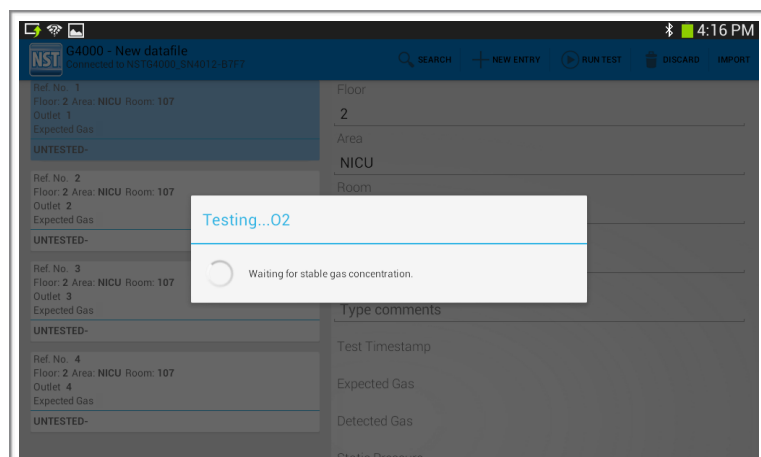
1. Plug the G4000 Gas Hose into the rear of the analyzer interface, the smaller diameter side of the hose connects to the brass nipple piece on the rear of the analyzer interface.



2. Select the appropriate gas outlet adapter that you need to use for your test and connect it to the other side of the G4000 Gas Hose. Connect the Gas Outlet Adapter into the outlet that you will be testing. It is normal to have a slight hissing coming from the analyzer when it is plugged into an outlet that has flowing gas.



3. Select **RUN TEST** and the analyzer will then perform its tests.



Special Instructions for Positive Pressure Gas Tests

1. Attach the desired gas outlet adapter for the outlet to the gas hose. If necessary, change the area identification in the test file.
2. Visually inspect the outlet. Purge the outlet if you suspect that it might contain moisture or contamination. Do not use the analyzer to test outlets with liquid or solid contamination or outlets with over 200 psi pressure.
3. Plug the adapter into an outlet and then select **RUN TEST**.
4. The analyzer will detect the expected gas type from the gas outlet adapter that you've selected. A series of tests will run automatically.
5. Your results will record in the test entry fields. Disconnect the outlet adapter from the outlet. Be careful not to separate the adapter from the hose.

This is an example of an O2 test that was done with an O2 gas outlet adapter:

The screenshot displays the G4000 - Grand Royal Medical Center.csv interface. The top bar includes the NST logo, a status indicator 'Not connected to analyzer', and navigation buttons: SEARCH, + NEW ENTRY, DISCARD, IMPORT, and SAVE. The main area is divided into two columns. The left column lists five test entries (Ref. No. 2 to 5) with details like Floor, Area, Room, Outlet, Expected Gas, and PASS status. The right column shows detailed test results for the selected entry (Ref. No. 3), including Test Timestamp, Expected Gas, Detected Gas, Static Pressure, Flow Rate, Flow Pressure, Pressure Drop, Transient Flow, Gas Concentration, and Tester's Note.

Ref. No.	Floor	Area	Room	Outlet	Expected Gas	PASS
2	1	OESR	1118	2	N2O	PASS
3	1	OESR	1118	3	O2	PASS
4	1	OESR	1118	4	N2O	PASS
5	1	OESR	1118	5	AIR	PASS

Test Results for Ref. No. 3
Test Timestamp: 1/12/16 12:42 PM
Expected Gas: O2
Detected Gas: O2
Static Pressure: 53.3 PSIG
Flow Rate: 101.3 LPM
Flow Pressure: 50.7 PSIG
Pressure Drop: 2.6 PSIG
Transient Flow: 175.2 LPM
Gas Concentration: 100.0% O2
Tester's Note:

Special Instructions for Vacuum/WAGD Tests

The G4000 can test Vacuum or Waste Gas Anesthesia Discharge two different ways.

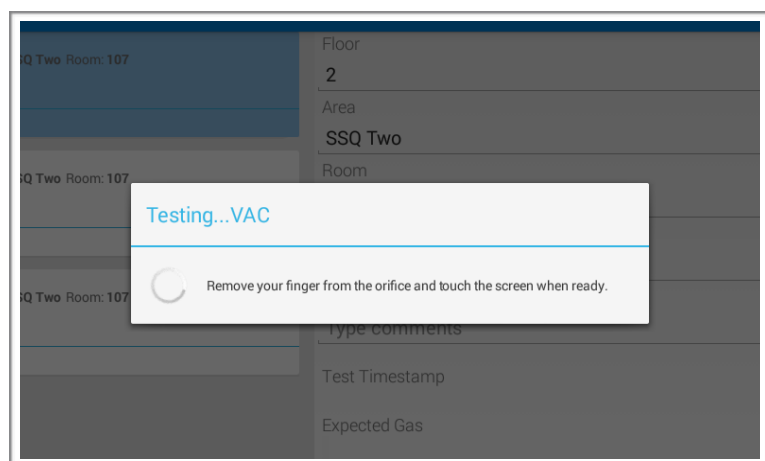
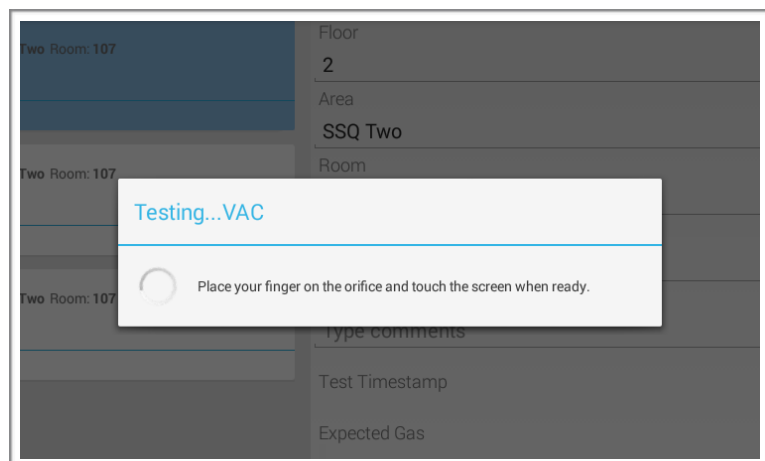
Brass Orifice Flow: Test takes VAC/WAGD pressure at the inlet and calculates flow at the adapter orifice.

Pressure Only: Test takes VAC/WAGD pressure at inlet with an adjacent inlet flowing at 85 liters per minute (lpm).

Follow the instructions below for your adapter type.

Vacuum/WAGD Flow Test (VAC/WAGD adapter with brass flow orifice):

1. Using the VAC/WAGD adapter with the brass flow orifice, cover the flow orifice on the vacuum adapter with your finger before testing the inlet.
2. Plug in and select **RUN TEST**. Follow the on screen instructions and touch the screen when you are ready to test the outlet. The analyzer will take a pressure reading.
3. When the pressure reading is complete, you will be asked to release your finger from the flow orifice. Allow flow and then touch the screen again to initiate the flow test.
4. Your results will record in the test entry field. Disconnect the inlet adapter from the inlet. Be careful not to separate the adapter from the hose.



