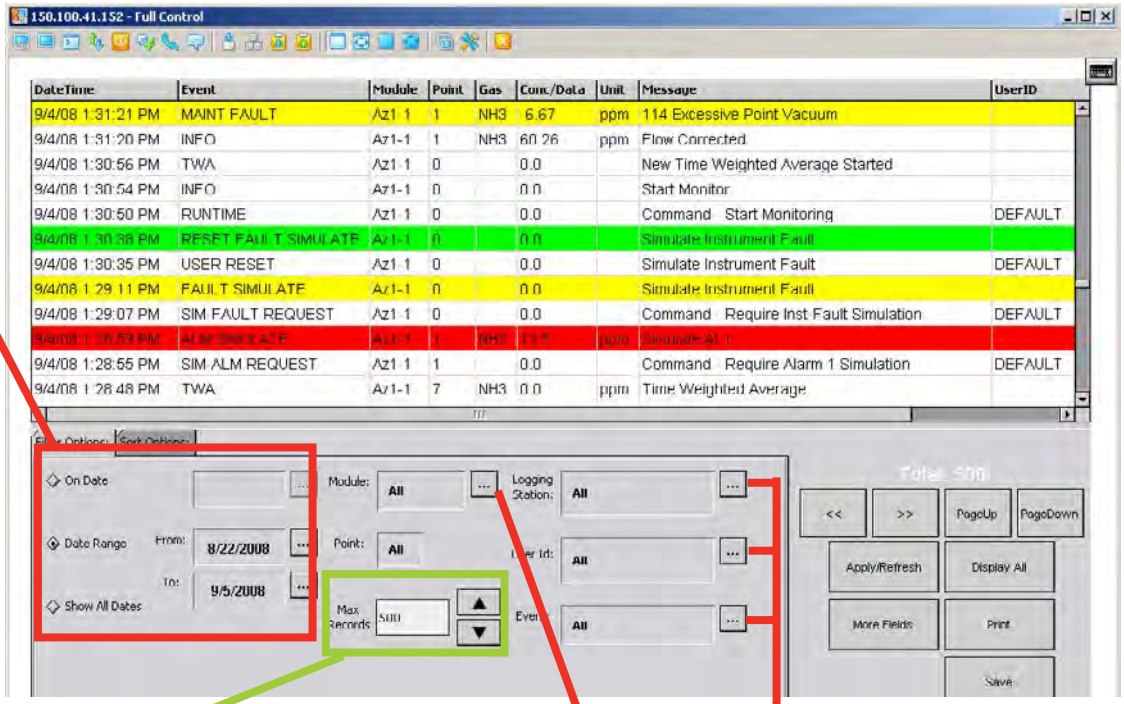
Date fields
Defaults to current date. The default range is current date and the previous two weeks.



Maximum Records
Use to limit the number of records to display. Vertex will display up to 10,000 records. The default setting is 500. Use the up and down arrow buttons to increment the value by 100.

Advance Filter Options
Use the Advance Filter Option buttons located to refine the sort.

Figure 4-8. Event History

Advanced Filter Options-Events

Use to filter on specific alarms, faults or other events.

