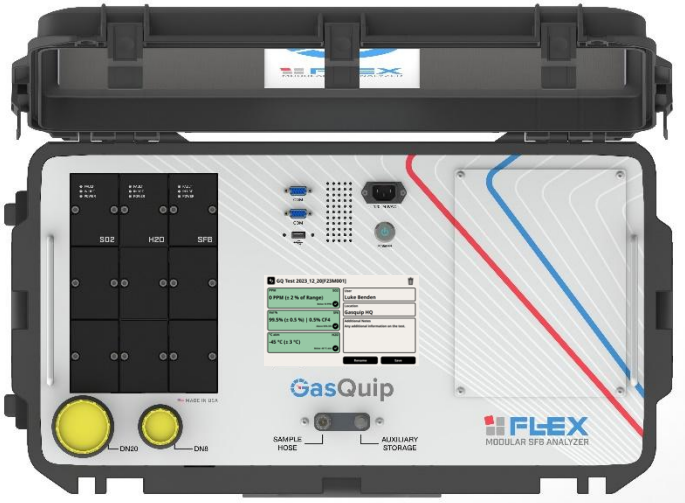
GasQuip

FLEX

MODULAR SF6 ANALYZER



Operation Manual

Version 1.3.4

Contents

Personnel Safety:

- Only trained personnel should operate the FLEX SF6 Analyzer.
- Wear the recommended personal protective equipment (PPE).
- Avoid exposure to SF6 gas and its decomposition products.

Analyzer Safety:

- Inspect the analyzer for damage before use.
- Follow power supply guidelines and use approved sources.
- Do not modify the internal components.
- Protect the analyzer from moisture, heat, and corrosive substances.

Gas Handling Safety:

- Follow regulations for SF6 gas handling, storage, and disposal.
- Use proper gas handling equipment designed for SF6 gas.
- Ensure proper sealing and prevent leaks during gas connections.

Electrical Safety

- Ensure all electrical components are adequately insulated and grounded to prevent shocks and electrical hazards.
- Verify that the analyzer's usage aligns with its specified electrical ratings (voltage, current, frequency) and that all components, like fuses and connectors, are compatible.

Prioritize safety, comply with regulations, and seek assistance from GasQuip support if needed.

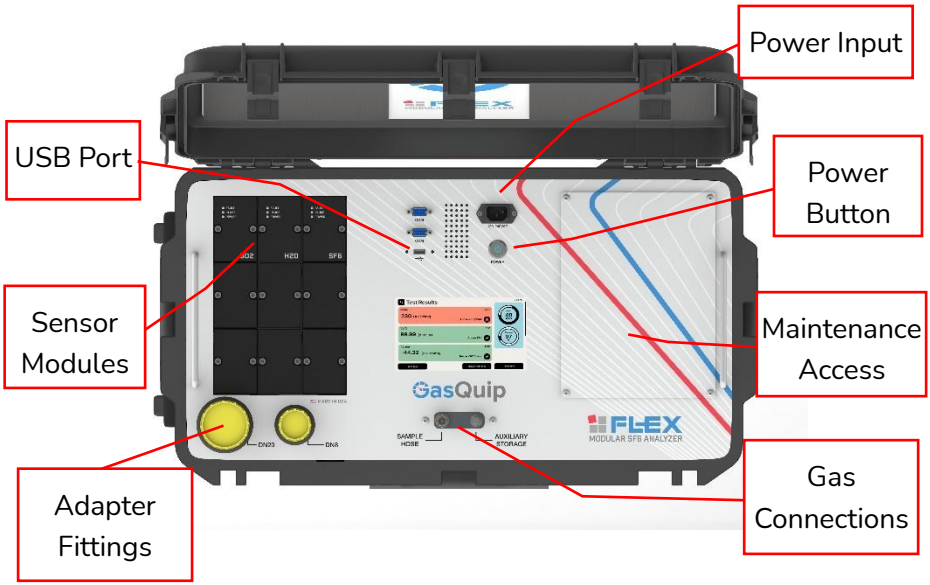
General Tips:

- Maximum pump back pressure is 145 PSIG (10 BarG)
- Inlet pressure range is 5-500 PSIG (0.4 – 34.5 BarG)
- At pressures above 145 PSIG, a regulator is suggested for ease of connecting & disconnecting analyzer quick connect couplings, as well as reducing the likelihood of SF6 emissions.
- It is not possible to pump back through a regulator.
- If more than 2-3 samples are needed from a single vessel, use a gas recovery bag.
- Do not perform additional tests after pumping samples back into the gas compartment. It will increase the moisture readings for subsequent tests. Wait at least 24 hours before retesting for moisture to re-homogenize.

Additional Testing Tips:

- Do not use Loctite/liquid thread sealant on any fittings used for sampling SF6. Chemical off-gassing can foul test equipment.
- Always test SF6 cylinders upright and sample the vapor space on top.
- It is normal for moisture values to decrease on cylinders when performing multiple tests in a row. This is caused by the cooling of the gas during vaporization and very dry gas entering the vapor space.

