OPERATING **GT6000 MOBILIS** FTIR GAS ANALYZER & OPTIONAL HOT/WET EXTRACTIVE SAMPLING SYSTEM QUICK GUIDE

Check the GT6000 & Calcmet manuals for full user instructions
or contact local representative or Gasmet

Gasmet Technologies

Tel : 1-866-685-0050

sales@gasmet.com

GT6000 Mobilis FTIR Gas Analyzer & optional Sampling system

Suggested Start-Up procedure

1. Install Heated Sample Lines before switching on power to GT6000 or PSS

(**Caution** : The connectors become very hot and gloves should be worn if tightening/adjusting is required when GT6000 or PSS is power on)

2. Power GT6000 & PSS on after Sample Lines installed
3. Turn rotary communication Switch to Bluetooth (if using another communication method be sure to change settings in Calcmet EASY software to match)
4. Install PSS control cable between GT6000 and PSS

5. Warm up to 180C (354F) operating temperature takes ~ 30 mins.

Monitoring of the warmup (temperature in GT6000, heated lines & sample pump) can be viewed in Calcmet EASY software

Running Calcmet™ EASY on Gasmet Tablet

Calcmet - [Analysis Results - SN54955_c14_135_Rev1.CLIB: SAMPLE_57541.SPEX]

MENU | IDENTIFY | HARDWARE | BACKGROUND | 5s SINGLE | 60s SINGLE | CONTINUOUS | STOP

Ch	Component	Concentration	Unit	Co...	Range	Residual
0001	Water vapor H2O	13.52	vol-%	wet	25	0.0062
0002	Carbon dioxide CO2	7.48	vol-%	wet	20	0.0007
0003	Carbon monoxide CO	33.53	ppm	wet	2000	0.0039
0004	Nitrous oxide N2O	2.46	ppm	wet	100	0.0038
0005	Nitrogen monoxide NO	21.43	ppm	wet	1500	0.0048
0006	Nitrogen dioxide NO2	2.62	ppm	wet	250	0.0007
0007	Sulfur dioxide SO2	0.00	ppm	wet	50	0.0095
0008	Ammonia NH3	1.49	ppm	wet	50	0.0006
0009	Hydrogen chloride HCl	2.68	ppm	wet	50	0.0005
0010	Hydrogen fluoride HF	1.55	ppm	wet	50	0.0022
0011	Methane CH4	1.44	ppm	wet	100	0.0028
0012	Ethane C2H6	0.00	ppm	wet	200	0.0033
0013	Ethylene C2H4	1.12	ppm	wet	100	0.0006
0014	Propane C3H8	0.00	ppm	wet	50	0.0029
0015	Hexane C6H14	0.06	ppm	wet	50	0.0028
0016	Formaldehyde HCOH	0.70	ppm	wet	50	0.0005

gasmet OK

1. Turn on Tablet
2. Double Tap Calcmet Icon with Stylus or Finger
3. Wait 10-20 secs for Calcmet EASY screen
   (last application library used will automatically load _ Default is CalcmetLibraryXXXXX

(xxxxx= serial number of GT6000)

If Calcmet software installed on users own laptop refer to Appendix 1.

Check Hardware Status

Click Hardware

HARDWARE

Checks that the analyzer is ready to measure

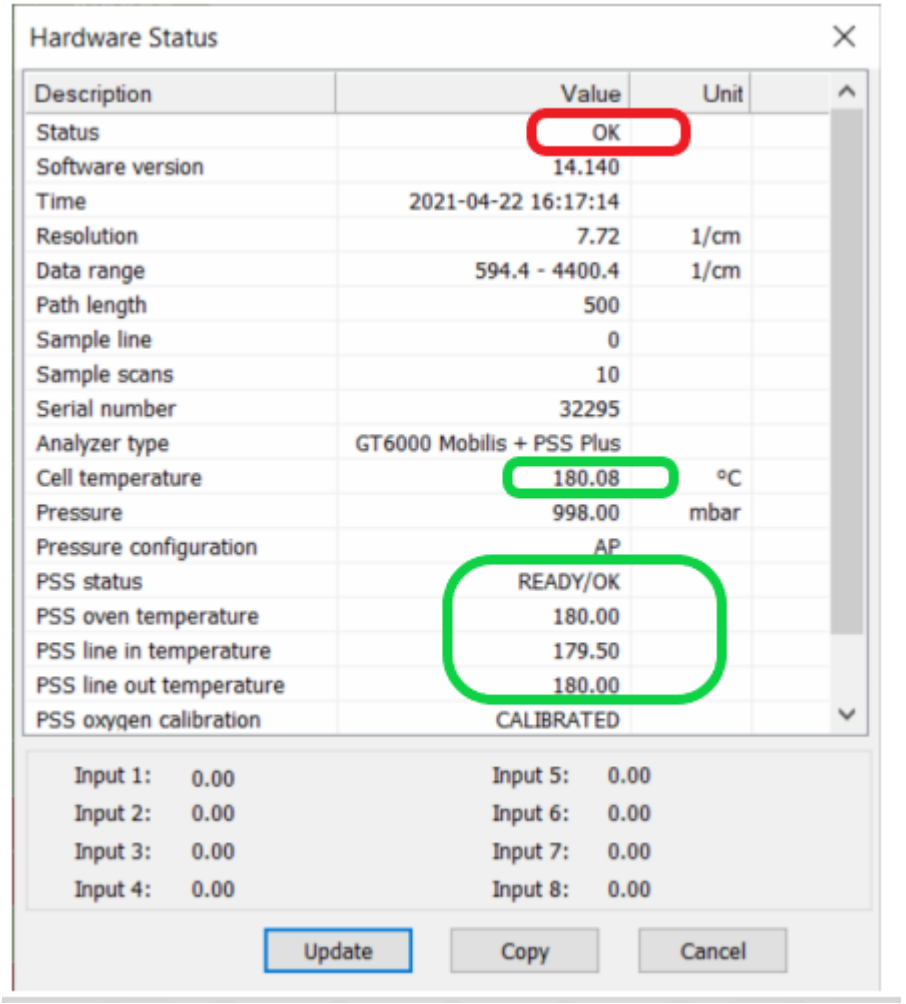
'Hardware status is **OK**' is displayed

if analyzer is ready to measure. This occurs when all components in touch with the sample have reached the 180C operating temperature.

