GASPACE 6000 HEADSPACE/MAP ANALYZER

OPERATIONS MANUAL

Version 1.3 *5th July 2018*

Illinois Instruments, Inc. (U.S.)
2401 Hiller Ridge Road
Johnsburg
Illinois IL
60051

E: sales.usa@systechillinois.com
E: support.usa@systechillinois.com

Systech Instruments Ltd
17 Thame Park Business Centre
Wenman Road
Thame
Oxfordshire
OX9 3XA

E: sales.uk@systechillinois.com
E: support.uk@systechillinois.com

www.systechillinois.com

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Revision History

Issue	Issue Date	Changes	By
1.0	8th Jul 2015	Initial Release Version	Victor Kofman
1.1	7th Jan 2016	Changes according to ECN1610i	Victor Kofman
1.2	29th Jun 2018	Changes according to CAR0308	Tim Keep
1.3	10th Aug 2018	Changed per ECN1819s	Tim Keep
1.4	21st Aug 2018	Changed per ECN1860s	Tim Keep

1.0 PREFACE

GS6600

GS6700

GS6500

The Gaspace 6000 Series is designed for measuring the concentration of modified atmosphere gases in the headspace of flexible and rigid packages. Primary applications are for testing Modified Atmosphere Packaged food and drink products, and pharmaceutical packaging and products.

This symbol is known as the 'Crossed-out Wheelie Bin Symbol'. When this symbol is marked on a product it means that consideration should be given to the disposal of the product, parts, or accessories. Only discard electrical/electronic items in separate collection schemes which cater for the recovery and recycling of the materials contained within. Your co-operation is vital to ensure the success of these schemes and for the protection of the environment.

1.1 Important

Please read this manual before attempting to install or operate the equipment.

In some variations, the sample gas in this equipment is heated to very high temperatures and therefore no flammable gases should be present in a combustible concentration.

No responsibility is accepted by Systech Illinois for accidents resulting from improper use of this equipment.

2.0 INTRODUCTION

Instruments are available and configured for the following applications:

Designation	Gases Measured and Ranges	Technology
GS6500	Oxygen 0.001% - 100%	Zirconia, solid state ceramic, non-depleting
GS6600	Oxygen 0.001% - 100%, Carbon dioxide 0.1% - 100%	Zirconia, solid state ceramic, non-depleting, Dual detector Infra-Red
GS6700	Carbon dioxide 0.1% - 100%	Dual detector Infra-Red

The analyzer is designed to measure the headspace of modified atmosphere packaged products.

Great care has been taken to ensure that the instrument is simple to use for the operator, while at the same time offering many features for the technical owner.

We are always trying to improve our product, of which this manual is part. We would greatly appreciate any feedback or information that you can give us in relation to the analyzer or the manual.

2.1 Identification and Check List

Unpack the Gaspace 6000 and inspect it visually.

The following items will be included:

- GS6000 Analyzer
- IEC standard power cable
- USB flash drive with GS6000 Operations Manual and Calibration Certificate
- Sampling Kit, GS6000, including the following items:

    1. Pack of needles 21G X 1.5” (50)
    2. Pack of needles 23G X 1.25” (1)
    3. Pack of needles 25G X 0.7” (50)
    4. Needle probe (Wand) assembly (1)
    5. Adhesive septa (100)
    6. Luer filters (50)

2.2 Options

- External printer (Part number OPT-6000-PRN), including the following items:

    1. Roll of printer paper (1)
    2. Printer cable

- Direct Injection (Part number 898 626)

    1. Syringe valve
    2. Syringe (30ml)

Sampling systems are available for accessing the headspace within rigid packages and cans. Please contact Systech Illinois for more information.

2.3 Operating Power

The analyzer is operated from AC line power (universal) between 90 and 260 VAC, 50/60 Hz. Line voltage is automatically sensed by the analyzer.

3.0 USING THE INSTRUMENT

3.1 Front Panel Controls

3.2 Powering up

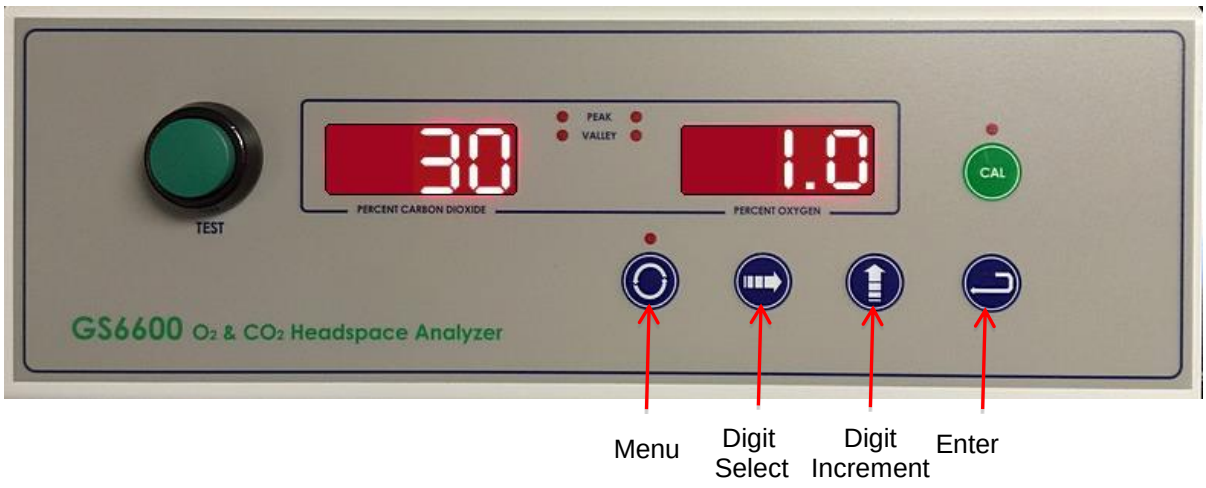
Connect the IEC power cable to the analyzer first, and then plug it into an outlet. The power switch is mounted on the back of the analyzer just above the IEC receptacle. After switching the analyzer on, all LED's and displays will light up. The version of software will flash momentarily, followed by the model number as shown below.

GS6500 and GS6600: After flashing the model number, the oxygen display (right-hand display on the GS6600) will flash “hEAt” (Heat) as illustrated below. Since the analyzer cannot produce meaningful readings until the sensor is at the proper operating temperature, the display will continue to flash “hEAt” (Heat) until the correct operating temperature is reached (usually about five minutes). In critical, high-accuracy applications, or when measuring at very low concentrations of oxygen, it is advisable to wait at least thirty minutes before taking a measurement. This will allow the analyzer to reach optimal operating conditions.

GS6600 Shown

GS6700: After flashing the model number, the display will show “0.0”. Since the detector will drift slightly until fully warm, it is suggested that the analyzer be allowed to warm up for thirty minutes before critical measurements are made.

3.3 Navigating the Menus



The analyzer is configured using the keypad shown above.

The ‘Menu’ button allows you to change the menu listing, the ‘Digit Select’ button is used to choose which digit of the display will be changing. The ‘Digit Increment’ button allows for digit change, and the ‘Enter’ button will store a new configuration in memory.

Changing the program codes to configure parameters is simple. There are three pages of information.

Page 0 contains all the parameters that a test operator may want to use frequently such as changing Product Code.

Page 1 contains all test configuration parameters which can be (optionally) password protected. The factory default is password protection disabled. The default password is 1234.

Page 2 parameters are those which are used to configure instrument options that do not need to accessed frequently. **Page 2** parameters are always password protected. The factory default password is 1234.

To access the parameters in **Page 0** press the 'Menu' button:

The LED above it will light and the display will briefly read "Prod" then indicate the current Product Code. Press the 'Menu' button to cycle through options until the display will read "PA9E" (Page) briefly then display "0" to indicate you are on **Page 0**. Available parameters depend on the instrument model and its configuration.

Every time the 'Menu' button is pressed a new parameter will be displayed briefly followed by the value for that parameter. **Note**: some parameters are read only.

Continual pressing of the 'Menu' button when on **Page 0** will eventually show "– O2 –" (**for GS6600 and GS6500**) or "CO_2" (**for GS6700**) and this signals the end of the Programming mode and the instrument is returned to the measurement mode (shown below is GS6500 display).

To access the parameters in **Page 1 or 2**, follow the steps below:

Press the 'Menu' button 3 times

The display will briefly read "PA9E" (Page) then "0" (to indicate you are on page 0).

Now press 'Digit Select' button

The display will flash.

Now press the 'Digit Increment' button

The display will change from "0" to "1".

Now press the ‘Digit Increment’ button again for menu 2 if required

The display will change from “1” to “2”.