1. Use provided power cord and plug FLEX into power outlet (100-120 VAC / 200-240 VAC at 50 to 60 Hz).
2. Power on by pressing the power button located above the display. A backlight will illuminate on the power button to indicate the device is on.
3. The bootup screen will display and will automatically take you to the Home Screen once it is finished.



Standard Equipment

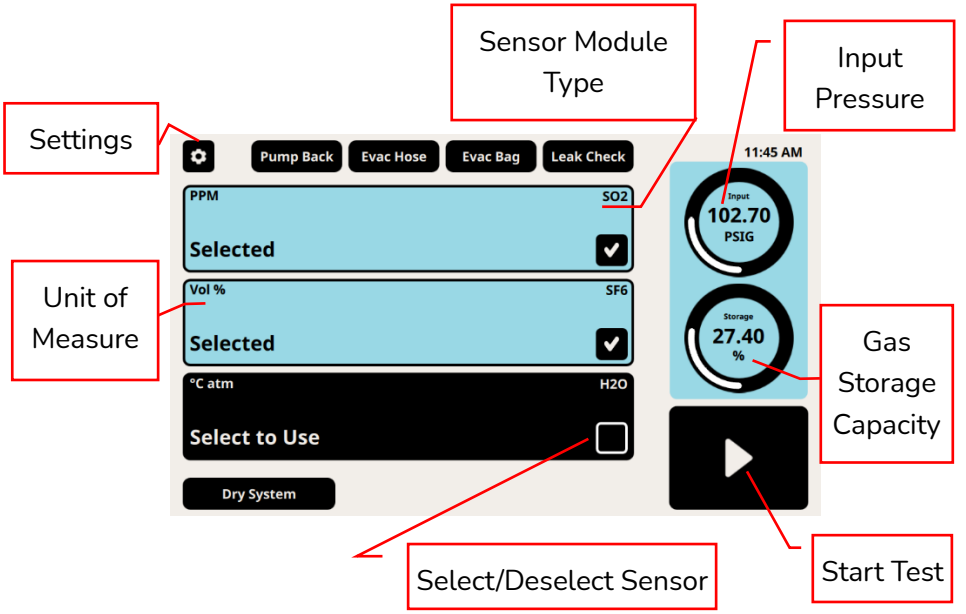
Torque Wrench

Power Cord

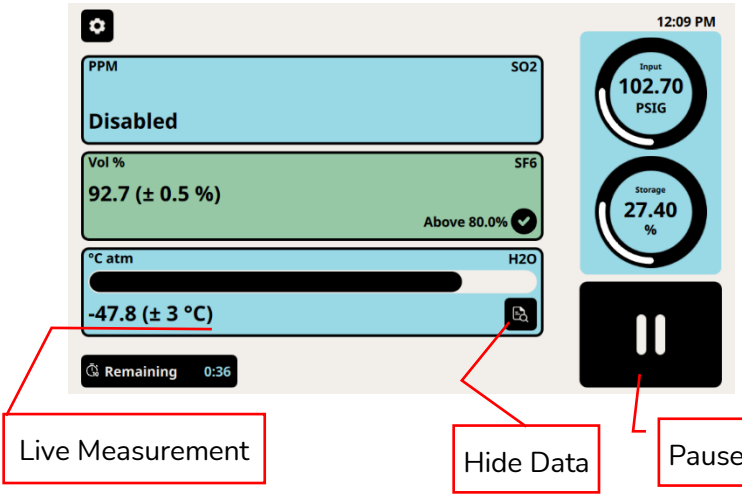
Sample Hose

USB Drive

User Interface Overview



(While Test is Running)



Leak Check

When to Use:

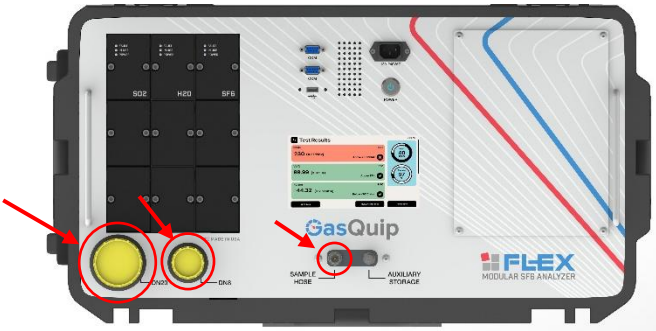
A. Prior to the first test of the day
B. As the first step for troubleshooting bad sensor readings

What Occurs:

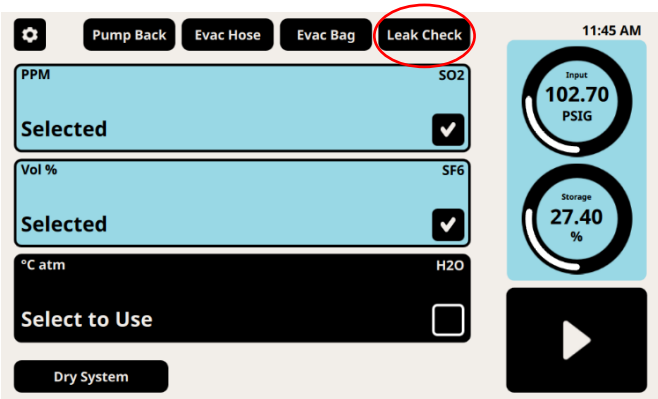
A vacuum is pulled on all the major components, and the pressure is monitored to ensure it does not rise.

