Total Gas Calibration

Updated September 24, 2018

Calibrating Total Gas using 1% and 99% Methane

The Total Gas Calibration is done by calibrating the Catalytic Combustion Detector and the Thermal Conductivity Detector (CCD and TCD filaments) using 1% and 99% Methane. It is recommended that these calibrations be done at the beginning of a well, after a Nuke, and after a filament has been replaced to get optimal results. When these calibrations are completed, 1% Methane should equal 100u and 99% Methane should equal 10000u. When doing the Total Gas calibrations, it is also recommended to perform the 1% Methane calibration before the 99% calibration.

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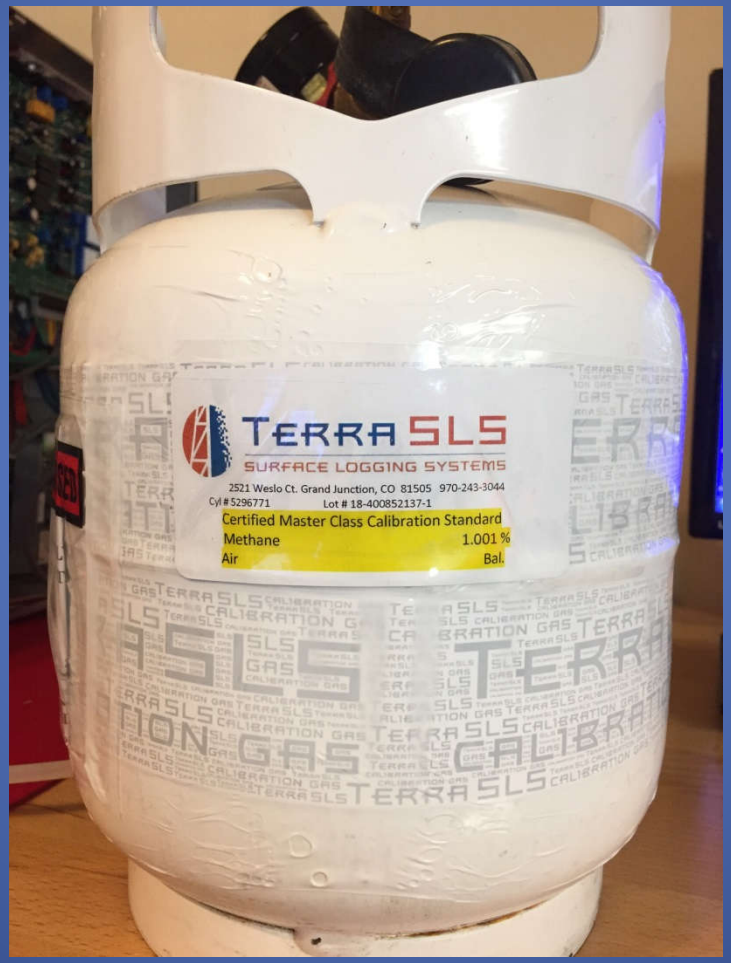
1% Methane Calibration



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1. Attach exhaust lines to each of the Exhaust ports on the rear panel of the MLogger and run them outside of the logging unit or trailer.
   - Blue Boxes will only have 2 exhaust ports: Main Exhaust and Detector Exhaust.
   - Red Boxes will have 3 exhaust ports: Main, Detector, and Chromat Exhaust.
   - Green Boxes will have 4 exhaust ports: Main, Detector, Chromat, and CO2 Exhaust.