Vacuum/WAGD Pressure Only Test (using the VAC/WAGD Pressure Only adapter):

1. Set the flow in a nearby vacuum inlet, on the same zone as the inlets to be tested, to 85 lpm (3 SCFM). This can be done easily using the NST Vacuum Flow Regulator (sold separately) or any hand held flow meter.
2. Using the Vacuum Pressure Only adapter, plug in and select **RUN TEST**. Follow the on screen instructions and touch the screen when you are ready to test the outlet. The analyzer will take a pressure reading.
3. Your results will record in the test entry field. Disconnect the inlet adapter from the inlet. Be careful not to separate the adapter from the hose.
4. Close the flow on the Vacuum Flow Regulator and disconnect from the inlet.

This is an example of a VAC test that was done with an VAC Flow Test adapter:

The screenshot shows the G4000 Medical Gas Outlet Analyzer interface. The top bar displays 'NST G4000 - Hodor.csv' and 'Not connected to analyzer'. The main screen is divided into two columns. The left column lists test results for four references (37, 38, 39, 40). Reference 37 is highlighted, showing 'Expected Gas: VAC' and 'PASS'. The right column displays test details for the selected reference (37): Test Timestamp (02/03/2016 11:25), Expected Gas (VAC), Detected Gas (VAC), Static Pressure (20.6 inHg), Flow Rate (98.4 LPM), Flow Pressure (3.8 inHg), Pressure Drop, Transient Flow, Gas Concentration, and Tester's Note.

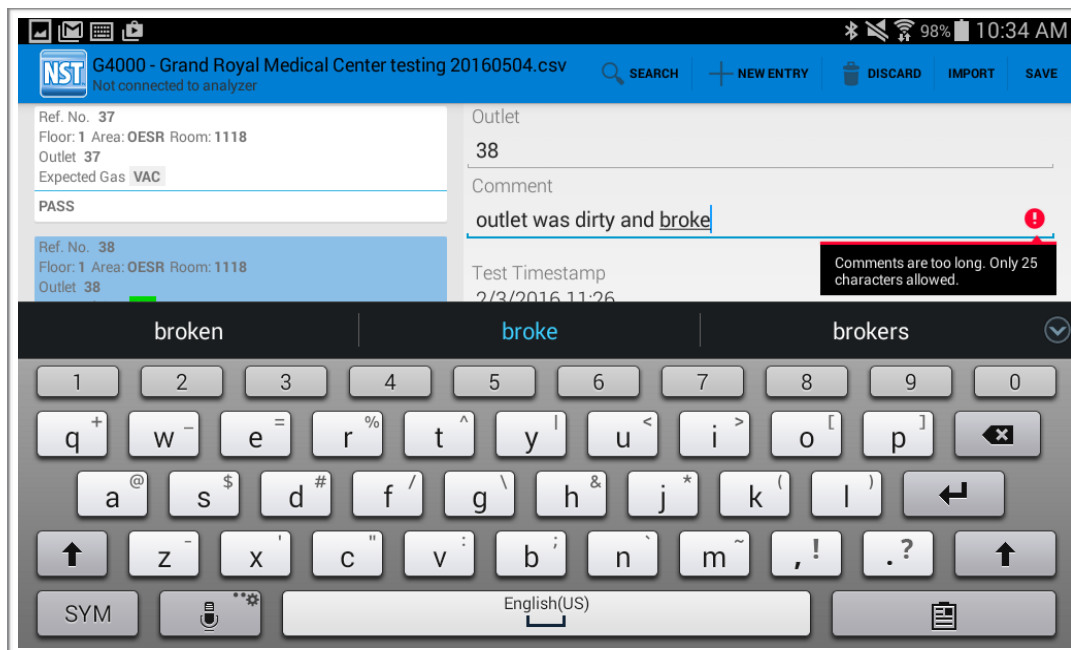
This is an example of a WAGD test that was done with an WAGD Pressure Only adapter:

The screenshot shows the G4000 Medical Gas Outlet Analyzer interface. The top bar displays 'NST G4000 - Hodor.csv' and 'Not connected to analyzer'. The main screen is divided into two columns. The left column lists test results for four references (33, 34, 35, 36). Reference 33 is highlighted, showing 'Expected Gas: WAGD' and 'PASS'. The right column displays test details for the selected reference (33): Outlet (33), Comment, Type comments, Test Timestamp (02/03/2016 11:21), Expected Gas (WAGD), Detected Gas (WAGD), Static Pressure (17.8 inHg), Flow Rate (90.9 LPM), Flow Pressure (3.3 inHg), Pressure Drop, and Transient Flow.

Test Completion

When an outlet test has concluded, the analyzer will send the test data to the MedGas Commander™ App. The testing field will show a status message of PASS or FAIL.

The actual measured test results for an outlet can be viewed by selecting the test entry individually. The line of data on the left will show the test results on the right of the screen. If there are any comments that you would like to add to the test entry then, you can select the **COMMENTS** field and write in your information. Comments can be used to take notes about the particular outlet or any other information that the user may find useful on the testing file report. Please note that you can only input 25 characters in this field.



Entering Tester's Notes

The MedGas Commander™ app is programmed with several helpful notes that can be used to identify certain issues or circumstances with an outlet. These notes export from the testing data file to the final report for easy identification.

Tester's Note Summary		
Tester's Note	Description	Result
Broken or Loose	Outlet or mounting plate is loose, broken or cracked and requires repair.	FAIL
Improper Type	Outlet is the wrong type.	FAIL
Incorrect Cover	Cover plate for the outlet is incorrect.	FAIL
Latch Failure	Outlet fails to latch securely.	FAIL
Leaky Connector	Outlet leaks before or during the insertion of the adapter.	FAIL
Moisture Observed	Moisture is observed while testing.	FAIL
Non-standard	Outlet type is acceptable for the location, but can't be tested by analyzer.	PASS
Not Accessible	Outlet cannot be reached, or critical patient support device is plugged into outlet.	Untested
Not In Use	Outlet is no longer in service.	PASS
Particulates Found	Particulates observed.	FAIL
System Check	Test performed to verify operation of the G4000 or for practice.	PASS

Tester's Note Summary:

A list of the preprogrammed notes and their meanings can be found in the MedGas Commander™ App. To find this list you need to select the MENU button on your Android device and then select **TESTER'S NOTE**. This will display the Tester's Note Summary section for your reference.

How to add a Tester's Note:

1. On the left side of the device screen, highlight the testing entry that you are assigning the note.
2. On the right side of the screen, scroll down until you see the option for **TESTER'S NOTE** and select it by pressing down on the data line under it.
3. Scroll down until you find the note that you would like to add, select it and the app will save that information to the Tester's Note data line.