If 'Hardware status is Not OK' is displayed

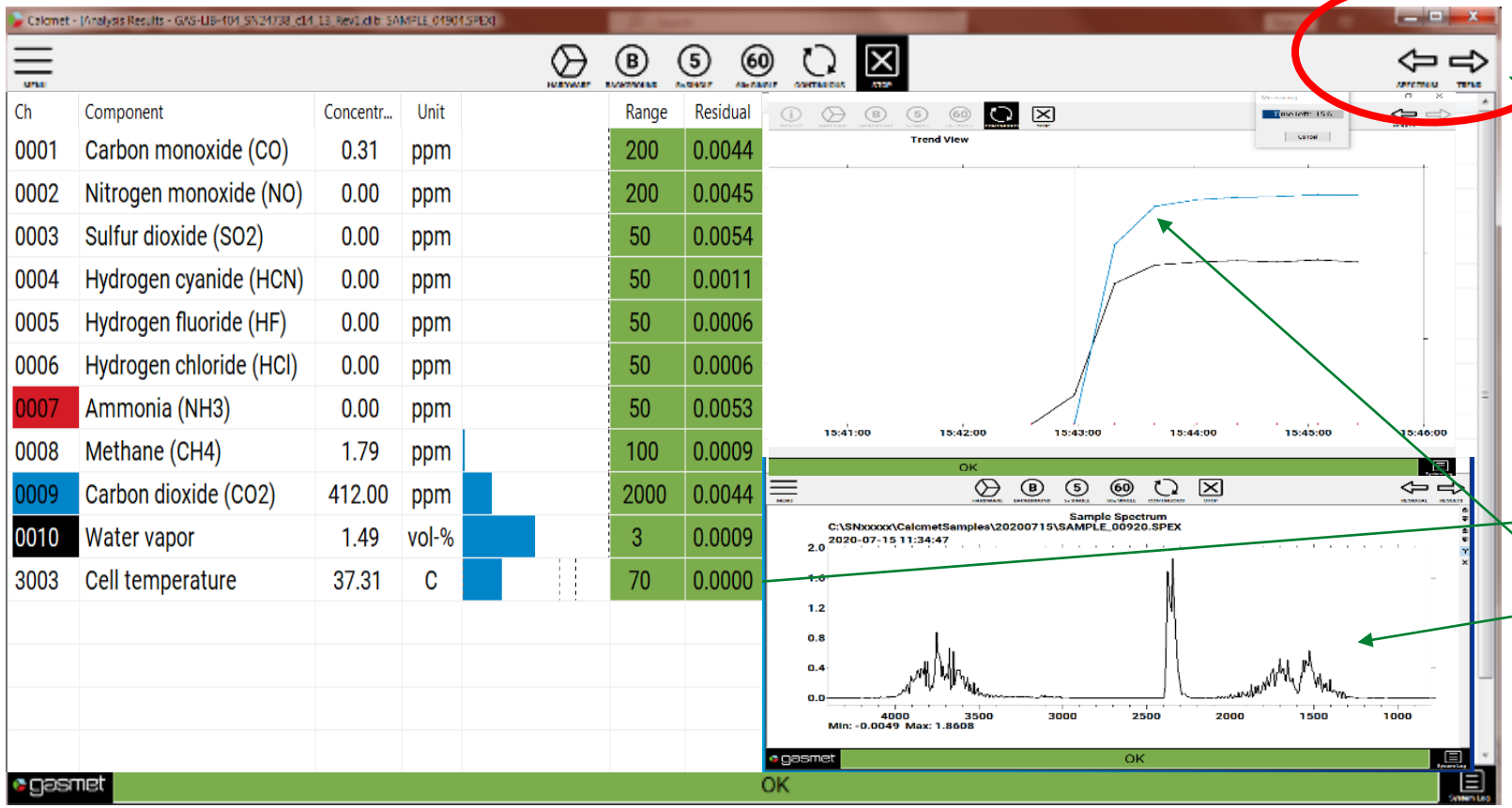
Click on Details. Contact Gasmet or representative if Status 'OK'

cannot be displayed after waiting further warm-up time.



If error occurs after clicking Hardware, check settings according to slide **"GT6000 & Calcmet EASY Communication Settings "**

Calcmet EASY Software



Left & Right arrows move between screens

Views
Results
Spectrum
Trend
Residual
Background

Five different screens available
(each screen is separate not as shown above)