Exhaust Ports (Red Box)

Exhaust Ports (Green Box)

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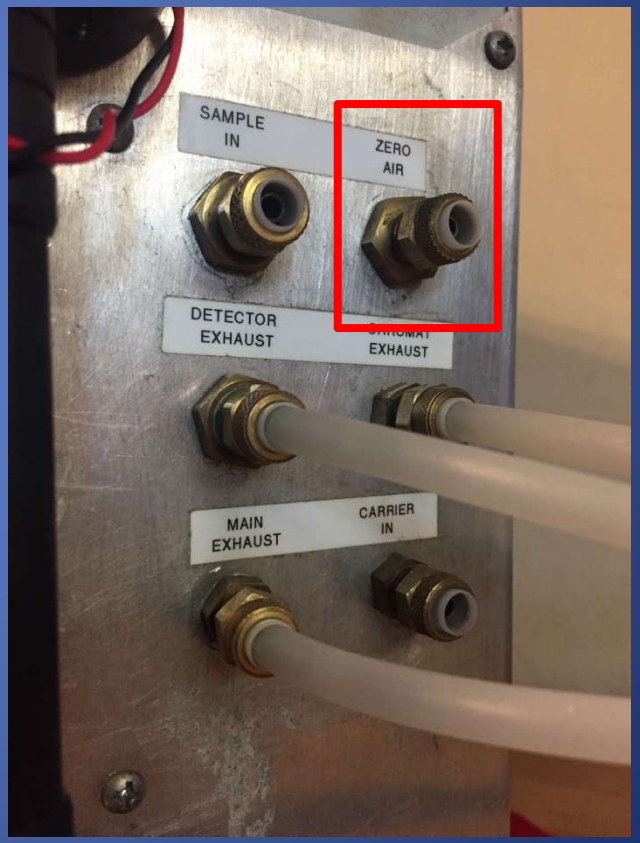
2. Zero the CCD and TCD filaments.
   a. Make sure the Zero Air knob is pointed to Zero Air.
   b. Make sure nothing is attached to the Zero Air port.

Pointed to Zero Air

Zero Air Port



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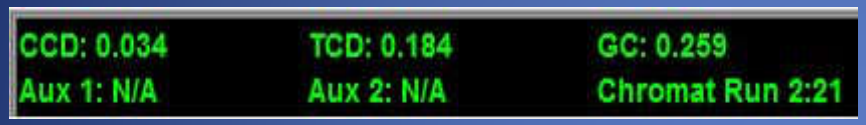
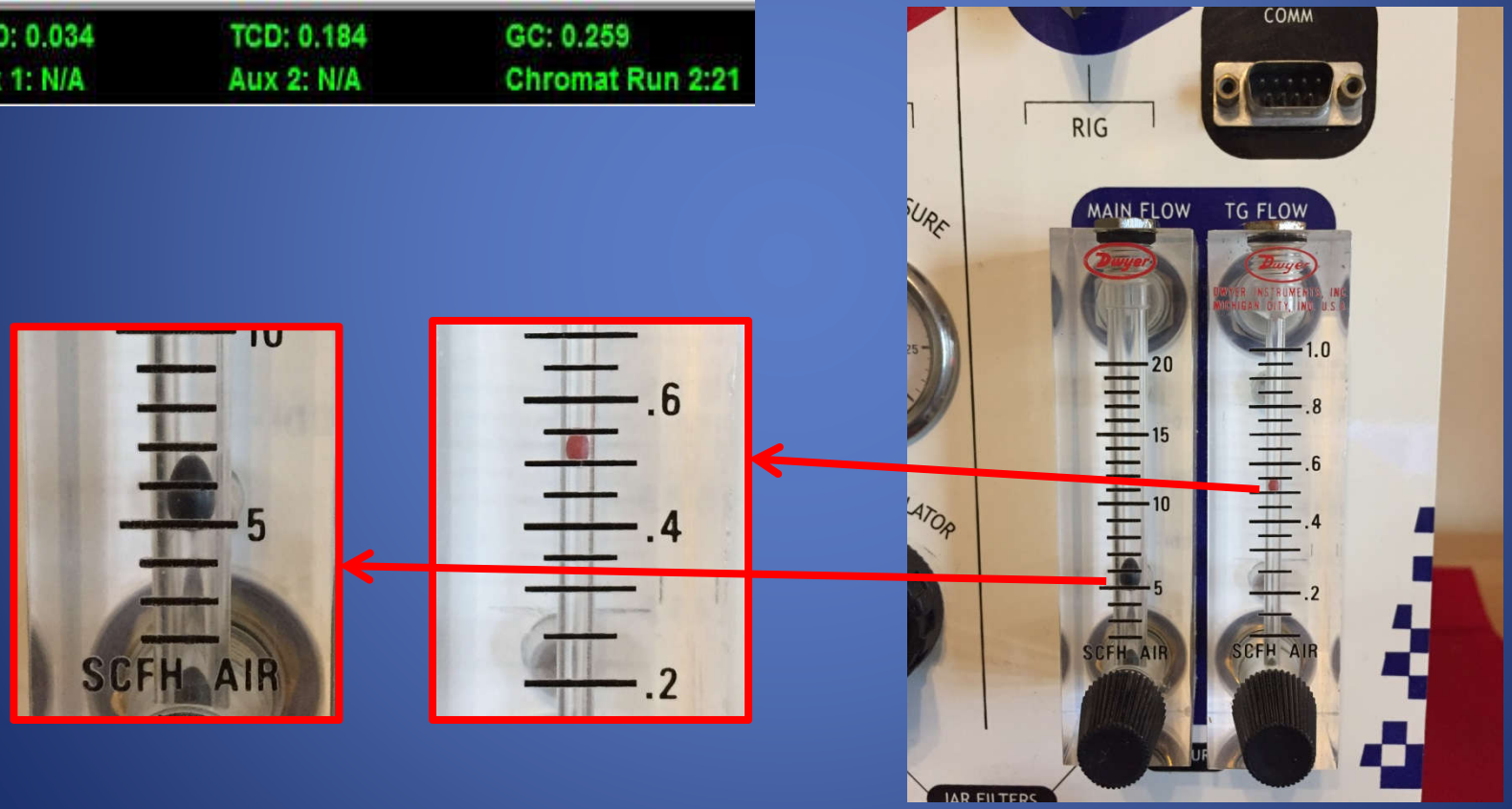
2. Zero the CCD and TCD filaments (cont'd).
   c. Make sure the Main Flowmeter is set to 5.0scfh and the TG Flowmeter to 0.5scfh.
   d. Watch the Status Bar and wait for the CCD and TCD voltages to drop and level out.