Broken or Loose	☐
Improper Type	☐
Incorrect Cover	☐
Latch Failure	☐
Leaky cConnector	☐
Moisture Observed	☐
Non-standard	☐
Not Accessible	☐
Not In Use	☐

Automatic Testing Entry Creation

After the test has been completed, the MedGas Commander™ App will instantly create a new field under the one that had just completed. The descriptor data in this new field will port over to the new field automatically. The reference number and the outlet number will auto-increment to the next sequential number. Once you leave the area you were testing medical gas outlets, you can change the next entry to reflect the new area in which you are testing. For example, if you are testing in the NICU of a medical facility and the information is as follows:

REF. No.: 1

FLOOR: 2

AREA: NICU

ROOM: 107

OUTLET: 1

There are 12 outlets in this room. As you are testing, the entry fields are auto-incrementing by one in the Reference Number and the OUTLET fields. The Floor, Area and Room fields are porting over their information to the new testing entry. When you reach the last outlet, your testing entry descriptors look like this:

REF. No.: 12

FLOOR: 2

AREA: NICU

ROOM: 107

OUTLET: 12

If the next room that you need to test on this data file is on the other side of the medical facility. On the next testing field (Ref. No. 13), you need to change the descriptor data to reflect the new area being tested. In this new area, my descriptor data will be:

REF. No.: 13

FLOOR: 7

AREA: PEDS

ROOM: 408

OUTLET: 1

After testing 15 outlets in this room, the last tested entry will display the following descriptor data:

REF. No.: 28

FLOOR: 7

AREA: PEDS

ROOM: 408

OUTLET: 15

Any field that is changed will port over to the next field unless changed by the user. The only field that you cannot change is the Reference Number Field.

Inserting a Test Entry

While testing, it is possible to insert a new test entry into the middle of completed outlets.

Select and highlight the test entry above where you would like to add a new entry.

- For example, If you want to add a second test for **OUTLET 3** you would highlight **OUTLET 2**.

Select **NEW ENTRY** from the task bar at the top of the screen.

The new test entry will appear on the bottom of the file.

Select your devices **MENU** button and then select **SORT**.

Sort by **FLOOR, AREA, ROOM No., OUTLET No., Ref**

The new test entry will now appear in line where you wanted to place it.

Sort Options

Sort By

☐ Reference No.

☒ Floor, Area, Room No., Outlet No., Ref

☐ Area, Floor, Room No., Outlet No., Ref

☐ Expected Gas, Floor, Area, Room No., Outlet No., Ref

☐ Expected Gas, Area, Floor, Room No., Outlet No., Ref

☐ Tester's Note, Floor, Area, Room No., Outlet No., Ref

☐ Tester's Note, Area, Floor, Room No., Outlet No., Ref

☐ Status, Area, Floor, Room No., Outlet No., Ref

☐ Status, Floor, Area, Room No., Outlet No., Ref

Sort Order

☒ Ascending

☐ Descending

Saving a Data File

Select the SAVE option on the MedGas Commander to save a file. Name your file, once the file is named, choose OK. All files are saved in the NST directory in your Android device's root directory. Please note that the G4000 MedGas Commander app doesn't autosave testing files. NST recommends saving every 20 outlets to prevent data loss or corruption.

Save data file

Grand Royal Medical Center testing 20160504.csv

Cancel

OK

Report Generation

The G4000 MedGas Commander™ App can generate pre-formatted testing reports that can be exported to e-mail, a printer or the cloud.

1. To generate a report, make sure that you have a file you wish to export opened in the app.
2. Find and select **REPORT** in the MedGas Commander™ Task Bar.
3. Name the file and then app will generate a PDF report of your testing data.

Medical Gas Outlet Survey Report

File Name: **MedGas.pdf** Download Date: **Thu May 26 11:09:34 EDT 2016** Facility: **NST**

Filter: (Display All)

Prepared By: **Tester(s):** **Chip Chipperson**
Department: **18000707074**
Phone: **Grand Royal Medical Center**
Comment:

Data collected and processed using the NST Medical Gas Outlet Analyzer.

National Safety Technologies
6800 Old English National Road - Suite 1118
Morgantown, PA 15067
800-NST-7074
www.nst-usa.com

page 1

Medical Gas Outlet Test Data

Out	Ref	Floor	Area	Room	Outlet	Expected Gas	Detected Gas	Static Pressure	Flow Rate	Flow Pressure	Pressure Drop	Transfer Flow	Gas Conc.	Note	Status	Timestamp
1	1	0000	1118	1		N2	N2	175.4 PSIG	140.0 LPM	167.7 PSIG	8.7 PSIG	120.1 LPM	100.0% N2		Pass	5/26/2016 11:09
2	1	0000	1118	2		O2	N2	110.0 PSIG	100.0 LPM	40.0 PSIG	2.0 PSIG	120.1 LPM	100.0% N2		Pass	5/26/2016 11:09
3	1	0000	1118	3		N2	N2	100.0 PSIG	100.0 LPM	40.0 PSIG	4.0 PSIG	120.1 LPM	100.0% N2		Pass	5/26/2016 11:09
4	1	0000	1118	4		N2	N2	100.0 PSIG	100.0 LPM	40.0 PSIG	1.7 PSIG	177.5 LPM	21.0% O2		Pass	5/26/2016 11:09
5	1	0000	1118	5		CO2	CO2	100.0 PSIG	100.0 LPM	47.2 PSIG	4.0 PSIG	120.1 LPM	100.0% CO2		Pass	5/26/2016 11:09
6	1	0000	1118	6		O2	O2	110.0 PSIG	100.0 LPM	40.0 PSIG	2.0 PSIG	120.1 LPM	100.0% O2		Pass	5/26/2016 11:09
7	1	0000	1118	7		O2	N2	100.0 PSIG	100.0 LPM	47.2 PSIG	4.0 PSIG	120.1 LPM	100.0% N2		Pass	5/26/2016 11:09
8	1	0000	1118	8		N2	N2	100.0 PSIG	100.0 LPM	47.2 PSIG	4.0 PSIG	120.1 LPM	100.0% N2		Pass	5/26/2016 11:09
9	1	0000	1118	9		N2	N2	100.0 PSIG	100.0 LPM	47.2 PSIG	4.0 PSIG	120.1 LPM	100.0% N2		Pass	5/26/2016 11:09
10	1	0000	1118	10		N2	N2	175.4 PSIG	140.0 LPM	167.7 PSIG	8.7 PSIG	120.1 LPM	100.0% N2		Pass	5/26/2016 11:09
11	1	0000	1118	11		N2	N2	100.0 PSIG	100.0 LPM	40.0 PSIG	1.0 PSIG	170.1 LPM	21.0% O2		Pass	5/26/2016 11:09
12	1	0000	1118	12		N2	N2	100.0 PSIG	100.0 LPM	40.0 PSIG	4.0 PSIG	120.1 LPM	100.0% N2		Pass	5/26/2016 11:09
13	1	0000	1118	13		O2	O2	110.0 PSIG	100.0 LPM	40.0 PSIG	2.0 PSIG	120.1 LPM	100.0% O2		Pass	5/26/2016 11:09
14	1	0000	1118	14		CO2	CO2	100.0 PSIG	100.0 LPM	47.2 PSIG	4.0 PSIG	120.1 LPM	100.0% CO2		Pass	5/26/2016 11:09
15	1	0000	1118	15		O2	O2	110.0 PSIG	100.0 LPM	40.0 PSIG	1.0 PSIG	170.1 LPM	100.0% O2		Pass	5/26/2016 11:09
16	1	0000	1118	16		N2	N2	100.0 PSIG	100.0 LPM	40.0 PSIG	4.0 PSIG	120.1 LPM	100.0% N2		Pass	5/26/2016 11:09
17	1	0000	1118	17		N2	N2	100.0 PSIG	100.0 LPM	40.0 PSIG	1.7 PSIG	177.5 LPM	21.0% O2		Pass	5/26/2016 11:09
18	1	0000	1118	18		CO2	CO2	100.0 PSIG	100.0 LPM	47.2 PSIG	4.0 PSIG	120.1 LPM	100.0% CO2		Pass	5/26/2016 11:09
19	1	0000	1118	19		O2	O2	110.0 PSIG	100.0 LPM	40.0 PSIG	1.0 PSIG	170.1 LPM	100.0% O2		Pass	5/26/2016 11:09
20	1	0000	1118	20		N2	N2	100.0 PSIG	100.0 LPM	40.0 PSIG	4.0 PSIG	120.1 LPM	100.0% N2		Pass	5/26/2016 11:09
21	1	0000	1118	21		N2	N2	175.4 PSIG	140.0 LPM	167.7 PSIG	8.7 PSIG	120.1 LPM	100.0% N2		Pass	5/26/2016 11:09
22	1	0000	1118	22		O2	O2	110.0 PSIG	100.0 LPM	40.0 PSIG	2.0 PSIG	120.1 LPM	100.0% O2		Pass	5/26/2016 11:09
23	1	0000	1118	23		N2	N2	100.0 PSIG	100.0 LPM	40.0 PSIG	4.0 PSIG	120.1 LPM	100.0% N2		Pass	5/26/2016 11:09
24	1	0000	1118	24		N2	N2	110.0 PSIG	100.0 LPM	40.0 PSIG	1.0 PSIG	170.1 LPM	21.0% O2		Pass	5/26/2016 11:09
25	1	0000	1118	25		CO2	CO2	100.0 PSIG	100.0 LPM	47.2 PSIG	4.0 PSIG	120.1 LPM	100.0% CO2		Pass	5/26/2016 11:09
26	1	0000	1118	26		O2	O2	110.0 PSIG	100.0 LPM	40.0 PSIG	2.0 PSIG	120.1 LPM	100.0% O2		Pass	5/26/2016 11:09
27	1	0000	1118	27		N2	N2	100.0 PSIG	100.0 LPM	40.0 PSIG	1.7 PSIG	177.5 LPM	21.0% O2		Pass	5/26/2016 11:09
28	1	0000	1118	28		N2	N2	100.0 PSIG	100.0 LPM	40.0 PSIG	4.0 PSIG	120.1 LPM	100.0% N2		Pass	5/26/2016 11:09
29	1	0000	1118	29		N2	N2	100.0 PSIG	100.0 LPM	40.0 PSIG	1.7 PSIG	177.5 LPM	21.0% O2		Pass	5/26/2016 11:09
30	1	0000	1118	30		O2	O2	110.0 PSIG	100.0 LPM	40.0 PSIG	4.0 PSIG	120.1 LPM	100.0% O2		Pass	5/26/2016 11:09