Steps:

1. Connect the sampling hose to the FLEX and connect either the DN8 or DN20 adapter fitting to the opposite end of the sample hose.



2. Press the **"Leak Check"** button.



Dry System

When to Use:

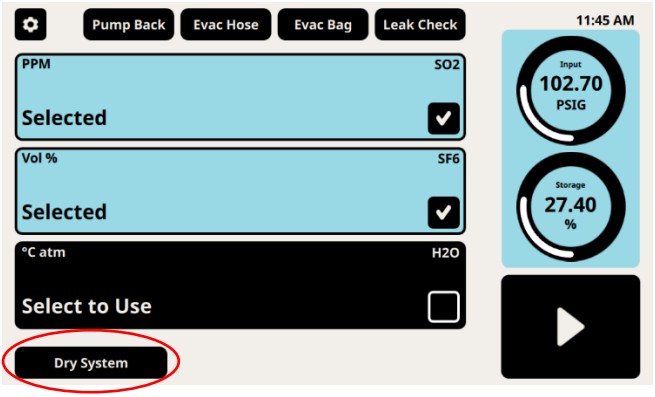
A. After exposure to high humidity levels and/or long-term storage.

What Occurs:

Internal plumbing, modules, and any connected hoses are evacuated. H2O sensor is heated to aid in evaporation of surface moisture.

Steps:

1. Press the **"Dry System"** button.



Evacuate the Sampling Hose

When to Use:

A. *After exposure to high humidity levels*
B. *Prior to the first test of the day*
C. *Remove contaminants such as arc byproducts*

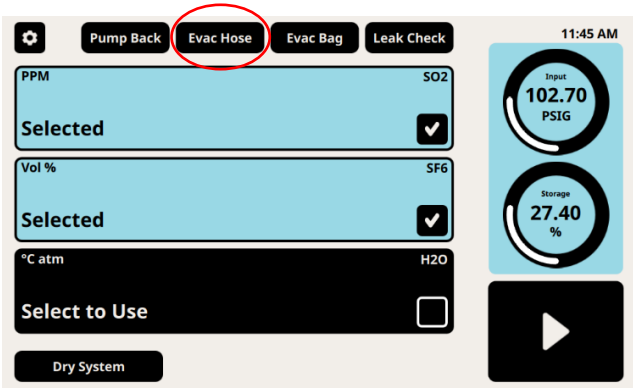
What Occurs:

Evacuation of the sample hose with the vacuum pump and leak check of the hose.

Steps:

1. Connect the sampling hose to the FLEX and connect either the DN8 or DN20 adapter fitting to the opposite end of the sample hose.

2. Press the **"Evac Hose"** button.



Evac Bag

When to Use:

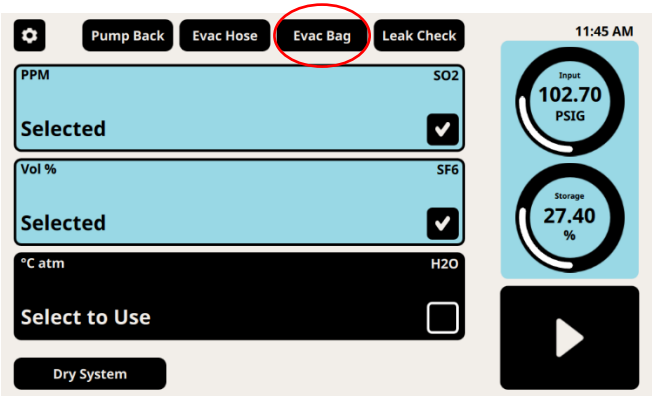
1. *If it is appropriate to empty stored gas to atmosphere*
2. *If purging the device with nitrogen*

What Occurs:

Evacuation of the internal storage bag to atmosphere (if auxiliary storage is connected, it will be evacuated too).

Steps:

1. Press the **"Evac Bag"** button

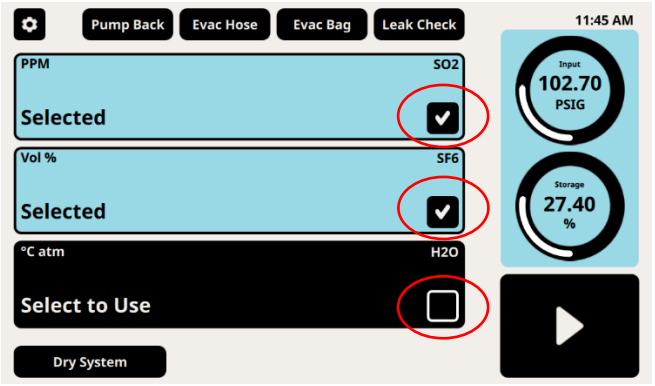


***Note** – The gas that is evacuated will be released through the vent holes between the power button and the USB port on the top plate.*