Now press the ‘Enter’ button

The display will briefly read “PAS?” (Password) if menu 2 was selected (optionally on menu 1) and then 4 digits. To access the page you must enter a correct password. At this point the display will read “0000” and the left-hand “0” will flash, prompting you to enter the password. The factory set password is 1234. Enter this password using the ‘Digit Increment’ and ‘Digit Select’ buttons. Press the ‘Enter’ button. The display will show “yES” (YES), for a correct password or “nO” (NO) if incorrect. If you have the correct password, access is allowed to the page parameters.

Note: to get out of **Page 1 or 2** back to **Page 0** and return to the measurement mode (“O2” screen for GS6500 and GS6600 or “CO2” screen for GS6700), you must keep pressing the ‘Menu’ key until you get to the “PA9E” (Page) parameter, then change the code to “0” using the method shown above (no password will be needed). Anytime the ‘Enter’ button is pressed, “Stor” (Store) will flash once on the display to indicate a change has been accepted.

3.3.1 GS6600 Menu System

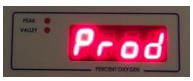
When navigating through the menus, the right-hand display will flash the parameter name followed by its value.

DISPLAYED PARAMETER		FUNCTION
Page 0		
		Selects which product code and its corresponding description will be printed. The user may enter up to 9 product codes (1 through 9).
		Shows the current temperature of the internal zirconia probe furnace (This parameter is 'read-only').
		Selects the menu page. **Page 1 or 2** parameters may be password protected. The factory default password is 1234.
Page 1 (optionally password protected. Default password is 1234)		
		Sets the duration of a timed test in seconds (1 to 200).
		Sets the delay time between tests for Autosense in seconds. 0=disable Autosense, 1=Continuous mode, >1=delay time up to 200 seconds.
		Sets the Peak/Valley measurement mode for CO_2/O_2 with the first digit corresponding to CO_2 and the second digit corresponding to O_2. 0=disable Peak/Valley, 1=Peak, 2=Valley i.e. "12" will set the Peak for CO_2 and Valley for O_2.
		Sets the alarm option. 0=alarm disabled, 1=alarm enabled.
		Sets the value at which the oxygen alarm will be triggered (0 to 100). This will not be shown if the alarms are disabled ("ALEn" or Alarm Enable set to "0").
		Sets the value at which the carbon dioxide alarm will be triggered (0 to 100). This will not be shown if the alarms are disabled ("ALEn" or Alarm Enable set to "0").
		Sets the oxygen alarm polarity. 0=low alarm, 1=high alarm. This will not be shown if the alarms are disabled ("ALEn" or Alarm Enable set to "0").
		Sets the carbon dioxide alarm polarity. 0=low alarm, 1=high alarm. This will not be shown if the alarms are disabled ("ALEn" or Alarm Enable set to "0").
		Selects the menu page. **Page 0** should be selected to return to the measurement mode. **Page 2** parameters are password protected. The factory default password is 1234.
Page 2 (password protected. Default password is 1234)		
		Selects whether a password is requested to access menu page 1. 0 is disabled, 1 is enabled.
		Sets the password to access the Page 1 menu.
		Sets the password to access the Page 2 menu.
		Sets the percent concentration of oxygen for calibration using certified gas (1% to 10% or 30% to 100%).
		Sets the percent concentration of carbon dioxide for calibration using certified gas (15% to 100%).

		Sets the time in 24-hour format (HHMM).
		Sets the date in format DDMM.
		Sets the year four-digit format (YYYY).
		Selects the menu page. **Page 0** should be selected to return to the measurement mode. **Page 2** parameters are password protected. The factory default password is 1234.

3.3.2 GS6500 Menu System

When navigating through the menus, the display will flash the parameter name followed by its value

DISPLAYED PARAMETER		FUNCTION
Page 0		
		Selects which product code and its corresponding description will be printed. The user may enter up to 9 product codes (1 through 9).
		Shows the current temperature of the internal zirconia probe furnace (This parameter is 'read-only').
		Selects the menu page. **Page 1 or 2** parameters may be password protected. The factory default password is 1234.
Page 1 (optionally password protected. Default password is 1234)		
		Sets the duration of a timed test in seconds (1 to 200).
		Sets the delay time between tests for Autosense in seconds. 0=disable Autosense, 1=Continuous mode, >1=delay time up to 200 seconds.
		Sets the Peak/Valley measurement mode for CO_2/O_2 with the first digit corresponding to CO_2 and the second digit corresponding to O_2. 0=disable Peak/Valley, 1=Peak, 2=Valley i.e. "12" will set the Peak for CO_2 and Valley for O_2.
		Sets the alarm option. 0=alarm disabled, 1=alarm enabled.
		Sets the value at which the oxygen alarm will be triggered (0 to 100). This will not be shown if the alarms are disabled on **Page 1** ("ALEn" or Alarm Enable set to "0").
		Sets the oxygen alarm polarity. 0=low alarm, 1=high alarm. This will not be shown if the alarms are disabled on **Page 1** ("ALEn" or Alarm Enable set to "0").
		Selects the menu page. **Page 0** should be selected to return to the measurement mode. **Page 2** parameters are password protected. The factory default password is 1234.
Page 2 (password protected. Default password is 1234)		
		Selects whether a password is requested to access menu page 1. 0 is disabled, 1 is enabled.
		Sets the password to access the Page 1 menu.

		Sets the password to access the Page 2 menu.
		Sets the percent concentration of oxygen for calibration using certified gas (1% to 10% or 30% to 100%).
		Sets the time in 24-hour format (HHMM).
		Sets the date in format DDMM.
		Sets the year four-digit format (YYYY).
		Selects the menu page. **Page 0** should be selected to return to the measurement mode. **Page 2** parameters are password protected. The factory default password is 1234.

3.3.3 GS6700 Menu System

When navigating through the menus, the display will flash the parameter name followed by its value
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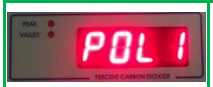
DISPLAYED PARAMETER		FUNCTION
Page 0		
		Selects which product code and its corresponding description will be printed. The user may enter up to 9 product codes (1 through 9).
		Selects the menu page. **Page 1 or 2** parameters may be password protected. The factory default password is 1234.
Page 1 (optionally password protected. Default password is 1234)		
		Sets the duration of a timed test in seconds (1 to 200).
		Sets the delay time between tests for Autosense in seconds. 0=disable Autosense, 1=Continuous mode, >1=delay time up to 200 seconds.
		Sets the Peak/Valley measurement mode for CO_2/O_2 with the first digit corresponding to CO_2 and the second digit corresponding to O_2. 0=disable Peak/Valley, 1=Peak, 2=Valley i.e. "12" will set the Peak for CO_2 and Valley for O_2.
		Sets the alarm option. 0=alarm disabled, 1=alarm enabled.
		Sets the value at which the carbon dioxide alarm will be triggered (0 to 100). This will not be shown if the alarms are disabled ("ALEn" or Alarm Enable set to "0").
		Sets the carbon dioxide alarm polarity. 0=low alarm, 1=high alarm. This will not be shown if the alarms are disabled ("ALEn" or Alarm Enable set to "0").
		Selects page (**Page 0, 1**). **Page 1** parameters are password protected. The factory default password is 1234.

Page 2 (password protected. Default password is 1234)		
		Selects whether a password is requested to access menu page 1. 0 is disabled, 1 is enabled.
		Sets the password to access the Page 1 menu.
		Sets the password to access the Page 2 menu.
		Sets the percent concentration of carbon dioxide for calibration using certified gas (15% to 100%).
		Sets the time in 24-hour format (HHMM).
		Sets the date in format DDMM.
		Sets the year four-digit format (YYYY).
		Selects page (**Page 0** or **Page 1**). **Page 1** parameters are password protected. The factory default password is 1234.

4.0 SETTING UP THE GS6000 SERIES ANALYZER

4.1 Setting a New Password for Page 1 or Page 2 Access

By default, the password to access **Pages 1 & 2** is "1234". To change the password, use the menu system (refer to section 3.3) to get to the "PAS1" or "PAS2" (Password 1 or Password 2) parameters on **Page 2** as shown below:

Using the 'Digit Select' and 'Digit Increment' buttons, set the new password to any 4-digit number. Press the 'Enter' button to save. If the password is lost, please contact Systech Illinois for assistance.

It is suggested that the new password is recorded and kept safe.

4.2 Setting Time

Use the menu system (refer to section 3.3) to get to the "tinE" (Time) parameter on **Page 2** as shown below:

The time format displayed on the analyzer is HHMM (hours and minutes) and cannot be changed. Using 'Digit Select' and 'Digit Increment' buttons, set up hours and minutes. Press the 'Enter' button to save.

