Series 9000 THA
Total Hydrocarbon Analyzer
Installation and User's Manual

143-151 Rev. D

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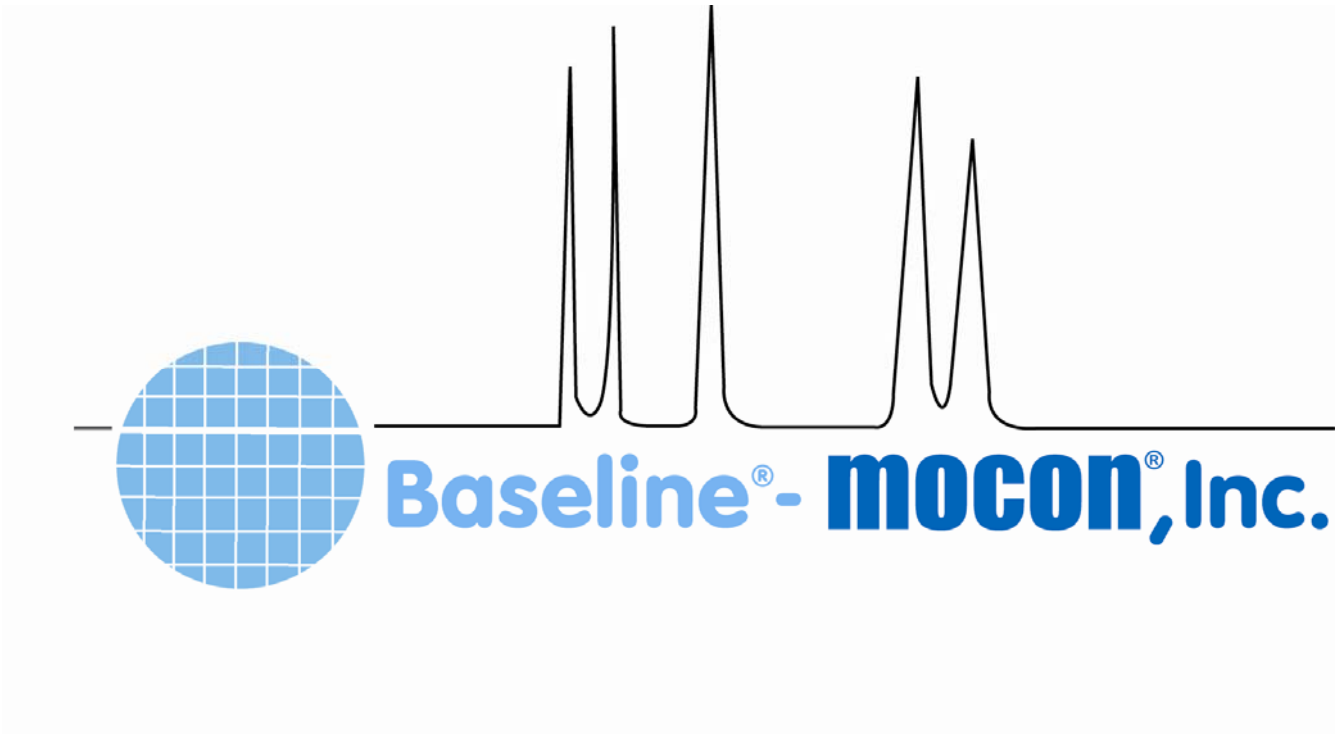

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WARNING:

FOR SAFETY REASONS, ONLY QUALIFIED PERSONNEL SHOULD OPERATE THIS EQUIPMENT.

The Series 9000 Total Hydrocarbon Analyzer contains no user-serviceable parts. The interior of the instrument should not be accessed by anyone other than a Baseline authorized technician. Repair or alteration of the instrument beyond the scope of the instruction manual, by anyone other than a person authorized by Baseline®-MOCON®, could cause the analyzer to fail to perform as designed. When needed, use only genuine Baseline® replacement parts. Substitution of components can impair instrument performance, alter its safety characteristics, or void agency approvals.

In the US, contact your nearest stocking location by dialing 1-800-321-4665.

Table of Contents

Section 1 – Overview and installation

1.1 Introduction

The Series 9000 Total Hydrocarbon Analyzer is suitable for industrial and environmental applications. The instrument can be purchased in a variety of configurations. Your instrument has been built to your specifications.

An appendix section has been added to the back of this manual for your reference. Become familiar with this section, as it will be referenced through out this manual.

Important Note

Your instrument has been configured specifically for your application. Do not change programmed values before reading and understanding this manual. If the material presented here is unclear or conflicts with other information call the Baseline service department for clarification and/or resolution.

1.2 Safety Documentation

Warnings & Cautions

WARNINGS

WARNING:

For safety reasons, only qualified personnel should operate this equipment.

WARNING:

The Series 9000 Analyzer contains no user-serviceable parts. The interior of the instrument should not be accessed by anyone other than a Baseline® authorized technician.

Repair or alteration of the instrument beyond the scope of the instruction manual, by anyone other than a person authorized by Baseline® - MOCON®, could cause the analyzer to fail to perform as designed. When needed, use only genuine Baseline® replacement parts. Substitution of components can impair instrument performance, alter its safety characteristics, or void agency approvals.

WARNING:

The interior of the instrument should not be accessed by anyone other than a Baseline® authorized technician. Never remove any of the instrument case covers while the unit is connected to an AC power source. While energized, high-voltage circuitry within the unit presents a shock hazard that could endanger the operator.

WARNING:

Never connect the analyzer directly to a gas source that is not pressure regulated. Over pressurization of the manifold could cause the manifold to fail, which could result in the release of explosive gases.

WARNING:

The Series 9000 Analyzer uses pressurized gases and an FID (Flame Ionization Detector) to perform the analyses.

Only experienced technicians should handle pressurized and flammable gases. Careless attachment or over-pressurization of support or sample gas lines can create a safety hazard and damage the analyzer.

Before attaching anything to the inlet or vent ports, refer to the table of gas pressures and flows and your plumbing diagram located in the appendix.

Damage incurred to the instrument caused by faulty installation is not covered by the instrument warranty.

WARNING:

Observe the maximum operating temperature of all temperature zones (listed in the appendix).

WARNING:

To maximize the performance and longevity of your analyzer, observe the operating and sample specifications listed in the appendix.

WARNING:

For continued protection against risk of fire, replace only with fuse of the specified type and current rating.

AVERTISSEMENTS

AVERTISSEMENT:

Pour des raisons de sécurité, seules des personnes dûment qualifiées sont habilitées à travailler avec cet analyseur.

AVERTISSEMENT:

L'analyseur modèle 9000 ne contient aucune pièce susceptible d'être changée par le client. Seules des personnes dûment habilitées par BASELINE® peuvent accéder à l'intérieur de l'analyseur 9000. La réparation ou l'altération de l'analyseur au delà des spécifications décrites dans le manuel par toute personne. non-autorisée par Baseline®- MOCON® pourrait empêcher l'analyseur de fonctionner normalement. Lorsque cela est nécessaire, n'utilisez que des pièces d'origine BASELINE®. Le remplacement de certains composants peut détériorer les performances de l'analyseur, altérer ses caractéristiques ou invalider les éventuels certificats.

AVERTISSEMENT:

Seules des personnes dûment habilitées par BASELINE® peuvent accéder à l'intérieur de l'analyseur 9000. Ne jamais ôter une partie quelconque du châssis de l'analyseur lorsque ce dernier est connecté à une alimentation électrique. En effet, lorsqu'il est connecté, des circuits électriques sous haute tension peuvent gravement électrocuter toute personne qui manipulerait l'appareil.

AVERTISSEMENT:

Ne jamais connecter l'analyseur directement à une alimentation de gaz qui ne soit pas régulée en pression. Une surpression du manifold peut endommager ce dernier ce qui pourrait engendrer un dégagement de gaz explosifs.

AVERTISSEMENT:

L'analyseur FID Modèle 9000 utilise du gaz sous pression ainsi qu'un FID (Détecteur à Ionisation de Flamme) pour fonctionner.

Seuls des personnes expérimentées doivent manipuler les gaz sous pression et les gaz explosifs. Un mauvais accrochage ou une surpressurisation des lignes de gaz support ou du gaz échantillon peuvent mettre en péril la sécurité et endommager l'analyseur. Avant de relier quoi que ce soit aux ports entrée ou sortie gaz, veuillez consulter la table des pressions et débits admissibles ainsi que le schéma fluide situé en annexe. La garantie ne couvre pas les dommages causés à l'analyseur du fait d'une mauvaise.

AVERTISSEMENT:

Veuillez respecter les températures de fonctionnement maximum des différentes zones listées dans l'annexe.

AVERTISSEMENT:

Pour obtenir les meilleures spécifications et augmenter la durée de vie de votre analyseur, veuillez respecter les conditions opératoires et les spécifications de l'échantillon (voir annexe).

AVERTISSEMENT:

Pour assurer la protection continue contre les risques d'incendie, ne remplacer oue par un fusible de type et de courant nominal specifies.

1.3 Theory of Operation

FID Theory

The Series 9000 Total Hydrocarbon Analyzer is configured with a flame ionization detector (FID).

This detector uses a flame produced by the combustion of a fuel gas and air. When an organic compound enters the flame it is ionized. This results in the production of electrons and positive ions. The stream of freed electrons is directed to a measuring circuit by a polarizing electrode within the detector. The measurement circuit senses the electron stream as a current that is proportional to the amount of organic compound in the flame. This current measurement is reported as a concentration by the analyzer.

Plumbing

The Series 9000 Total Hydrocarbon Analyzer uses the flame ionization detector in a continuous mode to sense the presence of hydrocarbons in the sample stream. Continuous analysis provides a "total" reading. This implies, and indeed means, that the concentration values or even the presence of **specific** substances cannot be determined. Refer to the appendix for the internal plumbing diagram of your instrument.

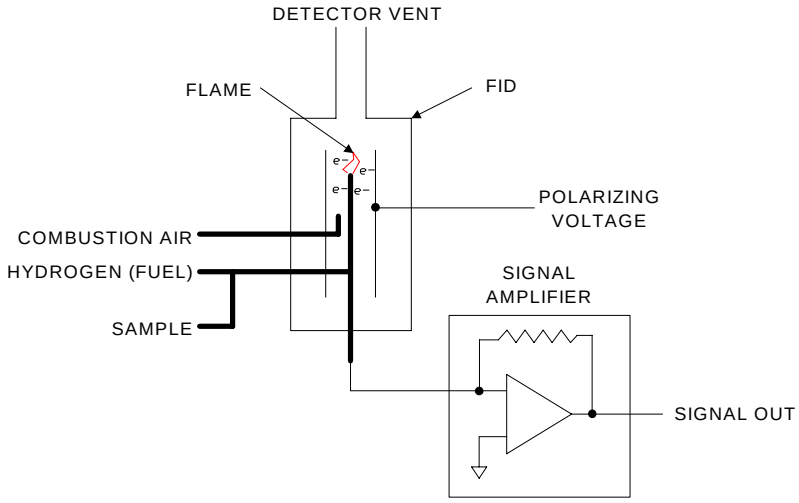


Figure 1-1. Series 9000 THA FID Diagram

1.4 System Electronics - General Information

System Configurations

Each system contains a power supply, motherboard, and a detector support module. Optional equipment includes support for sample and calibration valves, relays, and 0-20mA outputs.

All system electronic circuit cards are connected through a serial communication bus. This allows the system components to be arranged in a variety of configurations.

Communications

The Series 9000 platform provides access to certain operating parameters and concentration data through an RS-232 and Ethernet interface. A simple ASCII, tab delimited protocol has been implemented. External personal computers can acquire analytical information from the analyzer using a simple communications program such as Windows Hyper Terminal.

A full description of the RS-232 and Ethernet output can be found in Section 6 of this manual.

1.5 Installing the Analyzer

Unpacking

1. Remove the analyzer from the shipping box.

   Inspect the pneumatic connections, front panel, and case, to verify that the instrument was received in good condition. The analyzer kit contains the following items:

   - Series 9000 Total Hydrocarbon Analyzer
   - User's Manual
   - Power Cord
   - Certified Test Report

   Be sure your kit is complete before proceeding.

2. Familiarize yourself with the front panel of the analyzer.

   The front panel features a graphical display, and a keypad. The display is used in conjunction with the keypad to operate the instrument and report analytical results.

3. Familiarize yourself with the back panel of the analyzer.

   Looking at the back panel of the instrument, gas ports and vents are located on the left side and electrical connections are on the right.

   Refer to the appendix for back panel diagram.

Installation Notes

The following instructions will guide the user through the installation of the analyzer.

1. Evaluate the installation site.

   The analyzer has an operating temperature range of 32-104^{O}F (0-40^{O}C). Verify that the installation site will not exceed this range.

2. Verify that the installation site will provide sufficient clearance around the analyzer.

3. Instrument rack mount ears can not be used as the sole hardware for cabinet or enclosure mounting, slide rails must be used or instrument damage can occur.

4. Locate all rear panel gas connections. Connect all gas lines as shown on your plumbing diagram.

   A step-down regulator must be placed in pressurized gas streams to avoid damage to the instruments internal gas manifold. Refer to the gas pressures table (located in the appendix) to determine the correct inlet pressures for your analyzer.

   Exhaust all vents at ambient pressure. ***Never attach a pressurized line to an analyzer vent. Doing so will damage the analyzer.***

   Depending on the application and the toxicity of the sample gas or gases, all vents should be routed to a safe location. Flows rates and functions of vents are shown on your plumbing diagram.

5. If applicable connect the instrument outputs as they are documented in the appendix.

   Note that the event mapping for each relay is defined using the system software. (Refer to *Section 4: Operating the Analyzer, Setup Mode* for detailed instructions.)

6. Attach the AC power cord. AC power service needs to be (115/230VAC, 50/60Hz, 3 Amp).

7. Once the installation is complete, proceed to Section 2 of this manual.

Section 2 – Instrument Operation

2.1 User Interface

The Series 9000 Analyzer is a microprocessor-based instrument controlled by its internal system software. The software receives your instructions directly, using the buttons on the front panel.

WARNING:

Be sure you have completed the installation procedure described in Section 1 of this manual prior to starting the analyzer. Improper installation of the analyzer can cause damage to the instrument and potentially endanger the safety of the operator.

Description of the Front Panel Interface

The front panel interface consists of a graphic display, and a keypad. The display is used in conjunction with the keypad to operate the system. It communicates analytical results and provides the on-screen prompts necessary to guide you through the software menu's Main Screen

When the analyzer is turned on and the instrument has reached operating temperature, the Main screen opens automatically. The primary function of the Main screen is to display analytical results and alarms.

The Main screen is formatted so that the parameters monitored by the instrument are reported clearly and consistently.

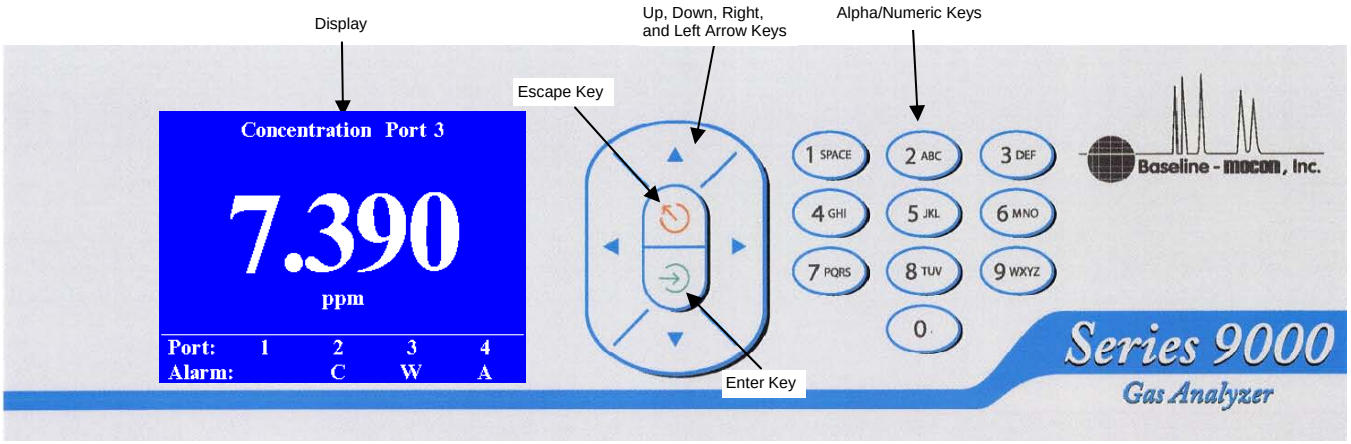


Figure 2-1. Front Panel Interface

2.2 Main Screen

Reading the Detector Signal & Port ID

The title at the top of the display indicates which port is currently being sampled if configured with the four port option. The measured concentration is displayed in large

numbers in the middle of the screen and directly below is the unit of measurement for the concentration value.

Concentration & Status Messages

The analyzer will periodically report results, internal events, and system alarms on the Main screen.

In the normal state, the real-time concentration for the active port is reported on the Main screen.

If a system alarm or other internal event occurs, the concentration is replaced by an on-screen message that indicates the occurrence of the event being monitored. Events that appear in the Main screen are listed below.

Main Screen Events

- **Automatic CAL** Indicates that an automatic calibration is taking place.
- **Sample Purge** Indicates that the analyzer is purging the sample line of residual gas. The unit automatically purges the line after switching sample ports.
- **Temperature Alarm** Indicates that a temperature controlled zone has deviated significantly from its set point or the instrument is in the process of warming up.
- **Flow Alarm** Indicates that the electronic flow sensors have detected a significant change in the fuel, air or sample flow.
- **Flameout Alarm** Indicates that the auto ignition sequence has failed, or that the FID flame has been extinguished in the active detector.

Main Screen Concentration Alarms

Located at the bottom of the screen is the number of ports as well as any alarms associated with the individual ports. If the analyzer is configured as a single port, only the concentration alarm will be displayed.

Concentration alarm flags are displayed in the lower portion of the screen. If an alarm is active on a given port, a one letter code indicating the alarm threshold violated will display directly below the port where the alarm was detected. The alarm codes are: "C" for Caution; "W" for Warning; "A" for Alarm level. In figure 2-1, an active alarm condition is being reported on port two, three, and four.

2.3 Main Screen States

The Main screen can be in one of two states, Normal or Alarmed.

Main Screen in the Normal State

When the Main screen is in the *Normal* state, there are no active concentration or system alarms.

In the Normal state, pressing either the left arrow or the right arrow button will open the Main menu. The Main menu is a top-level menu that allows you to initiate one of three lower-level menus: Operation, Calibration, or Setup menu. These selections are detailed in the M*ain Menu* subsection coming up.

Main Screen in the Alarmed State

When the Main screen is in the *Alarm* state, a concentration or system alarm is active. In the Alarm state, pressing either the left arrow or the right arrow button will open the Main menu.

A concentration or system alarm can be acknowledged by going to "Operation\Reset Alarms" in the menu system and pressing "Enter". Once a concentration alarm is acknowledged, the alarm code below the affected port will still be displayed until the alarm condition no longer exists; however, any audible alarms or relays mapped to the alarm will be deactivated.

Note that if multiple alarm thresholds are violated on a given port, the software displays the alarm code associated with the highest alarm level violated. The software uses the concentration alarm hierarchy shown below.

Caution - Lowest Priority

Warning - Medium Priority

Alarm - Highest Priority

For example, if a sudden spike of the monitored substance was detected in the sample stream directed to port two, all alarm thresholds could be violated. In this case, the software would indicate the violations with the alarm code "A" indicating the highest alarm threshold violated in this incident. If you opt to reset the alarm, all alarm conditions would be acknowledged. Following a reset, the Main screen reopens.

2.4 Menu Structure

The analyzer receives its instructions from the front panel keypad. The functions of the keys are as follows:

Arrow Keys - Used to navigate throughout the menu. Typically in a dialog window the left arrow is used to remove a value and the right arrow is used to move to the next field. The up and down arrows may also be used to move vertically in some dialog windows.

Enter Key - Used to select a menu item or to save a parameter.

Escape Key - Used to go back to the previous menu.

Alpha/Numeric Keys - Used to enter information required in dialog windows.

If enabled in the setup mode, each time a pressed button is detected the system will issue an audible beep. As you move through the software, the display will update to indicate the choices available at that point in the software. At the bottom of the display in a dialog window there is a message that indicates what key is used to execute the functions in the window.

Menu Navigation – To access lower-level menus:

1. From the Main screen, press (← or →) to open the Main menu.
2. Press (← or →) until the pull-down menu desired is shown.
3. Press (↑ or ↓) to highlight the desired option and press "Enter" to select.