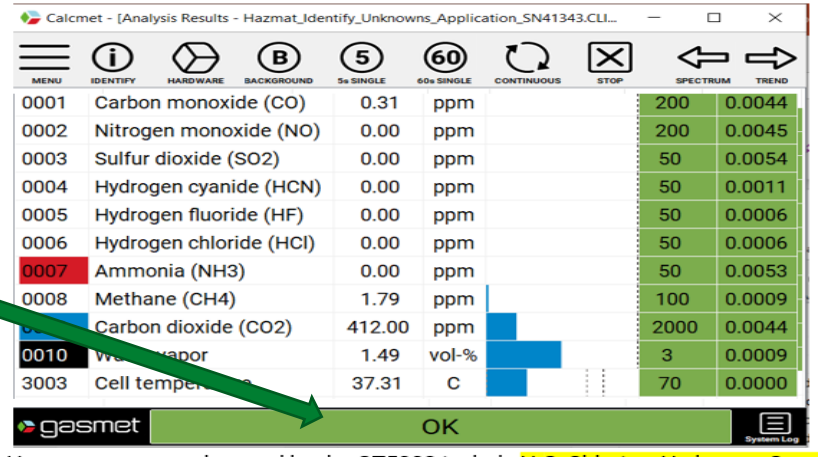
Verify GT6000 is functioning correctly

1. Position heated sample probe so it can draw in fresh ambient air (ie not installed in stack)

2. Start a continuous measurement where pump will automatically started by clicking 

3. Countdown clock initiates when Continuous button clicked showing measurement time. Analysis results are updated to the screen at end of each cycle.

4. Check that OK is displayed



5. One single measurement where the **<u>pump is not activated</u>** can be taken by clicking  or 

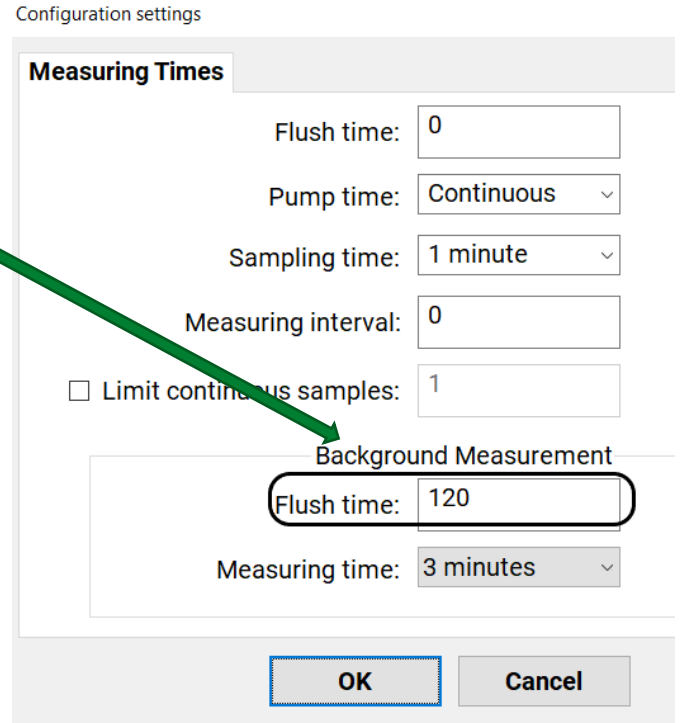
Background measurement

1. Connect 5.0 purity nitrogen (N_2) gas to **Zero gas port** inlet on the PSS. Depending on the regulator for the zero gas bottle following flush times are recommended.

2. Flush Time setting (Menu → Measuring Times)
   When (N_2) gas flow is 2 – 4 l/min set Flush time = 120s

3. Observe Zero gas flow on PSS Rotameter

4. Click **Background** .



The GT5000 will automatically proceed to the perform background. Time clock will show Flush Time then count down the preset 3 mins background time. At completion of background a new screen as shown next page will be displayed.

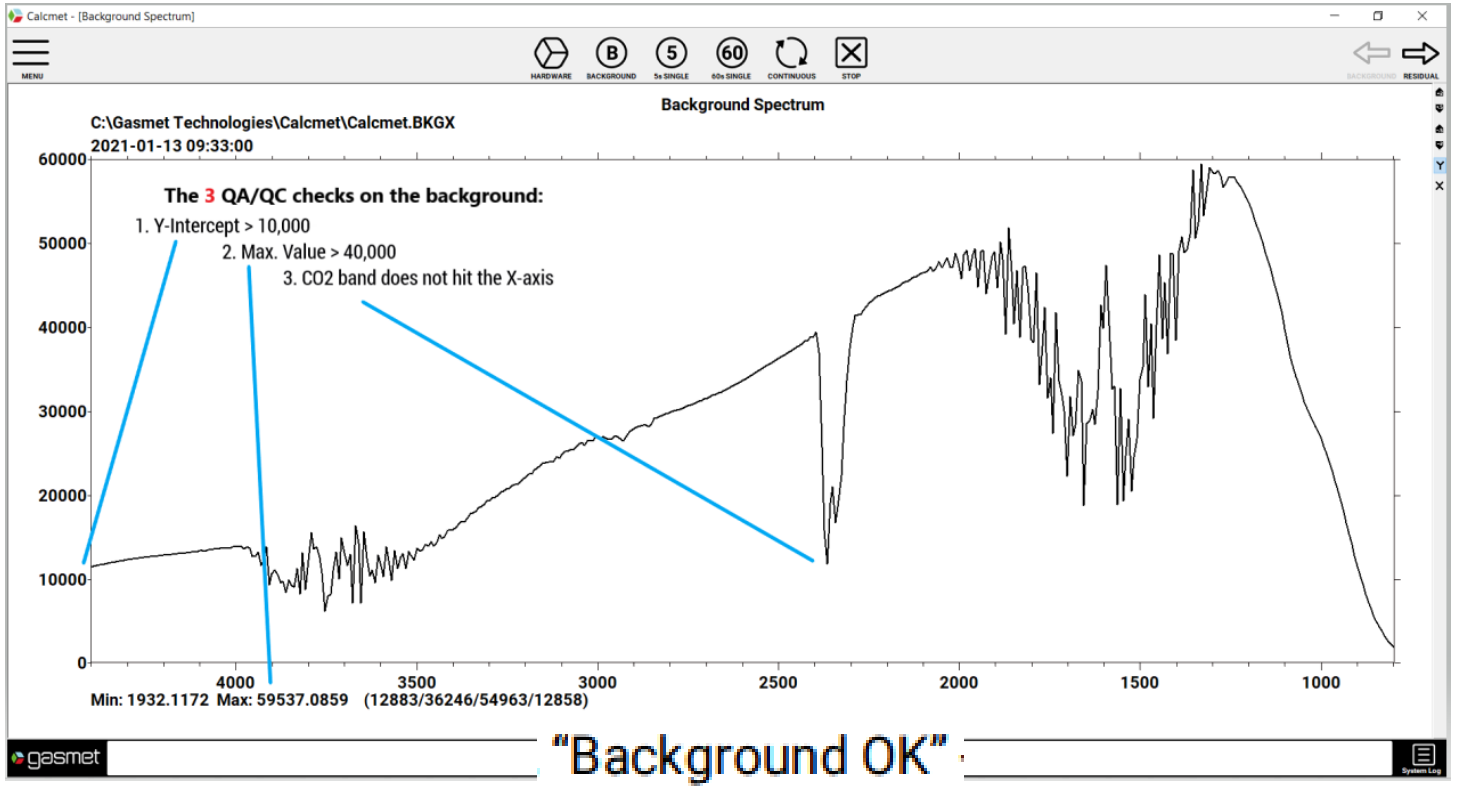
Turn off Nitrogen zero gas.