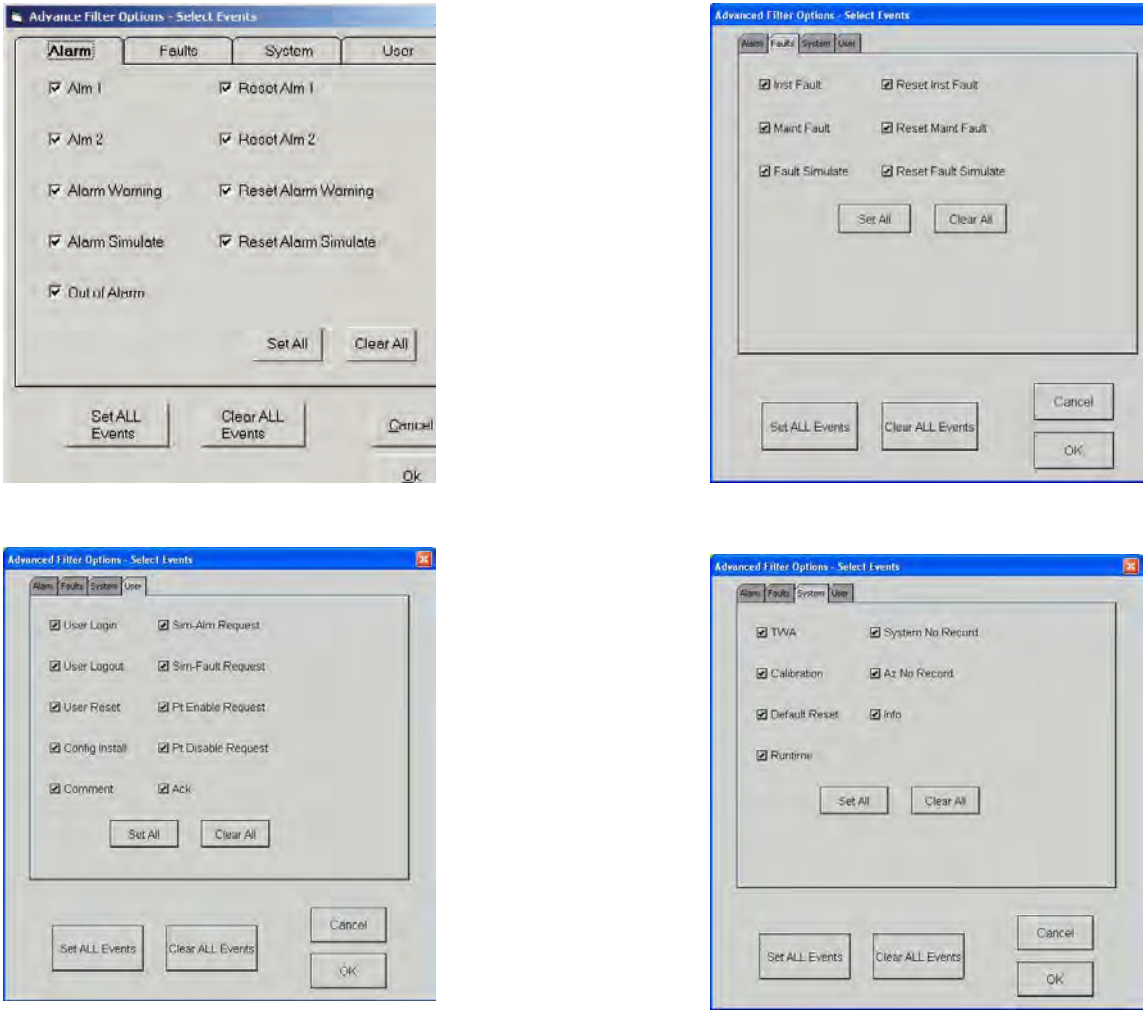


Figure 4-9. Filter Options

Select Filter Options-Modules

Use to filter events based on specific points, analyzers or other hardware modules.