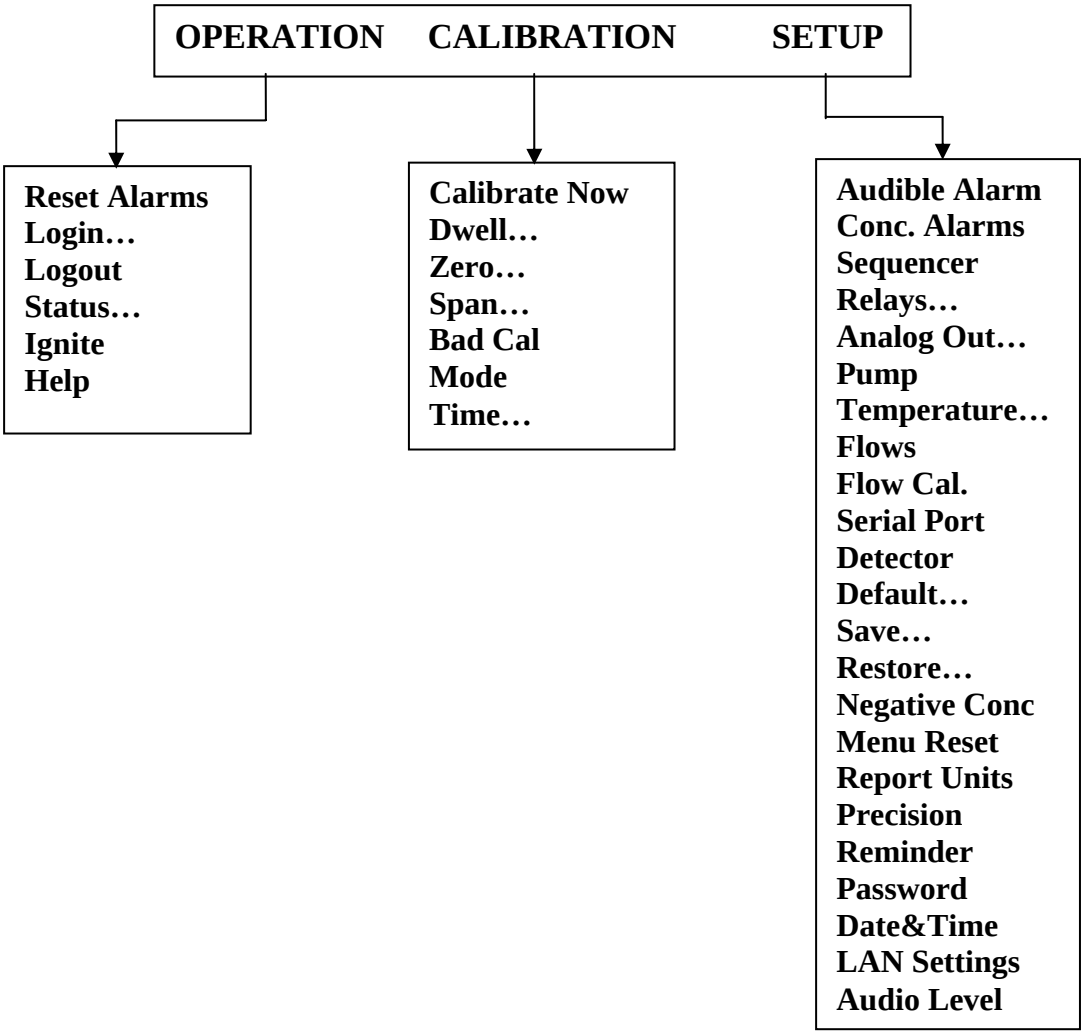


Figure 2-2. Main Software Tree

2.5 Main Menu

Selections in the Main menu are divided into three sub-menus: Operation, Calibration and Setup.

OPERATION

The options in the Operation menu are the basic options that an operator might use on a daily basis. These options include a Reset Alarm option, Login/Logout option, System Status, and Help screens.

CALIBRATION

The options in the Calibration menu are for the setup and operation of the detector calibration. The Calibration menu will be discussed in greater detail in section 4.

SETUP

The options in the Setup menu is where the parameters associated with the analyzer, including relays, pumps and other devices, are configured. The Setup menu will be discussed in greater detail in section 5.

2.6 Analyzer Startup

The steps documented in this subsection assume some familiarity with the operating software and interface. If you are not familiar with the Main screen, alarm prompts, and basic menu structure of the software, review the interface overview presented in the front of this section prior to startup.

2.7 Startup Instructions

IMPORTANT WARNING:

Be sure you have completed the installation procedure described in Section 1 of this manual prior to starting the analyzer. Improper installation of the analyzer can cause damage to the analyzer, and potentially endanger the safety of the operator.

1. Turn on the support, and sample gas flows to the analyzer. Verify that the inlet pressures are adjusted according to the recommended inlet pressures listed in the appendices.

   WARNING:

   Operating the analyzer without support gases may cause permanent damage to the analyzer.

2. Turn the power switch (located at the back of the analyzer) on.

   When the software initializes, the software version is briefly reported on the screen. Following this prompt, the Main screen opens.

3. Verify the operating temperature in the Temperature Setup screen matches the temperature settings listed in the appendices.

4. Open the Flow Setup screen and verify that the support and sample gas flows are set as described in the appendix.

5. Define the concentration alarms as desired. (Procedure documented in *Section 5*.)

6. define the configuration of the relays and analog output(s). (Procedure documented in *Section 5*.)

7. The analyzer goes through a sequence of events from power-on to normal operation. These events are as follows:

   a. The Main screen will typically open with a message to wait for the temperature. The warm-up period for the analyzer is typically between 15-20 minutes.

   b. After reaching its operating temperature the analyzer will turn on the Fuel, Air, and Sample flows to the detector. During this time the Main screen will display a message to wait for the flows. The time for the flows to stabilize is less than a minute.

   c. After the flows have stabilized the analyzer will ignite the flame. During this time the Main screen will display a message to wait for flame ignition.

   d. After the flame has successfully been ignited the Main screen will display the sample purge screen and then change to the normal operating Main screen.

Note: Wait a minimum of one hour to allow the analyzer to stabilize before performing a calibration.

8. Calibrate the analyzer as described in *Section 4.*

   Following calibration the analyzer should be reporting accurate, real-time readings.

2.8 Startup Trouble Shooting

If the analyzer continues to display an alarm prompt after a reasonable warm-up period, follow the steps documented below for the active alarm.

Temperature Message

A temperature message indicates that the unit has deviated from the current temperature setting or failed to reach its operating temperature.

1. Verify that the analyzer feels warm at the back panel near the detector vent.

   If the unit is warm, go into Operation mode and look at the current temperature reported in the "Status…" screen. The analyzer will initiate an alarm whenever the current temperature differs from the target temperature by more than 10%. Typically the temperature is set to 65°C.

2. If the analyzer does not feel warm, call Technical Support.

Flow Message

A flow message indicates that the support or sample gas flows have deviated from the value specified in the analyzer setup parameters.

1. Check the regulators on all attached gas sources to be sure the bottles are on and set to the correct pressure.
2. Verify they are set and calibrated properly.

Flameout Message

Indicates that the auto-ignite sequence has failed, or that the FID flame has been extinguished. The ignite sequence will not initiate until the analyzer reaches its operating temperature, and all flows are at their set points.

Section 3 – Operation Menu

3.1 Operation Menu

All the basic operations associated with the analyzer are located in the OPERATION menu.

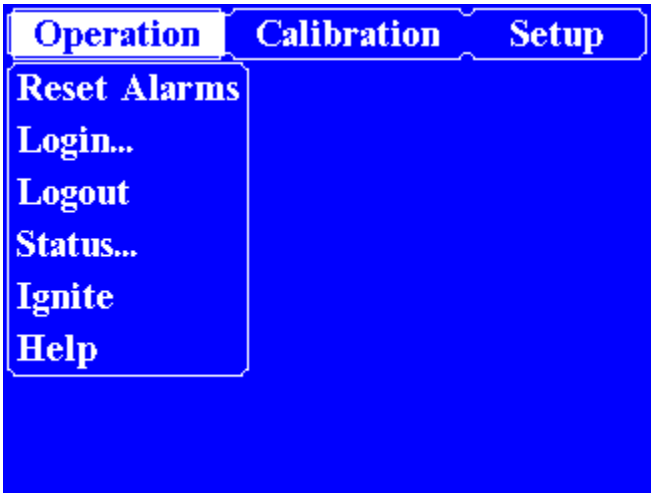


Figure 3-1 Operation Menu

3.2 Reset Alarms

A concentration or system alarm can be acknowledged by going to “Operation\Reset Alarms” in the menu system and pressing “Enter”. Once a concentration alarm is acknowledged, the alarm code below the affected port will still be displayed until the alarm condition no longer exists; however, any audible alarms or relays mapped to the alarm will be deactivated.

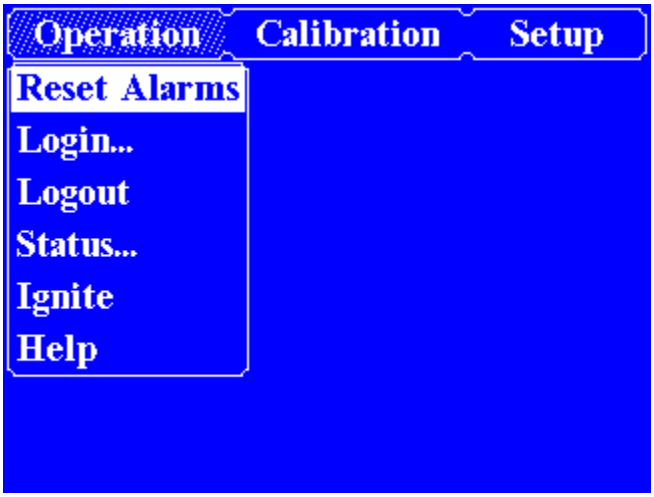


Figure 3-2. Reset Alarms Screen

3.3 Login

To Login, go to “Operation\Login” in the menu system and press “Enter”. Follow the instructions at the bottom of the screen to input the password.

Note:

The Login feature must first be enabled in the Setup Menu. If the password feature has been enabled but the user has not logged in, the analyzer will still operate normally; however, the user will have limited access to the options in the Menu as shown in Figure 3-4.

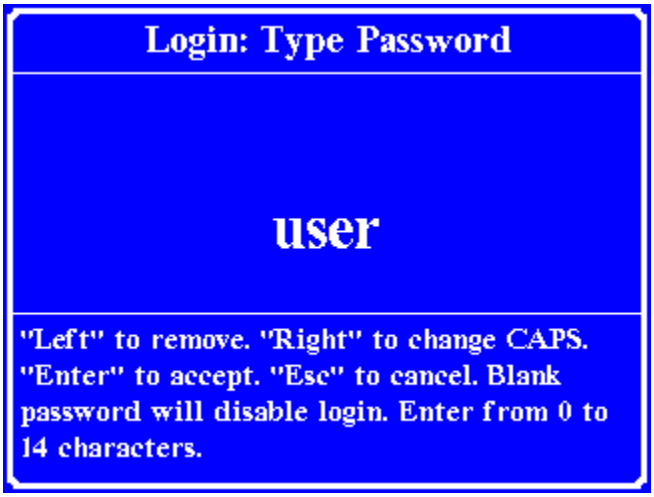


Figure 3-3. Login Screen

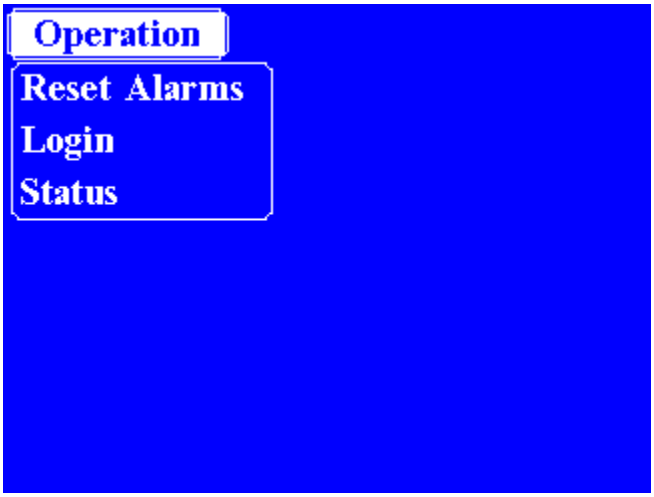


Figure 3-4. Available options .

3.4 Logout

To Logout, go to “Operation\Logout” in the menu system and press “Enter”. Note: the Login feature must first be enabled in the Setup Menu.

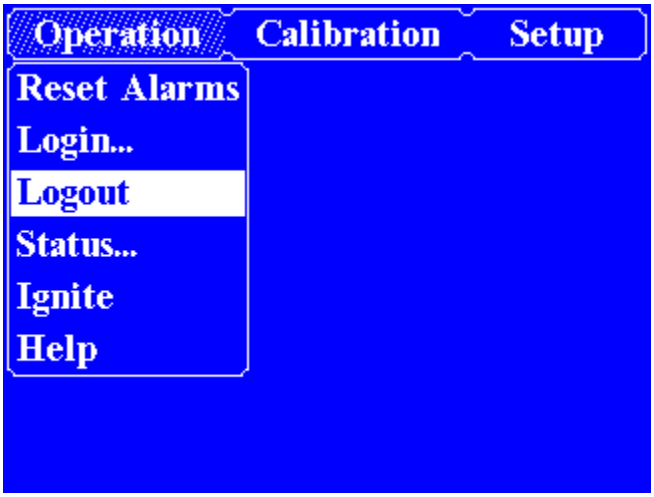


Figure 3-5. Logout Screen

3.5 Status

The Status screen can be viewed by going to “Operation\Status” in the menu system and pressing “Enter”. The status screen shows live readings of the basic system parameters.

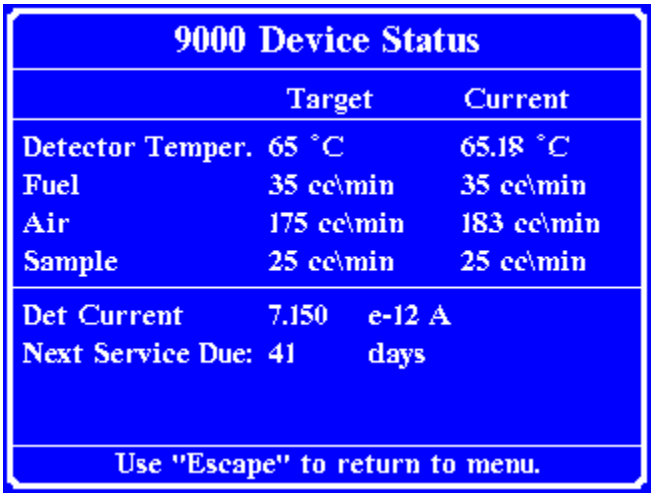


Figure 3-6. Status Screen

3.6 Ignite

A flame ignition sequence can be started by going to “Operation\Ignite” in the menu system and pressing “Enter”. The ignition sequence will ignite the FID detector after the system verifies that the temperature and flows are in there normal operating range.

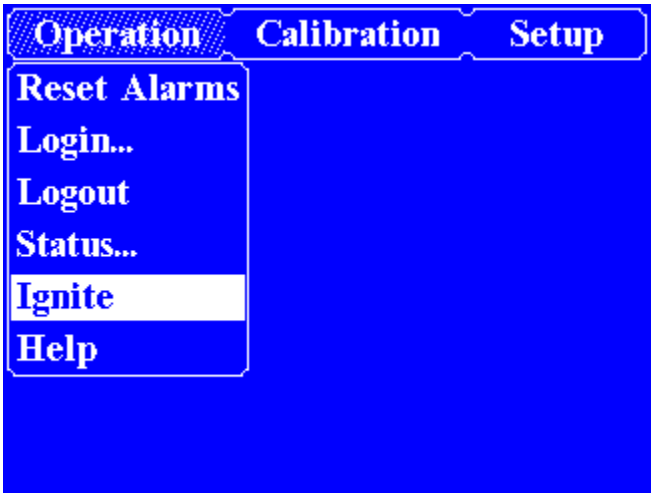


Figure 3-7. Ignite Screen

3.7 Help

To access the Help Screens go to “Operation\Help” in the menu system and press “Enter”. The Help Screens provide the user with basic information, which will help the user resolve many problems on their own. There is also contact information if the user needs to contact the service department.

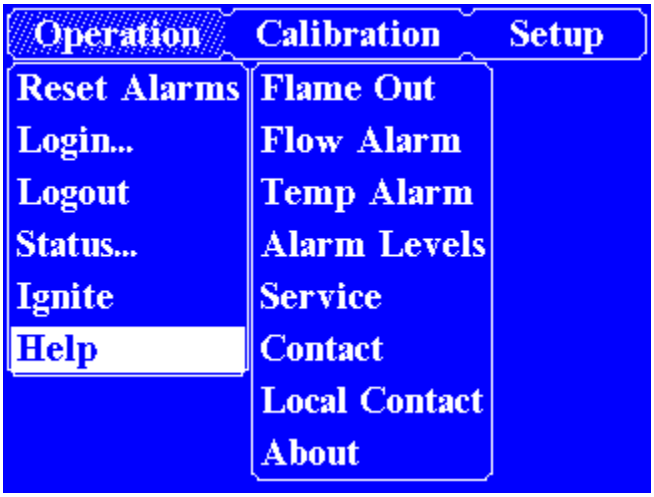


Figure 3-8. Help Screen

Section 4 – Calibration Menu

4.1 Calibration Menu

All the parameters and operations associated with calibration are located in the Calibration menu.

NOTE: It is recommended that the analyzer be calibrated every 24 hours.

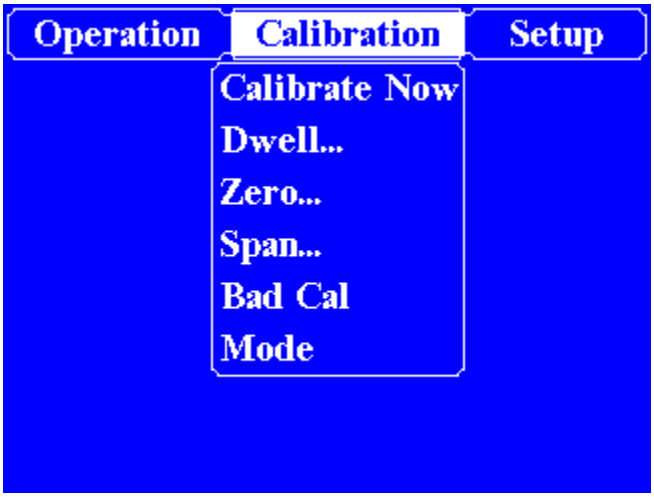


Figure 4-1 Calibration Menu

4.2 Setting the Calibration Parameters

Note: At any point in the menu structure, repeated presses of the Escape button will return you to the Main screen. Changes made to a calibration parameter are not saved until the Enter button is pressed.

4.3 Calibrate Now

The Calibrate Now option immediately initiates either a manual or an automatic (unscheduled) calibration sequence, depending upon the present mode setting. This feature is covered in more detail in section 4.8.

4.4 Dwell Time

The Dwell… option allows the user to set the length of time each calibration gas will be applied to the detector when performing an automatic calibration.

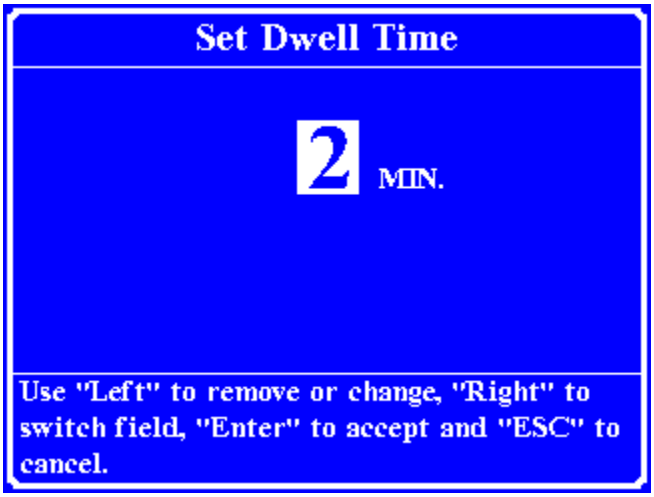


Figure 4-2. Cal Dwell Screen

4.5 Zero Gas

The Zero… option allows the user to set the value of the zero gas source. The zero gas should be the same as the balance of the span gas and the expected sample.

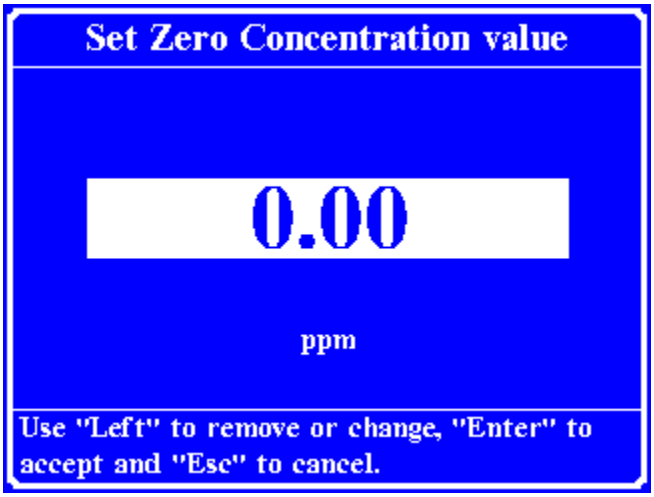


Figure 4-3. Zero Gas Screen

4.6 Span Gas

The Span… option allows the user to set the value of the span gas source. The span gas should be in the same range as the expected sample.