4.3 Setting Date

Use the menu system (refer to section 3.3) to get to the "dAtE" (Date) parameter on **Page 2** as shown below:

The date format shown above will depend on the format you entered in section 8.1. The default format is "0" – DD/MM. Using the 'Digit Select' and 'Digit Increment' buttons, set the day and month. Press the 'Enter' button to save.

4.4 Setting Year

Use the menu system (refer to section 3.3) to get to the "yEAr" (Year) parameter on **Page 2** as shown below:

Using the 'Digit Select' and 'Digit Increment' buttons, set the year. Press the 'Enter' button to save.

5.0 SETTING UP A TEST

5.1 Enabling Alarms(s) for O_2 and/or CO_2

Use the menu system (refer to section 3.3) to get to the “ALEn” (Alarm Enable) parameter on **Page 1** as shown below:

Using the ‘Digit Select’ and ‘Digit Increment’ buttons, set “1” to enable alarms, or “0” to disable alarms. Press the ‘Enter’ button to save.

5.2 Setting Alarm Levels

Alarms must be enabled to set levels (refer to section 5.1 above). Use the menu system (refer to section 3.3) to get to “AL1” and/or “AL2” (Alarm 1 and/or Alarm 2) parameter(s) on **Page 1** as shown below:

a) The “AL1” (Alarm 1) parameter sets the alarm level for O_2 (GS6500 and GS6600) or for CO2 (GS6700).

Using the ‘Digit Select’ and ‘Digit Increment’ buttons, set alarm 1 to the desired level. Press ‘Enter’ button to save.

b) The “AL2” (Alarm 2) parameter (available only for GS6600) sets the alarm level for CO_2.

Using the ‘Digit Select’ and ‘Digit Increment’ buttons, set alarm 2 to the desired level. Press ‘Enter’ button to save.

5.3 Setting Alarm Polarity Low / Hi

Alarm Polarity is the parameter that sets the alarm condition to trigger either low or high relative to the alarm level selected (see section 5.2) for “AL1” (Alarm 1) and/or “AL2” (Alarm 2 for GS6600).

Alarms must be enabled to set polarity (refer to section 5.1 above). Use the menu system (refer to section 3.3) to get to the “POL1” (Alarm Polarity) parameter on **Page 1** as shown below:

a) “POL1” option sets alarm polarity for O_2 (GS6500 and GS6600) or for CO_2 (GS6700).

Using the ‘Digit Select’ and ‘Digit Increment’ buttons, enter a “0” to set the polarity to low or a “1” to set the polarity too high. Press the ‘Enter’ button to save.

b) “POL2” option (available only for GS6600) sets the alarm polarity for CO_2.

Using the 'Digit Select' and 'Digit Increment' buttons, enter a "0" to set the polarity to low or a "1" to set the polarity too high. Press the 'Enter' button to save.

NOTE: Alarms triggered on the display will also be shown triggered on the printout if the optional printer is connected**.**

5.4 Setting the Test Method

There are several ways the analyzer can be used to measure residual gas in the headspace of MAP packaged products.

The available test methods are:

TIMED
PEAK/VALLEY
AUTOSENSE/CONTINUOUS

5.4.1 Timed

With the timed test method, the test time duration is user-selectable. When the test is started by pressing the green 'TEST' button, the test will run for a fixed period. The reading is displayed during the test and then remains frozen, so the values can be recorded. The internal sampling pump will stop at the end of the test time duration. The test time duration can be defined by the user in the **Page 1** menu.

Test time duration calculation:

The GS6000 analyzers have an approximate flow rate of 60cc/min (1cc/second). Estimate the available headspace volume in cubic centimeters in the package or container to be tested. This number is the approximate maximum test time duration in seconds. For example, if there is 30cc available headspace in the package or container, the maximum test time duration is 30 seconds. It is important not to exceed the maximum calculated test time to avoid the following:

1. Drawing product (particulates, liquids, etc.) into the sampling system.
2. Creating a vacuum within the package or container causing ambient air ingress.
3. Deadheading the pump (blocking the flow).

By default, the test time is set for 20 seconds. Use the menu system (refer to section 3.3) to get to the "teSt" (Test) parameters on **Page 1** as shown below:

Using the 'Digit Select' and 'Digit Increment' buttons, set a new test time in seconds. Press the 'Enter' button to save.

5.4.2 Peak/Valley

In the Peak/Valley test method, the final test result represents a peak or valley reading detected during the test time.

In the Peak/Valley set up page, the test parameters for O_2 and CO_2 can be set. The Peak/Valley is referenced to a normal air measurement, namely 20.9% for O_2 and 0.0% for CO_2. If the package gas is normally lower than 20.9% O_2 and higher than 0.0% CO_2, then the test should be set up for 'valley' on O_2 and 'peak' on CO_2. It should be set up on **Page 1** in "nodE" (mode) menu.

By default, the Peak/Valley method is turned off. To change test method to Peak/Valley using menu system, (refer to section 3.3) get to the “nodE” (mode) options on **Page 0** as shown below.

Using the “Digit Select” and “Digit Increment” buttons, set mode to desired peak / valley setup (refer to menu tables in section 3.3.1 for setup explanations). Press the ‘Enter’ button to save.

5.4.3 Autosense/Continuous

The Autosense test method may be used when measuring many packages. Autosense avoids having to press the ‘TEST’ button to initiate each test.

Autosense is a user-programmable parameter which specifies the delay time between each test in seconds. When Autosense mode is selected for the analyzer and the green ‘TEST’ button is pressed, the first package is tested as described for a timed test. The next test starts after the delay time specified in “Auto” setup on **Page 1**. Upon completion of the first test the user has the specified delay time to withdraw the needle from the first package, prepare and insert the needle into the next package, and so on until all the packages have been measured.

To pause Autosense, press the green ‘TEST’ button or the ‘Enter’ button after the pump stops (before next test starts). Press the green ‘TEST’ button again to re-start Autosense. To completely stop Autosense, change “Auto” in **Page 1** back to “0”.

To change Autosense to Continuous mode, change “Auto” in **Page 1** to “1”. This will cause the pump to run continuously until the green ‘TEST’ button is pressed to stop/start measurements or Autosense is turned off as described above.

By default, Autosense is turned off. To change Test method to Autosense, using menu system (refer to section 3.3) get to the “Auto” options on **Page 1** of menus as shown below:

Using the ‘Digit Select’ and ‘Digit Increment’ buttons, change “Auto” from “0” to the desired time in seconds between consecutive tests. Press the ‘Enter’ button to save. To turn Autosense method off change “Auto” time back to “0”.

5.5 Taking a Measurement

Connect the sampling probe (Wand) to the blue Luer connector on the right side of the instrument and screw hand tight. Connect the disposable filter and a needle to the sampling probe (Wand).
To take a measurement, follow the steps below:

1. Ensure the GS6000 is operational and ready to use, that it has a clean filter, a needle in good condition and sampling probe (wand) with no leaks.

2. Situate the package to be measured in such a way as to maximize the available headspace.

3. Pull the packaging away from its contents to create an area which will be used to accept the needle.

4. Apply an adhesive-backed septum to the area of the package through which the needle will be inserted – ensure the package is clean and dry in the area where the septum is applied (the septum creates a seal around the needle to avoid atmospheric oxygen ingress).

5. Pierce the septum with the needle and keep the needle in the area created, away from the product. Do not allow the needle to exit the other side of the package (if this happens, discard the package and start over with a new one).

6. Set the analyzer test time as mentioned in section 5.4.1. Initiate the measurement by pressing the green 'TEST' button – do not move the needle during the measurement.

7. If the oxygen/carbon dioxide concentration reading is still changing after the test time expires, consider extending the test time as mentioned in 5.4.1.

8. Once the measurement stabilizes, the test is complete. If connected, the external printer will document the test results.

9. Withdraw the needle from the package and place back in the sample probe holder on the side of the analyzer – dispose of tested packages as instructed.

10. Document test results in other ways if so instructed.

11. Visually inspect the upstream side of the filter after each test. If it begins to collect product, exchange it for a new filter. **Passing product through the filter may cause damage to the analyzer which will not be covered under warranty.**

12. Perform an Air Calibration at regular intervals, see section 6.1.

To maximize the uptime of your GS6000 Headspace analyzer, please note the following:

If new analysis cycles continue to be initiated or the test duration is too long, a vacuum will be created within the package which will eventually begin to draw product out of the package or ambient air through the septum – in either case the test has been compromised.

Always use a full septum, not a portion or piece of a septum and do not penetrate a septum more than once.

Replace the filter regularly! Passing product through the filter may cause damage to the analyzer which will not be covered under warranty.