Status Bar



Main & TG Flowmeters



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2. Zero the CCD and TCD filaments (cont'd).
   d. On the front panel of the MLogger, turn the CCD and TCD potentiometer knobs counterclockwise to decrease the voltage or clockwise to increase the voltage across the corresponding filament to get the voltage to 0.05v. Note: The voltage will not rest directly on 0.05v, so just get it as close as possible.

CCD and TCD Potentiometer Knobs

Zeroed to 0.05v

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3. Attach the gas regulator to the bottle of 1% Methane (both are provided by Terra SLS). Purge the regulator with the test gas by turning the bottle on for 2-3 seconds, letting the gas spew into open air, and then turn the bottle off. Then, attach a short piece of ¼" polyflow from the regulator to the Zero Air port on the rear panel.

1% Methane w/ Regulator

Connected to Zero Air

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4. Turn the bottle of 1% Methane on by twisting its valve handle counterclockwise by 2 to 3 turns. Ensure the bottle has gas in it by checking the PSI on the regulator gauge. Note: If the pressure gauge shows 0, tighten the Valve Fitting on the regulator. If the pressure gauge still shows 0 or <10psi, then switch to a different tank.
5. Leave the gas running and write down the peak CCD and TCD voltage displayed in the Status Bar. The peak TCD voltage is normally between 0.18v and 0.23v and the peak CCD voltage is normally between 1.01v and 1.3v. Peak voltage normally occurs around 60 to 75 seconds after turning the gas on.