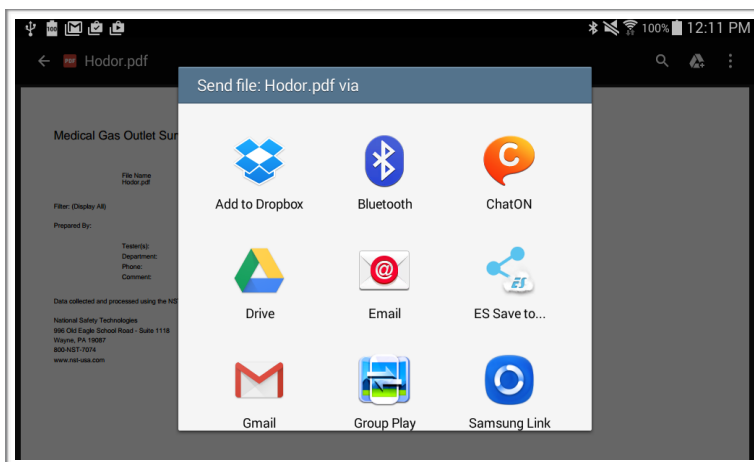
NOTE: ALWAYS SAVE YOUR DATA FILE BEFORE GENERATING A REPORT OR CLOSING DOWN MEDGAS COMMANDER™

MedGas Commander™ will save a copy of this report, as well as your test files, to the NST directory in your Android device's root directory. To find this file, navigate to your device's root directory using a file explorer application. For your convenience, the tablet included with your analyzer has a file explorer application preloaded on its desktop.

Exporting MedGas Commander™ Data

There are several ways to send MedGas Commander™ reports from your Android Device.

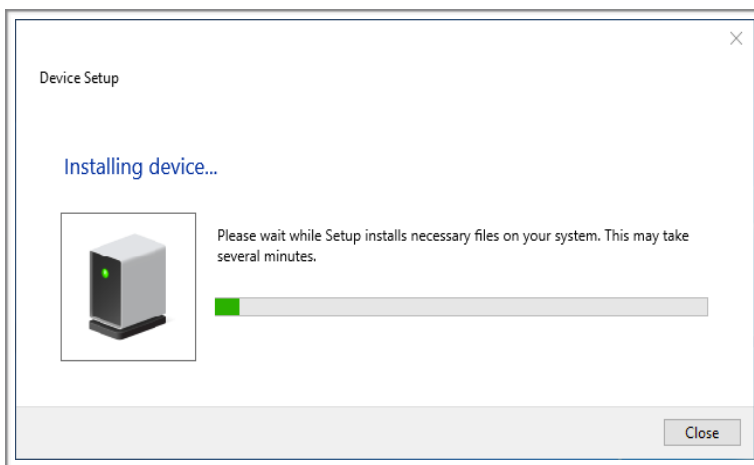
1. **Send File:** While viewing a Medical Gas Outlet Report, you can select your Android devices menu button to share your report.



- The Cloud: There are several cloud based services that you could upload the report. Dropbox, Google Drive and Microsoft OneDrive are just some of the more popular services.
- Email: You could send the report via your email account. In order to use your email, your Android device's email app will have to be setup with your email account information.

2. **EXPORT to PC via USB:** You can take a report right from your tablet and export it to your PC via your devices USB cable.