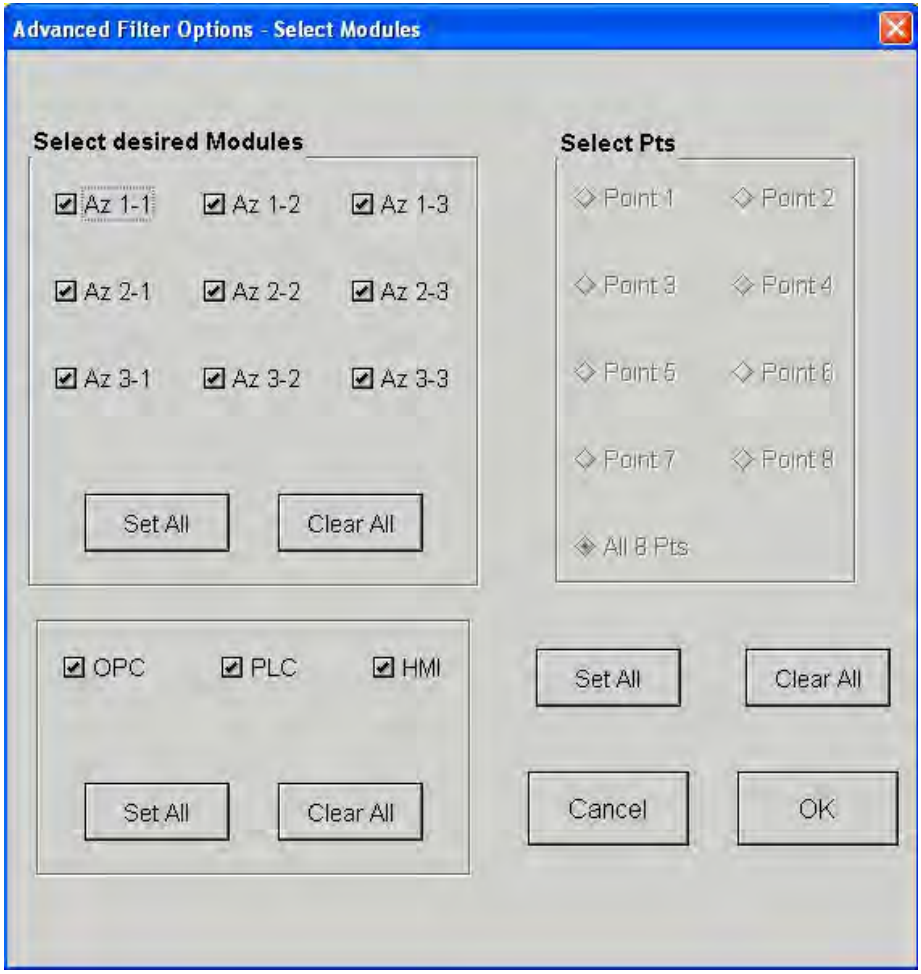


Figure 4-10. Filter Options

Select User ID or Logging station

Use to select a specific Vertex station or operator.