Peak Voltage (example)

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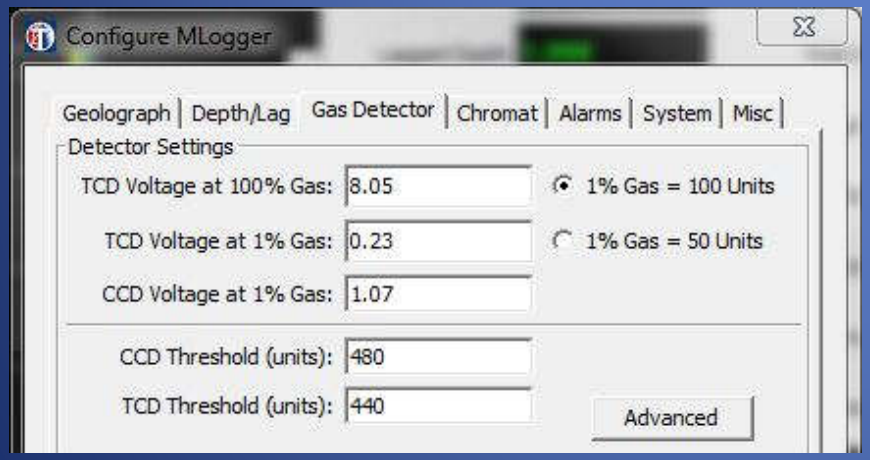
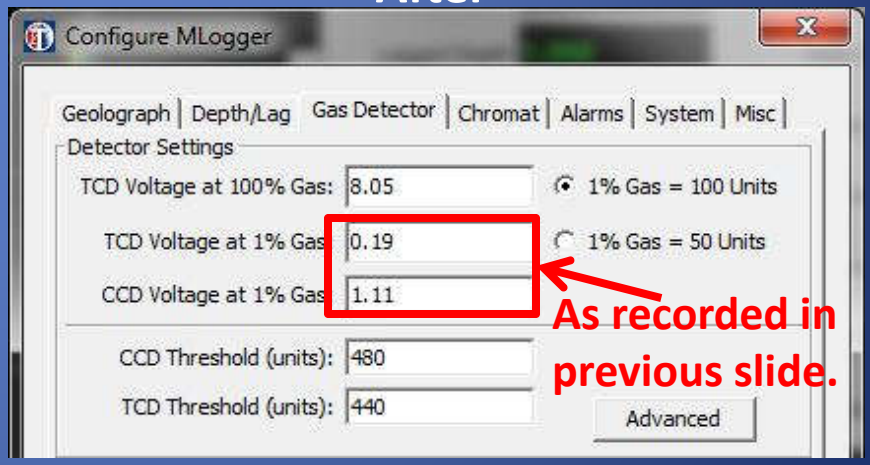
6. Once the peak voltages are written down, turn the bottle of 1% Methane off by turning its valve handle clockwise until it is tight and then disconnect its polyflow line from the Zero Air port.
7. Next, go to the Setup menu and select the Gas Detector tab.
8. Enter the values that were written down in step 5 into the corresponding fields for TCD Voltage at 1% Gas and CCD Voltage at 1% Gas.
9. Click OK to confirm the changes and to exit the Setup menu.
10. The 1% Methane calibration is done. Leave the Zero Air knob pointed to Zero Air to do the 99% Methane calibration is next.

Before



After



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Summary

1. Make sure all exhaust lines are attached and secure.
2. Make sure that the Zero Air knob is pointed to Zero Air.
3. Make sure that nothing is attached to the Zero Air port.
4. Make sure the Main and TG flowmeters are set to 5.0scfh and 0.5scfh, respectively.
5. Wait for the CCD and TCD voltages to drop and level out.
6. Zero the CCD and TCD voltages to 0.05v.
7. Attach the regulator to the bottle of 1% Methane and then purge the regulator.
8. Hook the bottle of 1% Methane up to the Zero Air port.
9. Turn the bottle on.
10. Write down the peak CCD and TCD voltages that are seen while the gas is on.
11. Turn the bottle off.
12. Disconnect the bottle from the Zero Air port.
13. Open the Gas Detector tab in the Setup menu and enter the recorded values in the appropriate fields.
14. Apply and OK.