Test a Sample

Steps:

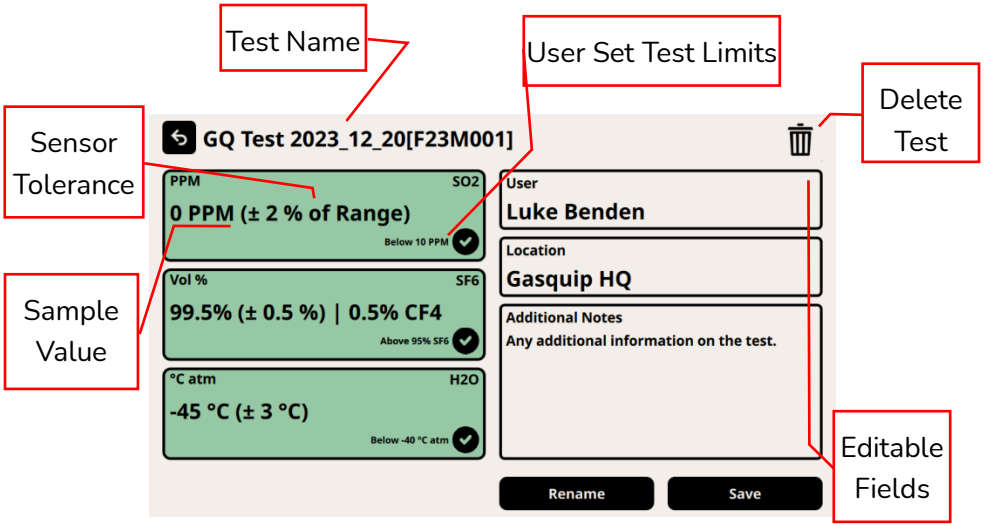
1. Connect the sample hose to the **“SAMPLE HOSE”** port.
2. Press **“Evac Hose”** if this function has not been run yet.
3. Connect the sample hose to the gas compartment using the correct adapter fitting.
4. **Input** pressure must be between 5-145 PSIG.
5. Ensure the desired sensor modules are selected for testing.



6. Press the play button to begin the test. If you need to stop the test for any reason, it is safe to press the pause button to cancel the test. If you would like to automatically pump back at the end of the test, toggle the **“Enable Auto Pump Back”** button.

***Note** – When testing H2O, the first test in a 24hr period will take longer than all subsequent tests.*

7. Upon completion, Test Results will show.



8. Upon completion of any options from step 7, the device will prompt the user to either pump back or not and then return to Main Screen.

***Note** – Pumping gas back into the gas compartment will increase the moisture readings for subsequent tests on the same gas compartment.*

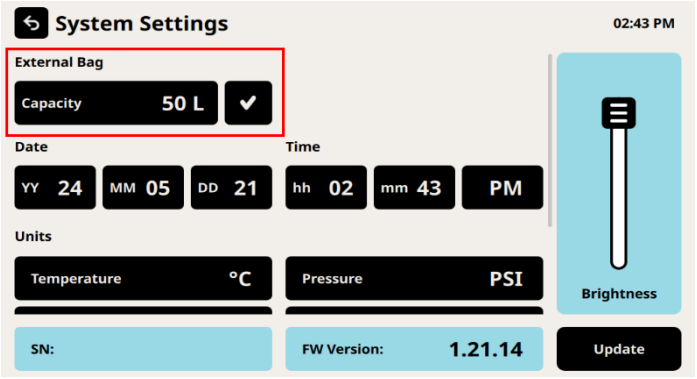
Using an External Bag

When to Use:

1. *To store more gas than internal storage*
2. *If gas cannot be pumped back to gas compartment*

Steps:

1. In System Settings, press the check mark to enable **External Bag** function.
2. Set the Capacity of the bag (default set to GasQuip Gas Recovery Bag size).



3. Connect the hose from the external storage bag to the port labeled **"AUXILLARY STORAGE"**

4. Use the analyzer as normal. The storage % readout will adjust to the new overall capacity, which is estimated using total storage volume and average amount of gas used for a test.
5. The auxiliary storage and internal storage are physically connected in series once the auxiliary hose is connected. If a pump back or evac bag function is run, it will evacuate the auxiliary storage bag also.

***Note** – If trying to use multiple Auxiliary Storage bags in succession with the same analyzer, add the capacity of all Auxiliary Storage bags together (see step 2).*

Pump Back

When to Use:

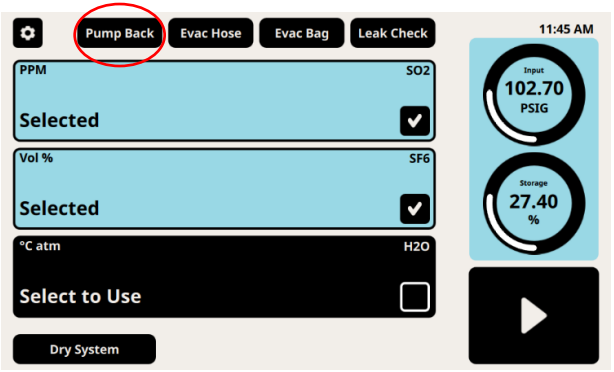
1. *To return internally stored gas to a gas compartment*

What Occurs:

Stored gas from the internal gas storage and auxiliary storage is pumped back out through the sample hose. The internal gas storage bag and auxiliary storage are pulled down to vacuum pressure.