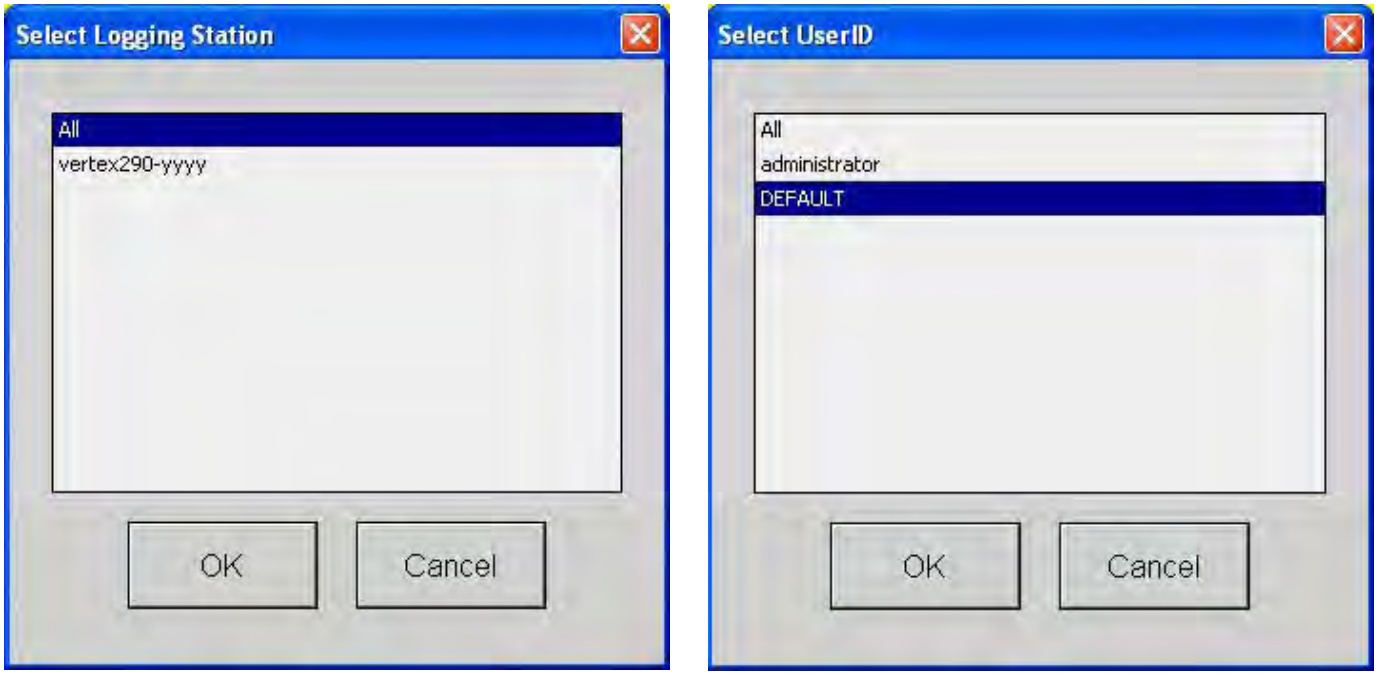


Figure 4-11. Selecting Station or ID

4.5.2 Data Trend

Vertex plots gas concentration in the Data Trend window. You may choose multiple points to plot each point a different colored line on the graph. Data displayed in the graph can be either *Stored* data from the data log or *Live* (a continuous, real-time display, scrolling right to left).

Data can only be stored if datalogging was selected in the Profile Management Utility screen. A maximum of one year of data can be stored, however faster datalogging rates may require more frequent purging. Stored data shows only concentration (not location names)

TIP Drag a finger across the screen to zoom into the area selected

Information for each point appears in the table to the left of the graph.