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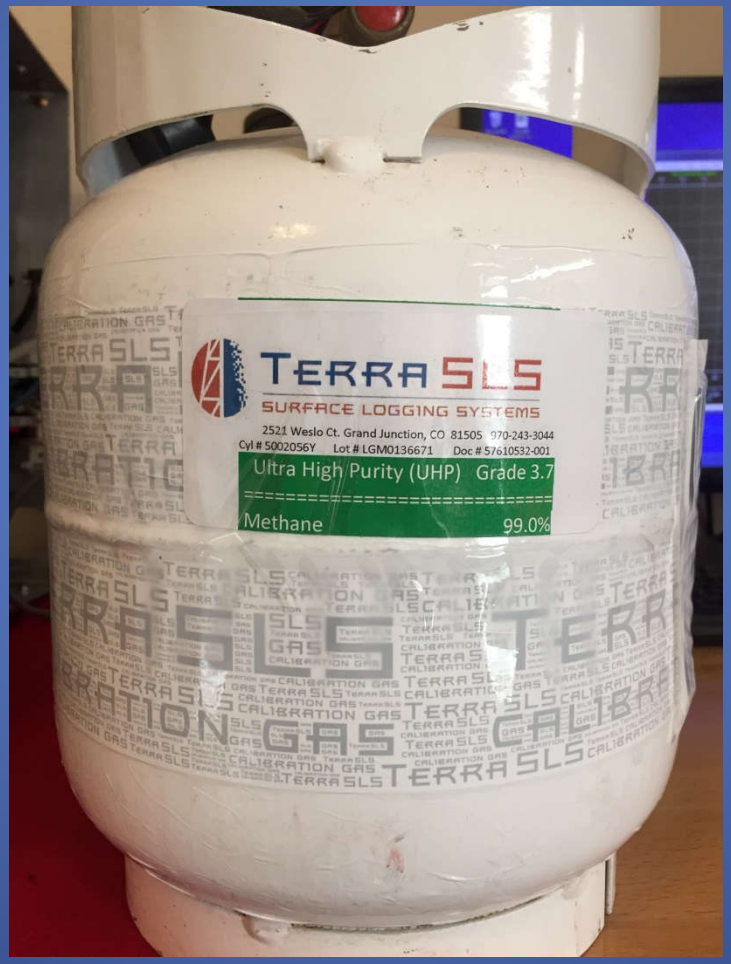
99% Methane Calibration



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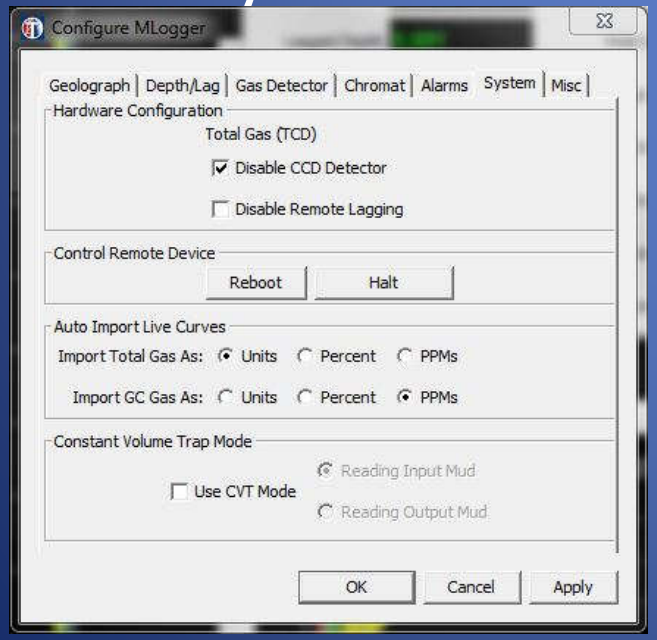
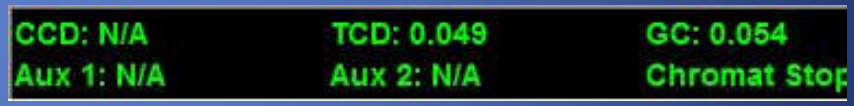
1. After the 1% Methane calibration has been completed and the bottle of 1% Methane has been disconnected from the Zero Air port, re-zero the filaments by repeating steps 2a through 2d in the 1% Methane Calibration procedure.
2. Next, go to the Setup menu, select the System tab, check the box for Disable CCD Detector, and then click OK to apply the changes and exit the Setup menu. The CCD voltage in the Status Bar should now display N/A. Note: This step helps prevent the CCD filament from saturating during this calibration by keeping it inactive for the entire time the 99% Methane is flowing through the system. The CCD voltage will normally turn to N/A on its own during normal drilling when the Total Gas reaches over 480u.