5.6 Additional Test Methods

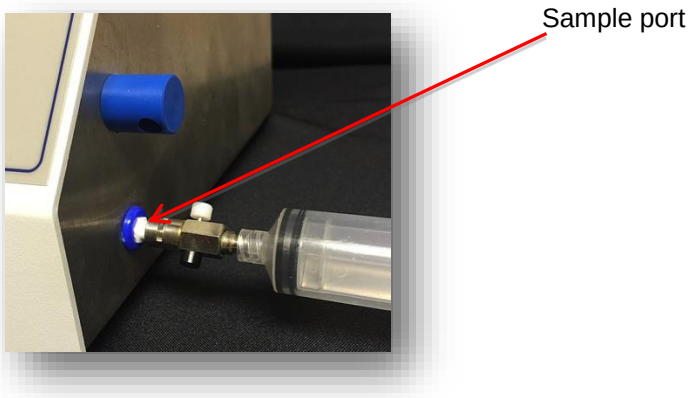
5.6.1 Direct Injection (syringe)

In some cases, the user may elect to collect a sample(s) using a syringe and inject that sample into the analyzer. This can be accomplished using the Direct Injection Option (P/N: 898 011) which includes the syringe (30ml) and the syringe valve.

To prepare the syringe, first connect the filter, valve, and needle to the syringe as shown below. Prepare the package as mentioned above in section 5.5. Collect the sample by opening the syringe valve and pulling back on the plunger after you have inserted the needle into the package. Close the valve prior to withdrawing the needle to capture the sample within the syringe and to prevent contamination.

1. Assemble the syringe as shown below. Note the valve is closed when the black button is against the valve body, and open when the white button is against the valve body.

2. Collect the sample as instructed above.
3. Before you can measure the sample, first remove the needle from the end of the syringe valve. Next, connect the syringe to the sample port (as shown below). Open the valve so the sample may be extracted from the syringe. At this point, you can calculate your test time by noting the amount of sample within the syringe and using the calculation mentioned in section 5.4.1.



4. Press the green 'TEST' button. This will allow the gas in the syringe to be pulled out by the pump inside the instrument. DO NOT push the gas into the instrument. The syringe must not be touched while the test is running.

5.6.2 Testing Rigid Packages

If the test package is made of a material that cannot be penetrated by a needle, then a rigid package and can piercing station can be used. Systech Illinois has several options available for accessing the headspace within rigid packages and cans. Please contact Systech Illinois for more information.

5.7 Filters

A filter should always be used when using the analyzer. This is to prevent dust and moisture from entering the internal gas detection system. Failure to observe this procedure may result in damage to the instrument. The standard filters supplied with the flexible package kit will be suitable for most applications.

The life of a filter is dependent upon many variables such as the volume of testing, test conditions, the product being sampled, user technique, etc. The filter should be changed regularly and not allowed to become saturated or blocked with debris. If the filter becomes blocked (or there is any restriction in the flow to the sample system), a failure message will appear in the instrument display "Prbl" (Sample Probe blocked).

Failure to regularly change the filter will result in dust/liquid becoming visible in the micro bore tube leading to the analyzer. In this case, the Sample Probe (Wand), filter, and needle must be replaced.

Below is the standard filter provided with the analyzer which works well for most applications:

- Part No: PFL-305143 or 100 702 Moisture / particulate filter – 0.2 micron 30mm diameter

The filter below is a better choice for when headspace volume is limited:

- Part No: 101 230 Moisture / particulate filter – 0.2 micron 13mm diameter

Some MAP packaged products may contain constituents which could interfere with the measurement i.e. an understatement of the actual oxygen concentration. The symptom is generally a reading of 0.00. This is caused by trace levels of a flammable gas in a combustible concentration interacting with the Zirconia based oxygen sensor which operates at a high temperature.

In these cases, a charcoal filter should be used which is identified by:

- PFL-400143 Hydrocarbon filter for headspace analysis Small, 0.785 cc

Replace the filter regularly! Passing product through the filter may cause damage to the analyzer which will not be covered under warranty.

6.0 CALIBRATING THE INSTRUMENT

The GS6000 may be calibrated using atmospheric air or by using a certified mixture. All calibrations should be conducted only after the analyzer has warmed up for at least 30 minutes.

Air can be used as the reference gas in virtually all applications. The instrument specifications will be met by using air for calibration. Make sure the sample probe (wand) is in air and the cap is removed from the needle. You may also want to ensure that you have a new/clean filter and needle before performing the calibration.

If using a certified calibration gas, it is advisable to use a gas that is in the same range as will be sampled in testing.

6.1 Calibration with Ambient Air for Oxygen and/or CO_2 (all models)

Press the green 'CAL' button (see section 3.1 Front Panel Controls). This sets the Oxygen value to 20.9%. When calibrating the GS6600 or GS6700, it will also zero the CO_2 reading to 0.0% CO_2.

6.2 Calibration with Certified Calibration Gas

Periodically individual calibrations on O_2 or CO_2 at other concentrations may be required. For gas calibrations, use only certified bottles of gas that are supplied with an analysis certificate.

Note: It is recommended that gas calibrations are carried out at the following levels:

O_2 – between 1% and 10% or between 30% and 100%, in keeping with your packaging requirements.

CO_2 – between 15% and 100%, in keeping with your packaging requirements.

The GS6000 will only allow gas calibrations within the O_2 and CO_2 limits listed above. If you attempt to input a gas value outside the limits, a "CAnt" (Can't) error message will be displayed.

6.2.1 Oxygen Calibration with Certified Calibration Gas (GS6500 & GS6600)

Using a good quality regulator, open the O_2 gas flow and adjust the regulator until you can hear and feel a flow of gas exiting the regulator. The pressure will only need to be approximately 0.1 Barg. Connect a close-fitting flexible tubing to the outlet of the regulator approximately 0.5 meter long.

To perform an O_2 calibration, go to the menu on **Page 2** (see section 3.1 Front Panel Controls) and locate the "OSpn" (Oxygen Span) parameter. Set the O_2 certified concentration using the 'Digit select' and 'Digit increment' buttons.

Pierce the flexible tubing with the sample probe (wand). Be careful not to pierce through both sides of the tubing.

Press the 'TEST' button. The pump will start and the display will flash "Cal". Once the reading stabilizes, press the 'Enter' button. The display will flash "Stor" indicating the analyzer is calibrated. Return to **Page 0** for testing.

6.2.2 Carbon dioxide Calibration Using Certified Calibration Gas (GS6600 & GS6700)

Using a good quality regulator, open the CO_2 gas flow and adjust the regulator until you can hear and feel a flow of gas exiting the regulator. The pressure will only need to be approximately 0.1 Barg. Connect a close-fitting flexible tubing to the outlet of the regulator approximately 0.5 meter long.

To perform a CO_2 calibration, go to the menu on **Page 1** (see section 3.1 Front Panel Controls) and locate the "SAdJ" (Span Adjust) parameter. Set the CO_2 certified concentration using the 'Digit select' and 'Digit increment' buttons.

Pierce the flexible tubing with the sample probe (wand). Be careful not to pierce through both sides of the tubing.

Press the 'TEST' button. The pump will start and the display will flash "Cal". Once the reading stabilizes, press the 'Enter' button. The display will flash "Stor" indicating the analyzer is calibrated. Return to **Page 0** for testing.

7.0 SERIAL COMMUNICATIONS VIA USB

The USB port is a bi-directional high-speed communications port which allows operator intervention via a communication utility called **Systech Illinois Client Utility**. This communication utility is included on the flash drive supplied with the analyzer, along with a USB data connection cable.

If you do not have the flash drive, the software can be downloaded from our website. Please contact Systech Illinois to obtain the utility. The USB data communication cable is a standard USB A to USB B cable.

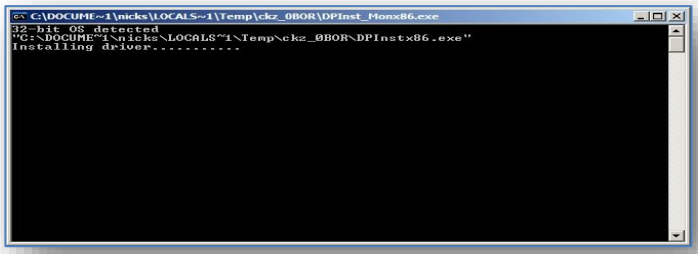
However, before the USB cable is plugged into your PC you **MUST** install the necessary driver software.

7.1 Installing the USB Driver Software

Plug the flash drive into a USB port on a PC. Open the drive directory using Windows Explorer and double click on setup and then click on Client Software as shown below:

You will then be presented with the following screen.