CHECKING BACKGROUND

Check these two parameters :

1). **Max value _ Pass if reading > 40,000**
2). **Y-intercept _ Pass if reading > 10,000**

Contact Gasmet or your representative if there is a Fail for either above parameters.



3). The CO2 band should not reach the x-axis. (refer line 3.above)

If this fails _ Repeat Background but first check following :

a. **Is (N_2) gas turned on & contain pressure ?**
b. **Is (N_2) gas connected to GT5000 zero gas connector ?**

This message is displayed if background successful

GT6000 Taking Measurements

1. Install Heated Sample probe into stack. Use Gasmet supplied “donut foam” or equivalent to ensure no cold spot between sample probe and heated line.

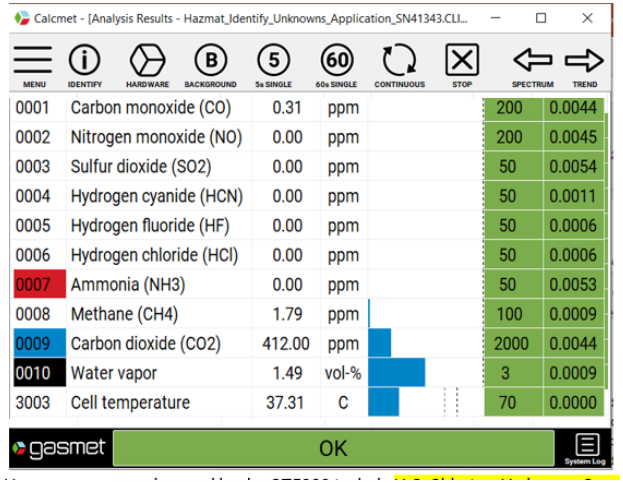
2. Start a continuous measurement started by clicking 

the sample pump in PSS will start.

3. Continuous measurement starts, countdown clock appears counting from down from 60s .

4. At completion of 60s the gas readings or Analysis Results will be updated for all gases.

5. Historical measurement data can be viewed on the Trend Graph page.



Perform any site performance verification test if measurements being recorded as part of regulatory compliance testing. Refer to specific Test Method.

Interpreting Analysis Results (1)

Calcmet - [Analysis Results - SN54955_c14_135_Rev1.CLIB: SAMPLE_57541.SPEX]

MENU | IDENTIFY | HARDWARE | BACKGROUND | 5s SINGLE | 60s SINGLE | CONTINUOUS | STOP

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0005	Nitrogen monoxide NO	21.43	ppm	wet	1500	0.0048
0006	Nitrogen dioxide NO2	2.62	ppm	wet	250	0.0007
0007	Sulfur dioxide SO2	0.00	ppm	wet	50	0.0095
0008	Ammonia NH3	1.49	ppm	wet	50	0.0006
0009	Hydrogen chloride HCl	2.68	ppm	wet	50	0.0005
0010	Hydrogen fluoride HF	1.55	ppm	wet	50	0.0022
0011	Methane CH4	1.44	ppm	wet	100	0.0028
0012	Ethane C2H6	0.00	ppm	wet	200	0.0033
0013	Ethylene C2H4	1.12	ppm	wet	100	0.0006
0014	Propane C3H8	0.00	ppm	wet	50	0.0029
0015	Hexane C6H14	0.06	ppm	wet	50	0.0028
0016	Formaldehyde HCOH	0.70	ppm	wet	50	0.0005

gasmet OK

Successful Analysis

What is normal ?

Calcmet Software is reporting green residuals for all gas components. Concentration Alarms can occur if gas measures higher than Range or