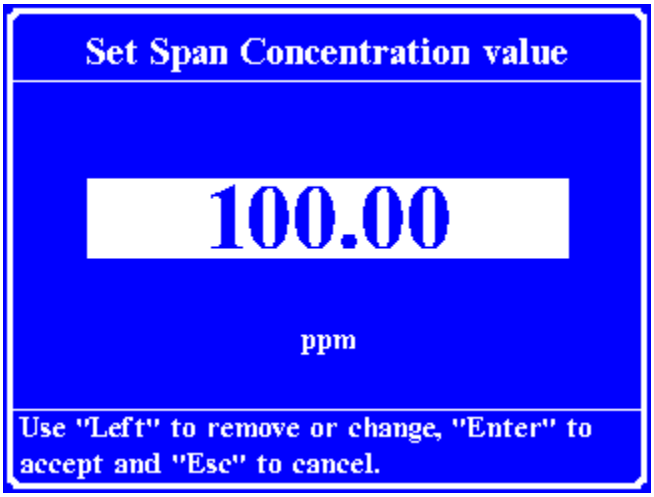


Figure 4-4. Span Gas Screen

4.7 Bad Calibration

The Bad Cal option allows the user to set a minimum and maximum detector gain value to detect a bad calibration. The purpose of the Bad Calibration option is to guard against some common problems such as the calibration gas being disconnected, incorrect calibration gas, reversal of the zero and span gas at their inlets, and the performance of the detector.

The gain of the detector is specified as pA/ppm which is the detector current in pA(1.00E-12A) per one ppm (Parts per Million) of span gas. The Bad Calibration Menu will display the detector gain value from the last calibration. It is recommended that the user allow for some deviation of the gain due to small operating changes.

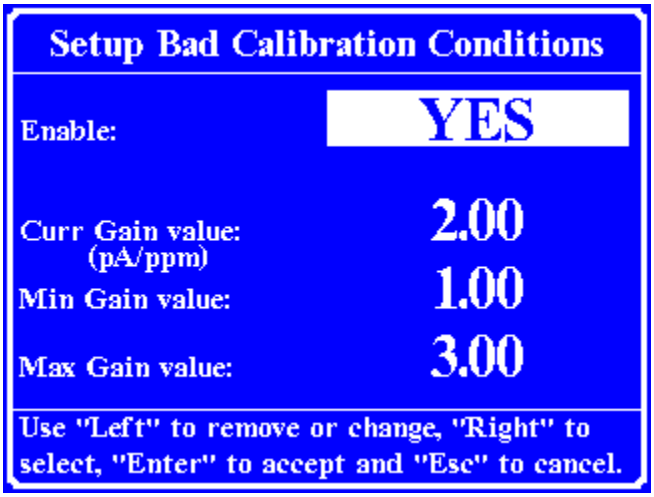


Figure 4-5. Bad Calibration Screen

4.8 Selecting the Calibration Mode

The calibration mode can be set to one of the following:

- **Manual:** In this mode a calibration is always initiated by the user.

- **Interval:** This mode allows the user to calibrate the analyzer at a given interval up to 24 hours. For example if an interval of 30 minutes is selected the analyzer will perform an auto-calibration exactly 30 minutes after the last calibration is completed. Note: This interval is the time between the end of a calibration and the start of the next calibration.
- **Hourly:** The Hourly mode allows the user to calibrate the analyzer every hour at a particular time of the hour. For example the analyzer can be set to perform an auto-calibration exactly 15 minutes after the beginning of each hour.
- **Daily:** The Daily mode allows the user to calibrate the analyzer at a particular time every day.
- **Weekly:** The Weekly mode allows the user to calibrate the analyzer at a particular time every week.
- **Monthly:** The Monthly mode allows the user to calibrate the analyzer at a particular time every month.
- **Yearly:** The Yearly mode allows the user to calibrate the analyzer at a particular time every year.

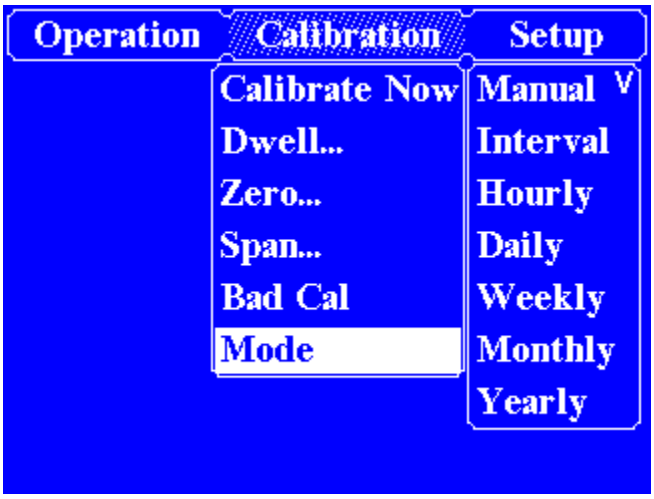


Figure 4-6. Calibration Mode Screen

4.9 Setting the Calibration Period/Time

The Period/Time… option is displayed in the menu only when the calibration mode selected requires an auto-calibration time i.e. Interval, Hourly etc. If any mode other than Manual is selected the user must setup the correct time for the calibration. See figure 4.7.

The right arrow moves to the next field, the left arrow removes the last character or number from the field, the alpha/numeric keys are used to enter a new value, the escape key is used to go to previous menu, and the enter key is used to save the displayed values and exit the screen.

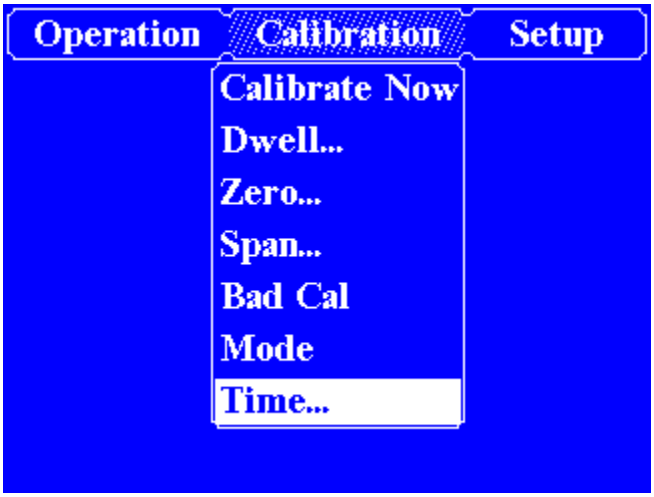


Figure 4-7. Calibration Time Setup Screen

4.10 Manual Calibration Sequence

When the analyzer is in Manual calibration mode, it allows the user to manually step through a zero and span of the detector.

4.11 Performing a Manual Calibration

Follow the procedure below to perform a manual calibration. Note that the ← key must be pressed to update the displayed value and ENTER must be pressed to save the current zero or span value. These instructions assume the analyzer is properly connected to appropriate sources of zero and span gas. If the analyzer is equipped with the auto-calibration option the appropriate valves will automatically be turned on as needed. Otherwise the appropriate calibration gas will need to be applied, as the sequence demands it.

1. From the Main screen, press the ← or → key. Go to the Calibration menu and verify that the Mode is set to Manual. Next from the Calibration menu select “Calibrate Now” and press Enter.

   This action opens the first calibration screen as shown in figure 4-8. At this point Zero gas is directed to the detector. The detector current, target concentration value and actual concentration value will be displayed on the screen.

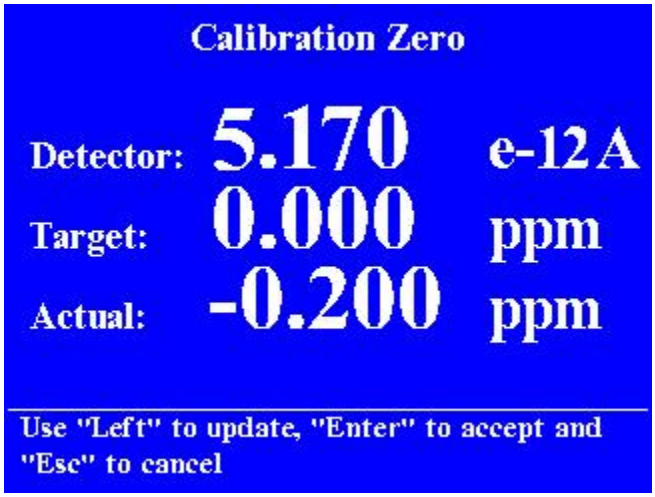


Figure 4-8. Calibration. Zero Screen

2. Monitor the zero gas detector current and actual concentration readings until they stabilize. This could take several minutes.
3. When satisfied with the stability of the zero gas readings press the ← key to update the actual concentration value to match the target concentration.
4. Press the Enter key to accept this calibration value or Escape to skip to the next screen without saving the zero point.

   Once the zero point is entered Span gas is directed to the detector and the Calibration Span screen will open as shown in Figure 4-9.

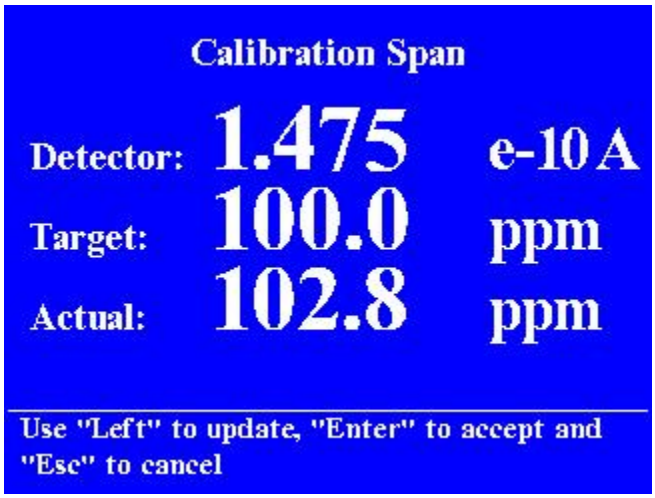


Figure 4-9. Calibration Span Screen

5. Monitor the span gas detector current and actual concentration readings until they stabilize. This could take several minutes.
6. When satisfied with the stability of the span gas current reading press the ← key to update the actual concentration value to match the target concentration .

7. Press the Enter key to accept this calibration value. If the reading seems to fluctuate after a single span, press the ← key again, monitor the readings, and press the Enter key to accept the final span value.

   After pressing the Enter key, the manual calibration is over and the main screen will appear.

4.12 Automatic Calibration Sequence

Follow the procedure below to perform an unscheduled automatic calibration. The ← key may be used at any time to zero or span the current value. By pressing the Enter key the current value will be saved and go immediately to the next screen. The Escape key will skip the current screen without saving any value.

4.13 Performing an Unscheduled Automatic Calibration

These instructions assume the analyzer is properly connected to appropriate sources of zero and span gas. If the analyzer is equipped with the auto-calibration option the appropriate valves will automatically be turned on as needed.

1. From the Main screen, press the ← or → key. Go to the Calibration menu and verify that the Mode is set to a mode other than Manual.
2. From the Calibration menu select "Calibrate Now" and press Enter.

   This action opens the first calibration screen as shown in figure 4-10. At this point Zero gas is directed to the detector. The real-time concentration and detector current will be displayed on the screen.

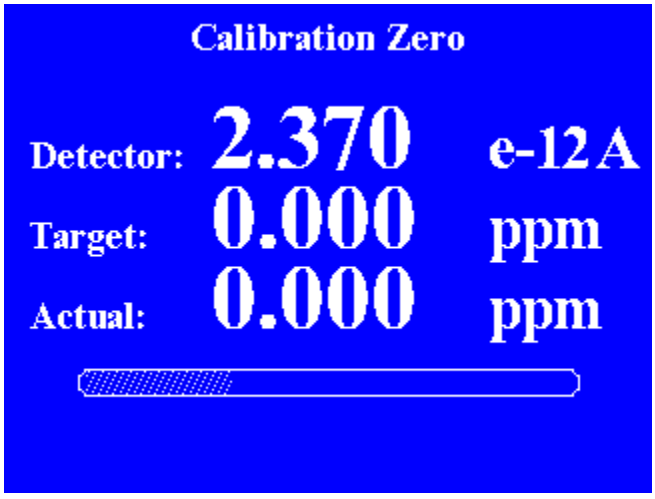


Figure 4-10. Auto Calibration Zero Screen

3. The Calibration Zero screen will remain open for the length of the dwell time. At the end of the dwell time the zero point will be saved and the actual concentration value will automatically be adjusted. After the Zero point has been saved, Span gas is directed to the detector and the Calibration Span screen will open as shown in Figure 4-11.

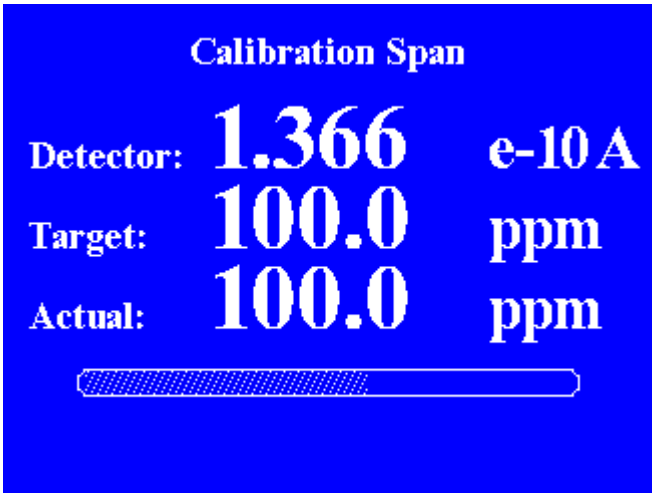


Figure 4-11. Auto Calibration Span Screen

4. The Calibration Span screen will remain open for the length of the dwell time. At the end of the dwell time the span point will be saved and the actual concentration value will automatically be adjusted. After the span point has been saved the calibration is over and the main screen will appear.

Section 5 – Set Up Menu

5.1 Setup Menu

In the Setup menu, you can configure the analyzer for different applications by defining the software selectable features in the Setup Menu. This section of the manual provides the following information for each user-defined feature:

- A brief description of the feature
- Complete setup instructions

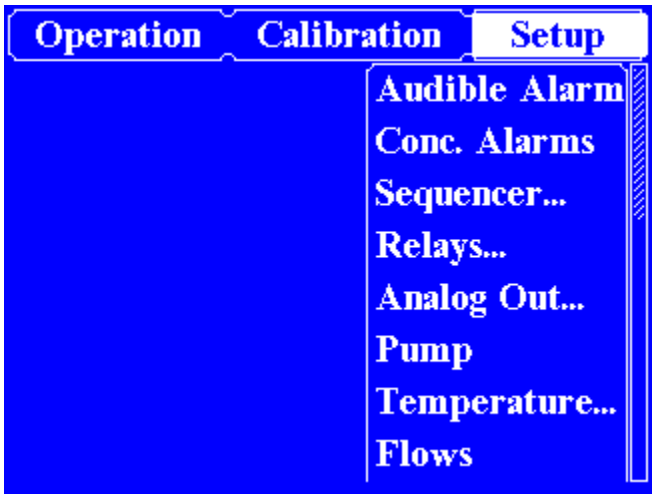


Figure 5-1. Setup Menu

Editing Setup Parameters

Typically in a dialog window the left arrow is used to change a value and the right arrow is used to move to the next item. The up and down arrows may also be used to move vertically in some dialog windows. At any point in the menu structure repeatedly pressing the Escape button will return you to the Main screen. Changes made to a parameter are not saved until the "Enter" button is pressed.

5.2 Audible Alarm

The user can be alerted to the occurrence of an event by turning on the audible alarm associated with that event. The audible alarm consists of an electronic beep.

A brief description of the Audible Alarm events are:

Trouble: This event consists of a temperature, flow, or flameout alarm.

Caution: A low-level concentration alarm.

Warning: A medium-level concentration alarm.

Alarm: A high-level concentration alarm.

Calibration: There will be a beep when a calibration is taking place.

Key press: There will be a beep when a key is pressed.

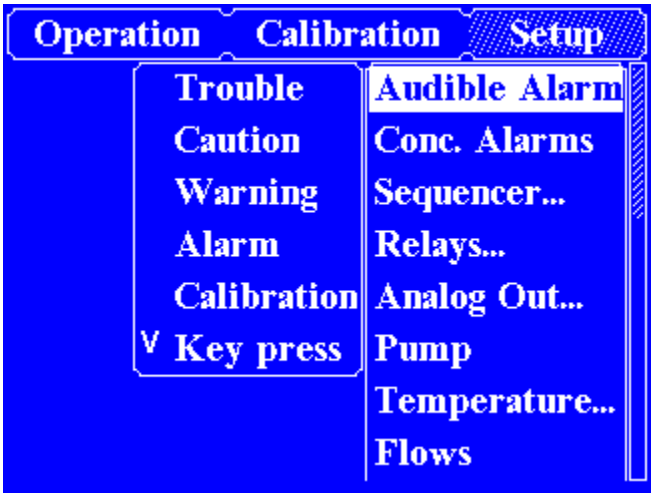


Figure 5-2. Audible Alarm Setup Screen

Setting up Audible Alarms

1. From the Main screen, press the ← or → key. Go to the Setup menu and select Audible Alarm.
2. Use the ← key to go to the submenu.Use the ↑ or ↓ to select an event that will require an audible alarm.
3. Pressing the Enter key will toggle the highlighted item on and off.

5.3 Concentration Alarms

The analyzer supports three concentration alarm levels: Caution, Warning, and Alarm. Each alarm can be enabled or disabled and the alarm threshold for each alarm is programmable.

Note if multiple alarm thresholds are exceeded on a given port, the software displays the alarm code associated with the highest alarm level. The software uses the concentration alarm hierarchy shown below.

Caution - Lowest Priority

Warning - Medium Priority

Alarm - Highest Priority

The displayed alarm code will clear when the alarm condition is no longer detected. If a critical alarm condition clears, yet a less critical alarm is still active, the alarm code will update in the Main screen to indicate the presence of the active alarm.

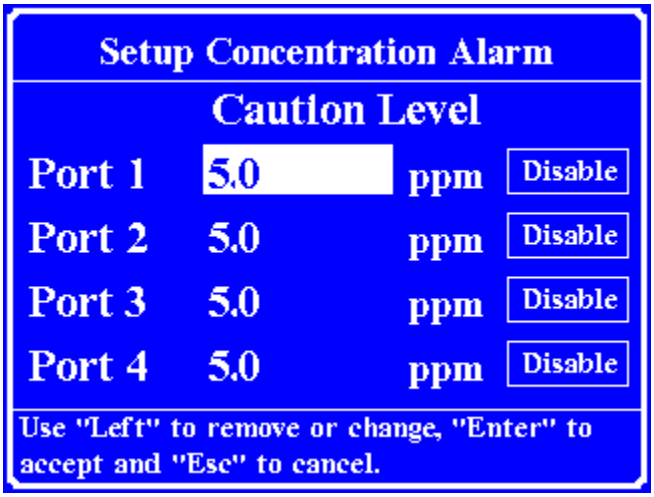


Figure 5-3. Concentration Alarm Setup Screen

Setting Alarm Levels

1. From the Main screen, press the ← or → key. Go to the Setup menu and select Conc Alarms.
2. Use the ← key to go to the sub-menu and highlight the concentration alarm that needs editing. Press Enter to select the alarm and a screen similar to figure 5-3 will open.
3. To change a value use the ← key to delete the high lighted value, and use the alpha/numeric keys to enter the new value. Press “Enter” to save the displayed value or Escape to go back to the previous menu without saving the value.

5.4 Purge Time

The purge time is the amount of time it takes for the previous sample source to be cleared out of the analyzer. If the analyzer is configured for more than one sample port, the purge time is set in the Sequencer option menu.

Note: The Sequencer option is only available on an instrument with more than one sample port.

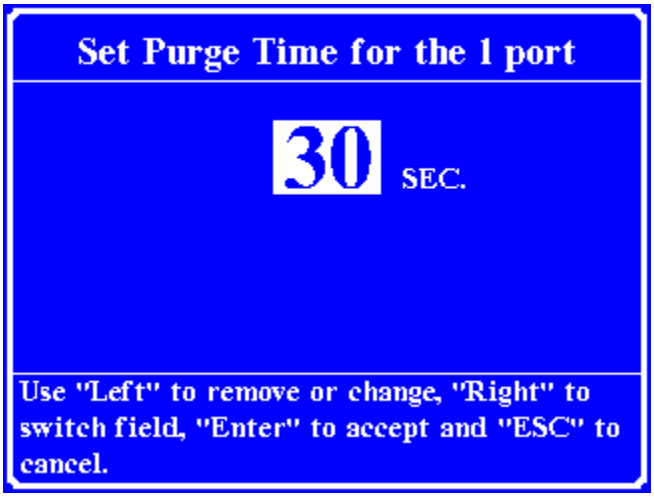


Figure 5-4. Purge Time Setup Screen

Setting Purge Time

1. From the Main screen, press the ← or → key. Go to the Setup menu and select Purge Time.
2. Press Enter to open the Purge Time Setup screen. See figure 5-4.
3. To change a value use the ← key, to go to the next field press the → key, press Enter to select the displayed value or Escape to go back to the previous menu without saving the value.