Steps:

1. Ensure the sample hose is connected to either a gas compartment or storage container that is less than 145 PSI (shown as **Input** pressure on home screen)
2. Press the **"Pump Back"** button and follow the directions on the screen.



***Note** – Pump Back function will not work when using regulators or non-return gas fittings.*

Auto Pump Back

When to Use:

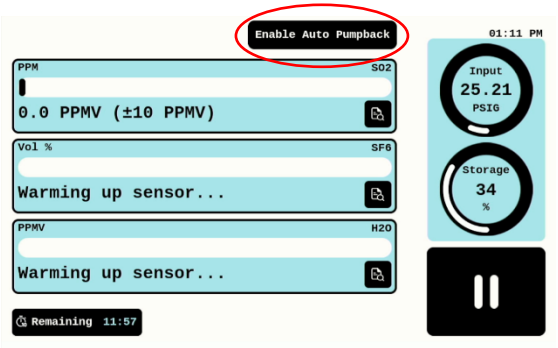
1. *To return internally stored gas to a gas compartment automatically after a test.*

What Occurs:

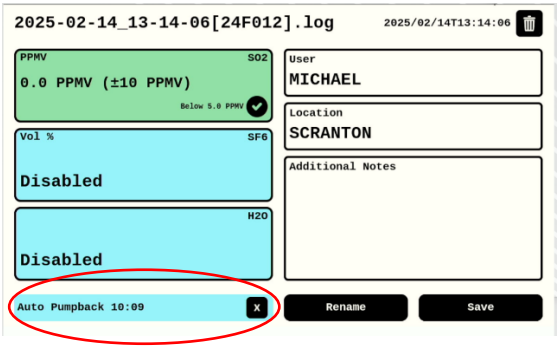
Stored gas from the internal storage and auxiliary storage is automatically pumped back out through the sample hose at the end of a test. The internal gas storage bag and auxiliary storage are pulled down to vacuum pressure.

Steps

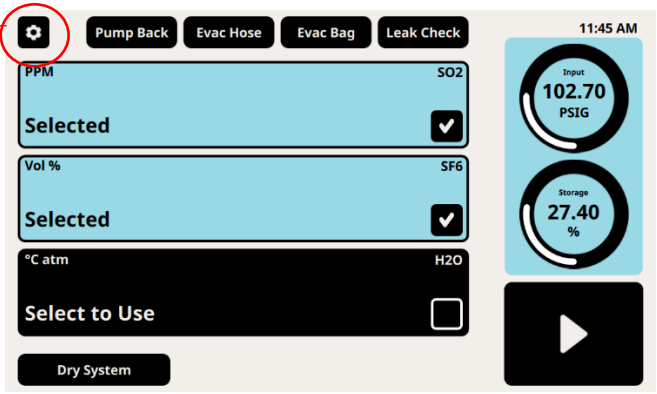
1. While the test is running, press the **"Enable Auto Pumpback"**

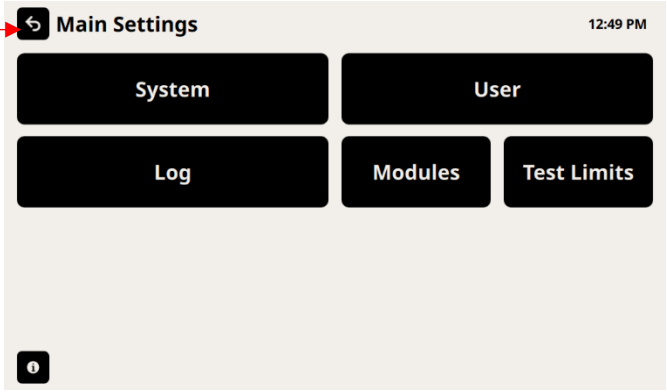


2. Once the test is complete, the status of the **Auto Pump Back** will show in the bottom left corner of the results screen.