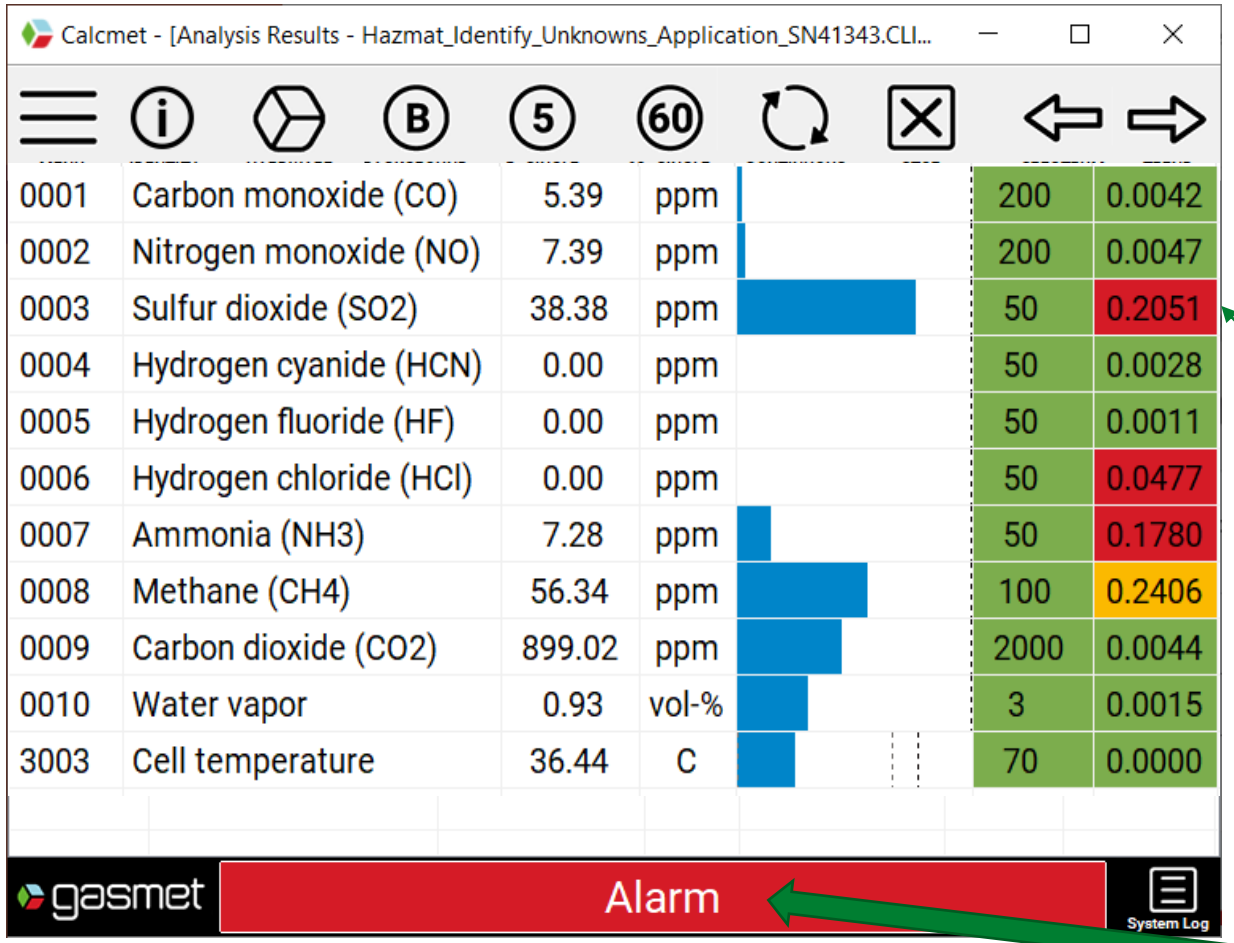
(if this not the case refer next page)

The two largest combustion gases should have significant values as shown below

1. **Carbon Dioxide (CO2)** : 5 – 20 v/v%
2. **Water Vapor (H2O)** : 5 – 25 v/v%

(If sampling form a vented or non-combustion source these values can be much lower)

Interpreting Analysis Results (2)

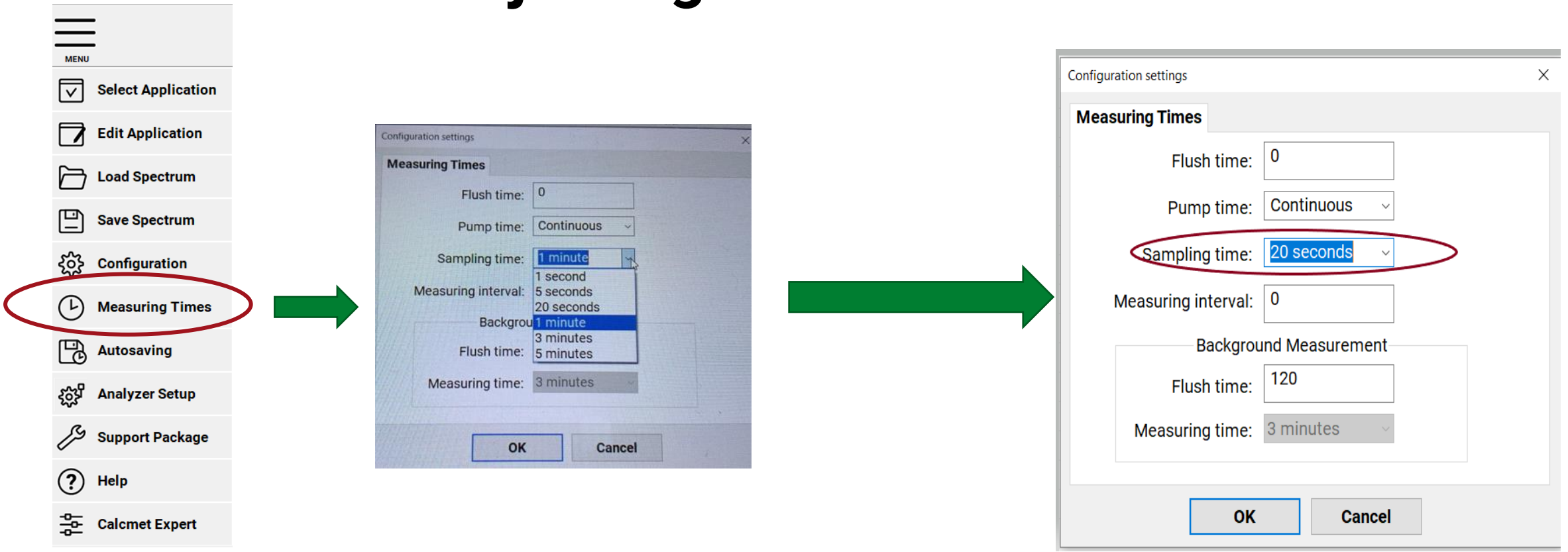


Unsuccessful Analysis

Calcmet Easy Software is reporting sample measurement is not normal and needs further review before reporting.