5.5 Sequencer Setup

If the analyzer is configured for more than one sample port, the sequencer menu allows each sample port to be configured separately. From the Setup Sequencer menu several parameters can be configured including: port on/off, purge time, dwell time, and sampling sequence.

Each port may be turned on or off by selecting + (Enabled) or – (Disabled) in the sequencer menu.

The purge time is the length of time that readings are ignored directly after selecting the next sample port in the sequence. The previous sample is cleared out of the analyzer during this time.

Dwell time is the length of time the analyzer monitors a port. The concentration alarms are active if enabled.

There are three options shown at the bottom of the Sequencer screen: Enable, Lock, and File.

Enable: Allows the user to enable the normal port sequence if another mode has been selected.

Lock: Allows the user to indefinitely lock on to one particular port.

File: Allows the user to use a text file to use a sequence other than a continuous loop. For instructions on how to create sequence file and install it in the analyzer, please contact the Baseline®-MOCON® service department.

Note: The purge time and dwell time are additive. In other words, dwell time does not start until the purge cycle is complete.

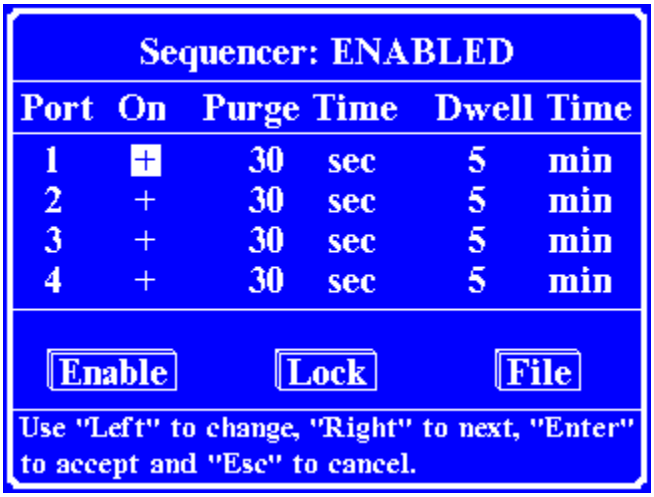


Figure 5-5. Sequencer Setup Screen

Setting up the Sequencer

1. From the Main screen, press the ← or → key. Go to the Setup menu and select Sequencer.
2. Press Enter to open the Sequencer Setup screen. See figure 5-5.
3. To change a value, use the ← key. To go to another field press the →, ↑, or ↓ keys. Press Enter to select the displayed values or Escape to go back to the previous menu without saving the parameters.

5.6 Relay Setup

A relay can be mapped to one of several events: power, trouble, flameout, zero, span, cal, bad cal, caution, warning, alarm, and port. Relays have three attributes: the relay event mapping, the normal energy configuration, and the latch configuration. All relay attributes are programmable.

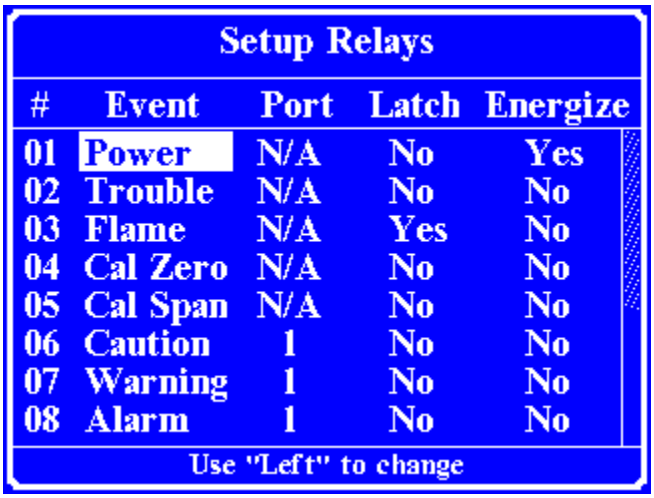


Figure 5-6. Relay Setup Screen

Setting up Relays

1. From the Main screen, press the ← or → key. Go to the Setup menu and select Relays.
2. Press Enter to open the Relay Setup screen. See figure 5-6.
3. To change a value use the ← key. To go to another field press the →, ↑, or ↓ keys. Press Enter to select the displayed values or Escape to go back to the previous menu without saving the value.

Relay Events Assignment

The events a relay can be mapped to are:

- **Power:** Allows the user to remotely monitor the power to the analyzer. In this mode the relay is always energized when the analyzer is on.
- **Trouble:** Includes the temperature, flow, and flameout alarms.
- **Flame:** Detector flameout alarm.
- **Cal Zero:** The time zero gas is applied to the detector during a calibration.

- **Cal Span:** The time span gas is applied to the detector during a calibration.
- **Cal:** The total time of a calibration.
- **Bad Cal:** A bad calibration alarm.
- **Caution:** A caution concentration alarm.
- **Warning:** A warning concentration alarm.
- **Alarm:** An alarm concentration alarm.
- **Port:** The sample port that is currently active.

Relay Port Selection

If the relay is mapped to a concentration alarm event, the user may select the individual port number for the alarm or "Any" may be selected if the concentration alarm applies to all ports. If the relay event does not apply to a sample port a "N/A" will be displayed in the Port column.

Relay Latch Configuration

Under the Latch column the user may select "Yes" or "No". If "Yes" is selected the relay will remain active until the user acknowledges or resets the alarm in the Operation menu. If "No" is selected the relay will remain active only as long as the alarm event is active.

Relay Energized Configuration

Under the Energize column the user may select "Yes" or "No". If "Yes" is selected the relay will be normally energized when the mapped event is not in the active or alarm condition. If "No" is selected the relay will be not be normally energized when the mapped event is not in the active or alarm condition. The most common configuration under the Energize column is "No".

5.7 Analog Output Setup

An analog output can be mapped to one of several modes: Conc, CNC, Raw, and RNC. Analog outputs have three attributes: the analog channel mapping, the current setting, and the maximum value of the range. All analog output attributes are programmable.

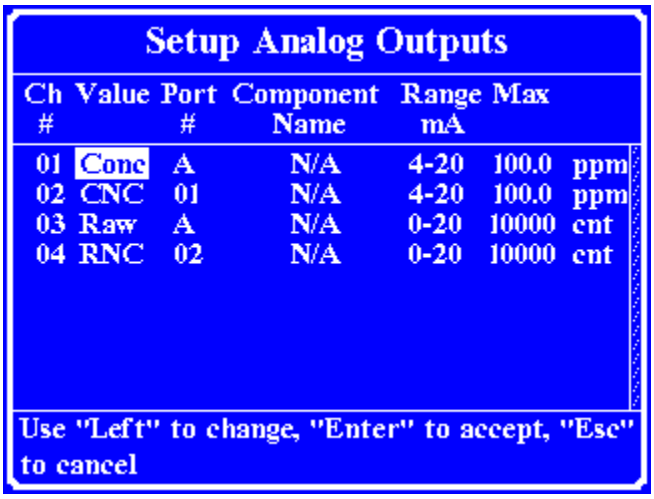


Figure 5-7. Analog Output Setup Screen

Setting up Analog Outputs

1. From the Main screen, press the ← or → key. Go to the Setup menu and select Analog Out.
2. Press Enter to open the Analog Output Setup screen. See figure 5-7.
3. To change a value, use the ← key. To go to another field press the →, ↑, or ↓ keys. Press Enter to select the displayed values or Escape to go back to the previous menu without saving the value.

Channel Selection

There are a maximum of four analog channels that can be selected.

Analog Output Modes

The events an analog output can be mapped to are:

- **Conc (Concentration):** Allows the user to monitor the reported concentration. This mode will also output the reported concentration during a calibration.
- **CNC (Concentration with no Calibration):** Allows the user to monitor the reported concentration. This mode will not output the reported concentration during a calibration, but will output the last reported concentration from the sample port.
- **Raw:** This is the raw current generated by the detector before it is converted to a concentration value. It is a live signal during the sample and calibration mode of the analyzer. One cnt represents a current of 1E-14A. For example: 1pA (1.000E–12A) would equal 100 cnts.
- **RNC:** This is the raw current generated by the detector before it is converted to a concentration value. It is a live signal only during the sample mode of the analyzer. One cnt represents a current of 1E-14A. For example: 1pA (1.000E–12A) would equal 100 cnts.

Analog Output Port Selection

If the analyzer is configured for multiple sample ports, this parameter allows the user to map the analog output to a particular port. If the user would like the analog output to represent all the sample ports, An “A” (All Ports) should be selected.

Component Name

Not applicable. There are no additional components in a THC analyzer. This is reserved for an analyzer with either a oxidizer or a methanizer installed, in which case there would be two separate components that could be selected.

Analog Output Range Selection

There are two ranges that can be selected 0-20mA and 4-20mA. The 0 or 4mA represents the current that is output at 0 concentration. The 20mA represents the current that is output at the maximum concentration range.

Analog Output Maximum Range Selection

The user can set the maximum value that will equal 20mA. In Conc or CNC modes this value will be in ppm or % units. If the analog output is set to raw it will be in cnt units (1 cnt = 1E-14A).

5.8 Sample Pump Setup

The analyzer can be equipped with a single sample pump. Using the pump setup feature, the pump can be turned on or off, or placed in automatic mode. In automatic mode, the pump will not turn on until the detector block comes up to temperature. Automatic mode is the recommended pump setting for most applications.

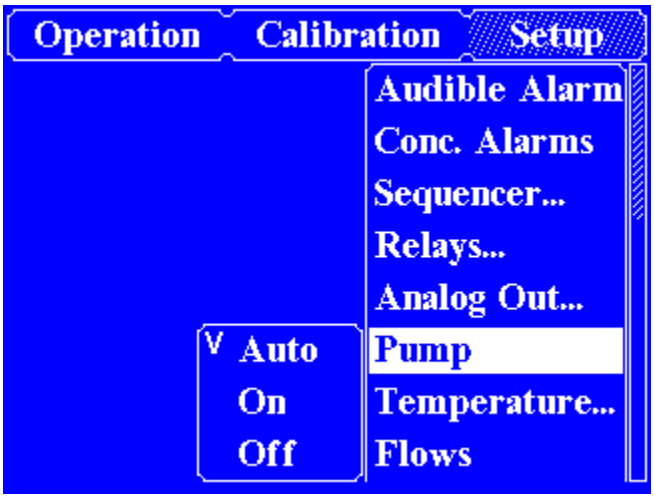


Figure 5-8. Sample Pump Setup Screen

Pump Setup

1. From the Main screen, press the ← or → key. Go to the Setup menu and select Pump.
2. Use the ← key to go to the sub-menu to highlight an item.
3. Pressing the Enter key will toggle the item on and off.

5.9 Temperature Setup

Typically the analyzer is configured with one controlled temperature zone. Additional zones may be added for other applications. The default value is 65°C. The user should never need to adjust this value. Setting a value higher than 65°C could damage the analyzer.

To monitor the current temperature of the temperature zone, go to the Operation Menu and select Status.

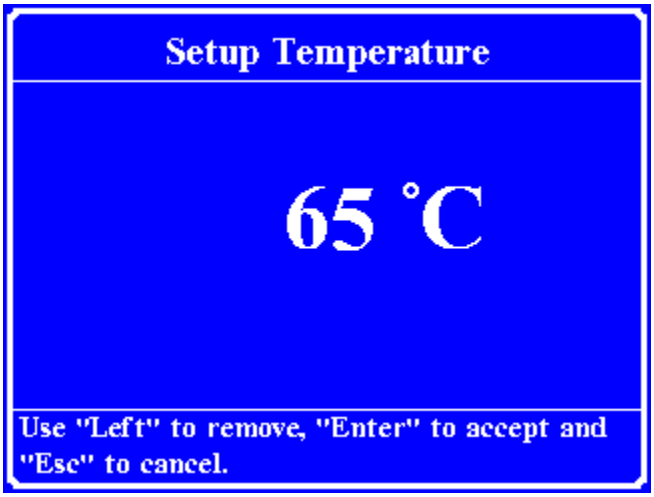


Figure 5-9. Temperature Setup Screen

Setting Temperatures

1. From the Main screen, press the ← or → key. Go to the Setup menu and select Temperature.
2. Press Enter to open the Setup Temperature screen. See figure 5-9.
3. To change a value, use the ← key. Press Enter to select the displayed values or Escape to go back to the previous menu without saving the value.

5.10 Flow Setup

The standard flow control configuration for the Series 9000 Total Hydrocarbon Analyzer includes three settings:

- Sample flow
- Fuel flow
- Air flow

The Series 9000 Analyzer is equipped with electronic flow sensors that allow you to set the sample, fuel, and combustion gas flows from the front panel.

To monitor the flow zones, go to the Operation Menu and select Status.

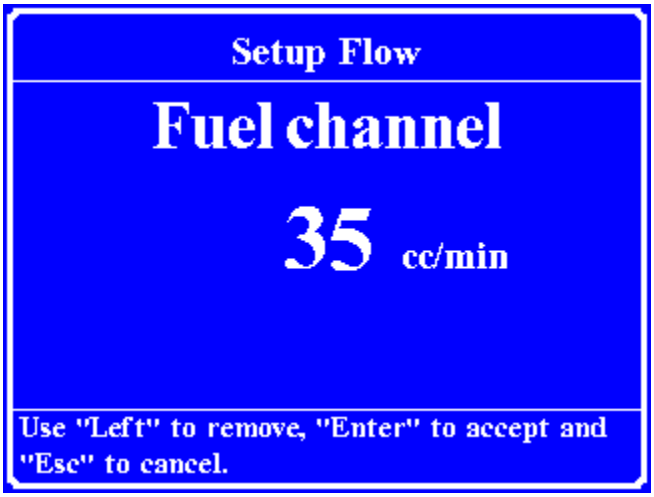


Figure 5-10. Flow Setup Screen

Setting Flows

1. From the Main screen, press the ← or → key. Go to the Setup menu and select Flows.
2. Press Enter to open the Setup Flow screen. See figure 5-10.
3. To change a value, use the ← key. Press Enter to select the displayed values or Escape to go back to the previous menu without saving the value.

5.11 Flow Calibration

Each flow zone uses an electronically controlled valve and pressure sensor to create a stable flow to the detector. Each flow zone requires a two point calibration. The first calibration point is the zero point with no flow through the analyzer and the second point is the span point with pressure applied to the flow zone. The “Press. Cnts” shown on the screen refers to the pressure measurement from the sensor.

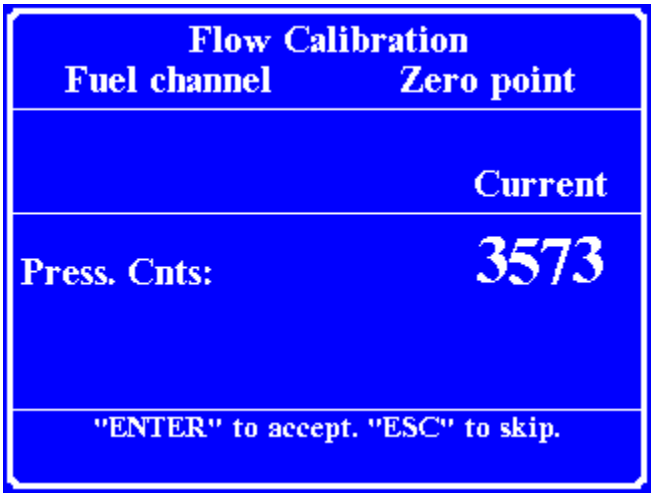


Figure 5-11. Flow Calibration (Zero Point) Screen

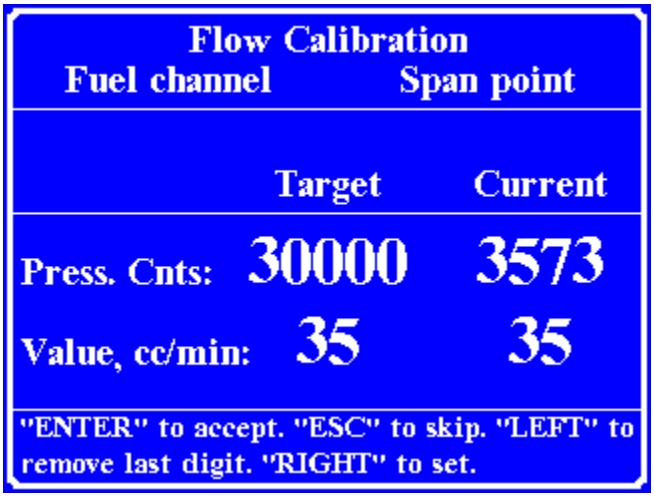


Figure 5-12. Flow Calibration (Span Point) Screen

Performing Flow Calibration

1. From the Main screen, press the ← or → key. Go to the Setup menu and select Flows Cal.
2. Use the ← arrow to select either Fuel, Air, or Sample. Press Enter to open the Flow Calibration screen (Zero Point). See figure 5-11.
3. Remove all pressure from the analyzer and allow time to stabilize.
4. When the displayed pressure counts are stable, press “Enter” to accept the zero point or “Escape” to skip this step.
5. The Span Point calibration screen is now shown. See figure 5-12.
6. Apply the recommended pressure (20psi) to the inlet port for the flow zone being calibrated.
7. Wait until the current pressure counts are equal to or close to the target pressure counts. Measure the flow out of the detector vent on the back panel and compare the measured value with the target flow shown on the display. If necessary use the ← key and the numeric keypad to change the target pressure counts. Use the → key to update the new value. Wait for the pressure counts to stabilize and re-measure the flow at the detector vent.
8. When the measured flow equals the target flow, press “Enter” to save the span point or press “Escape” to discard changes and exit the flow calibration.
9. Repeat the above steps for all three flow zones.

5.12 Communication Setup

The analyzer is equipped with a RS232 and Ethernet port. There are five modes of operation.

- **1 sec Conc Fields:** This mode outputs the date, time, and concentration as ASCII text in 1 second intervals.
- **10 sec Conc Fields:** This mode outputs the date, time, and concentration as ASCII text in 10 second intervals.
- **1 sec All Fields:** This mode outputs the date, time, concentration, and system parameters as ASCII text in 1 second intervals.

- **10 sec All Fields:** This mode outputs the date, time, concentration, and system parameters as ASCII text in 10 second intervals.
- **Binary:** This mode enables the analyzer to communicate with a PC application used to create and download methods to the analyzer as well as to upload a method from the analyzer.

The serial and Ethernet port and the five modes are covered in more detail in section six.

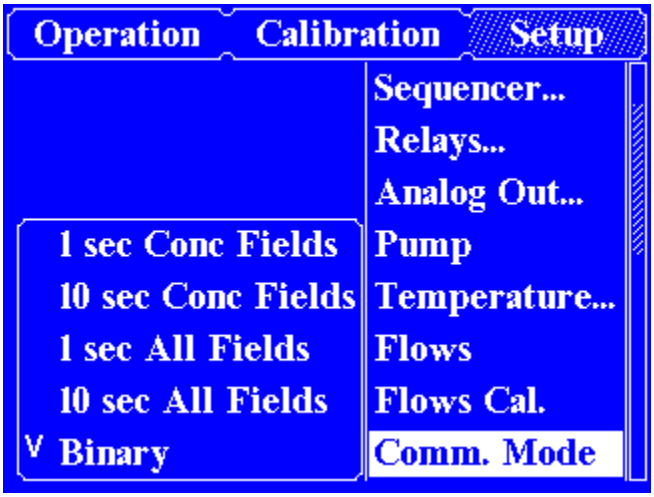


Figure 5-13. Communication Setup Screen

Setting the Communication Mode

1. From the Main screen, press the ← or → key. Go to the Setup menu and select Comm. Mode.
2. Use the ← key to go to the sub-menu to highlight an item.
3. Pressing the Enter key will select the item high-lighted.

5.13 Detector Setup

The detector configuration for the Series 9000 Total Hydrocarbon Analyzer allows the user to set the collector voltage and the electrometer offset. Typically these parameters are never changed by the user.

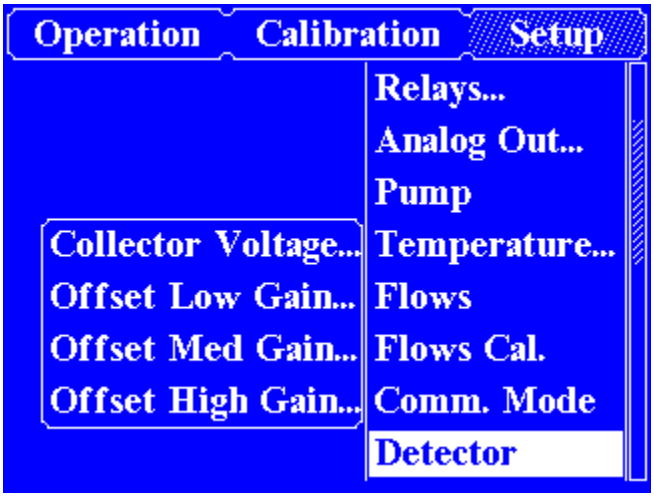


Figure 5-14. Detector Setup Screen

Collector Voltage

The collector voltage may be set to one of four settings:

- **Off:** This mode allows the user to turn off the collector voltage.
- **Low:** This mode is typically used for low range applications (0 – 2,000ppm).
- **Medium:** This mode is typically used for medium range applications (0 – 20,000ppm).
- **High:** This mode is typically used for high range applications (0 – 100%).