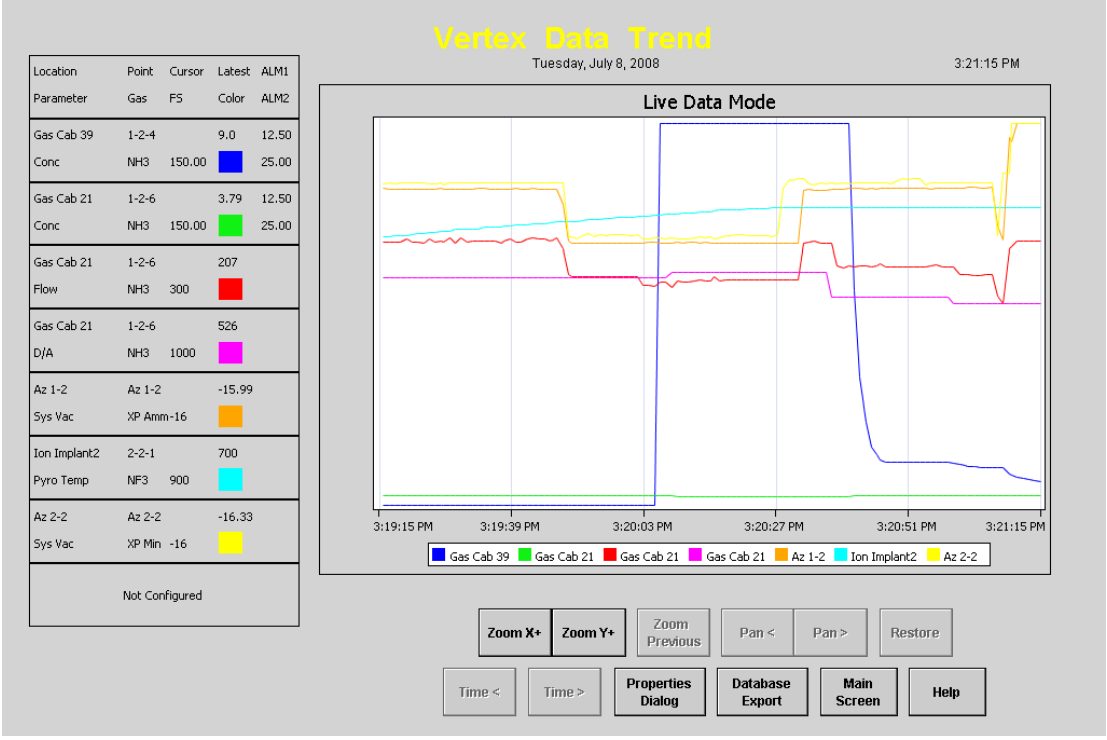


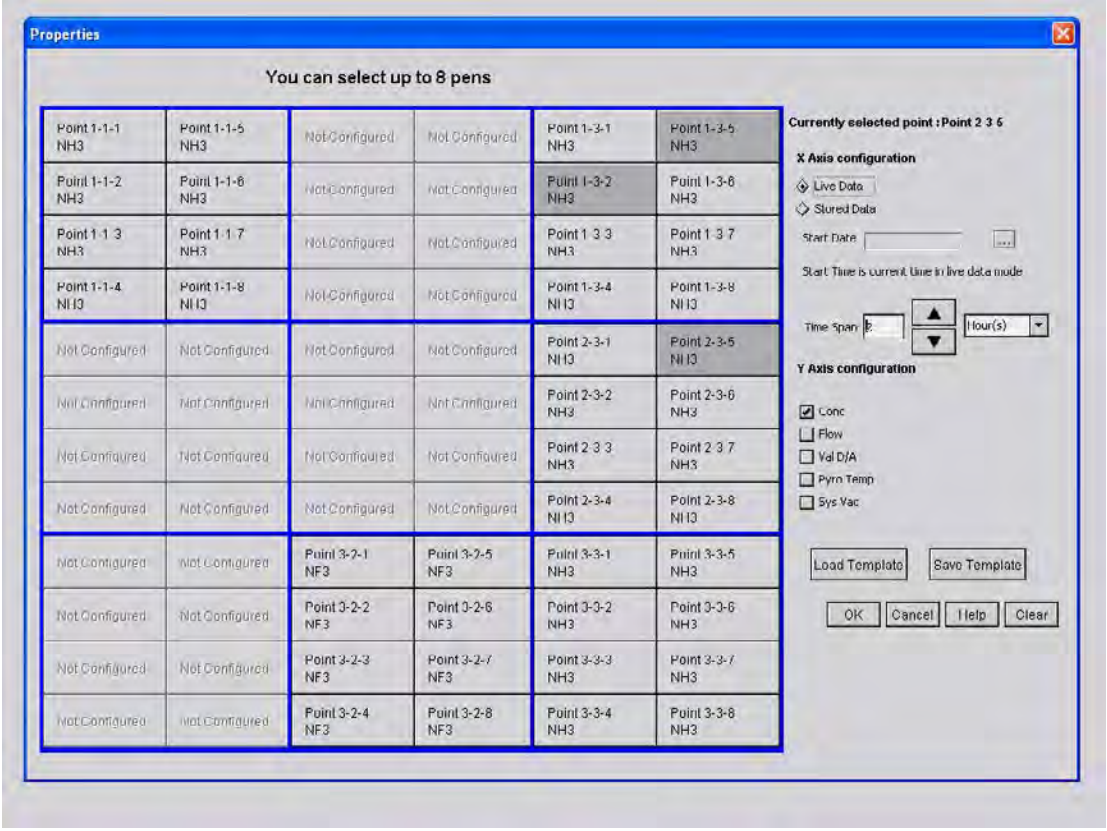
Figure 4-12. Data Trend

Use the Properties window (bottom right) to select locations and data to include in the Data Trend. Selection options include the

Y axis data: points to display (to a maximum of 8), the data to display (live or stored) and the time span; and the

X axis data: one, some or all detection values.

TIP Touch Help for additional information on using the Properties dialog.



4.5.3 Optional ChemCam

The Vertex ChemCam option provides a means to observe the stains on the last window of a Chemcassette® tape. It consists of a small video camera located between the Chemcassette® take up reel and the optic head. The Vertex System records images of the stains in either AutoPicture mode or by a ChemCam Live capture. See Section 3.6.3 Set Analyzer Window for more information.

Note:

Some faint stains may not be visible via the camera.

To use the ChemCam window, touch Main Screen, Review and then ChemCam.

ChemCam Live

Use the ChemCam Live tab to manually save an image to the ChemCam database.