System Tab



CCD Disabled



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3. Attach the gas regulator to the bottle of 99% Methane (both are provided by Terra SLS). Then, attach a short piece of ¼" polyflow from the regulator to the Zero Air port on the rear panel.

99% Methane w/ Regulator

Connected to Zero Air

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4. Turn the bottle of 99% Methane on by twisting its valve handle counterclockwise by 2 to 3 turns. Ensure the bottle has gas in it by checking the PSI on the regulator gauge. Note: If the pressure gauge shows 0, tighten the Valve Fitting on the regulator. If the pressure gauge still shows 0 or <15psi, then switch to a different tank.
5. Leave the gas running and write down the peak TCD voltage that is displayed in the Status Bar (normally between 6.5v and 8.5v). Peak voltage normally occurs around 2.5 minutes after the gas is turned on.

Peak Voltage (example)

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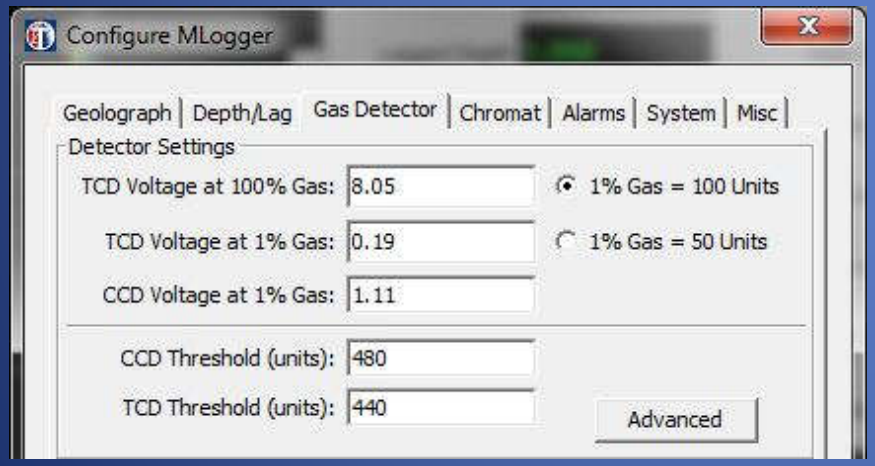
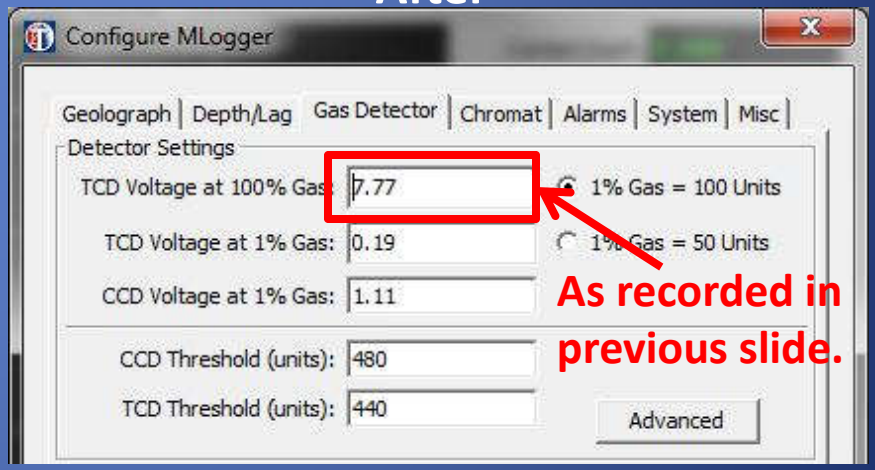
6. Once the peak voltage is written down, turn the bottle of 99% Methane off by turning its valve handle clockwise until it is tight and then disconnect its polyflow line from the Zero Air port.
7. Next, go to the Setup menu and select the Gas Detector tab.
8. Enter the value that was written down in step 5 into the corresponding field for TCD Voltage at 100% Gas.
9. Click OK to confirm the changes and to exit the Setup menu. The 99% Methane calibration is done.