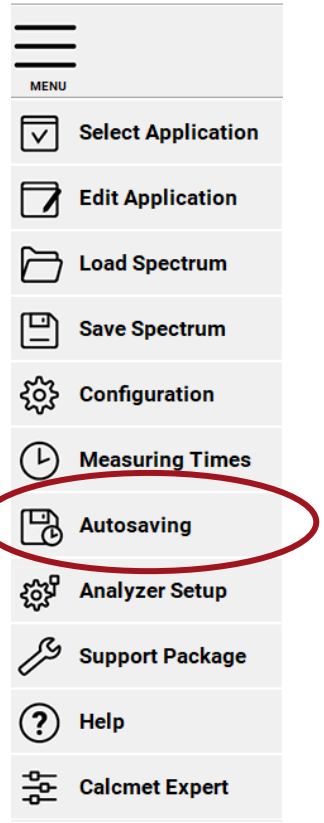
Residual Column turns from **Green** to **Yellow** or **Red** for one or more gases
AND
ALARM Condition

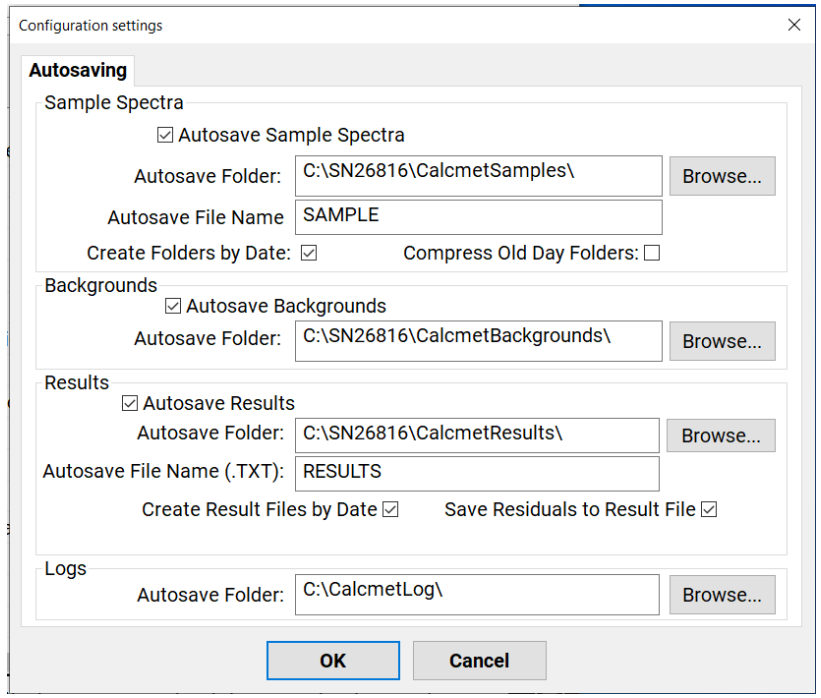
Adjusting Measurement Time



There maybe occasions when the measuring (Called sampling time in software) should be changed from the default of 60 seconds. The 3 common measurement time settings are 5s, 20s & 60s.
60s is recommended when seeking lowest detection levels and leaving the GT6000 stationary for longer term monitoring. 20s or 5s is recommended if the sample stream is dynamic (Shorter measurement times result in gas readings being noisier noise or more variation).

Saving Data – Calcmet Easy Settings





Check that Saving is activated per check marks in the box as shown

Note saving location for the files that are stored
These include :
1.Text File
2. Spectra File
3. Background File
4. Log File

C:\SN26816 will change according to the serial number of your GT5000

Saved Data (1) – Results File

All measured samples will be stored as a text file.

Location of saved files is C:\SNxxxxx\CalcmetResults\Date (Date = when measurements taken)