Note: This procedure is done at the factory and the user should never have to adjust this value.

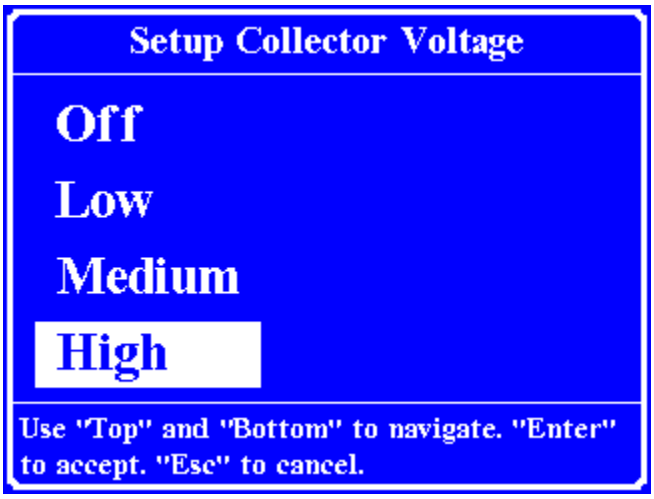


Figure 5-15. Collector Voltage Setup Screen

Setting the Collector Voltage

1. From the Main screen, press the ← or → key. Go to the Setup menu and select Detector.
2. Use the ← key to go to the Collector Voltage item and press Enter to open the Setup Collector Voltage Screen. See figure 5-15.
3. To move between settings use the ↑ or ↓ key to highlight a selection and press Enter.

Detector Offset

The detector offset must be set for each individual electrometer gain stage. The electrometer gain is determined by the jumper settings on the PCB. The offset should be set with no signal at the detector (Flame Off). A value slightly below the current counts displayed should be entered as the desired offset. Note: This procedure is done at the factory and the user should never have to adjust this value.

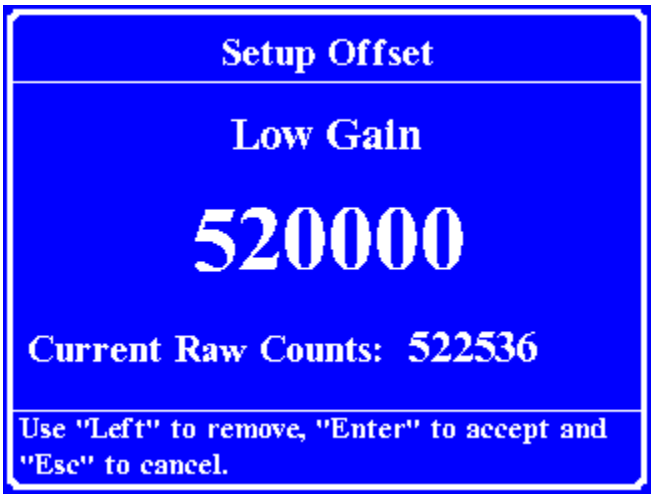


Figure 5-16. Detector Offset Setup Screen

Setting the detector Offset1. From the Main screen, press the ← or → key. Go to the Setup menu and select Detector.

2. Use the ← key to go to the Offset (Low, Med, High) Gain item and press Enter to open the Setup Offset screen. See figure 5-16.
3. To change a value, use the ← key. Press Enter to select the displayed values or Escape to go back to the previous menu without saving the value.

5.14 Default Method

If necessary the user may select a default method to replace the existing method. A method is a file that contains the configuration of the analyzer.

If the user selects the default method, all flow zones as well as the detector will need re-calibrated. All user programmable items such as port sequence, concentration alarms, relays, and analog outputs will need to be reset.

Selecting the Default Method

1. From the Main screen, press the ← or → key. Go to the Setup menu and select Default.

2. Press “Enter” and a message will appear that will prompt you to press “Enter” again to select the default method or “Escape” to exit the menu.

5.15 Save Current Method

The user may save the current method in the analyzer and restore the analyzer to the saved method at a future date. A method is a file that contains the configuration of the analyzer.

For example, before a user makes changes to an analyzer he could save the method and then make the changes to the analyzer. If the user is not happy with the changes, he can restore the analyzer to the saved method.

Save Current Method Procedure

1. From the Main screen, press the ← or → key. Go to the Setup menu and select Save.
2. Press “Enter” and a message will appear that will prompt you to press “Enter” again to save the current method or “Escape” to exit the menu.

5.16 Restore Method

If a method has previously been saved, the user may restore the saved method to the analyzer. The analyzer may need to be re-calibrated depending on the changes to the analyzer since the method was saved.

Restore Method Procedure

1. From the Main screen, press the ← or → key. Go to the Setup menu and select Restore.
2. Press “Enter” and a message will appear that will prompt you to press “Enter” again to restore the saved method or “Escape” to exit the menu.

5.17 Negative Concentration

The reported concentration for the Series 9000 Total Hydrocarbon Analyzer can be set to display both positive and negative concentration values or to display just positive concentration values. The two modes are shown as:

- **Enabled:** This mode will display both negative and positive concentrations.
- **Disabled:** This mode will display only positive concentrations. Any concentration less than zero will be shown as zero.

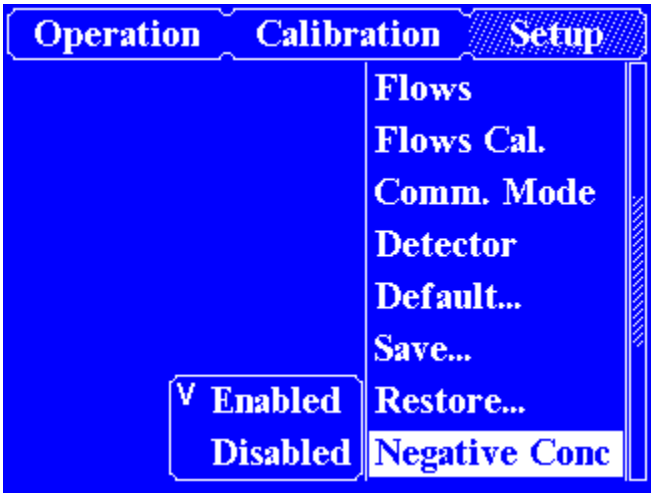


Figure 5-17. Negative Concentration Setup Screen

Setting up Negative Concentration

1. From the Main screen, press the ← or → key. Go to the Setup menu and select Negative Conc.
2. Use ← key to high-light an item and press Enter to select it. See figure 5-17.

5.18 Menu Reset

The time the menu remains active without user input can be set by the user. For example if a time of one minute is selected and the analyzer does not detect a key press for one minute the display will automatically revert back to the main screen.

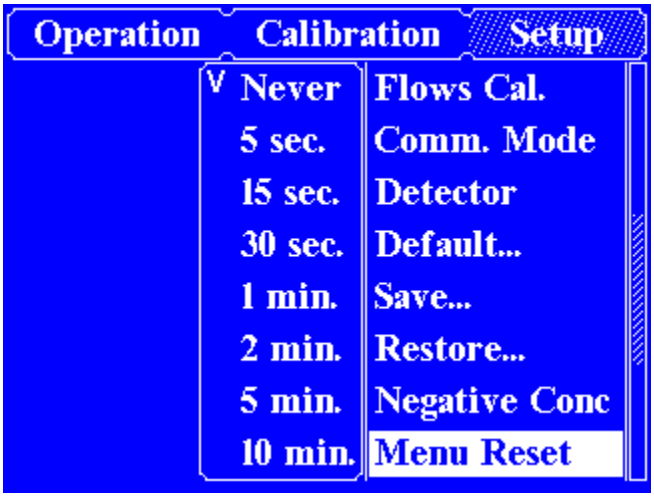


Figure 5-18. Menu Reset Screen

Setting up Menu Reset

1. From the Main screen, press the ← or → key. Go to the Setup menu and select Menu Reset.
2. Use ← key to high-light an item and press Enter to select it. See figure 5-18.

5.19 Report Units

The reported concentration units are displayed as either a ppm unit or a % unit. The user can configure the analyzer to either automatically change from a ppm unit to a % unit or the analyzer can be set to a static value where it remains as either a ppm unit or a % unit depending on the range of the instrument.

If the analyzer is configured with a range of 0 – 2000ppm or 0 – 20000ppm, the unit will be a ppm value in the static mode. If the analyzer is configured with a range of 0 – 100%, the unit will be a % value in the static mode.

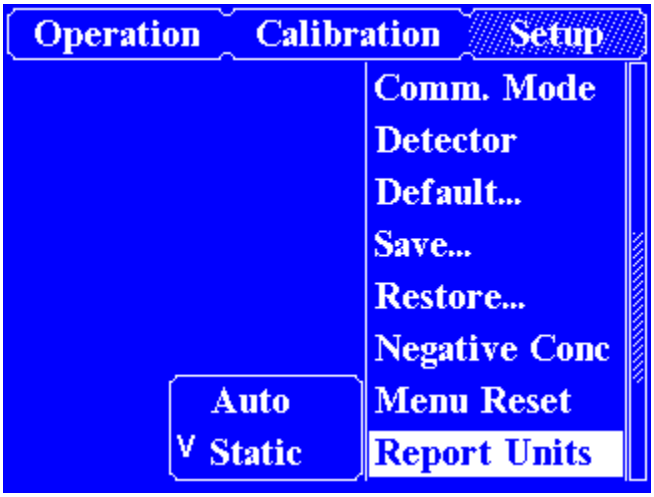


Figure 5-19. Report Units Setup Screen

Setting Report Units

1. From the Main screen, press the ← or → key. Go to the Setup menu and select Report Units.
2. Use ← key to high-light an item and press Enter to select it. See figure 5-19.

5.20 Display Precision

The precision of the reported concentration may be set by the user. The precision can be set to one of the following:

- **Low:** The precision of the reported concentration is limited to a maximum of two places to the right of the decimal. The display may show three places to the right of the decimal, but the last character will be zero.
- **High:** The precision of the reported concentration can be up to three places to the right of the decimal.

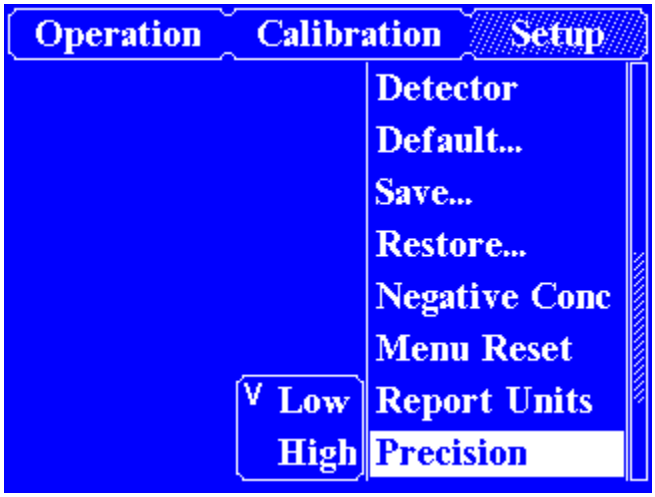


Figure 5-20. Precision Setup Screen

Setting Display Precision

1. From the Main screen, press the ← or → key. Go to the Setup menu and select Precision.
2. Use ← key to high-light an item and press Enter to select it. See figure 5-20.

5.21 Maintenance Reminder

The user can enable a service reminder option. If enabled, a message will appear to remind the customer to perform any scheduled or routine maintenance to the analyzer. The user may enable or disable this message; however, the time interval can only be set by authorized personnel such as the Baseline®-MOCON® service department.

There are two settings:

- **Enabled:** The service message will appear when the analyzer is powered up after the designated time has elapsed. After the user has acknowledged the message, it will not re-appear.

Disabled: The service message will not ever appear.

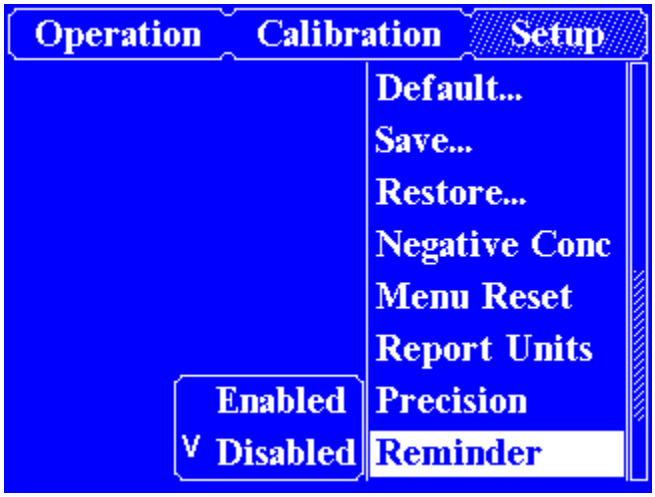


Figure 5-21. Maintenance Reminder Setup Screen

Setting up the Reminder

1. From the Main screen, press the ← or → key. Go to the Setup menu and select Reminder.
2. Use ← key to high-light an item and press Enter to select it. See figure 5-21.

5.22 Password

The analyzer can be setup to use a password system. To activate the password system a password must be entered in the Setup Password screen. When the password system is activated, only basic operations under the operations menu are accessible to a user without a password.

The password may be numbers or letters up to 14 characters in length.

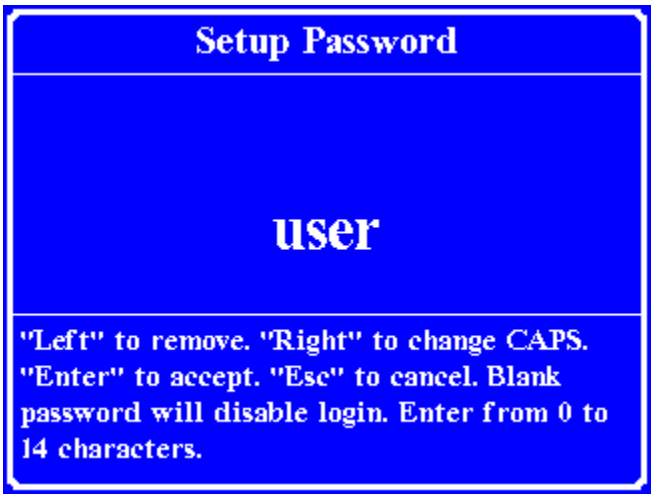


Figure 5-22. Password Setup Screen

Setting the Password

1. From the Main screen, press the ← or → key. Go to the Setup menu and select Password.
2. Press Enter to open the Setup Password screen. See figure 5-22.
3. To remove a character, use the ← key. To switch to capital letters use the → key. Press “Enter” to select the displayed password or “Escape” to go back to the previous menu without saving the value.

5.23 Date and Time

The Analyzer has an internal clock to track the timing of internal and external events. The current time of the internal clock can be set by the user.

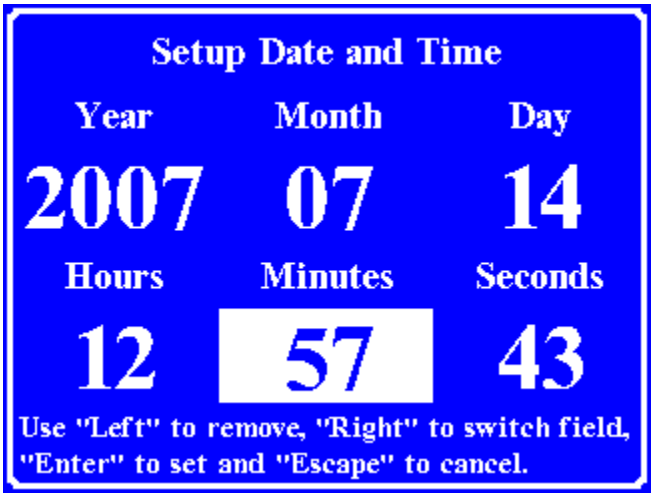


Figure 5-23. Time/Date Setup Screen

Setting the Time and Date

1. From the Main screen, press the ← or → key. Go to the Setup menu and select Date&Time.
2. Press Enter to open the Setup Date and Time screen. See figure 5-23.
3. To remove a character, use the ← key. To go to the next field use the → key. Press "Enter" to save the displayed time and date or press "Escape" to go back to the previous menu without saving any changes.

5.24 LAN Setup

The Analyzer can be connected to a Local Area Network (LAN). It is recommended that the user consult with the network administrator when setting up the analyzer for use with a LAN.

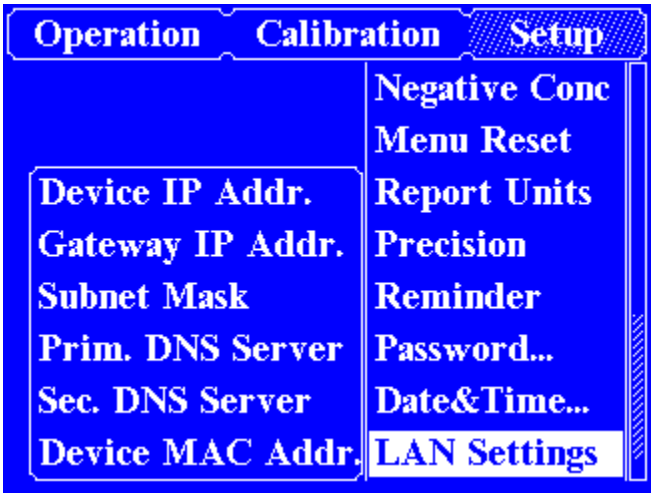


Figure 5-24. LAN Setup Screen

Configuring the LAN

1. From the Main screen, press the ← or → key. Go to the Setup menu and select LAN Settings.
2. Use ← key to high-light an item and press Enter to select it. See figure 5-24.

5.25 Audio Level Setup

The Audio level of the Analyzer that indicates key presses and alarms can be set to Low, Medium, or high.

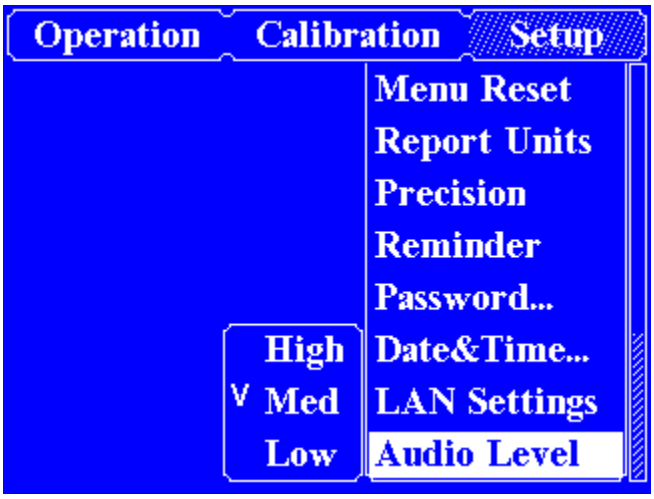


Figure 5-25. Audio Level Setup Screen

Setting the Audio Level

1. From the Main screen, press the ← or → key. Go to the Setup menu and select Audio Level.
2. Use ← key to high-light an item and press Enter to select it. See figure 5-25.

Section 6 – Communications

6.1 General Information

The Series 9000 THA provides access to operating parameters and concentration data through an RS-232 or Ethernet port. A simple ASCII, tab delimited protocol has been implemented. The ASCII data can be acquired by an external PC running a basic communications program such as Windows Hyper Terminal.

6.2 Data Stream

The analyzer sends the following data fields when set to concentration fields.

- Date (Year/Month/Day)
- Time (Hour:Minutes:Seconds)
- Concentration for each sample port starting with port one.
- Unit of concentration (ppm or %) for each sample port.

Example of data stream with only concentration fields selected:

2007/06/15 (TAB) 13:18:50 (TAB) 1.01 (TAB) ppm (TAB) 2.02 (TAB) ppm (TAB) 3.03 (TAB) ppm (TAB) 4.04 (TAB) ppm (CRLF)

The analyzer sends the following data fields when set to all fields.

- Date (Year/Month/Day)
- Time (Hour:Minutes:Seconds)
- Concentration for each sample port starting with port one.
- Unit of concentration (ppm or %) for each sample port.
- Sample Flow (cc/min.)
- Fuel Flow (cc/min.)
- Combustion Air Flow (cc/min)
- Detector Current (Amps)
- Calibration Slope (Whole parts/Ampere)
- Calibration Zero Offset (Whole parts)
- Detector Temperature (Deg C)

Example of data stream with all fields selected:

2007/06/15 (TAB) 13:18:50 (TAB) 1.01 (TAB) % (TAB) 2.02 (TAB) % (TAB) 3.03 (TAB) % (TAB) 4.04 (TAB) % (TAB) 16.1 (TAB) 35.0 (TAB) 175.2 (TAB) 5.05e-12 (TAB) 1000000 (TAB) -000058 (TAB) 65.01 (CRLF)

6.3 Commands Accepted by the Analyzer

Hex Value	Keyboard Value	Function
Ox13	^S	Stop Shipping Data
Ox11	^Q	Start Shipping Data
Ox12	^R	Initiate Auto Calibration
Ox14	^T	Update Zero (Offset) Value
Ox08	^H	Update Span Value
Ox06	^F	Acknowledge Alarms

^ designates the "Ctrl" key on the keyboard. For example: Pressing the "Ctrl" key and the "Q" simultaneously would send the command to the analyzer to start sending data.