Before



After



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10. Once the TCD voltage in the Status Bar has dropped down and leveled out, go back into the Setup menu, select the System tab, enable the CCD Detector, and then click OK to apply the changes and exit the Setup menu. The CCD voltage should now appear back in the Status Bar.
11. Wait for the CCD voltage to level out and then re-zero both the CCD and TCD filaments one last time using the same steps as before.
12. The Total Gas calibration is now complete.
13. Turn the Zero Air knob so that it is pointed to Rig. Connect the Sample Line to the Sample In port on the rear panel to start reading the gas from the well.

Summary

1. Make sure all exhaust lines are attached and secure.
2. Make sure the Zero Air knob is pointed to Zero Air.
3. Make sure that nothing is attached to the Zero Air port.
4. Make sure the Main and TG flowmeters are set to 5.0scfh and 0.5scfh, respectively.
5. Wait for the CCD and TCD voltages drop and level out.
6. Zero the CCD and TCD voltages to 0.05v.
7. Disable the CCD Detector.
8. Hook the bottle of 99% Methane up to the Zero Air port.
9. Turn the bottle on.
10. Write down the peak TCD voltage that is seen while the gas is on.
11. Turn the bottle off.
12. Disconnect the bottle from the Zero Air port.
13. Open the Gas Detector tab in the Setup menu and enter the recorded value in the appropriate field.
14. Apply and OK.
15. Wait for the TCD voltage to drop and level out.
16. Enable the CCD.
17. Re-zero the filaments.
18. Turn the Zero Air knob back to Rig.

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Troubleshooting

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Low Voltage/Gas Value During 99% Calibration

During the 99% calibration, it is a common issue to see the TCD voltage only reach about 4v to 6v, causing the Total Gas value to only reach about 5000u or 6000u. This could be due to one of a few reasons.

Disconnected or Loose Main Exhaust Line

The Total Gas side of the MLogger draws a vacuum on the Main Exhaust port to get its sample gas. If there is not a line attached to the Main Exhaust port, then air will be vacuumed into the line, diluting the sample.

1. Check the rear panel and make sure there is an exhaust line attached to the Main Exhaust port.
2. If one is already attached, pull on it to make sure it does not fall right out.

Low Tank Pressure

1. Make sure the pressure gauge on the test gas bottle shows at least 15psi since the 99% Methane calibration typically uses about 15psi out of the bottle each time.

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Low Voltage/Gas Value During 99% Calibration (cont'd)

Loose Mounting Screws On Filaments

1. Loosen the two thumb screws on the front panel of the MLogger and slide the carriage out. If the carriage only slides out about half way, read the *MLogger Wont Open All The Way* troubleshooting guide.
2. Look at the left side and the 3 filaments can be seen with the identifying label above them.
3. Make sure the screws that secure the filaments to the aluminum block are secure as to not cause a leak.

Loose Vacuum/Pressure Jars

1. Check the clear Vacuum Jar and the clear Pressure Jar on the front panel of the MLogger and make sure that they are screwed in tight to the red aluminum housing.
2. Make sure that the Vacuum Jar and the Pressure Jar are not broken. However, some of the clear jars may have visible cracks in them that do not go all the way through the plastic and wont leak.

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TCD Voltage Peaks and Then Steadily Drops

When performing the 1% or 99% calibrations, the TCD voltage can sometimes reach a peak value and then the voltage will steadily start to decrease. This is most commonly due to a bad filament. Try changing the TCD filament to see if that helps. For help with changing the filament, read the *Changing Filaments* guide.

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