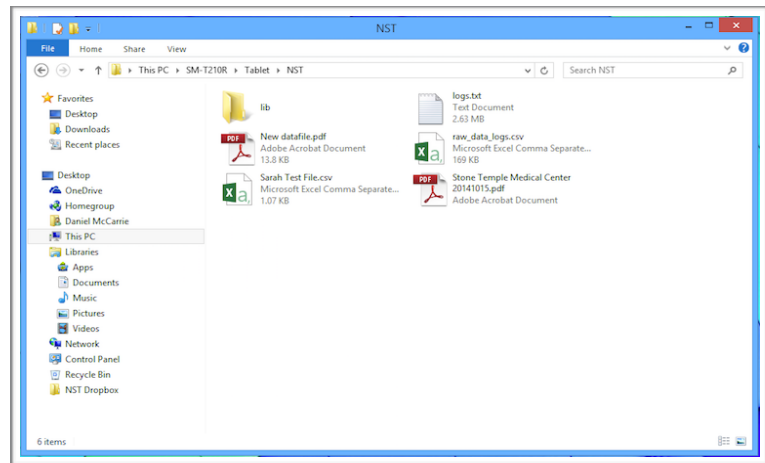
- A. Plug the USB cable into the tablet and your PC, if this is your first time connecting to this PC then Windows will automatically download the tablet drivers from Windows Update.
- B. Open Windows Explorer and navigate to the Android device icon (SM-T210R here) once the drivers are installed.



- C. The directory that has the Med Gas Commander data is:

PC(Your PCs Name)
\\SM-T210R(Tablet
Name)\\Tablet\\NST

- D. From here you can copy your testing data, to your PC.



3. EXPORT to PC via Bluetooth: You can wirelessly send a report right from your tablet and export it to your PC via Bluetooth connection.

- A. Setup your PC to connect with the Android device containing the test data for export.

1. On your Windows PC, navigate to your CONTROL PANEL and then select DEVICES AND PRINTERS. Then, select add device.
2. On your Android device, open up the Bluetooth settings. This is typically found under the SETTINGS of your device. Scan to find your PC and then select it.
3. On your PC, the Android device should appear under the ADD A DEVICE window. Select the device and the press NEXT. Allow the device to connect to your PC
4. Verify that the pairing codes are the same on both your PC and the Android device. If both codes match, then select PAIR on both devices.
5. You may have to wait for some additional drivers to download and install. Once this has completed, and you are connected you will be able to send data files from the Android Device to the PC.

- B. Open up the MedGas Commander™ App and find the data file that you are trying to export. Send the data file to a REPORT and then select SHARE and Bluetooth.

- C. Select the PC that your device is configured to send data via Bluetooth. You should receive an alert on your PC that there is a file being received. Open the PDF that was sent over to verify that it is the correct report. Save the file on your PC.

Please feel free to contact NST Technical Services at 1-800-678-7074 if you are having issues with exporting reports from the G4000 Medical Gas Outlet Analyzer.

Warranty

National Safety Technologies warrants the model G4000 Medical Gas Outlet Analyzer to be free from defects in material and workmanship under normal use and service for a period of one year from date of purchase. This warranty shall not apply to any unit or parts subject to alteration, misuse, neglect, accident, or abnormal conditions of operation.

This warranty is limited to repair or replacement by NST of any parts found by NST to be defective. Such repair or replacement will be made without charge, provided the analyzer is returned within one year of the original date of purchase. If the failure is found to be caused by alteration, neglect, accident, or abnormal conditions of operation, parts and repairs will be billed at the prevailing charges.

NST's liability for damages for any cause whatsoever will be limited to the payment actually received by NST.

IN NO EVENT WILL NST BE LIABLE FOR ANY LOST PROFITS, INCIDENTAL DAMAGES, SPECIAL DAMAGES, OR CONSEQUENTIAL DAMAGES, EVEN IF NST HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

IN ADDITION, NST WILL NOT BE LIABLE FOR ANY DAMAGES OF THE CUSTOMER BASED UPON A THIRD PARTY CLAIM.

THE FOREGOING WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS OF A PARTICULAR PURPOSE.

Appendix A: Sample Data Report

Medical Gas Outlet Survey Report			
File Name Hodor.pdf	Download Date Thu May 26 14:03:03 EDT 2016	Facility NST	
Tester(s): Department: Phone: Comment:	Chip Chipperson NST 18006757074 Grand Royal Medical Center		
Data collected and processed using the NST Medical Gas Outlet Analyzer. National Safety Technologies 998 Old Eagle School Road - Suite 1118 Wayne, PA 19087 800-NST-7074 www.nst-usa.com			

Explanation of Codes

This report contains test results of a survey of medical gas outlets at the facility listed above. Outlets were tested for gas type, static pressure, and pressure during flow and concentration. Notes may have been added by test personnel when appropriate.

No tests of gas purity were performed

The significance of the data in each column is as follows:

LINE - Maintains a count of the number of outlets tested.

FLOOR, AREA, ROOM, and OUTLET - Gives the location of the outlet within the hospital and within the room.

EXPECTED GAS - The gas type as marked on the adapter plugged into the inlet end of the analyzer gas hose. This adapter is chosen to match the gas type marked on the gas outlet. (Oxygen, Nitrous Oxide, Air, Carbon Dioxide, Nitrogen, Vacuum, or WAGD)

DETECTED GAS - The gas type actually flowing from the outlet. A "*" indicates that a different gas was flowing from the outlet than was expected.

STATIC PRESSURE - The pressure at the outlet with no flow. A "*" indicates pressure above or below:

Gas:	O2 (PSIG)	N2O (PSIG)	Air (PSIG)	CO2 (PSIG)	N2 (PSIG)	Vacuum (inHg)	WAGD (inHg)
Min. Pressure:	50.0	50.0	50.0	50.0	160.0	12.0	12.0
Max. Pressure:	55.0	55.0	55.0	55.0	185.0	31.0	31.0

GAS FLOW - Gas is drawn from the outlet at an increasing rate until flow reaches the test value or pressure drops below the minimum value listed below. Flow and pressure are then recorded. A "*" indicates pressure above or below:

Gas:	O2 (PSIG)	N2O (PSIG)	AIR (PSIG)	CO2 (PSIG)	N2 (PSIG)
Min. Pressure:	40.0	40.0	40.0	40.0	150.0
Max. Pressure:	55.0	55.0	55.0	55.0	185.0
Test Flow:	100.0 LPM	100.0 LPM	100.0 LPM	100.0 LPM	140.0 LPM

PRESSURE DROP - Is static pressure minus the pressure measured at the flow listed in the 'FLOW RATE' column. A "?" indicates that the test was aborted before the flow reached the 'Test Flow' listed above. A "*" indicates a pressure drop greater than:

Gas:	O2 (PSIG)	N2O (PSIG)	AIR (PSIG)	CO2 (PSIG)	N2 (PSIG)
Max. drop:	15.0	15.0	15.0	15.0	15.0

VACUUM FLOW - (Performed with brass flow orifice adapter) - Maximum flow into the vacuum inlet and pressure drop in the analyzer are recorded. A "*" indicates flow was less than 85 LPM. Inlet should be tested with 3 SCFM (85 LPM) flow at an adjacent inlet.

VACUUM PRESSURE - (Performed with adapter without flow orifice) - Test result labeled ADJACENT INLET FLOW indicates that a STATIC PRESSURE test was performed on a vacuum station inlet while an adjacent station inlet on the same zone was flowing at 3 SCFM (85 LPM). A "*" indicates pressure was less than 12 inHg.

NOTE - Notes are entered by test personnel and reflect observations beyond the scope of the automatically performed tests. A "*" indicates an unacceptable condition.