6.4 Communications Framing Parameters

The analyzer sends a stream of ASCII data every 1 or 10 seconds. The data stream is tab delimited and terminated by a carriage return and line feed. Communication parameters are as follows:

- Baud Rate = 9600
- 8 Data Bits
- 1 Stop Bit
- No Parity Checking

6.5 Explanation of Data Fields

Date

Contains the Date.

Time

Contains the time of day.

Concentration.

Contains the current concentration at the specific port. The following field contains the unit of measurement for the concentration field.

Concentration Unit.

Contains the unit of measurement for the previous concentration field. This field will be either "ppm" or "%". Note that if "Auto" is selected in the Report Units Setup menu, the unit may change back and forth between ppm and percent.

Sample Flow

Contains the sample flow rate to the detector and is expressed in cc/min.

Fuel Flow:

Contains the fuel flow rate to the detector and is expressed in cc/min.

Combustion Air Flow

Contains the combustion airflow rate to the detector and is expressed in cc/min.

Detector Current

Contains the detector current, in amperes, measured by the analyzer. The current, along with the calibration information is used to determine the reported concentration.

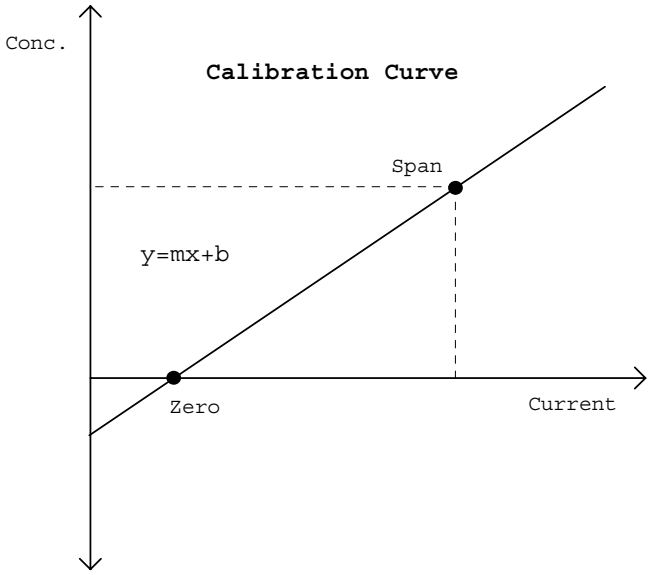
Calibration Slope

Contains the slope of the calibration curve. The slope is expressed in whole parts per ampere and only changes when the analyzer is re-calibrated.

Calibration Offset

Contains the offset value or "y intercept" of the calibration curve. The offset is expressed in whole parts and only changes when the analyzer is re-calibrated. The following figure illustrates why the offset is a negative concentration. In the figure we have the well known equation for a line, y=mx+b where:

- y=concentration
- m=slope
- x=current
- b=offset



Temperature

Contains the operating temperature of a temperature zone.

Appendices

Appendix 1 – 9000 Specifications

Analytical

Detector: Flame ionization detector (FID).

Alarms: Multilevel concentration and fault alarms that result in an audible and visually displayed alarm. Alarms may also be mapped to relays to control external equipment.

Sampling: Internal single or multipoint modules, with or without sample pump for pre-filtered (<0.1 microns), non-condensing samples.

Calibration: Programmable automatic or manual calibration.

Support Gas: Hydrogen 35 cc/min, Air 175 cc/min. Hydrocarbon content must be less than 1 ppm.

Range	Response Time (T90)	MDQ	Accuracy (Full-Scale)	Repeatability (Full-Scale)	Zero Drift (Full-Scale) (24Hrs)	Span Drift (Full-Scale) (24Hrs)
200 ppm (Methane)	5 sec	0.01 ppm	+/- 1%	+/- 1%	+/- .025%	+/- 1%
2000 ppm (Methane)	5 sec	0.1 ppm	+/- 1%	+/- 1%	+/- .025%	+/- 1%
20000 ppm (Methane)	5 sec	0.3 ppm	+/- 1%	+/- 1%	+/- .025%	+/- 1%
100% (Methane)	5 sec	0.003%	+/- 5%	+/- 1%	+/- .025%	+/- 1%

Note: The analyzer range is configured at the factory.

Physical

Dimensions: 19.00” W x 14.25” D x 5.25” H.

Weight: < 20 lb.

Configuration: Bench-top or rack-mount (19” panel).

Connections: 1/4” tube fitting connectors.

Environment Conditions

Operating Temperature: 32 - 104 °F (0 - 40 °C).

Operating Humidity: 0 – 95% (non-condensing).

Electrical

Power: 100 – 240 VAC, 50/60Hz, 3A.

Display: 3.4” x 4.5” graphical display.

Relay Outputs: 5 programmable form A relays rated to 3A @ 230V.
(9 additional relays are available as an option).

Analog Outputs: 1 programmable 0-20mA or 4-20mA isolated output).
(3 additional analog outputs are available as an option.

Digital Outputs: RS-232, Ethernet.

Appendix 2 – Instrument Settings

Temperature Settings

Temp Zone	Assigned to	Setting °C	Max Temp °C
Zone 1	Detector Manifold	65	65

Gas Pressures and Flow Settings

Description	Range	Inlet Pressure (psig)	Setting (cc/min)
Fuel (H2)	**All**	20	35
Fuel (Blend)	**All**	30	90 - 110
Combustion Air	**All**	20	175
Zero	**All**	20	Same as Sample Port(s)
Span	**All**	20	Same as Sample Port(s)
Sample Port(s)	**0 - 200ppm (Methane)**	* 15	35 - 45
Sample Port(s)	**0 - 2000ppm (Methane)**	* 15	8 - 16
Sample Port(s)	**0 - 20000ppm (Methane)**	* 15	8 - 16
Sample Port(s)	**0 - 100% (Methane)**	* 15	3 - 8

If an Analyzer is equipped with an internal pump the inlet is at ambient pressure.

Appendix 3 – Trouble Shooting Guide

Power related trouble		
Symptom	Probable Cause	Remedy
No indication of power	Power switch “off”.	Turn power switch “on”
	Power cord disconnected.	Connect
	Instrument fuses blown.	Replace fuses
	No line voltage.	Check main breaker
	Power supply failure.	Replace power supply board.
	Power cord failure.	Replace
Intermittent power	Loose power cord	Reconnect
	Main power fluctuations	Check to see that power is within instrument specifications. Check for other equipment on the same main circuit, which may cause intermittent power surges (i.e.: compressors, Air conditioners, etc.)
	Power cord failure	Replace
	Power supply failure	Replace power supply

FID ignition trouble		
Symptom	Probable Cause	Remedy
FID will not light or will not stay lit	Temperature problem.	Check to see that detector block is up to temperature and is controlling properly.
		If a temperature problem is suspect, review the following common temperature failure symptoms.
	Combustion Air or Fuel gas problem.	Check to see that the instrument flows are reading within 10% of the set point and controlling properly. If a flow problem is suspect, review the following common flow failure symptoms.
	H2 and Air flows are out of calibration	Re-Calibrate flows.
	Electrometer cable is unplugged from main board or electrometer board.	Re-Connect.
	Electrometer not securely connected to FID.	Seat board onto FID and tighten into place.
	FID thermocouple failure.	Replace the FID.
	Damaged FID ignite coil.	Replace the FID.
	Dirty FID	Clean
	Electrometer cable failure.	Replace cable.
	Electrometer board failure.	Replace electrometer board.

Temperature failure symptoms		
Symptom	Probable Cause	Remedy

Temperature fails to increase to set point.	Heater is unplugged from controller board.	Reconnect
	Broken heater wire or bad connection.	Replace heater assembly.
	Heater failure. (Open)	Replace heater assembly.
	Broken wire or bad connection on thermal cutoff.	Replace thermal cutoff assembly.
	Thermal cutoff failure. (Open)	Replace thermal cutoff assembly.
	RTD unplugged from the main board.	Reconnect.
	Broken RTD wire or bad connection.	Replace RTD assembly.
	RTD failure. (Open)	Replace RTD assembly.
	Controller board failure	Replace controller board.
Temperature runs away.	RTD Failure. (Short)	Replace RTD assembly
	Controller board failure	Replace controller board.
Temperature read point is unstable or bouncing.	Bad or intermittent heater wire connection.	Replace heater assembly.
	Bad or intermittent connection on thermal cutoff.	Replace thermal cutoff assembly.
	Thermal cutoff failure	Replace thermal cutoff assembly.
	RTD failure.	Replace RTD assembly.
	Controller board failure	Replace controller board.

Flow failure symptoms

Symptom	Probable Cause	Remedy
Flow fails to increase to set point	Block is not up to temperature.	Allow the instrument time to warm up. If temperature alarm persists, see the common temperature failure symptoms.
	Flow source is not connected or set to the proper inlet pressure.	Connect flow source and set inlet pressure. If it is the sample flow, verify that the pump is on.
	Flow source failure.	Repair or replace.
	Leak in the internal or external gas train.	Find and repair leak.
	Control cable is unplugged from the controller board.	Reconnect.
	Broken wire or bad connection on control cable.	Replace cable assembly.
	Restrictor is plugged.	Replace
	Flows are out of calibration	Recalibrate flows.
	Pressure transducer failure.	Replace controller board.
	Electronic regulator is not plugged into the controller board.	Reconnect.
	Electronic regulator failure.	Replace regulator assembly.

	Controller board failure	Replace controller board.
Flow read point is unstable or bouncing	Leak in the internal or external gas train.	Find and repair leak.
	Flow inlet pressure unstable	Repair or replace combustion air source.
	Bad or intermittent connection on control cable.	Replace cable assembly.
	Pressure transducer failure.	Replace controller board.
	Electronic regulator failure.	Replace regulator assembly.
	Controller board failure	Replace

Common Signal problems

Symptom	Probable Cause	Remedy
No detector signal	Incorrect installation, setup or programming of the instrument.	Review operation manual.
	Temperature Alarm	Rectify alarm condition
	Air Flow Alarm	Rectify alarm condition
	Fuel Flow Alarm	Rectify alarm condition
	Sample Flow Alarm	Rectify alarm condition
	Flame out Alarm	Rectify alarm condition
	External recording device or data acquisition system wired incorrectly or disconnected from the instrument.	Connect to rear panel terminal strip.
	Analog outputs not setup properly	Verify connections
	No sample flow	Verify all flows have been properly set and calibrated
	Restrictor plugged	Replace
	Detector failure	Replace
	Electrometer cable is unplugged.	Reconnect.
	Electrometer not securely connected to FID.	Seat board onto FID and tighten into place.
	Electrometer cable failure.	Replace cable.
	Electrometer board failure.	Replace electrometer board.
	Analog output failure	Replace I/O board.
Excessive Signal Noise	Dirty support gas	Support gasses should contain less than 1 PPM total hydrocarbons.
	Incorrect flow rate	Reset flow rates
	Contaminated gas connection lines	Replace lines
	Faulty regulation of support gasses	Replace
	Contaminated detector	Clean
	Contaminated electrometer	Clean
Excessive Signal Drift	Dirty support gasses	Support gasses should contain less than 1 PPM total hydrocarbons.
	Excessive fuel flow rate	Reset hydrogen flow.
	Contaminated gas connection lines	Replace
Excessive Background Ionization	Incorrect fuel and air flow rates	Reset flows
	Contaminated support gasses	Support gasses should contain less than 1 PPM total hydrocarbons.
	Contaminated detector	Clean
	Contaminated electrometer	Clean

	Contaminated gas connection lines	Replace
	Calibration valve leak	Replace
Low Sensitivity	Below or reaching lower detectable limits	Verify gain settings are correct.
	Incorrect gain	Verify gain settings are correct.
	Leaks in internal plumbing	Leak check system.
	Loss of detector collector voltage	Replace electrometer board
	Contaminated detector	Clean
	Detector failure	Replace
	Electrometer failure	Replace
High Sensitivity	Incorrect gain settings	Verify gain settings are correct.
Non-Linear signal	Beyond linear range of detector	Decrease Sample flow.
	Inaccurate calibration standards	Verify calibration gasses are certified and new.
	Improper gain settings	Adjust gain settings
	Loss of collector voltage	Replace electrometer board
	Calibration valve leaks	Replace
	Excessive fuel or air flows	Reset flows
Poor Reproducibility	Leaks within the internal gas train	Leak check instrument
	Variation in support gas flow rates	Reset flows and verify they are constant over time.
	Variations in temperature	Verify temperature is constant over time.
	Extreme fluctuation in sample flow rate	Verify sample flow rate is constant over time.

Appendix 4 – Replacement Parts List

Number	Baseline® Part Number	Description	Quantity
1	**042-925**	**FLASH CARD, 1GB, MINI-SD**	**1**
2	**035-935**	**PCB ASSY, MOTHER BOARD,**	**1**
3	**042-380**	**AC/DC POWER SUPPLY**	**1**
4	**042-379**	**PCB ASSY, I/O**	**1**
5	**042-598**	**PCB ASSY, OPTION**	**1**
6	**037-867**	**POWER ENTRY MODULE, FILTER, SWITCH, FUSE**	**1**
7	**037-752**	**FUSE, 5 X 20 MM 6.3 AMPS, 250 VOLTS**	**2**
8	**039-313**	**FAN, 12V, 16.6 CFM**	**1**
9	**039-342**	**FAN FILTER**	**1**
10	**043-001**	**HEATER, CARTRIDGE, 25W, 12V, FIREROD**	**1**
11	**043-032**	**ASSY, RTD, FID SENSOR, 9000**	**1**
12	**042-388**	**PCB ASSY, TEMP/FLOW CONTROL**	**1**
13	**043-031**	**ASSY, RESTRICTOR, AIR, 0.01 TUBING**	**1**
14	**043-030**	**ASSY, RESTRICTOR, FUEL, 0.007 TUBING**	**1**
15	**043-028**	**ASSY, RESTRICTOR, BYPASS, 0.02 TUBING**	**1**
16	**043-029**	**ASSY, RESTRICTOR, SAMPLE, 0.007 TUBING**	**1**
17	**042-389**	**PCB ASSY, ELECTROMETER**	**1**
18	**039-041**	**FID DETECTOR**	**1**
18	**025-118**	**O-RING, .117 ID X .040 CS**	**3**
18	**033-613**	**O-RING, .087 ID X .040 CS**	**2**
18	**039-284**	**O-RING, .551 ID X .070 CS**	**1**
19	**042-383**	**CHAMBER, FID, EXHAUST**	**1**
20	**043-024**	**ASSY, VALVE, 3 WAY, MANIFOLD**	**1**
21	**039-896**	**SAMPLE PUMP**	**1**
22	**043-025**	**ASSY, VALVE, SAMPLE**	**1**
23	**043-026**	**ASSY, VALVE, FUEL**	**1**
24	**043-027**	**ASSY, VALVE, AIR**	**1**
25	**042-377**	**OVERLAY, MODEL 9000**	**1**
26	**035-939**	**DISPLAY, LCD**	**1**
	143-151	**MANUAL, ON CD, 9000**	**1**

See Figure A4-1 for replacement parts location.

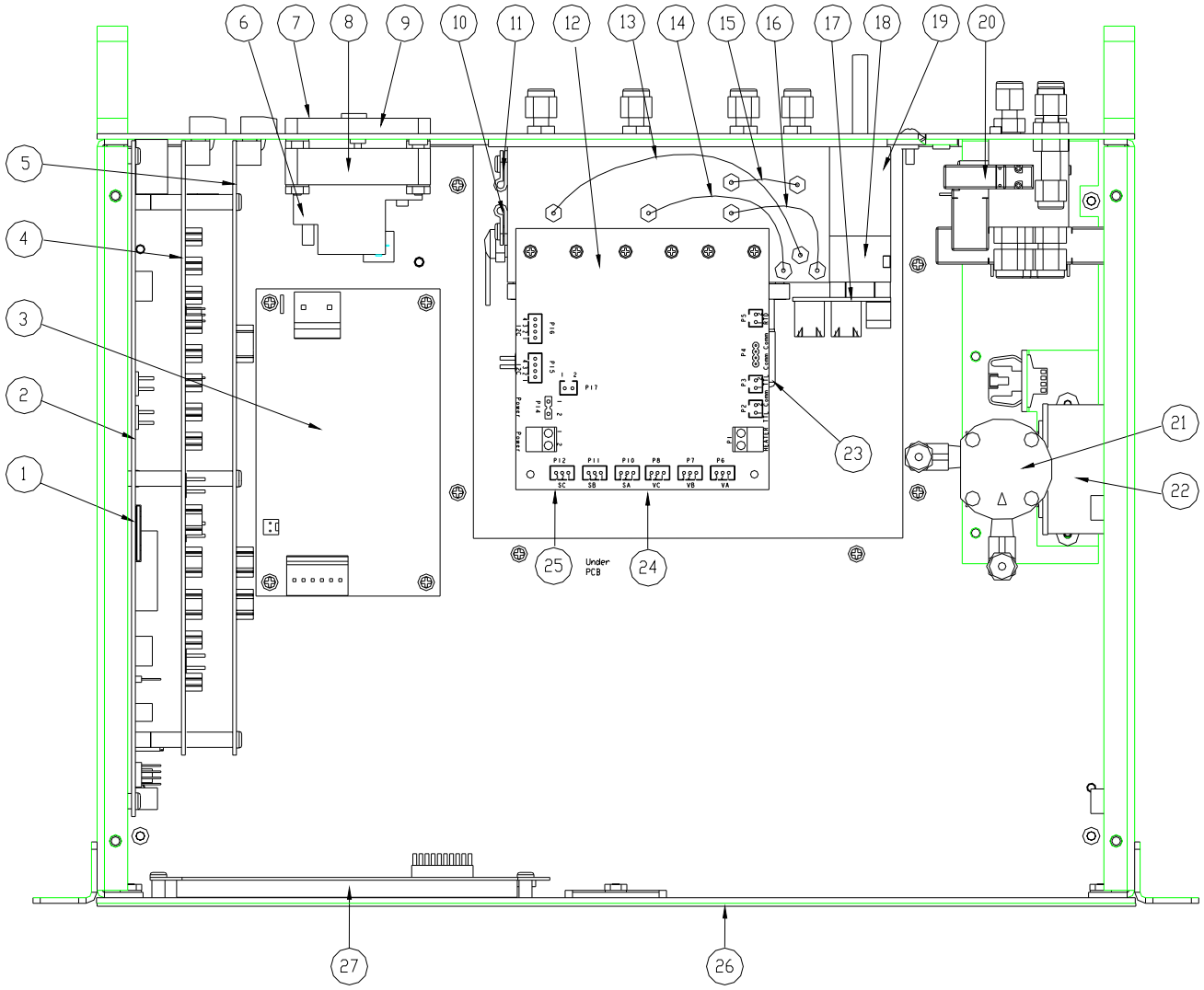
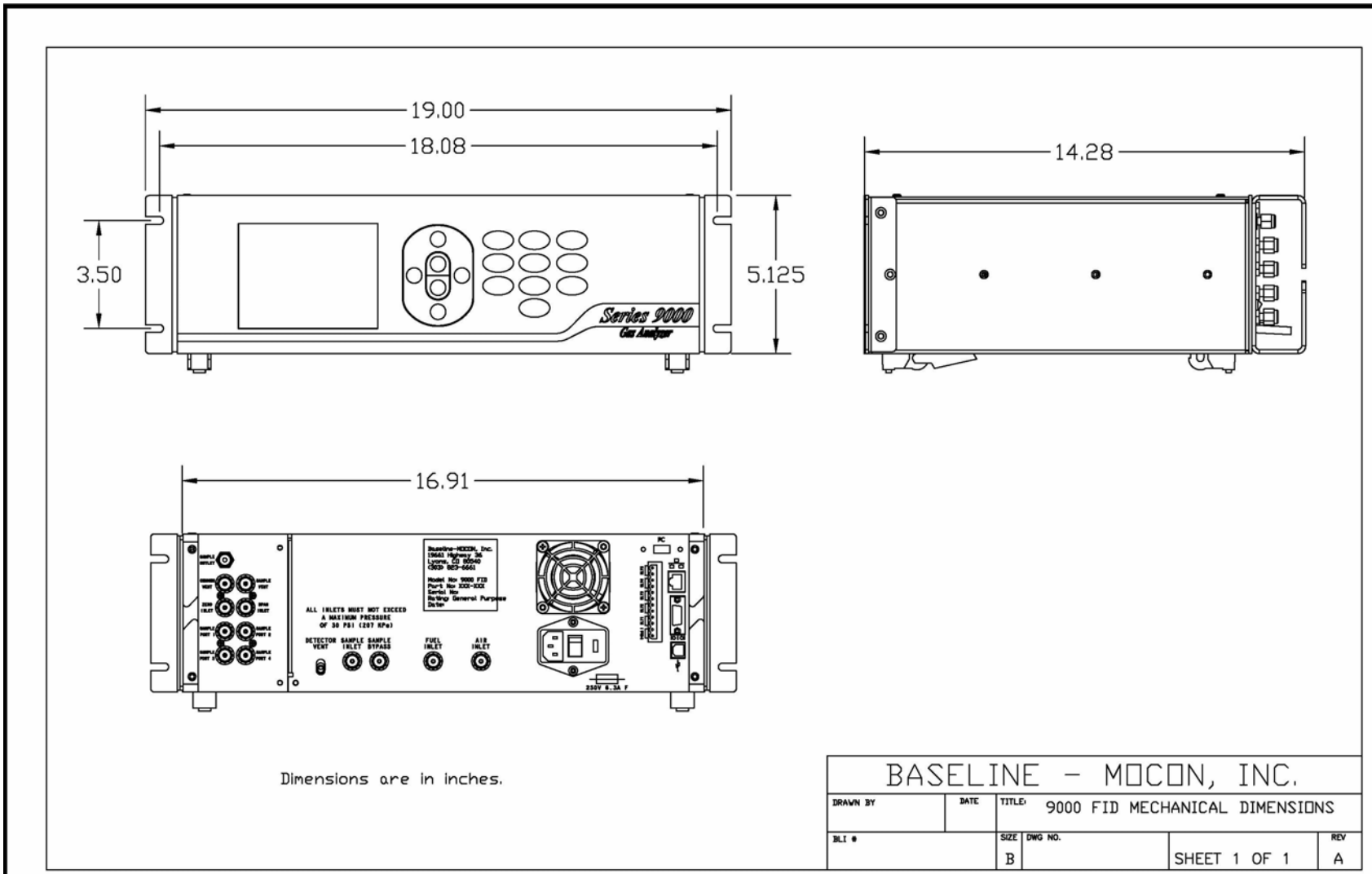
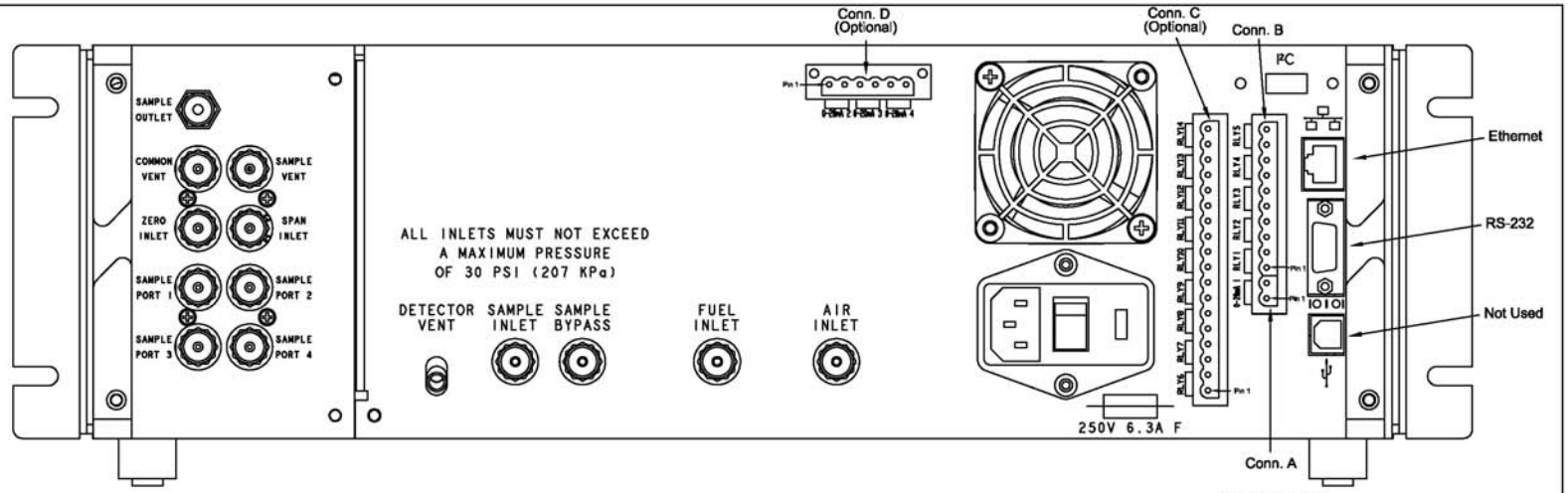