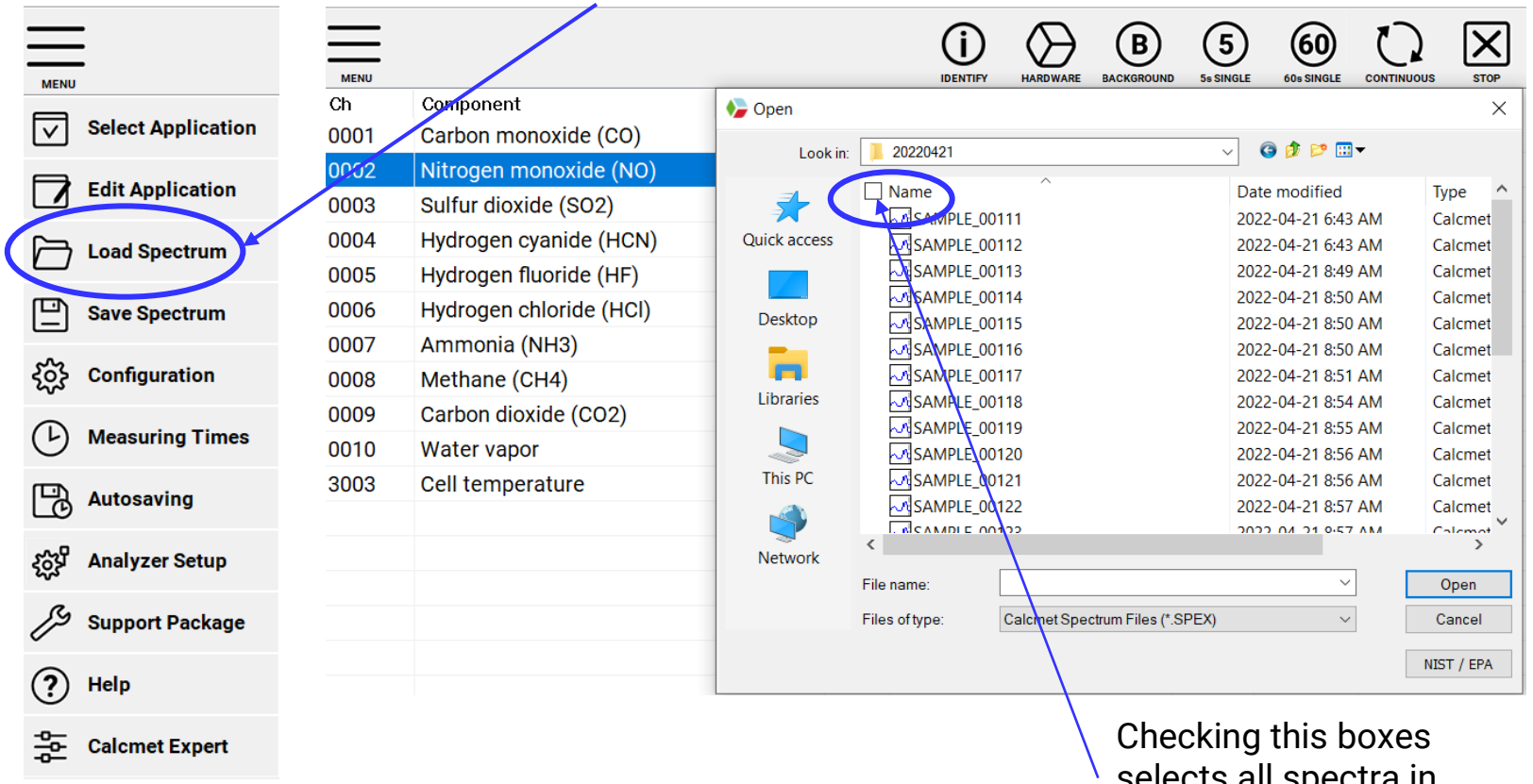
Text file can be imported into EXCEL® using import wizard·

Date	Time	SpectrumFile	LibraryFile	Water	Unit	Residua	Carbon	Ur	Residu	Met	Ur	Resi	Nitr	Un	Resic	Carbon	Uni
2020-05-01	9:27:39 PM	C:\SN26816\Calcme	GAS-LIB-402_SN26816_c	0.44	vol-%	0.0004	834.57	ppm	0.0013	1.58	ppm	0.0014	0.23	ppm	0.0013	1.89	ppm
2020-05-01	9:28:58 PM	C:\SN26816\Calcme	GAS-LIB-402_SN26816_c	0.8	vol-%	0.0005	760.07	ppm	0.0012	1.66	ppm	0.0015	0.18	ppm	0.0009	1.8	ppm
2020-05-01	9:29:20 PM	C:\SN26816\Calcme	GAS-LIB-402_SN26816_c	1.06	vol-%	0.0005	705.12	ppm	0.0013	1.26	ppm	0.0017	0.25	ppm	0.001	1.61	ppm
2020-05-01	9:29:41 PM	C:\SN26816\Calcme	GAS-LIB-402_SN26816_c	1.09	vol-%	0.0006	704.13	ppm	0.0013	1.28	ppm	0.0018	0.25	ppm	0.0011	1.48	ppm
2020-05-01	9:30:03 PM	C:\SN26816\Calcme	GAS-LIB-402_SN26816_c	1.1	vol-%	0.0005	709.55	ppm	0.0013	1.49	ppm	0.0017	0.26	ppm	0.0011	1.51	ppm
2020-05-01	9:30:25 PM	C:\SN26816\Calcme	GAS-LIB-402_SN26816_c	1.1	vol-%	0.0006	712.02	ppm	0.0013	1.49	ppm	0.0018	0.26	ppm	0.0011	1.51	ppm
2020-05-01	9:31:16 PM	C:\SN26816\Calcme	GAS-LIB-402_SN26816_c	1.1	vol-%	0.0005	711.24	ppm	0.0012	1.31	ppm	0.0017	0.26	ppm	0.0011	1.54	ppm
2020-05-01	9:31:37 PM	C:\SN26816\Calcme	GAS-LIB-402_SN26816_c	1.1	vol-%	0.0006	701.64	ppm	0.0013	1.46	ppm	0.0018	0.26	ppm	0.0011	1.5	ppm
2020-05-01	9:31:59 PM	C:\SN26816\Calcme	GAS-LIB-402_SN26816_c	1.1	vol-%	0.0006	696.42	ppm	0.0011	1.45	ppm	0.0017	0.26	ppm	0.0011	1.54	ppm
2020-05-01	9:32:21 PM	C:\SN26816\Calcme	GAS-LIB-402_SN26816_c	1.1	vol-%	0.0007	700.85	ppm	0.0013	1.49	ppm	0.0018	0.25	ppm	0.0011	1.48	ppm
2020-05-01	9:32:42 PM	C:\SN26816\Calcme	GAS-LIB-402_SN26816_c	1.1	vol-%	0.0006	705.73	ppm	0.0012	1.29	ppm	0.0018	0.26	ppm	0.0011	1.56	ppm

C:\SNxxxxx will change according to the serial number of your GT6000

Saved Data (2) – Calcmet Sample Spectra

It may be necessary to re-analyze measured test samples
Location of saved sample spectra files is C:\SNxxxxx\CalcmetSamples\Date (Sub-Folder when measurements taken)
These files can be Opened in Calcmet Software under Load Spectrum



Checking this boxes selects all spectra in the folder.