Click on the “USB Driver Installation” button and a window will be shown similar to the one here:

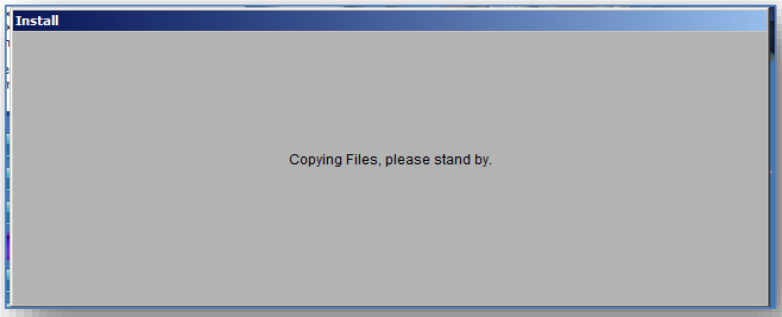


When the driver software has installed, the above window will close and you will be back at the driver installation screen. Click on “Return” and continue with the next section.

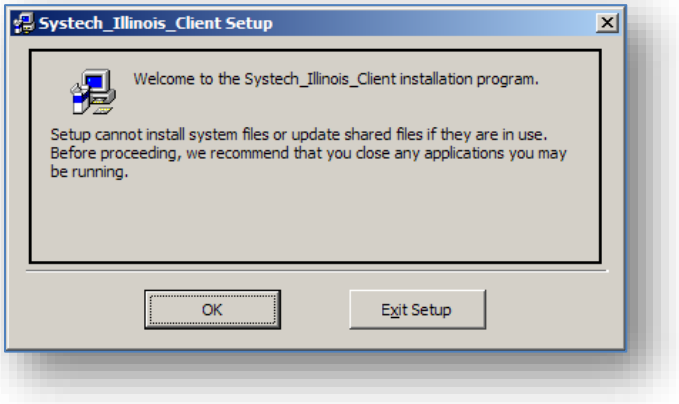
7.2 Installing the Systech Illinois Client Utility Software

From the flash drive distribution screen, click on “Systech Illinois Client Installation” as shown below:

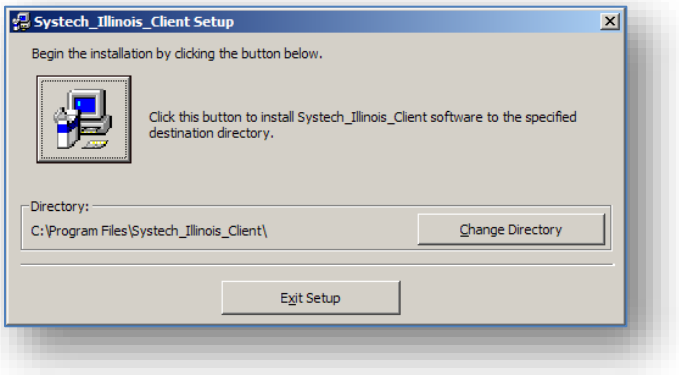
The installation program then starts with the following screen:



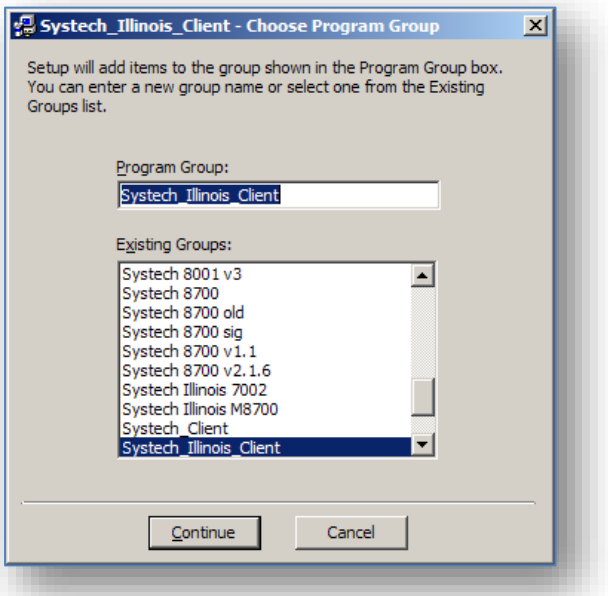
After a short amount of time the following screen is displayed:



Click on OK, then the screen will change to this:



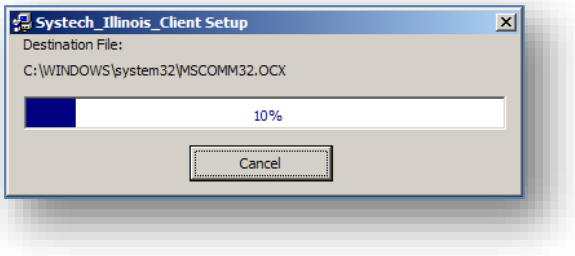
Click on the button shown above to install the Systech Illinois Client Utility software to the specified destination directory. You can at this point select a different folder, however Systech Illinois does not recommend this. You will then be presented with the following screen:



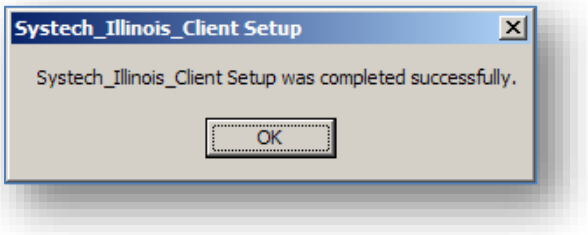
This screen allows you to select or change the program group.

NOTE: Systech Illinois recommends that at this point you accept the default setting and click Continue.

Now the software will commence its installation process with the following screen:



The blue bar shown indicates the installation progress. When it has reached 100% (which only takes a few minutes) you will be presented with this screen (below). This indicates that the software has been installed successfully.



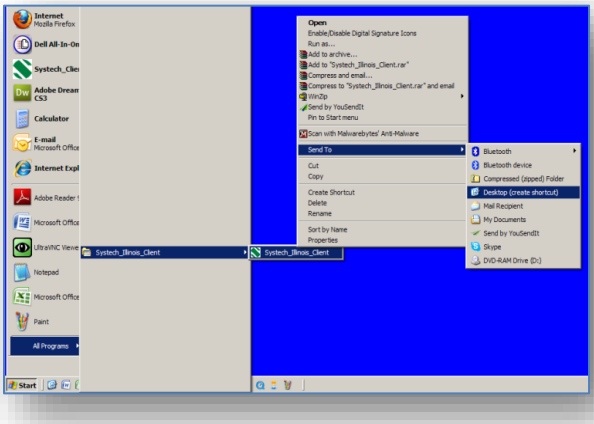
During the installation phase, if you are asked to replace a file on your computer with an older version than the one you have, always keep the newer file.

Creating a Desktop Icon

If you wish to have a desktop icon for the Systech Illinois Client Utility, follow these steps:

Go to “Start”, “All Programs”, “Systech_Illinois_Client”, and right click on “Systech_Illinois_Client”.

Next click on “Send to” and then click on “Desktop (create shortcut)” as shown below. Then an icon will be placed on your desktop to invoke the Systech Illinois Client program.

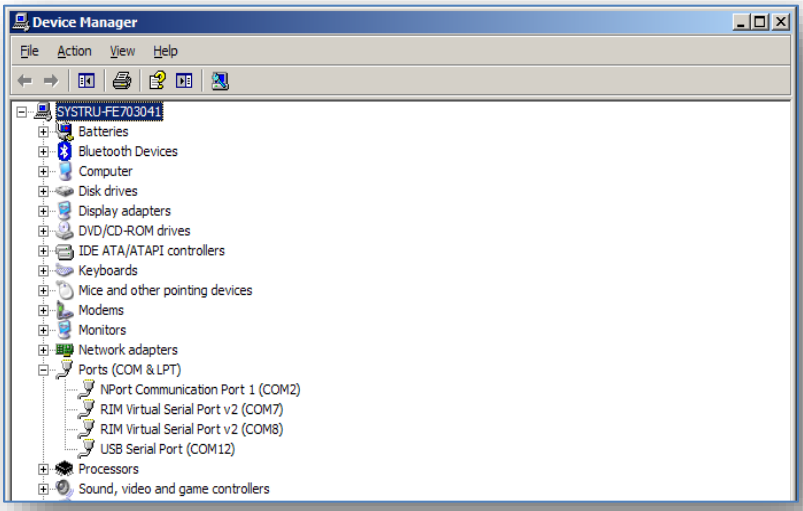


7.3 Determining the Installed COM Port.

When running the software for the first time, determine which COM port has been assigned to the analyzer. **NOTE:** For multiple analyzers connected simultaneously, each will have a different COM port allocation. Systech Illinois Client Utility can only access up to eight COM ports.