STATUS - The outlet is:

'PASS' - If all test results and the NOTE are acceptable (not flagged with a "*")
'FAIL' - If any test result or NOTE is unacceptable (flagged with a "*")
'UNTESTED' - If the outlet was not tested and the NOTE is acceptable (i.e. 'Not Accessible')



Medical Gas Outlet Test Data

Cont	Pat.	Floor	Area	Room	Outlet	Expirant Gas	Gas Outlet Gas	Static Pressure	Flow Rate	Flow Pressure	Pressure Drop	Transient Flow	Gas Conc.	Note	Status	Timestamp
c	1	1	OSR1	1118	1	NE	NE	175.4 PSIG	146.8 LPM	166.7 PSIG	9.7 PSIG	176.1 LPM	0% O2		PASS	2020016 9:23
	2	1	OSR1	1118	2	CO2	CO2	56.6 PSIG	101.7 LPM	49.6 PSIG	2.0 PSIG	176.1 LPM	100% O2		PASS	2020016 9:24
	3	1	OSR1	1118	3	N2O	N2O	56.6 PSIG	104.1 LPM	48.1 PSIG	4.4 PSIG	177.8 LPM	100% N2O		PASS	2020016 9:25
	4	1	OSR1	1118	4	Air	Air	52.0 PSIG	104.1 LPM	50.3 PSIG	1.7 PSIG	177.8 LPM	22.3% O2		PASS	2020016 9:26
	5	1	OSR1	1118	5	CO2	CO2	52.0 PSIG	104.1 LPM	47.2 PSIG	4.8 PSIG	176.1 LPM	100% CO2		PASS	2020016 9:27
c	6	1	OSR1	1118	6	CO2	CO2	51.6 PSIG	102.8 LPM	49.6 PSIG	2.0 PSIG	176.1 LPM	100% CO2		PASS	2020016 9:28
	7	1	OSR1	1118	7	CO2	CO2	52.0 PSIG	103.7 LPM	47.3 PSIG	4.8 PSIG	176.1 LPM	100% CO2		PASS	2020016 9:29
	8	1	OSR1	1118	8	Air	Air	Unknown	146.8 LPM	166.7 PSIG	9.7 PSIG	176.1 LPM	0% O2		FAIL	2020016 9:41
	9	1	OSR1	1118	9	NE	NE	175.4 PSIG	146.8 LPM	166.7 PSIG	9.7 PSIG	176.1 LPM	0% O2		FAIL	2020016 9:42
	10	1	OSR1	1118	10	Air	Air	52.0 PSIG	102.8 LPM	50.3 PSIG	1.6 PSIG	176.1 LPM	22.3% O2		PASS	2020016 9:43
c	11	1	OSR1	1118	11	N2O	N2O	56.6 PSIG	104.1 LPM	48.1 PSIG	4.5 PSIG	172.1 LPM	100% N2O		PASS	2020016 9:44
	12	1	OSR1	1118	12	CO2	CO2	51.6 PSIG	104.1 LPM	49.6 PSIG	2.0 PSIG	172.1 LPM	100% CO2		PASS	2020016 9:45
	13	1	OSR1	1118	13	CO2	CO2	52.0 PSIG	104.1 LPM	47.2 PSIG	4.8 PSIG	176.1 LPM	96.4% CO2		PASS	2020016 9:46
	14	1	OSR1	1118	14	CO2	CO2	51.6 PSIG	101.5 LPM	49.7 PSIG	1.9 PSIG	176.1 LPM	100% CO2		PASS	2020016 9:49
	15	1	OSR1	1118	15	CO2	CO2	56.6 PSIG	101.5 LPM	48.2 PSIG	4.3 PSIG	176.1 LPM	100% N2O		PASS	2020016 9:50
c	16	1	OSR1	1118	16	N2O	N2O	55.5 PSIG	101.5 LPM	48.2 PSIG	4.3 PSIG	177.8 LPM	100% N2O		PASS	2020016 9:51
	17	1	OSR1	1118	17	Air	Air	52.2 PSIG	102.2 LPM	50.5 PSIG	1.7 PSIG	177.8 LPM	22% O2		PASS	2020016 9:53
	18	1	OSR1	1118	18	CO2	CO2	52.2 PSIG	104.4 LPM	47.4 PSIG	4.8 PSIG	177.8 LPM	100% CO2		PASS	2020016 9:55
	19	1	OSR1	1118	19	CO2	CO2	52.2 PSIG	104.4 LPM	49.6 PSIG	1.8 PSIG	178.7 LPM	100% CO2		PASS	2020016 9:56
	20	1	OSR1	1118	20	N2O	N2O	51.7 PSIG	100.1 LPM	48.4 PSIG	4.1 PSIG	178.7 LPM	100% N2O		PASS	2020016 9:57
c	21	1	OSR1	1118	21	NE	NE	175.4 PSIG	146.8 LPM	166.7 PSIG	9.7 PSIG	178.7 LPM	0% O2		PASS	2020016 9:58
	22	1	OSR1	1118	22	CO2	CO2	51.5 PSIG	103.1 LPM	49.6 PSIG	2.0 PSIG	178.7 LPM	100% CO2		PASS	2020016 11:05
	23	1	OSR1	1118	23	N2O	N2O	56.3 PSIG	104.1 LPM	48.5 PSIG	4.5 PSIG	171.9 LPM	80.5% N2O		PASS	2020016 11:06
	24	1	OSR1	1118	24	Air	Air	51.9 PSIG	102.8 LPM	50.4 PSIG	1.4 PSIG	171.9 LPM	22.3% O2		PASS	2020016 11:07
	25	1	OSR1	1118	25	CO2	CO2	Unknown	104.8 LPM	47.1 PSIG	4.8 PSIG	172.3 LPM	86.7% CO2		FAIL	2020016 11:08
c	26	1	OSR1	1118	26	CO2	CO2	51.9 PSIG	104.8 LPM	49.5 PSIG	2.1 PSIG	172.3 LPM	100% CO2		PASS	2020016 11:09
	27	1	OSR1	1118	27	CO2	CO2	51.6 PSIG	104.8 LPM	48.0 PSIG	4.4 PSIG	175.7 LPM	100% CO2		PASS	2020016 11:11
	28	1	OSR1	1118	28	N2O	N2O	55.4 PSIG	101.9 LPM	50.5 PSIG	1.7 PSIG	175.7 LPM	99.4% N2O		PASS	2020016 11:14
	29	1	OSR1	1118	29	Air	Air	52.2 PSIG	101.9 LPM	50.5 PSIG	1.7 PSIG	175.7 LPM	22.3% O2		PASS	2020016 11:15
	30	1	OSR1	1118	30	CO2	CO2	51.9 PSIG	102.2 LPM	47.3 PSIG	4.6 PSIG	175.7 LPM	100% CO2		PASS	2020016 11:16
c	31	1	OSR1	1118	31	N2O	N2O	56.4 PSIG	101.3 LPM	48.3 PSIG	4.1 PSIG	174.9 LPM	100% N2O		PASS	2020016 11:17
	32	1	OSR1	1118	32	Air	Air	52.6 PSIG	100.8 LPM	50.8 PSIG	1.8 PSIG	174.9 LPM	21.3% O2		PASS	2020016 11:18
	33	1	OSR1	1118	33	WAGO	WAGO	17.8 HgHg	90.9 LPM	3.3 HgHg	1.8 PSIG	174.9 LPM	100% CO2		PASS	2020016 11:21
	34	1	OSR1	1118	34	CO2	CO2	52.0 PSIG	102.8 LPM	47.3 PSIG	4.7 PSIG	175.1 LPM	100% CO2		PASS	2020016 11:21
	35	1	OSR1	1118	35	Air	Air	52.5 PSIG	102.4 LPM	50.7 PSIG	1.9 PSIG	175.1 LPM	21.4% O2		PASS	2020016 11:23
c	36	1	OSR1	1118	36	N2O	N2O	56.3 PSIG	102.4 LPM	48.2 PSIG	4.1 PSIG	175.1 LPM	100% N2O		PASS	2020016 11:24
	37	1	OSR1	1118	37	N2O	N2O	56.6 HgHg	98.4 LPM	3.8 HgHg	4.1 PSIG	175.7 LPM	100% CO2		PASS	2020016 11:25
	38	1	OSR1	1118	38	CO2	CO2	51.5 PSIG	104.8 LPM	48.5 PSIG	2.1 PSIG	175.7 LPM	100% CO2		PASS	2020016 11:26
	39	1	OSR1	1118	39	CO2	CO2	51.9 PSIG	101.7 LPM	47.4 PSIG	4.5 PSIG	175.7 LPM	100% CO2		PASS	2020016 11:28
	40	1	OSR1	1118	40	NE	NE	174.9 PSIG	141.2 LPM	166.8 PSIG	8.3 PSIG	178.3 LPM	0% O2		PASS	2020016 11:30
c	41	1	OSR1	1118	41	CO2	CO2	51.6 PSIG	102.4 LPM	49.7 PSIG	1.9 PSIG	178.3 LPM	100% CO2		PASS	2020016 11:32
	42	1	OSR1	1118	42	N2O	N2O	55.4 PSIG	101.5 LPM	48.1 PSIG	4.2 PSIG	178.3 LPM	92.7% N2O		PASS	2020016 11:34
	43	1	OSR1	1118	43	N2O	N2O	56.6 PSIG	101.5 LPM	48.3 PSIG	4.3 PSIG	178.3 LPM	92.6% N2O		PASS	2020016 11:36
	44	1	OSR1	1118	44	N2O	N2O	56.6 PSIG	104.4 LPM	48.2 PSIG	4.4 PSIG	178.3 LPM	100% N2O		PASS	2020016 11:54
	45	1	OSR1	1118	45	CO2	CO2	52.0 PSIG	103.8 LPM	47.3 PSIG	4.7 PSIG	178.3 LPM	100% CO2		PASS	2020016 11:55
c	46	1	OSR1	1118	46	CO2	CO2	52.0 PSIG	102.8 LPM	47.3 PSIG	4.7 PSIG	178.3 LPM	100% CO2		PASS	2020016 11:57
	47	1	OSR1	1118	47	Air	Air	52.2 PSIG	102.8 LPM	50.2 PSIG	2.0 PSIG	175.9 LPM	21.9% O2		PASS	2020016 11:58
	48	1	OSR1	1118	48	N2O	N2O	56.5 PSIG	102.4 LPM	48.5 PSIG	2.0 PSIG	175.9 LPM	100% N2O		PASS	2020016 11:59
	49	1	OSR1	1118	49	CO2	CO2	52.0 PSIG	104.1 LPM	47.6 PSIG	4.4 PSIG	175.9 LPM	100% CO2		PASS	2020016 12:00
	50	1	OSR1	1118	50	Air	Air	52.8 PSIG	104.1 LPM	51.1 PSIG	1.7 PSIG	178.4 LPM	21.8% O2		PASS	2020016 12:02
c	51	1	OSR1	1118	51	NE	NE	175.1 PSIG	142.1 LPM	165.3 PSIG	9.8 PSIG	178.4 LPM	0% O2		PASS	2020016 12:04
	52	1	OSR1	1118	52	N2O	N2O	56.5 PSIG	102.8 LPM	48.1 PSIG	4.4 PSIG	178.4 LPM	100% N2O		PASS	2020016 12:06
	53	1	OSR1	1118	53	Air	Air	52.7 PSIG	101.9 LPM	50.8 PSIG	2.0 PSIG	172.6 LPM	22.3% O2		PASS	2020016 12:07
	54	1	OSR1	1118	54	NE	NE	175.2 PSIG	144.8 LPM	164.8 PSIG	10.4 PSIG	172.6 LPM	0% O2		PASS	2020016 12:08