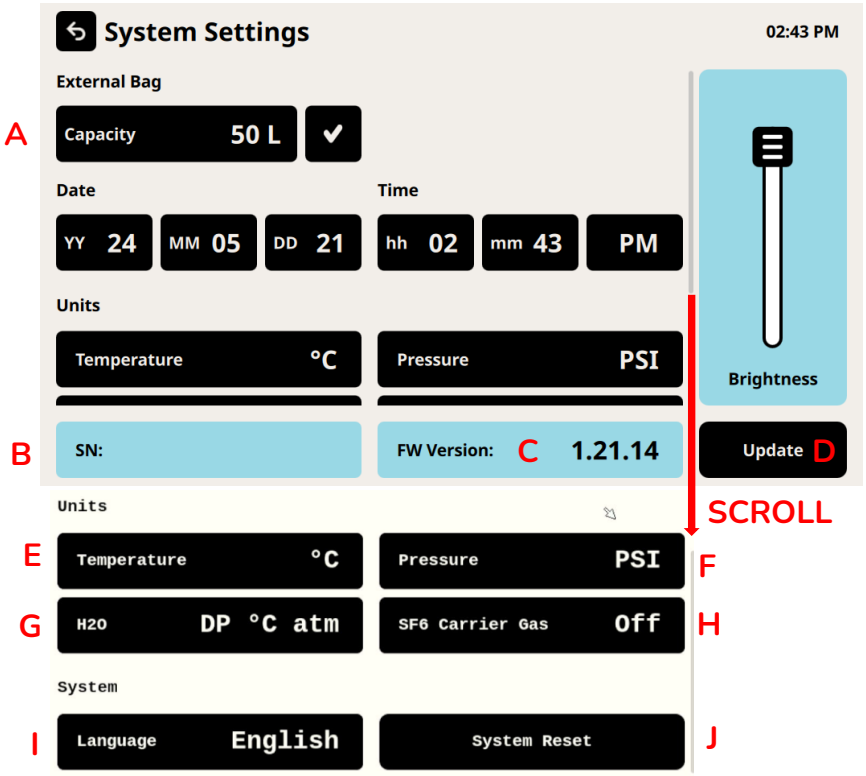


Press the **Settings** icon to access the Main Settings





System Settings



A. Enable External Bag & Set Capacity

B. Serial Number for FLEX

C. Firmware Version for FLEX

D. Update Firmware

E. Ambient Air Temperature Units

F. Inlet Pressure Units

G. Moisture Display Units

H. Carrier Gas Selection (For SF6 Mixtures)

I. Language Selection

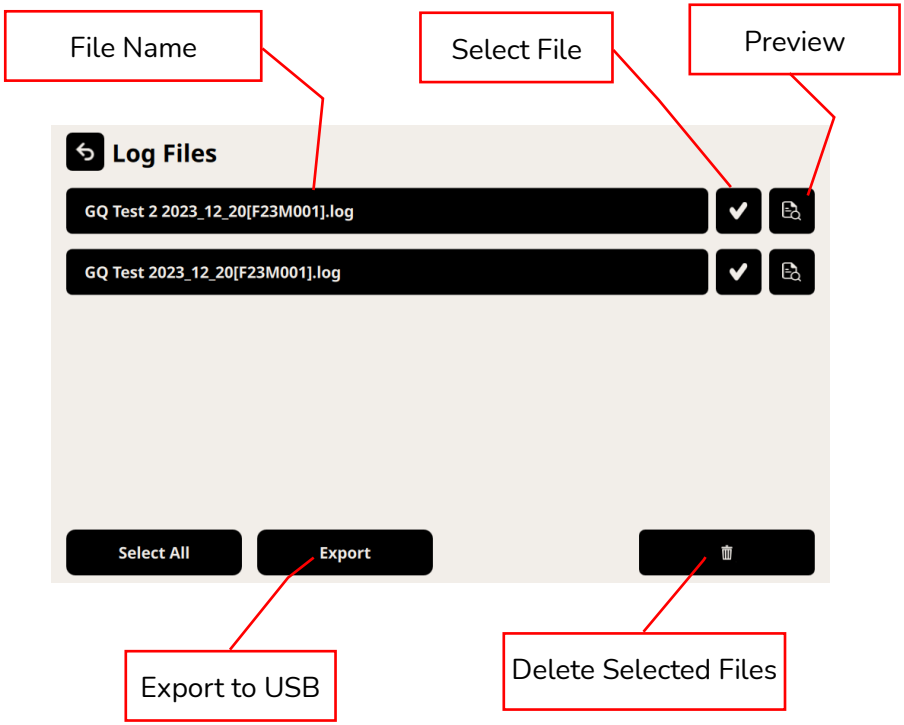
J. System Reset (Delete all Logs, Settings and Errors)

Module Settings

A. Selected sensor module

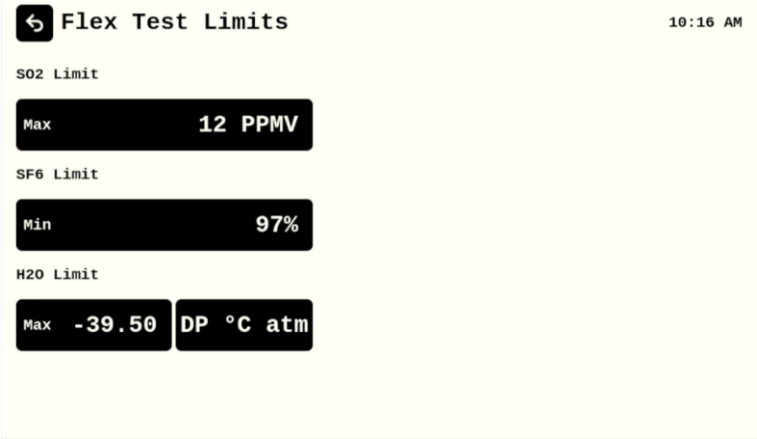
***Note** - Information is stored on each module and automatically populates into the module settings.