Figure A4-1. 9000 Parts Location

Appendix 5 – Instrument Diagrams

9000 External Dimension Diagram
9000 Back Panel Connections
Plumbing Diagrams
Internal Wiring Diagrams


19.00
18.08
3.50
5.125
Series 9000
Gas Analyzer
14.28
16.91
ALL INLETS MUST NOT EXCEED
A MAXIMUM PRESSURE
OF 30 PSI (207 KPa)
DETECTOR VENT
SAMPLE INLET
SAMPLE BYPASS
FUEL INLET
AIR INLET
Dimensions are in inches.
BASELINE - MOCON, INC.
DRAWN BY
DATE
TITLE: 9000 FID MECHANICAL DIMENSIONS
BLI #
SIZE B
DWG NO.
SHEET 1 OF 1
REV A



Connection	Description	Type
Sample Outlet	Connected to the sample inlet	Outlet
Common Vent	This vent is only active on 4 port units. It allows the user to connect a pump to the vent and pull flow from all inactive sample ports. This flow should be vented to atmospheric pressure.	Vent
Sample Vent	This vent is typically capped but in some applications may be configured to release excess sample. Do not operate the instrument with the vent uncapped unless the instrument has been specifically engineered to operate in that manner.	Vent
Zero Inlet	Connected to Zero gas for calibration.	Inlet
Span Inlet	Connected to Span gas for calibration.	Inlet
Sample Port 1	Sample inlet, goes to internal pump and multi-port sampler	Inlet
Sample Port 2	Sample inlet, goes to internal pump and multi-port sampler	Inlet
Sample Port 3	Sample inlet, goes to internal pump and multi-port sampler	Inlet
Sample Port 4	Sample inlet, goes to internal pump and multi-port sampler	Inlet
Detector Vent	Releases residual combustion gases. Since ionization destroys the organic constituents of the sample, the detector vent is typically discharged into the environment.	Vent
Sample Inlet	Goes to the sample flow regulator and then to the detector.	Inlet
Sample Bypass	Releases approximately 500 cc/min to 2 l/min of gas from the output of the sample regulator. The gas may be zero, span, or sample depending on the current operational mode of the analyzer. This flow should be vented to atmospheric pressure.	Vent
Fuel Inlet	Goes to the fuel flow regulator and then to the detector.	Inlet
Air Inlet	Goes to the air flow regulator and then to the detector.	Inlet

Relay Outputs

Description	Conn	Pin #
Relay 1 A	B	1
Relay 1 B	B	2
Relay 2 A	B	3
Relay 2 B	B	4
Relay 3 A	B	5
Relay 3 B	B	6
Relay 4 A	B	7
Relay 4 B	B	8
Relay 5 A	B	9
Relay 5 B	B	10
Relay 6 A	C	1
Relay 6 B	C	2
Relay 7 A	C	3
Relay 7 B	C	4
Relay 8 A	C	5
Relay 8 B	C	6
Relay 9 A	C	7
Relay 9 B	C	8
Relay 10 A	C	9
Relay 10 B	C	10
Relay 11 A	C	11
Relay 11 B	C	12
Relay 12 A	C	13
Relay 12 B	C	14
Relay 13 A	C	15
Relay 13 B	C	16
Relay 14 A	C	17
Relay 14 B	C	18

0-20mA Outputs

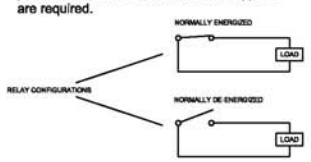
Description	Conn	Pin #
0-20mA 1 (-)	A	1
0-20mA 1 (+)	A	2
0-20mA 2 (-)	D	1
0-20mA 2 (+)	D	2
0-20mA 3 (-)	D	3
0-20mA 3 (+)	D	4
0-20mA 4 (-)	D	5
0-20mA 4 (+)	D	6

RELAY OUTPUTS

All relays are user programmable and can be mapped to various system events. Each relay can be configured as Latching, Non-latching, Normally Energized or Normally Deenergized. The relays are a form A relay and are rated for 3A @ 230VAC.

0-20mA OUTPUT

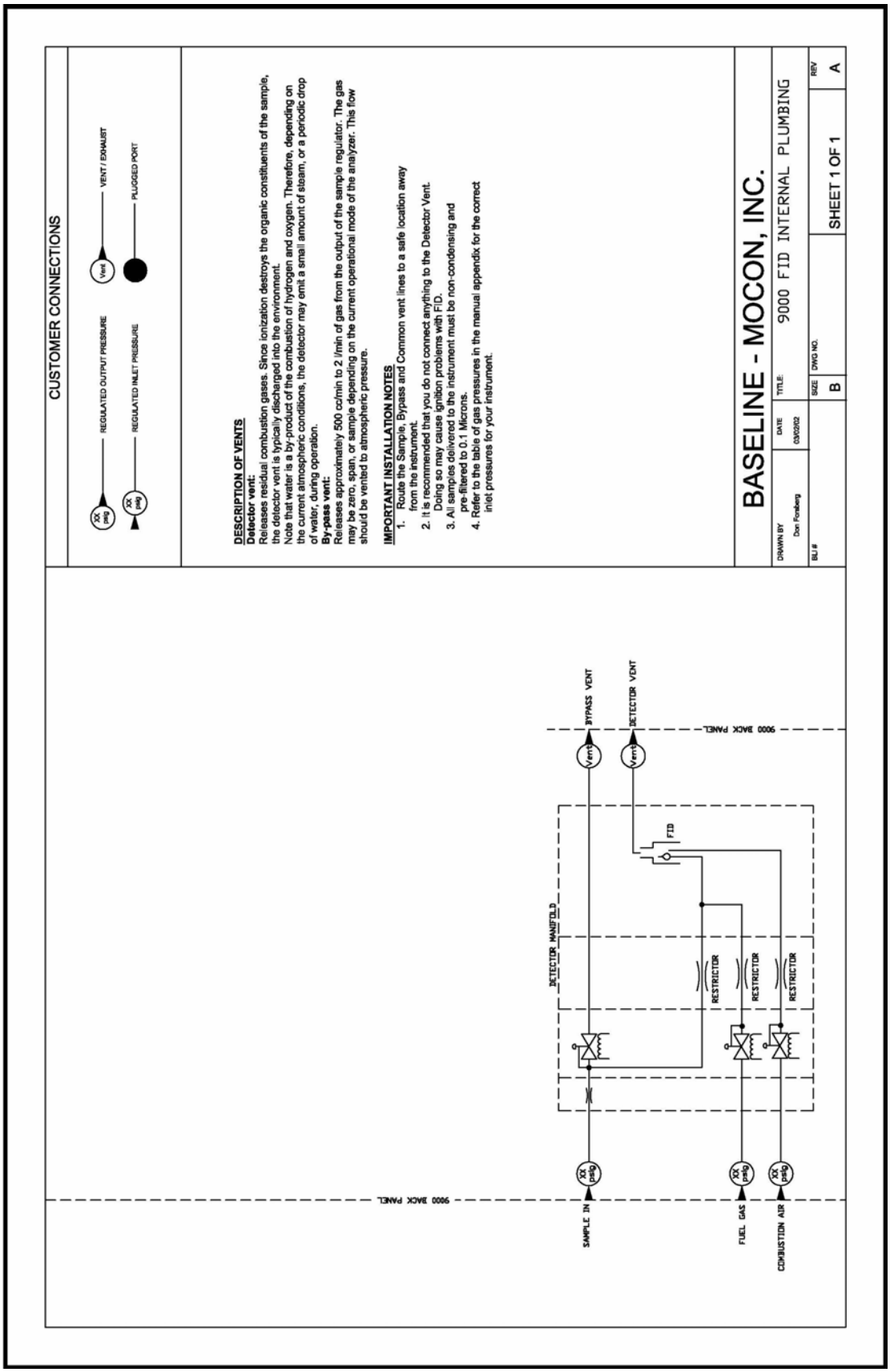
All mA outputs are user programmable for 0 - 20mA or 4 - 20mA. Each signal loop is self powered and isolated. No external supplies are required.