Cmt	Ref.	Floor	Area	Room	Outlet	Expected Gas	Detected Gas	Static Pressure	Flow Rate	Flow Pressure	Pressure Drop	Transient Flow	Gas Conc.	Note	Status	Timestamp
	55	1	OESR	1118	55	VAC	VAC	18.4 inHg	Adjustment Inlet Flow						PASS	20200516 12:14
	56	1	OESR	1118	56	VACD	VACD	20.2 inHg	Adjustment Inlet Flow						PASS	20200516 12:17

Medical Gas Outlet Comment Report

File Name Hodor.pdf	Download Date Thu May 26 14:18:33 EDT 2016	Facility NST
Comments for file: Hodor.csv		
Reference No.	Comment	
8	Gas Hose Loose	
9	Electronic Malfunction	
49	Missing security sticker	
53	Dirty Outlet	



Medical Gas Outlet Summary Report

File Name
Hodor.pdf

Download Date
Thu May 26 14:18:33 EDT 2016

Facility
NST

Filter: (Display All)

	Detected Gas	Static Pressure	Flow	Pressure Drop	Transient Flow	Note	Status
PASS		53	56	53	49	20	53
FAIL *		3	0	0	0	0	3
UNTESTED-		0	0	3	7	36	0
Filtered total							56

	Detected Gas	Static Pressure	Flow	Pressure Drop	Transient Flow	Note	Status
PASS	94.64%	100.00%	100.00%	94.64%	87.50%	35.71%	94.64%
FAIL *	5.36%	0.00%	0.00%	0.00%	0.00%	0.00%	5.36%
UNTESTED-	0.00%	0.00%	0.00%	5.36%	12.50%	64.29%	0.00%
Filtered Total							100.00%

Appendix B: Suggested Room Abbreviations

Title	Abbreviation
Administrative Offices	ADMIN
Animal Laboratory	ANIM
Audiology	AUD
Autopsy and Morgue	AUT
Blood Bank	BBNK
Blood Gas Lab	BGAS
Cardiac Cath Lab	CATH
Cast Room	CAST
Central Supply	CEN
Chemistry	CHEM
Chemistry, Automated	CHEMA
Clinic	CLIN
Clinic, Dental	CDEN
Clinic, Ear, Nose, & Throat	CENT
Clinic, Endoscopy	CEND
Clinic, Eye	CEYE
Clinic, Medicine	CMED
Clinic, Pediatric	CPED
Clinic, Surgery	CSRU
Clinic, Urology	CURO
Clinical Laboratory	CL
Clinical Laboratory, Cyst	CLCYS
Clinical Laboratory, Hemo	CLHEM
Clinical Laboratory, Micro	CIMIC
Clinical Laboratory, Sero	CLSER
Clinical Laboratory, Urin	CLURI
Clinical Laboratory, Viro	CLVIR
Coronary Care Unit	CCU
Coronary Care Unit, Progressive	CCUP
Cystoscopy	CYS
Dark room	DKRM
Delivery Room	DELR
Delivery Suite	DELS
Dialysis Unit, In-Patient	DIALI
Dialysis Unit, Out-Patient	DIALO
Dietary	DIE
Electrocardiography	ECG