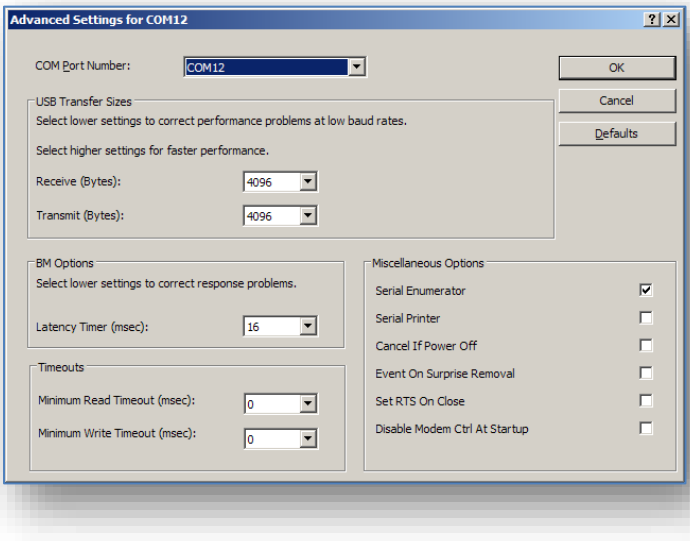
Ensure that the supplied or similar USB cable is connected between the PC and the analyzer.

1. Access the Device Manager in Windows. The screen will be similar to this:

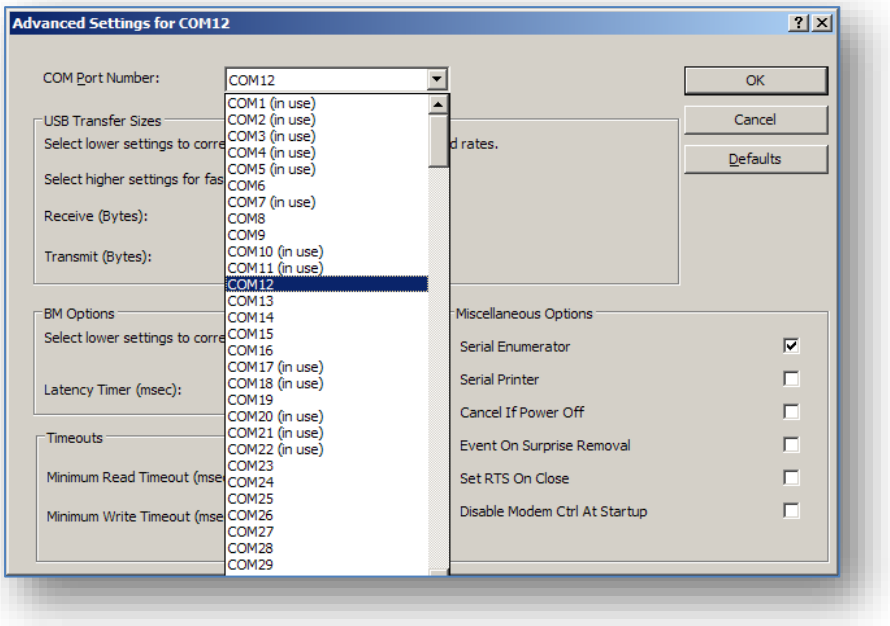


Expand out the “Ports (COM & LPT)” section and you will see an entry for “USB Serial Port” this is the GS6000 Series analyzer. You will note that in the illustration above it has been installed as COM 12. This is not suitable for Systech Illinois Client as it is above COM 8.

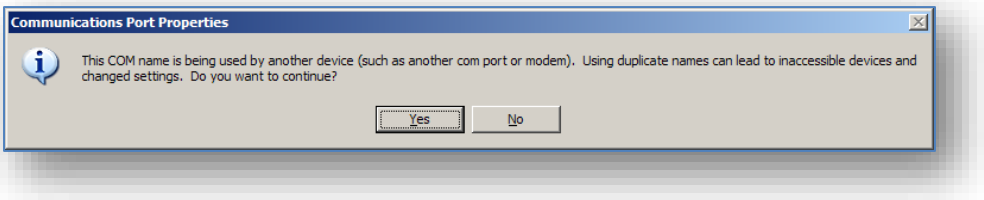
To change this port number, double click on “USB Serial Port”. You should be presented with the following screen.



Click on the downward arrow next to COM12, and you will get a drop down list of all in-use and available ports as shown here:



If, for example, COM 1 is the only physical port installed and in use on the PC, move the USB Serial Port to COM 2. This will be achieved by clicking on COM 2. Then click OK. If the port shows "(in use)" as in this example, the following message will be displayed:



Click "Yes", and then OK, then OK again. Finally, close the "Device Manager" and "Control Panel". The COM port used by the GS6000 Series analyzer will now be set to COM 2.

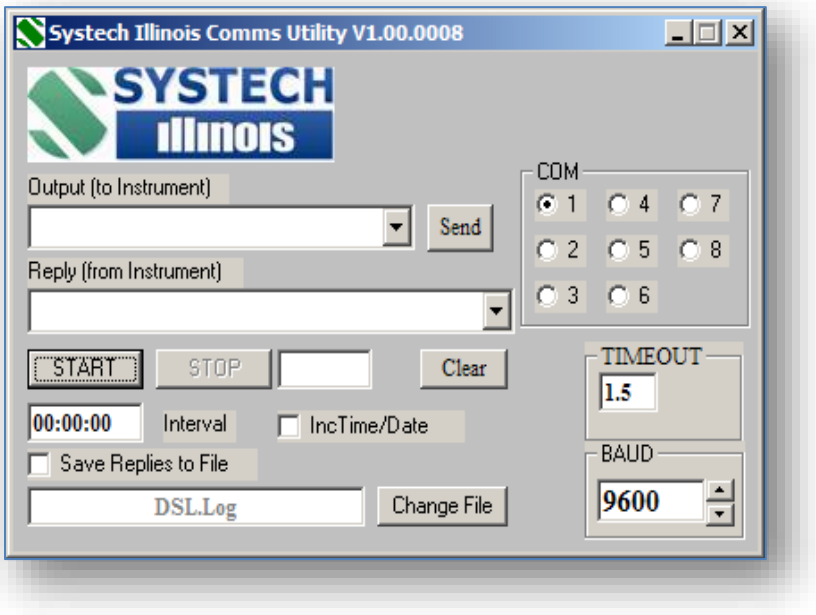
If multiple analyzers are to be connected simultaneously, then you will have to assign a COM port for each. **NOTE:** You can only attach 8 analyzers (COM 1 through 8) simultaneously to the PC and operate / interrogate them with Systech Illinois Client.

7.4 Running the Systech Illinois Client Utility Software.

Ensure that the supplied or similar USB cable is connected between the computer and the GS6000 Series analyzer. Using the Device Manager in Windows, note which COM port is being used for the USB connection.

To Run Systech Illinois Client, either use the SHORTCUT on the desktop or run from the START menu.

When the Systech Illinois Client Utility window is open, you should see the following box:



First select which port the analyzer is connected e.g. COM 1

Type in the correct command from the analyzer commands list (shown below) in the OUTPUT (to instrument) window and hit return or click on “Send”. If communications are OK, then an answer is shown in the REPLY (from instrument) field. Otherwise “TIMEOUT” is shown. This issue could be due to an incorrect COM port selection, a disconnected or faulty USB cable or some other fault. Should a “?1” be shown in the REPLY (from instrument) field, it means that the instrument does not understand the question.

7.5 Communications Commands for the GS6000

COMMAND	PARAMETER	DESCRIPTION
VER?		Reads Firmware Version
TEMP?		Reads cell temperature (degrees Celsius)
SERNO?		Reads analyzer serial number
HDRTXT?		Reads Header text for printout
HDRTXT=		Sets Header text for printout
LINETXT?		Reads Line description for printout
LINETXT=		Sets Line description for printout
PRDTXT?n	n=1 through 9	Reads Product description for printout
PRDTXT=n “aaa”	n=1 through 9	Sets Product description for printout
RTC?		Reads date and time
RTC=dd/mm/yy hh:mm:ss		Sets date and time
RTCPREF?		Reads date and time format preference for printout
RTCPREF=	0 – dd/mm/yy 1 – mm/dd/yy 2 – yy/mm/dd	Sets date and time format preference for printout

8.0 SETTING UP THE OPTIONAL EXTERNAL PRINTER FOR THE GS6000

NOTE: All display pictures in this section reflect GS6600 displays. Refer to section 3.3 tables for GS6500 and GS6700 display pictures.

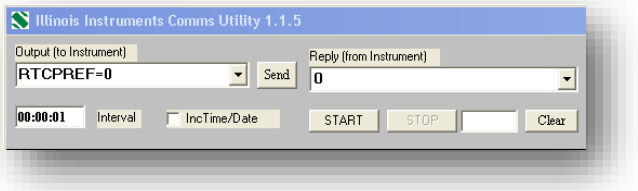
8.1 Setting the Time and Date for Printouts

Besides setting up the time, date, and year as described in section 4.0, it can also be accomplished via the Systech Illinois Client on a PC connected to the analyzer with the provided USB cable.