Log Files

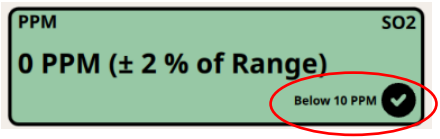


From this screen you can examine, export, and delete logged test files. If exporting a log file, plug in the provided USB drive into the FLEX (it will take up to 30 seconds to recognize the USB). The exported files will be .txt files.

Test Limits

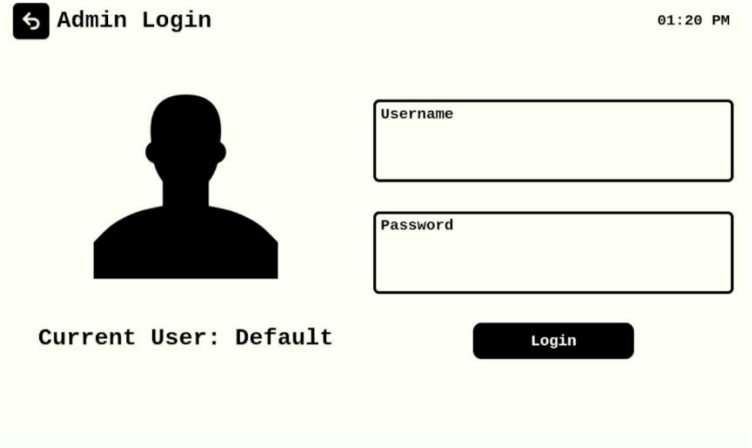


Each test parameter can have a “Test Limit” set by the user that will indicate either a pass or fail result in the results page of a test. These numbers could be specific to company standards, industry standards, or unique to any situation. This is meant to be a reference for the user and does not affect any of the resulting values.



For example, the above test result turned green with a check mark because the measured value of 0 PPM was below the 10 PPM Test Limit. If the test fails the Test Limit, the box will turn red, and an “X” will appear at the bottom. H2O & SO2 test limits are “Max Values” because they are contaminants. SF6 is a “Min” value because it is a purity measurement.

User



User login settings provide tiered access to unit information and operational controls. GasQuip utilizes admin access for troubleshooting and support, while the **'Default'** setting is recommended for standard operation.

Calibration Intervals

H20 Sensor Module	1 Year
SF6 Sensor Module	2 Years
SO2 Sensor Module	1 Year
Pressure Module	At Customer's Discretion

Order Modules Online ->

https://gasquip.com/product/flex-sensor-modules/

Module Installation

Step 1

Unscrew both bolts.

Step 2

Lift module out by bolts.

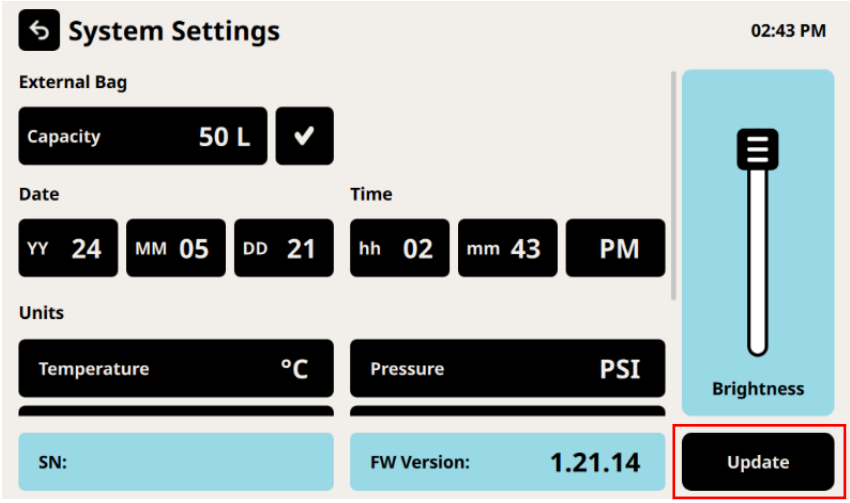
Step 3

Push new module into slot, tighten until click.

Steps:

1. Copy the updated software file to the provided USB drive.
2. Plug the USB drive into the FLEX.
3. Go to Settings → System Settings → Update.
4. Once USB is detected (takes 15-30 seconds), press “Update.”

Depending on the size of the update, the process will take 1-30 minutes. Do not turn the device off while the update is underway. Once the update is complete, turn off the FLEX, wait a few seconds, and turn it back on.