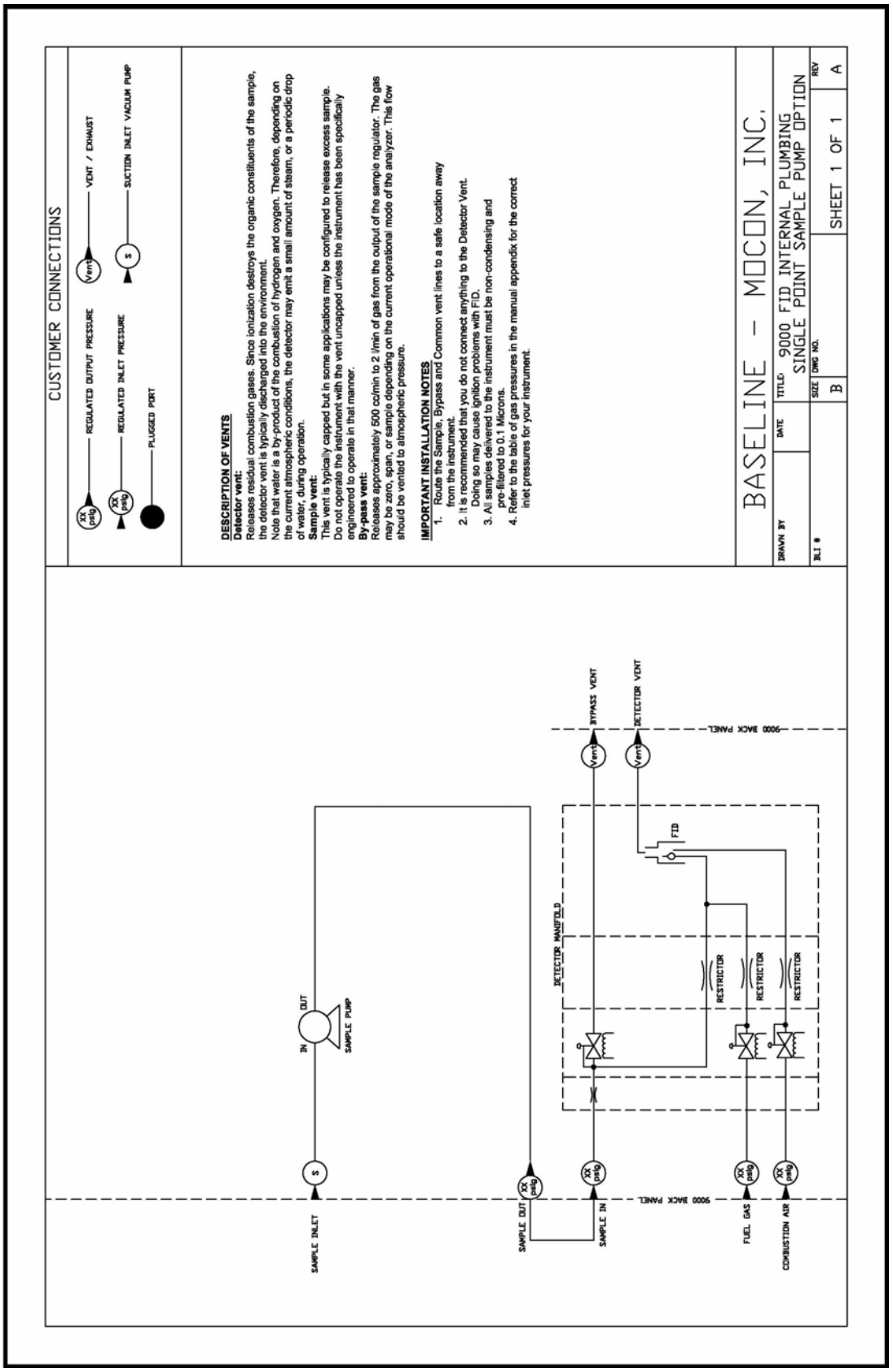


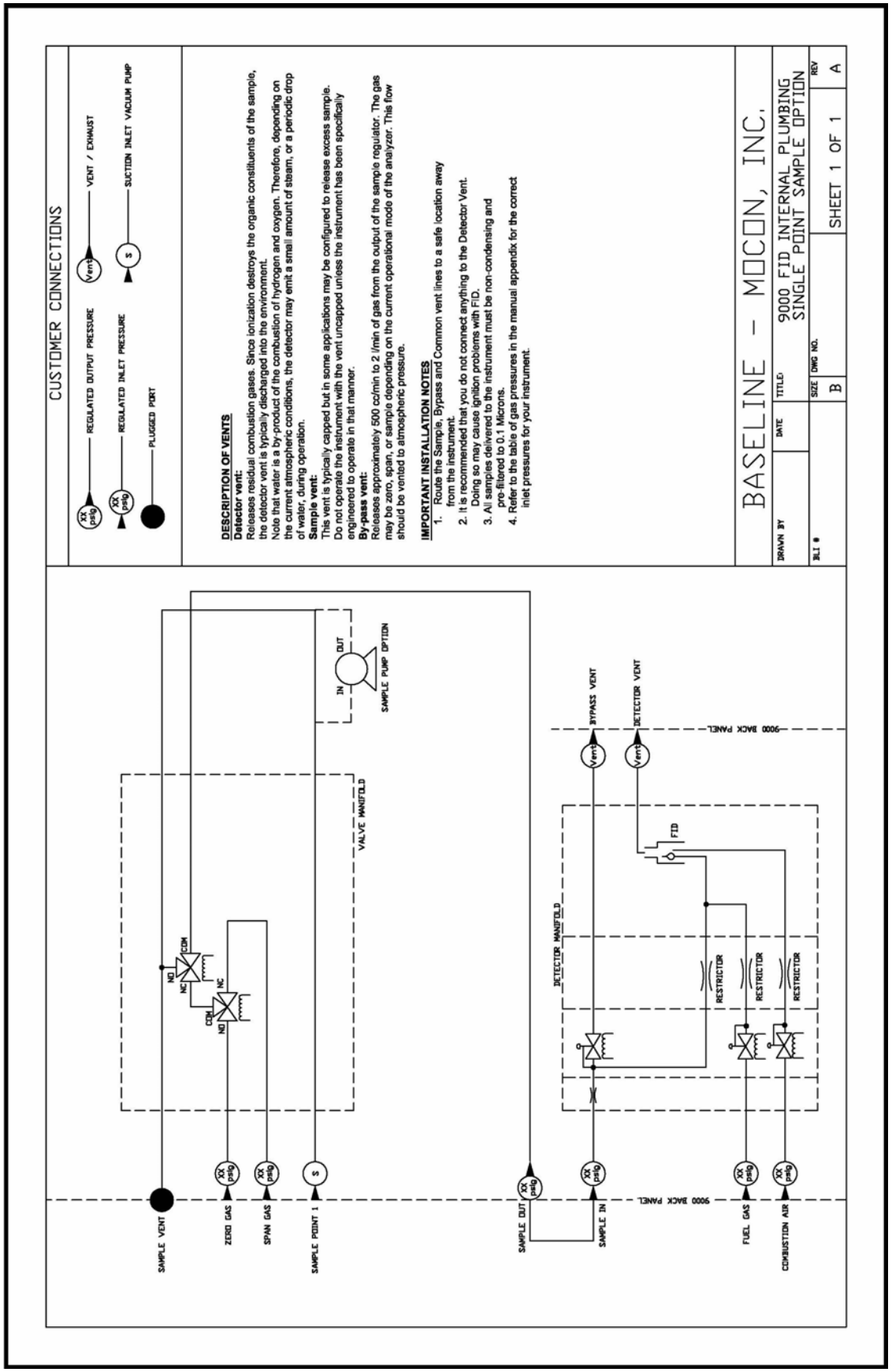
IMPORTANT INSTALLATION NOTES

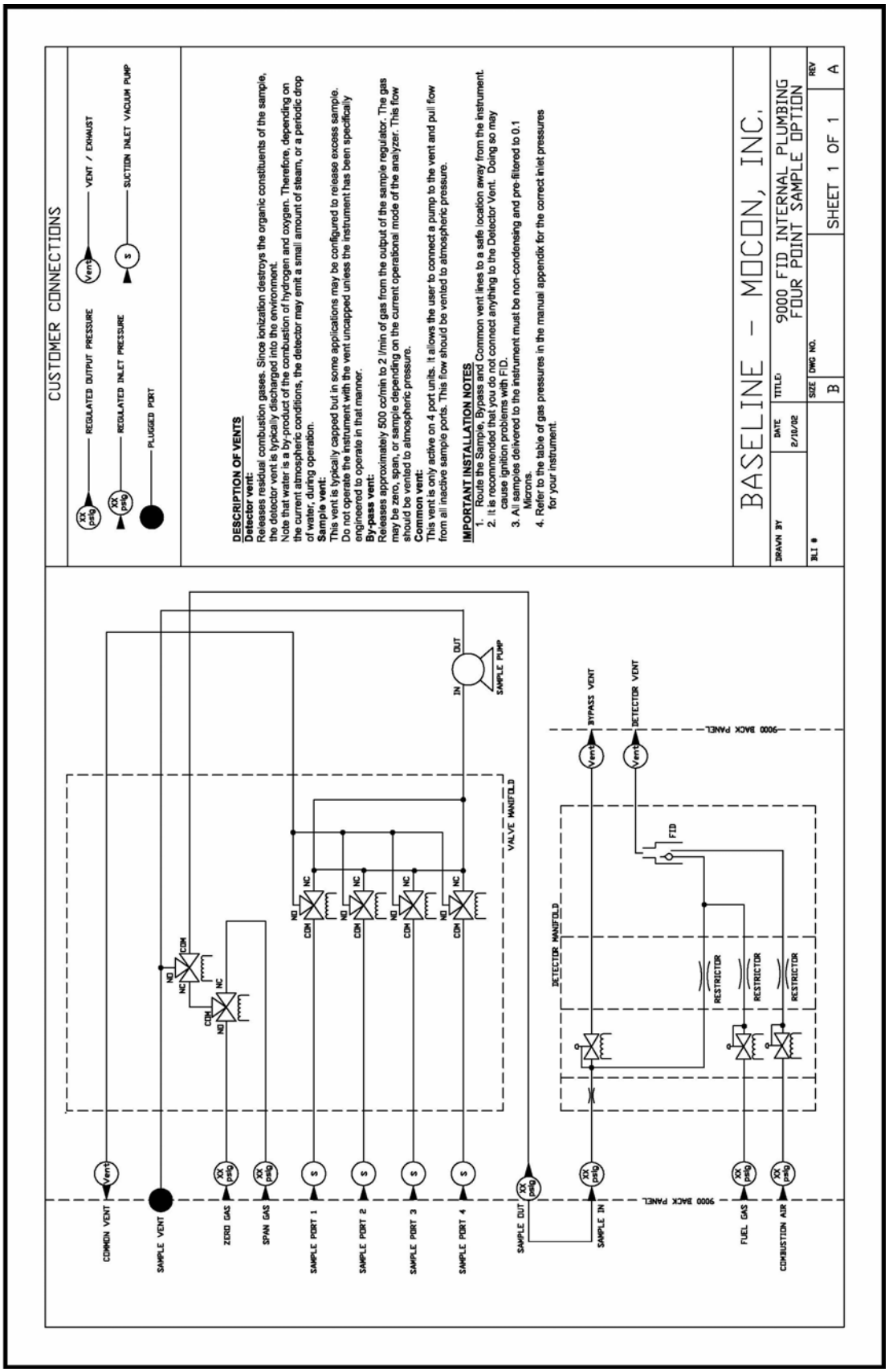
1. Route the Sample, Bypass and Common vent lines to a safe location away from the instrument.
2. It is recommended that you do not connect anything to the Detector Vent. Doing so may cause ignition problems with FID.
3. All samples delivered to the instrument must be non-condensing and pre-filtered to 0.1 Microns.
4. Refer to the table of gas pressures in the manual appendix for the correct inlet pressures for your instrument.

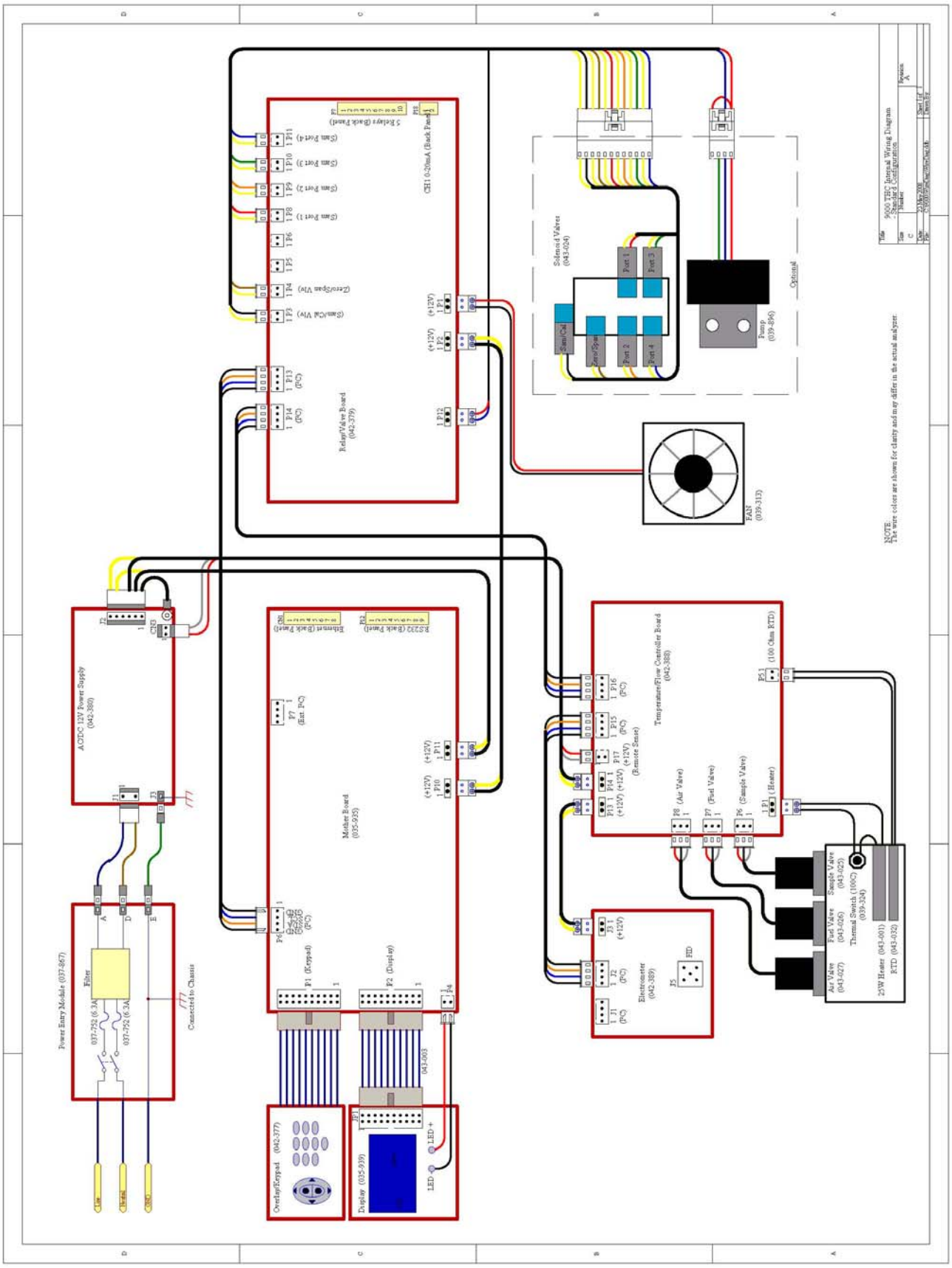
BASELINE - MOCON, INC.			
DRAWN BY: Don Forsberg	DATE: 03/02/02	TITLE: SERIES 9000 BACK PANEL CONNECTIONS	
BLI #	SIZE: B	SHEET 1 OF 1	REV: C

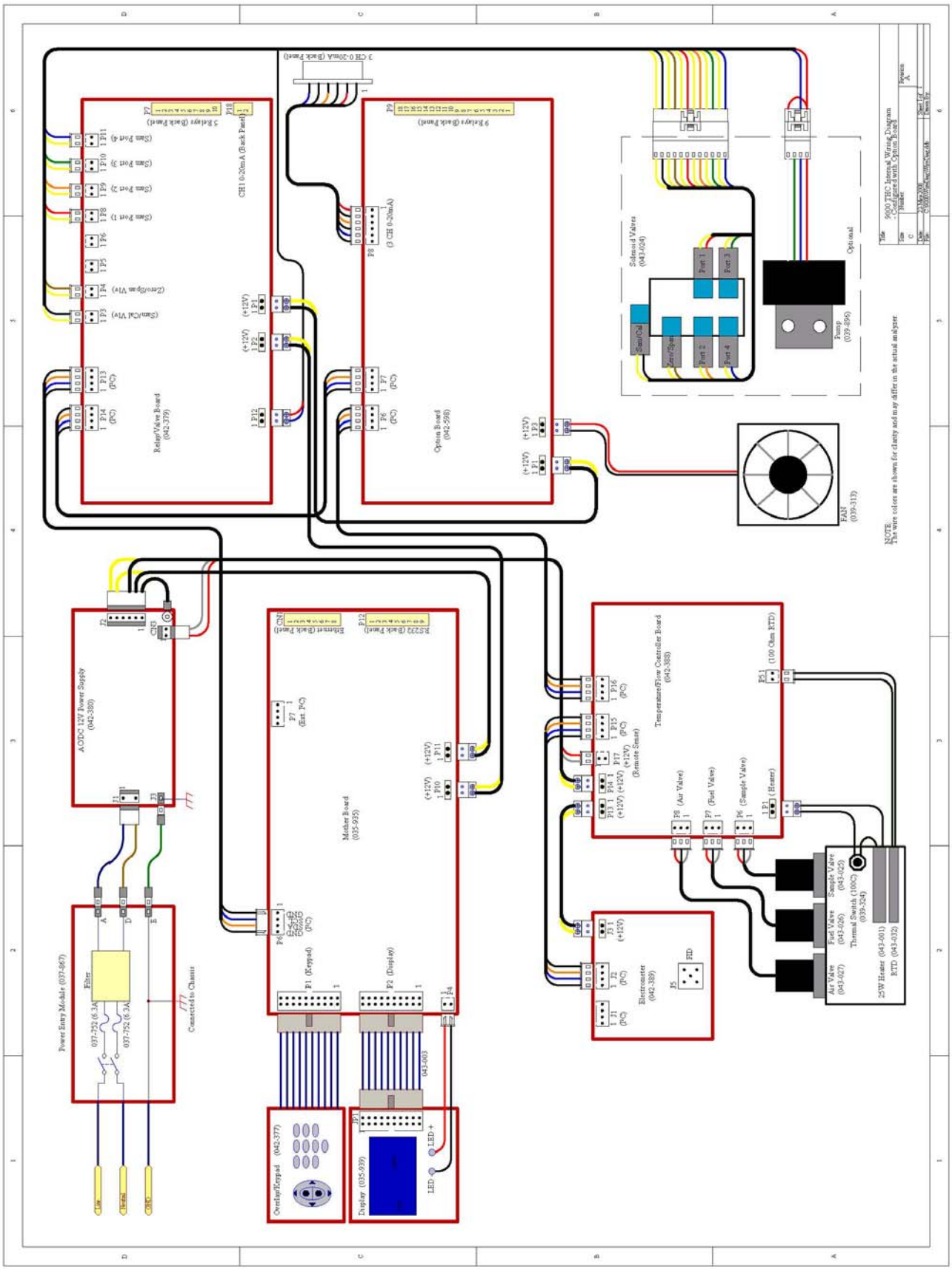

CUSTOMER CONNECTIONS
REGULATED OUTPUT PRESSURE
VENT / EXHAUST
REGULATED INLET PRESSURE
PLUGGED PORT
DESCRIPTION OF VENTS
Detector vent:
Releases residual combustion gases. Since ionization destroys the organic constituents of the sample, the detector vent is typically discharged into the environment.
Note that water is a by-product of the combustion of hydrogen and oxygen. Therefore, depending on the current atmospheric conditions, the detector may emit a small amount of steam, or a periodic drop of water, during operation.
By-pass vent:
Releases approximately 500 cc/min to 2 l/min of gas from the output of the sample regulator. The gas may be zero, span, or sample depending on the current operational mode of the analyzer. This flow should be vented to atmospheric pressure.
IMPORTANT INSTALLATION NOTES
1. Route the Sample, Bypass and Common vent lines to a safe location away from the instrument.
2. It is recommended that you do not connect anything to the Detector Vent. Doing so may cause ignition problems with FID.
3. All samples delivered to the instrument must be non-condensing and pre-filtered to 0.1 Microns.
4. Refer to the table of gas pressures in the manual appendix for the correct inlet pressures for your instrument.
BASELINE - MOCON, INC.
DRAWN BY
Don Forsberg
DATE
03/02/02
TITLE:
9000 FID INTERNAL PLUMBING
BLI #
SIZE
B
DWG NO.
SHEET 1 OF 1
REV
A
9000 BACK PANEL
SAMPLE IN
FUEL GAS
COMBUSTION AIR
DETECTOR MANIFOLD
RESTRICTOR
RESTRICTOR
RESTRICTOR
FID
BYPASS VENT
DETECTOR VENT
9000 BACK PANEL


CUSTOMER CONNECTIONS
REGULATED OUTPUT PRESSURE
Vent
VENT / EXHAUST
XX psig
REGULATED INLET PRESSURE
S
SUCTION INLET VACUUM PUMP
PLUGGED PORT
DESCRIPTION OF VENTS
Detector vent:
Releases residual combustion gases. Since ionization destroys the organic constituents of the sample, the detector vent is typically discharged into the environment.
Note that water is a by-product of the combustion of hydrogen and oxygen. Therefore, depending on the current atmospheric conditions, the detector may emit a small amount of steam, or a periodic drop of water, during operation.
Sample vent:
This vent is typically capped but in some applications may be configured to release excess sample. Do not operate the instrument with the vent uncapped unless the instrument has been specifically engineered to operate in that manner.
By-pass vent:
Releases approximately 500 cc/min to 2 l/min of gas from the output of the sample regulator. The gas may be zero, span, or sample depending on the current operational mode of the analyzer. This flow should be vented to atmospheric pressure.
IMPORTANT INSTALLATION NOTES
1. Route the Sample, Bypass and Common vent lines to a safe location away from the instrument.
2. It is recommended that you do not connect anything to the Detector Vent. Doing so may cause ignition problems with FID.
3. All samples delivered to the instrument must be non-condensing and pre-filtered to 0.1 Microns.
4. Refer to the table of gas pressures in the manual appendix for the correct inlet pressures for your instrument.
BASELINE – MOCON, INC.
DRAWN BY
DATE
TITLE: 9000 FID INTERNAL PLUMBING SINGLE POINT SAMPLE PUMP OPTION
BLI #
SIZE B
DWG NO.
REV A
SHEET 1 OF 1
SAMPLE INLET
S
IN
OUT
SAMPLE PUMP
SAMPLE OUT
XX psig
SAMPLE IN
XX psig
9000 BACK PANEL
DETECTOR MANIFOLD
BYPASS VENT
Vent
DETECTOR VENT
Vent
9000 BACK PANEL
FID
RESTRICTOR
RESTRICTOR
RESTRICTOR
FUEL GAS
XX psig
COMBUSTION AIR
XX psig


CUSTOMER CONNECTIONS
REGULATED OUTPUT PRESSURE
VENT / EXHAUST
REGULATED INLET PRESSURE
SUCTION INLET VACUUM PUMP
PLUGGED PORT
DESCRIPTION OF VENTS
Detector vent:
Releases residual combustion gases. Since ionization destroys the organic constituents of the sample, the detector vent is typically discharged into the environment.
Note that water is a by-product of the combustion of hydrogen and oxygen. Therefore, depending on the current atmospheric conditions, the detector may emit a small amount of steam, or a periodic drop of water, during operation.
Sample vent:
This vent is typically capped but in some applications may be configured to release excess sample. Do not operate the instrument with the vent uncapped unless the instrument has been specifically engineered to operate in that manner.
By-pass vent:
Releases approximately 500 cc/min to 2 l/min of gas from the output of the sample regulator. The gas may be zero, span, or sample depending on the current operational mode of the analyzer. This flow should be vented to atmospheric pressure.
IMPORTANT INSTALLATION NOTES
1. Route the Sample, Bypass and Common vent lines to a safe location away from the instrument.
2. It is recommended that you do not connect anything to the Detector Vent. Doing so may cause ignition problems with FID.
3. All samples delivered to the instrument must be non-condensing and pre-filtered to 0.1 Microns.
4. Refer to the table of gas pressures in the manual appendix for the correct inlet pressures for your instrument.
BASELINE - MOCON, INC.
DRAWN BY
DATE
TITLE: 9000 FID INTERNAL PLUMBING SINGLE POINT SAMPLE OPTION
INLI #
SIZE B
DWG NO.
SHEET 1 OF 1
REV A
SAMPLE VENT
ZERO GAS
SPAN GAS
SAMPLE POINT 1
VALVE MANIFOLD
IN
OUT
SAMPLE PUMP OPTION
9000 BACK PANEL
SAMPLE OUT
SAMPLE IN
BYPASS VENT
DETECTOR VENT
DETECTOR MANIFOLD
FID
RESTRICTOR
RESTRICTOR
RESTRICTOR
FUEL GAS
COMBUSTION AIR
9000 BACK PANEL


CUSTOMER CONNECTIONS
REGULATED OUTPUT PRESSURE
VENT / EXHAUST
REGULATED INLET PRESSURE
SUCTION INLET VACUUM PUMP
PLUGGED PORT
DESCRIPTION OF VENTS
Detector vent:
Releases residual combustion gases. Since ionization destroys the organic constituents of the sample, the detector vent is typically discharged into the environment.
Note that water is a by-product of the combustion of hydrogen and oxygen. Therefore, depending on the current atmospheric conditions, the detector may emit a small amount of steam, or a periodic drop of water, during operation.
Sample vent:
This vent is typically capped but in some applications may be configured to release excess sample. Do not operate the instrument with the vent uncapped unless the instrument has been specifically engineered to operate in that manner.
By-pass vent:
Releases approximately 500 cc/min to 2 l/min of gas from the output of the sample regulator. The gas may be zero, span, or sample depending on the current operational mode of the analyzer. This flow should be vented to atmospheric pressure.
Common vent:
This vent is only active on 4 port units. It allows the user to connect a pump to the vent and pull flow from all inactive sample ports. This flow should be vented to atmospheric pressure.
IMPORTANT INSTALLATION NOTES
1. Route the Sample, Bypass and Common vent lines to a safe location away from the instrument.
2. It is recommended that you do not connect anything to the Detector Vent. Doing so may cause ignition problems with FID.
3. All samples delivered to the instrument must be non-condensing and pre-filtered to 0.1 Microns.
4. Refer to the table of gas pressures in the manual appendix for the correct inlet pressures for your instrument.
BASELINE - MOCON, INC.
DRAWN BY
DATE 2/18/02
TITLE: 9000 FID INTERNAL PLUMBING FOUR POINT SAMPLE OPTION
JOB #
SIZE B
DWG NO.
SHEET 1 OF 1
REV A
COMMON VENT
SAMPLE VENT
ZERO GAS
SPAN GAS
SAMPLE PORT 1
SAMPLE PORT 2
SAMPLE PORT 3
SAMPLE PORT 4
SAMPLE OUT
SAMPLE IN
FUEL GAS
COMBUSTION AIR
VALVE MANIFOLD
DETECTOR MANIFOLD
9000 BACK PANEL
9000 BACK PANEL
BYPASS VENT
DETECTOR VENT
SAMPLE PUMP
IN
OUT
FID
RESTRICTOR
RESTRICTOR
RESTRICTOR
NC
NO
COM


9000 TBC Internal Wiring Diagram
Standard Configuration
Heater
NOTE:
The wire colors are shown for clarity and may differ in the actual analyzer.
Solenoid Valves
(043-024)
Optional
Pump
(039-896)
FAN
(039-313)
Relay/Valve Board
(042-379)
CH1 0-20mA (Back Panel)
5 Relays (Back Panel)
Mother Board
(035-935)
Ethernet (Back Panel)
RS232 (Back Panel)
Temperature/Flow Controller Board
(042-388)
(100 Ohm RTD)
(Air Valve)
(Fuel Valve)
(Sample Valve)
(Heater)
(Remote Sense)
Electrometer
(042-389)
Sample Valve
(043-025)
Fuel Valve
(043-026)
Air Valve
(043-027)
Thermal Switch (100C)
(039-324)
25W Heater (043-001)
RTD (043-032)
AC/DC 12V Power Supply
(042-380)
Power Entry Module (037-867)
Filter
037-752 (6.3A)
037-752 (6.3A)
Connected to Chassis
Line
Neutral
GND
Overlay/Keypad (042-377)
Display (035-939)
LED +
LED -
043-003


9000 TEC Internal Wiring Diagram
- Configured with Option Board
NOTE:
The wire colors are shown for clarity and may differ in the actual analyzer.
Relay/Valve Board (042-379)
Option Board (042-598)
Motherboard (035-939)
Temperature/Flow Controller Board (042-388)
AOTOC 12V Power Supply (042-380)
Power Entry Module (037-867)
Solenoid Valves (043-024)
Pump (039-896)
FAN (039-313)
Sample Valve (043-025)
Fuel Valve (043-026)
Air Valve (043-027)
Thermal Switch (100C) (039-324)
25W Heater (043-011)
RTD (043-032)
Electrometer (042-389)
Overlay/Keypad (043-377)
Display (035-939)
043-003