Use the command RTC= dd/mm/yy hh:mm:ss to re-set the real time clock.

There are three optional date formats for printouts (see section 5.5):

DD/MM/YY - 12/06/15 (format “0”)
MM/DD/YY - 06/12/15 (format “1”)
YY/MM/DD - 15/06/12 (format “2”)

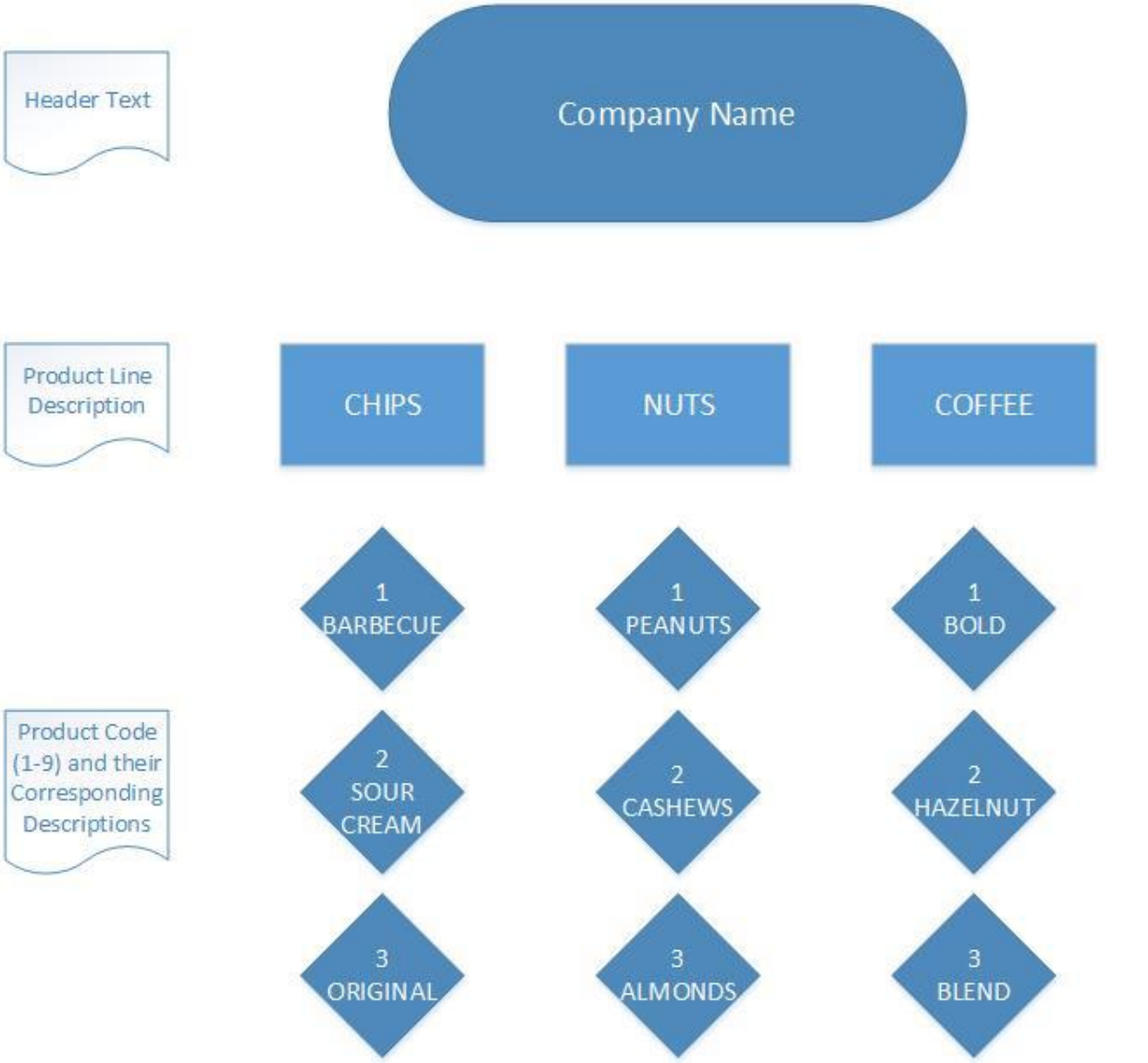


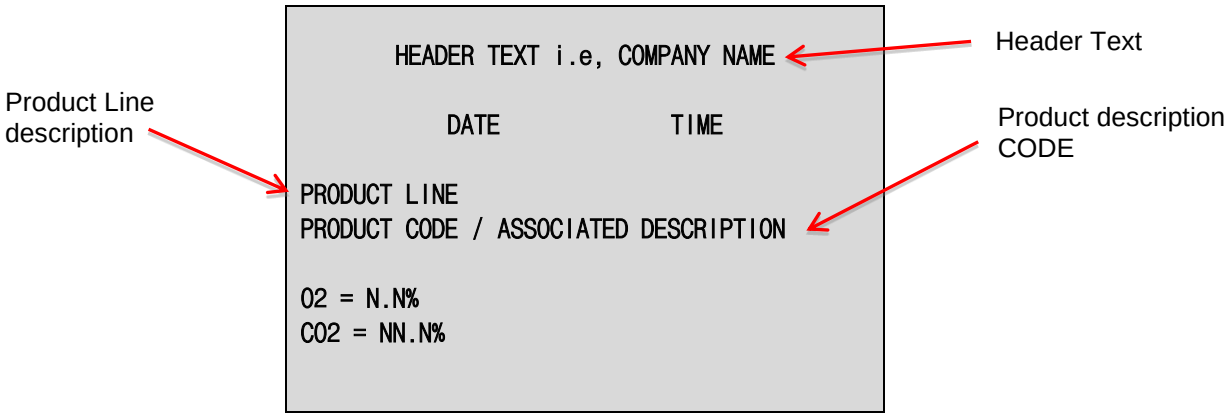
Connect the GS6000 to a computer using the USB cable provided. Start the Systech Illinois Client program. In the “Output (to instrument)” window, key in the preferable format with the command “RTCPREF=0” for DD/MM/YY format and click “send”. The instrument will reply “0” as shown above indicating the acceptance of the command. The formats MM/DD/YY and YY/MM/DD can also be set with the commands “RTCPREF=1” and “RTCPREF=2” respectively.

8.2 Setting the Product Code and Description for Printouts

If you want to print only your test results, simply connect the optional printer. See section 9.1 for more information.

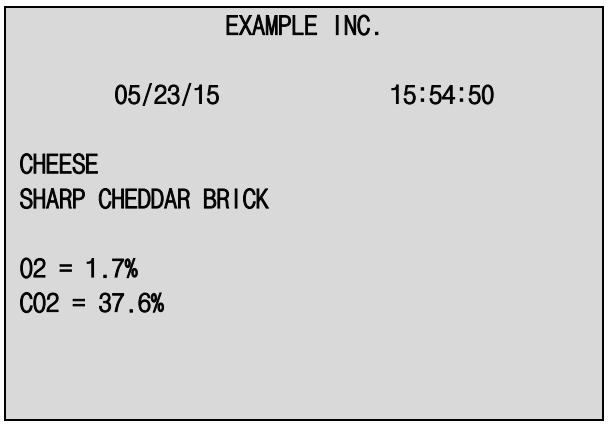
If printing a product description along with the result is needed, a user will first need to set up the product code via the analyzer keypad and its corresponding description via the Systech Illinois Client Utility on a PC connected to the analyzer with a USB cable (see section 7.0). You can also enter a Line Description and the Header Text for the printout using the Systech Illinois Client Utility.
NOTE: Remember to select the appropriate product code prior to taking a measurement.


Header Text
Company Name
Product Line Description
CHIPS
NUTS
COFFEE
1 BARBECUE
1 PEANUTS
1 BOLD
Product Code (1-9) and their Corresponding Descriptions
2 SOUR CREAM
2 CASHEWS
2 HAZELNUT
3 ORIGINAL
3 ALMONDS
3 BLEND


HEADER TEXT i.e, COMPANY NAME
DATE TIME
PRODUCT LINE
PRODUCT CODE / ASSOCIATED DESCRIPTION
O2 = N.N%
CO2 = NN.N%
Header Text
Product Line description
Product description CODE

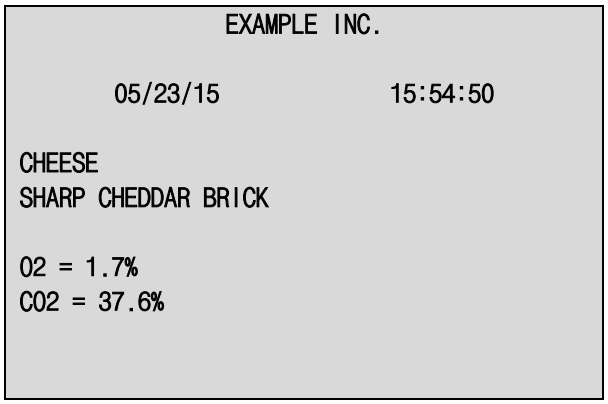
8.2.1 Changing Header Text on Printouts

Connect the GS6000 Series analyzer to a PC using the provided USB cable. Start the Systech Illinois Client Utility. In the “Output (to instrument)” window, key in the command “HDRTXT=aaa”, where aaa is the header text. If you are using the printer, the description will be printed out as shown below (“EXAMPLE INC.” in this example) after a test has been performed.