General

Dimensions	27.4 × 15.1 × 11.8"
Weight	50 lbs
Inlet Pressure	5-500 PSIG
Touch Panel Size	7” Sunlight Readable
Sampling Time	~ 4-12 Minutes
Power Supply	120 / 240 V
Data Export	USB Port
Warranty	Standard 12 Months

Sensor Modules

	H2O	**SF6**	**SO2**
Sensor Type	Heated Capacitive Polymer	Infrared	Electrochemical
Accuracy	± 2 °C	± 0.5 %	± 2 %
Calibration Interval	1 Year	2 Years	1 Year
Units	°C atm, °F atm, PPMw, PPMv	% SF6	PPMv

Standard Equipment

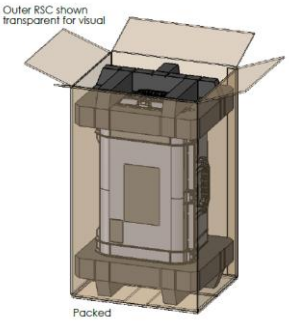
15' Sample Hose	GQ-FLEX-SH
DN8 Adapter Fitting	MQD-DN8F
DN20 Adapter Fitting	MQD-DN20F
Power Cord for FLEX	GQ-FLEX-PC
USB Drive	GQ-FLEX-USB
Operating Manual	GQ-FLEX-MANUAL

Accessories

SF6 Sensor Module for FLEX	GQ-FLEX-MOD-SF6
H2O Sensor Module for FLEX	GQ-FLEX-MOD-H2O
SO2 Sensor Module for FLEX	GQ-FLEX-MOD-SO2
O2 Sensor Module for FLEX	GQ-FLEX-MOD-O2
Empty Sensor Module for FLEX	GQ-FLEX-MOD-EMPTY
Analyzer Verification Gas Kit	GQ-CAL-GAS-ANLZR
Gas Recovery Bag	GQ-GRB
SF6 Analyzer Adapter Kit	GQ-ANLZR-AKIT
Protective Shipping Box	GQ-FLEX-PSB

Packaging:

- Before transportation, ensure that the analyzer is properly packaged in a protective box with custom foam inserts.
- Secure all components and accessories to prevent movement or damage during transit.
- If necessary, use additional padding or cushioning materials to protect the analyzer from impacts or vibration.



Handling:

- Always handle the analyzer with care and avoid dropping or mishandling it.
- Do not place heavy objects on top of the analyzer during transport.

Unpacking and Inspection:

- Upon reaching the destination, carefully unpack the analyzer and inspect it for any signs of damage that may have occurred during transport.
- In the event of any visible damage or operational issues, contact GasQuip support for further assistance.

General Troubleshooting:

- Turn off the device, unplug, wait 10 seconds, and turn the device back on.
- Ensure the latest firmware is running by contacting GasQuip.
- Perform a system reset in main settings (save any log data first).

Screen Doesn't Turn On

- Turn off, wait 15 seconds, and turn on again
- Ensure provided power cord is plugged directly into the wall

H2O Sensor Reading Higher than Expected:

- Ensure that the couplings and test hoses in use are thoroughly wiped down with a lint free cloth to remove any lingering moisture.
- Ensure the sensor module screws are tightened down using the torque wrench provided.
- Verify that no rubber components are present in the testing equipment, such as regulator diaphragms or testing hoses.
- Apply pressure to the inlet hose and employ a leak detector to inspect for any potential leaks. Leaks can lead to elevated moisture readings.
- Execute the **"Dry System"** function on the analyzer, followed by conducting supplementary tests.
- Regulate and attach a Nitrogen bottle to the analyzer's inlet. Run a series of tests to desiccate the internal contents of the device. Reconnect to the previous gas source and perform a test.

SF6 Purity Reading Lower than Expected:

- Apply pressure to the inlet hose and employ a leak detector to inspect for any potential leaks.
- Ensure the sensor module screws are tightened down using the torque wrench provided.
- Execute the "Dry System" function on the analyzer, followed by conducting supplementary tests.

Module Disconnect Error

- Remove module that was showing as disconnected. Remove any debris from the electrical connection by gently blowing on the base of the module.
- Try a different module slot (any module can be put into any slot).
- Use provided torque wrench to tighten bolts to correct torque.

Storage Capacity Full or Unknown

- Run the pump back function and pump gas into a gas reservoir. The storage % will reset to 0
- If appropriate, run the evac bag function and dump the stored gas to atmosphere. The storage % will reset to 0.

USB Not Recognized

- Use only the provided USB drive
- Plug the USB drive in and wait 30 seconds for the unit to recognize the drive.

For additional troubleshooting, contact support at:

sales@gasquip.com

713.955.3177

12 Month Standard Warranty

GasQuip warrants the products it manufactures or distributes to be free of defects in material and workmanship under normal use and service when operated within the specified design limitations for a period of 12 months from date of initial shipment. Under this Warranty, GasQuip will, at its discretion, repair or replace any component that upon examination by GasQuip or its duly authorized representatives proves to be defective during the warranty period provided the system is returned to the factory for inspection and repair shipping prepaid. Improper or unauthorized maintenance, storage, repair, or alteration of any kind by personnel other than GasQuip or its duly authorized representatives may void all warranties. Warranty may also be voided for misuse, neglect, accident, corrosion, and improper installation. This Warranty is exclusive and in lieu of all other warranties of merchantability, fitness for a particular purpose, or any other warranty, expressed or implied, and all other liabilities and obligations on the part of GasQuip. GasQuip will not be liable for any other claims or damages, either direct, indirect, or consequential, arising out of the use of its products.

GasQuip LLC

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