Title	Abbreviation
Electroencephalography	EEG
Electromicroscopy	EMIC
Electromyography	EMG
Emergency Care Facility	ECF
Emergency Room	ER
Emergency Vehicle	EV
Examination Room	EXAM
Fluorescent Microscopy	FMIC
Fluoroscopy	FLO
Fracture Room	FRAC
General Office Area	GO
Heart Station	HS
Histology	HISTO
Housekeeping	HK
Immunology	IMM
Industrial Medical Facility	IMF
Intensive Care Unit, Burn	ICUB
Intensive Care Unit, General	ICUG
Intensive Care Unit, Infant	ICUI
Intensive Care Unit, Medical	ICUM
Intensive Care Unit, Neo	ICUNN
Intensive Care Unit, Neur	ICUN
Intensive Care Unit, Pediatric	ICUP
Intensive Care Unit, Progressive	ICUPRG
Intensive Care Unit, Respiratory	ICUR
Intensive Care Unit, Surgical	ICUS
Labor Room	LABOR
Laundry	LAU
Library	LIB
Medical Records	MEDR
Multiphasic Screening	MULTI
Nuclear Medicine	NUC
Nursery	NUR
Nursery, Intensive Care	NURI
Nursery, Premature	NURP
Nurses Station	NS
Occupational Therapy	OCC

Title	Abbreviation
Operating Room	OR
Operating Suite	OS
Out-Patient Department	OUTP
Pathology	PATH
Patient Room, Isolation	PRI
Patient Room, Pediatric	PRP
Patient Room, Private	PRPR
Patient Room, Semi-Private	PRSP
Patient Room, Ward	PRW
Pharmacy	PHAR
Physical Therapy	PT
Plant Support Area	PLANT
Post-Anesthesia Recovery	PAR
Psychiatric Unit	PSY
Pulmonary Function Lab	PULF
Radio-Isotope	RISO
Radiology Suite	RAD
Recovery Room	RR
Research Lab	RLAB
Respiratory Therapy	RT
Special Studies Room	SSR
Speech and Hearing Lab	SPECH
Student Laboratory	STU
Treatment Room	TRE

Appendix C: Troubleshooting

Analyzer will not initiate tests

Check the following:

- The Android device is connected to the interface via bluetooth.
 - If the interface is connected to the Android device but is unresponsive, it is sometimes helpful to use the RESET ANALYZER function. This function can be found in the ANALYZER COMMANDS section of MedGas Commander™ main menu.
- Make sure that the adapter that you are using has a good connection to the hose and the hose to the interface.
 - If you have access to a multi-meter, take a continuity test between the two brass rings of the hose and then the two inner brass couplers inside of the hose. If these connections are broken then the analyzer will not be able to detect the gas outlet adapter and not be able to initiate testing. You will need to contact NST to have the hose repaired.
- The analyzer has warmed up properly and has given the sixth and final beep.
 - The analyzer will not test until it has warmed up properly. This process can take upwards of 5-8 minutes depending upon environmental conditions.

Analyzer gas concentrations are drifting

Initiate either a nitrogen test or a Zero Analyzer command. Instructions on how to perform a Zero Analyzer command can be found on page 13 of this document.

Most analyzer testing issues can be solved by doing a nitrogen test or by performing the Zero Analyzer command.

Android Device Troubleshooting

Please consult the Android device's manual if you are having issues. NST can only provide Android device technical support in regards to how it applies to the operation of the G4000 Medical Gas Outlet Analyzer

Bluetooth Connectivity Issues

The analyzer is configured to save as much power as possible, as a result of this the analyzer disconnects from the Android tablet when the tablet goes to screen saver mode. If having to reconnect every time the tablet is woken from sleep is bothersome, change the display settings in the tablet menu from the recommended 5 minutes of inactivity before the screen turns off to a longer interval.

If the tablet regularly disconnects from the analyzer while in normal use:

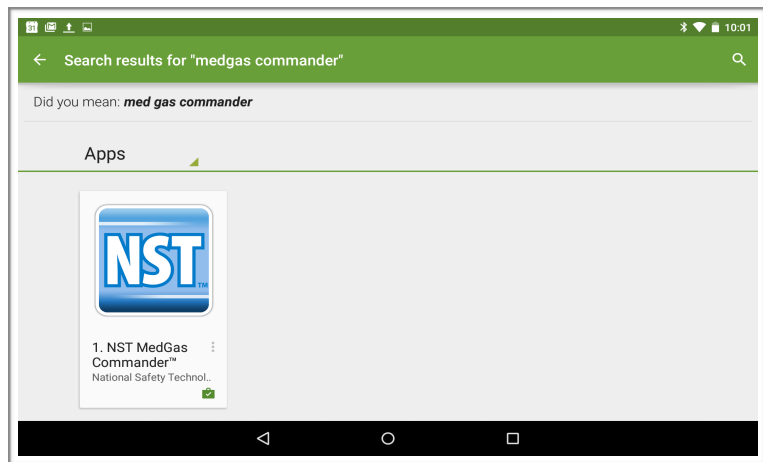
- Save your testing work in the NST MedCommander™ Application, shut down all Android applications running in the background and reboot the tablet.
- Turn off the G4000 interface and wait for a minute. Turn it back on.
- Reconnect the analyzer to the tablet via the MedGas Commander™ App and resume testing.

MedGas Commander™

Recovery

The Android device provided with your G4000 Medical Gas Outlet Analyzer will come preloaded with all the applications that you will need to do your testing. If you have an issue with the MedGas Commander™ app, you can always download the latest copy in the Google Play store.

Simply search for MedGas Commander in the search field of the Google Play store and then download the application to your device.



Returning an analyzer to NST

Please Note: Analyzers suspected of having a problem should be returned to NST only after discussing the issue with an NST technician. Some problems can easily be solved over the telephone or with a visit to our webpage at www.nst-usa.com.

- Place the G4000 interface and all of it's accessories in it's carrying case. Pack that case in shipping container that is of adequate size.
- Please include a brief written description of what the issue that is occurring to the machine.
- Please include the contact information of the person to speak with regarding the issues with the analyzer.

Ship the analyzer to:

996 Old Eagle School Road, STE 1118
Wayne, PA 19087
Ph# 1-800-678-7074
Fx# 1-800-678-9594

Appendix D: Notes



996 Old Eagle School Road - Suite 1118 • Wayne, Pennsylvania 19087 • U.S.A.
Phone: 1.800.678.7072 • Email: sales@nst-usa.com • www.NST-USA.com

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