Calcmet will automatically re-analyze all the spectra selected and show the Trend View for all samples.

Note : the last sample is shown when processing finishes.
Click on the trend view for Calcmet to load a specific sample spectra.

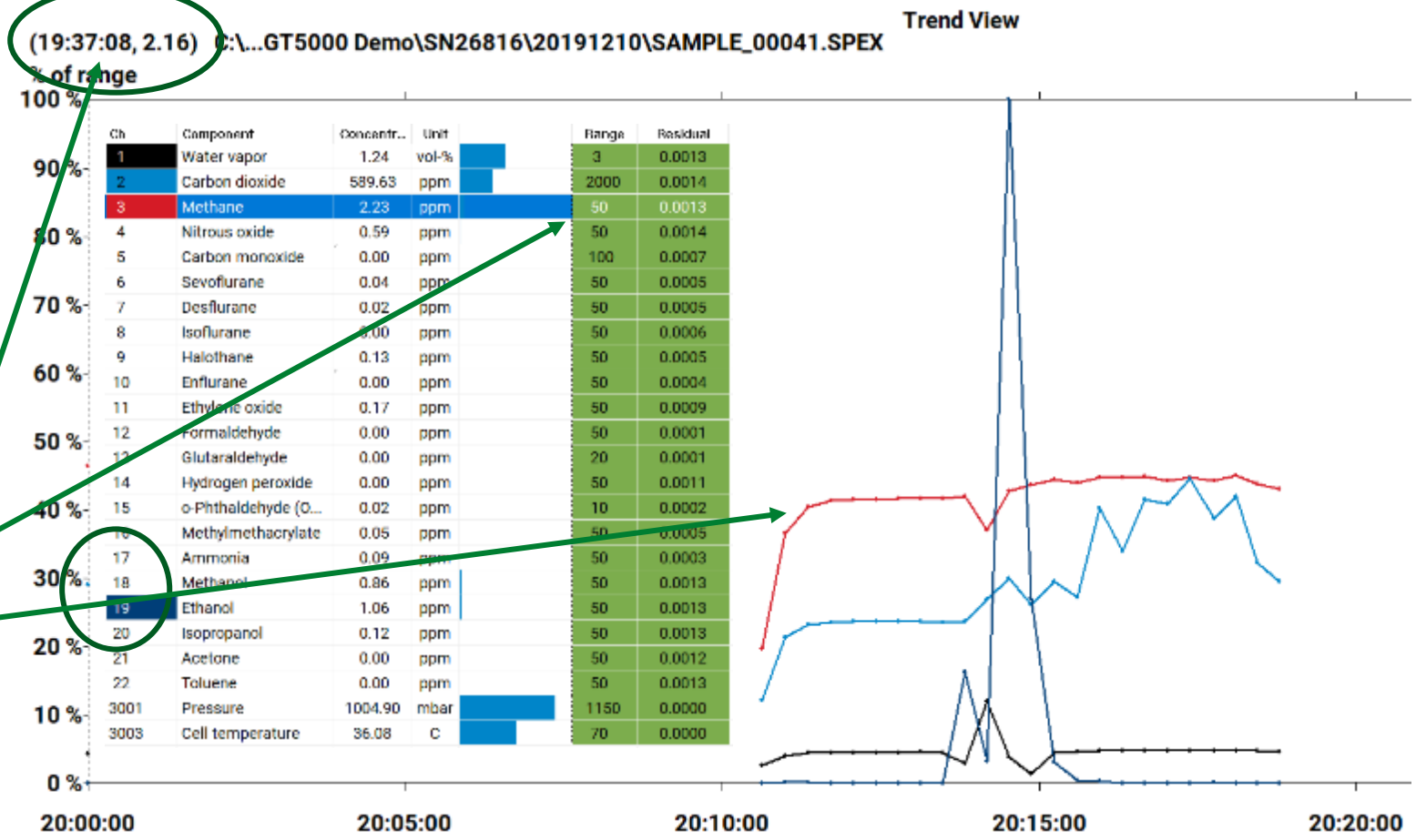
Using the Trend Graph

- Up to 15 Components can be plotted on the Trend Graph
- Click on **Ch** column and a color will appear for this gas on the Trend Graph
- The 100% Y-axis = gas measurement range.

Example :

- Red gas = Methane
- 100% = 50 ppm

- Black component (always 1st gas clicked) shows time & gas concentration.



About this document

The objective of this guide is to provide GT6000 Mobilis users a quick reference guide to get them familiar with the basic operation. It must be empathized that this guide does not replace the Model GT6000 Mobilis Operations manual, PSS Operation manual or the Calcmet™ EASY software manual that was supplied with the gas analyzer.

The steps outlined in this guide focuses on a combustion gas tester setting up the standard CEMS application library as part of their testing of various emissions gases projects.

When using the GT6000 Mobilis to accurately quantify gases, it is strongly encouraged that additional quality control steps be initiated to verify further support the gas analysis readings. These steps can be reviewed in the manual(s) or further discussion with your local Gasmet office or local representative.

To continued improvement and support of the Gasmet portable FTIR gas analyzer users we invite your feedback on this document and/or other Gasmet related matters.

The FTIR gas measurement technology measures an extensive number of gases and vapors. However the following gases are not measured by the GT6000 - Nitrogen, Oxygen, Chlorine, Bromine, Fluorine, Neon, Helium, Argon, Krypton, Xenon, Radon, Mercury and H_2S (Hydrogen Sulfide)