8.2.2 Entering Product Line Description

Connect the GS6000 Series analyzer to a PC using the provided USB cable. Start the Systech Illinois Client Utility. In the “Output (to instrument)” window, key in the command “LINETXT=aaa”, where aaa is the product line description. If you are using the printer, the description (“CHEESE” in this example) will be printed out as shown below after a test has been performed.



8.2.3 Choosing the Product Code

A user may enter up to nine product codes (1 through 9).

Use the menu system (refer to section 3.3) to get to the “Prod” (Product Code) parameter on **Page 0** as shown below:

Using the ‘Digit Select’ and ‘Digit Increment’ buttons, enter a “1” (1 through 9) to set the product code. Press the ‘Enter’ button to save.

8.2.4 Entering Descriptions for Corresponding Product Codes

Connect the GS6000 Series analyzer to a PC using the provided USB cable. Start the Systech Illinois Client Utility. In the “Output (to instrument)” window, key in the command “PRDTXT=n aaa”, where n is product code and aaa is a description of the corresponding product. **NOTE:** Remember to include a space between the product code (n) and its description (aaa). There is no restriction on the length of the description. If you are using the printer, the description (“SOUR CREAM FAMILY SIZE” in this example) will be printed out as shown below after a test has been performed.

```
                EXAMPLE INC.

        05/23/15            15:54:50

CHIPS
SOUR CREAM FAMILY SIZE

O2 = 1.2%
```

9.0 PRINTER REPORTS

Optional external printer will be supplied if ordered.

Connect the printer to the 9-pin connector on the back of the GS6000 Series analyzer and turn it on.

NOTE: All printouts in this section reflect GS6600

9.1 Test report

By connecting a printer to the analyzer, it is possible to obtain a printed report of the test results. The format of the test report is as follows:

```
                EXAMPLE INC.

       05/23/15              15:54:50

CHIPS
SOUR CREAM FAMILY SIZE

O2 = 1.2%
```

After the test is finished, the results will be sent to the printer automatically. The “<FAIL>” will only be printed if an alarm condition has been set and met.

9.2 Calibration Report

By connecting a printer to the analyzer, it is possible to obtain a Calibration Report. The format of the calibration report is as follows:

```
                EXAMPLE INC
        05/23/15            15:54:50


Calibration Results:

O2 before = 20.9%
O2 after =  20.9%

CO2 before = 0.0%
CO2 after =  0.0%



Sign_____________________________
```

After Calibration is finished Calibration results will be sent to the printer.

9.3 Analyzer Status Report

An Analyzer Status Report prints all the current settings of your analyzer. By connecting a printer to the analyzer, it is possible to obtain an Analyzer Status Report. The report is printed whenever the 'Enter' button is pushed. The format of this report is as follows:

```
                EXAMPLE INC.

        05/23/15            15:54:50

Status Print:

ZERO (O2) = 0.000000
SPAN (O2) = 1.000000
ZERO (CO2) = 1.114000
SPAN (CO2) = 11.419998
Temp' r = 670.0C
CAL (O2) = 20.9%
CAL (CO2) = 0.0%
TEST (secs) = 11
O2 VALLEY selected
CO2 PEAK selected
```

10.0 ERROR / MESSAGE CODES

If a fault is detected, a message will appear on the instruments' display. A table follows that lists these fault messages along with their descriptions.

FAULT MESSAGE	DESCRIPTION
HEAT	Instrument is in heating mode. Furnace temperature has not yet reached operating temperature.
F-LO	Low furnace temperature alarm. Furnace temperature has fallen below operating temperature, flow through the analyzer is too high, or the furnace has failed.
F-HI	High furnace temperature alarm. Furnace temperature has risen above operating temperature.
F-tc	Thermocouple failure.
Err	Signifies error in inputting new data.
Cant	Indicates instrument cannot calibrate to the value entered in "CAL", or function is not allowed when in menu.
Prnc	Probe is not connected.
Prbl	Probe is blocked.

11.0 WARRANTY

This Instrument is guaranteed for a period of one year from its delivery to the purchaser, covering faulty workmanship and replacement of defective parts. This assumes fair wear and tear and usage specified on the data sheet. It does not cover routine calibration and housekeeping.

Warranty covers parts and labor on a “return to base” basis. Any on-site warranty visits may be chargeable in terms of travel and expenses.

We maintain comprehensive after sales facilities and the instrument should be returned to our factory for repair, servicing or routine calibration if this is necessary. Service agreements are available and can include routine maintenance at the customer’s premises. Please contact Systech Illinois for more details.

The type and serial number of the instrument should always be quoted, together with full details of any fault.

All service and technical inquiries are covered from our factories in Thame, Oxfordshire, and Johnsburg, Illinois where we will endeavor to give a quick and helpful response to all queries. We are happy to quote for routine servicing or maintenance of the equipment at the customer's premises.

The factory addresses are:

Illinois Instruments, Inc. (U.S.)
2401 Hiller Ridge Road,
Johnsburg, IL 60051
Tel: +1 815 344 6212
sales.usa@systechillinois.com
support.usa@systechillinois.com

Systech Instruments Ltd
17 Thame Park Business Centre
Wenman Road, Thame
Oxfordshire OX9 3XA
Tel: +44 (0) 1844 216838
sales.uk@systechillinois.com
support.uk@systechillinois.com

For customers outside the UK or USA, please contact us for information regarding your local representative. Alternatively check out our website:

www.systechillinois.com

12.0 TECHNICAL SPECIFICATIONS

RANGE:	GS6500:	O_2, 0.001% - 100%
	GS6700:	CO_2, 0.1% - 100%
	GS6600:	O_2, 0.001% - 100% CO_2, 0.1% - 100%
DISPLAY:	LED	
ACCURACY:	O_2:	±2% of reading at constant temperature, after calibration Stability: Better than ±2% of reading per month Repeatability: Better than ±2% of reading
	CO_2:	± 2% of range
SUITABLE GASES:	All inert gases	
AMBIENT TEMP:	41 to 104 ^oF (+5 to 40^oC)	
SIZE:	13.5 W x 11.5 D x 5.7 H inches (340W x 145H x 290D mm)	
WEIGHT:	9 lbs (4 Kg)	
POWER:	90 – 264 VAC, 50/60Hz at 60VA	
ALARMS:	User configurable, on screen and printed	
COMMUNICATIONS:	USB interface allows connection to computer for configuration.	

13.0 SPARES & ACCESSORIES

13.1 General Spare Parts List

PART NUMBER	DESCRIPTION
898 624	Assembly Needle Probe (Sampling Wand)
PFL-305143/100 702	Filter (min order, 25)
PFL-460143/101 059	Filter Hydrocarbon, Large 2.35 cc
100 560	Needle orange 25G 5.8 .5x 16mm
PPL-193456/891 065	Septa, Self-Adhesive (100 no.)
PSM-100000	Syringe 30ml
100 561	Syringe 10ml
100 557	Minert Valve on/off luer
810 046	CPU PCB
898 640	Assy Zirconia Probe
PHT-011034	Cable, Coiled Heater, 24 VDC
900 213	Power Supply Universal 12 VDC
900 214	Power Supply Universal 24 VDC

13.2 Options Spare Parts List

PART NUMBER	DESCRIPTION
898 067	Rigid package and can piercing station.
898 041	Carrying Case Aluminium Framed
898 051	Printer Paper Roll Spare
OPT-6000-PRN	Printer Option
898 011	Direct Injection Option

Calibration gas kits Include; compact 20 litre gas cylinder and regulator / flowmeter. (See shipping note below)

PART NUMBER	DESCRIPTION
898 080	with 100% CO_2 gas mixture
898 082	with 30% CO_2, 2% O_2, balance N_2
101 657	Gas can only, 100% C O_2
101 659	Gas can only, 30% CO_2, 2% O_2, balance N_2 mixture
101 660	Regulator flowmeter for gas cans

NOTE: Special arrangements exist for shipping gas cans (by road only). Contact Systech Illinois for more information and prices.