1. Touch the image you have selected for capture. The border around the image will turn green.
2. Enter comments about the image in the Comment text box.
3. Touch Capture. The border on the image will turn red.
4. When the border returns to green, the capture is complete. Choose an additional image to capture or touch Close.

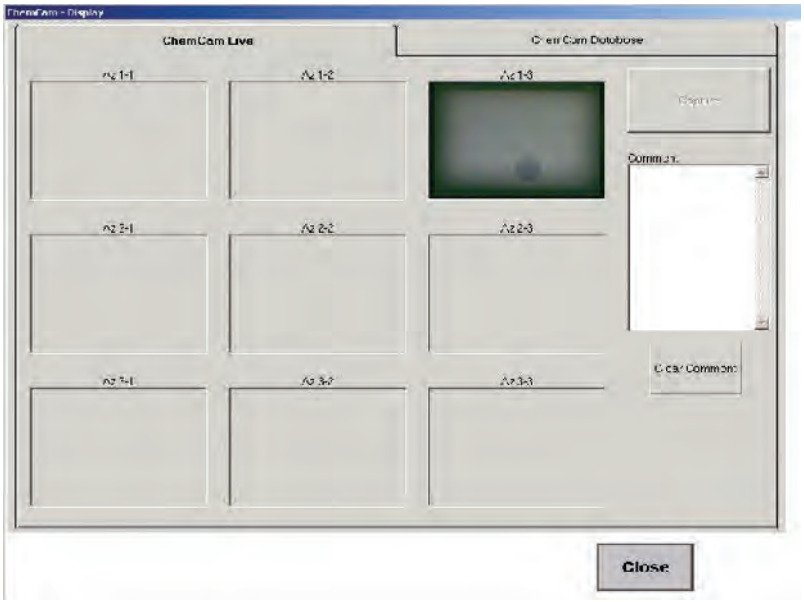


Figure 4-13. ChemCam Window

ChemCam Database

Use the ChemCam Database tab to review, print or delete records in the ChemCam database. The Refresh button updates the window with records stored since the window was opened.

Every record in the database includes the following:

- Time and date of capture
- Type of capture (manual or automatic)
- Analyzer associated with the database entry
- Chemcassette® serial number
- Computer name

Additional information for records stored by ChemCam AutoPicture includes

- Point number which triggered the alarm
- Gas concentration at the time of alarm
- Unit of measure for the concentration
- The alarm level the concentration reached
- The location ID

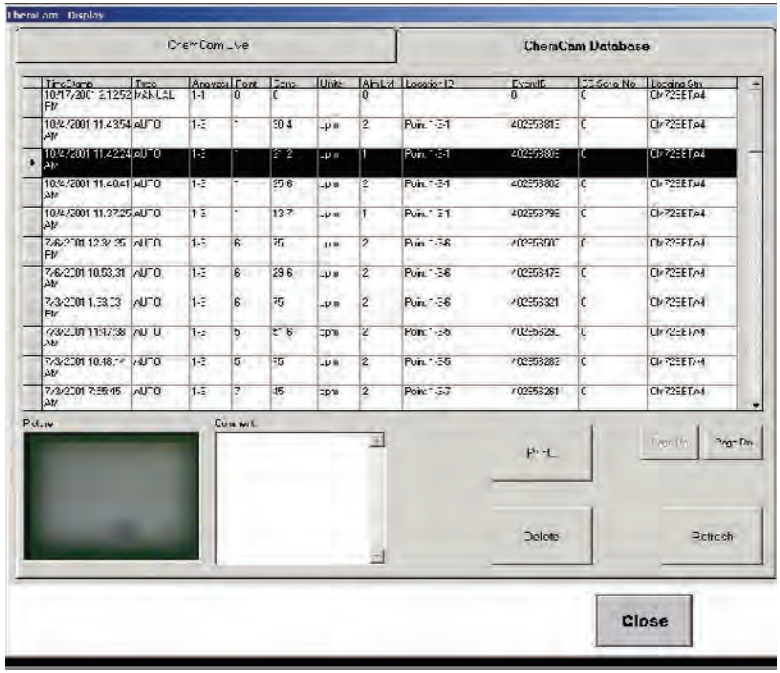
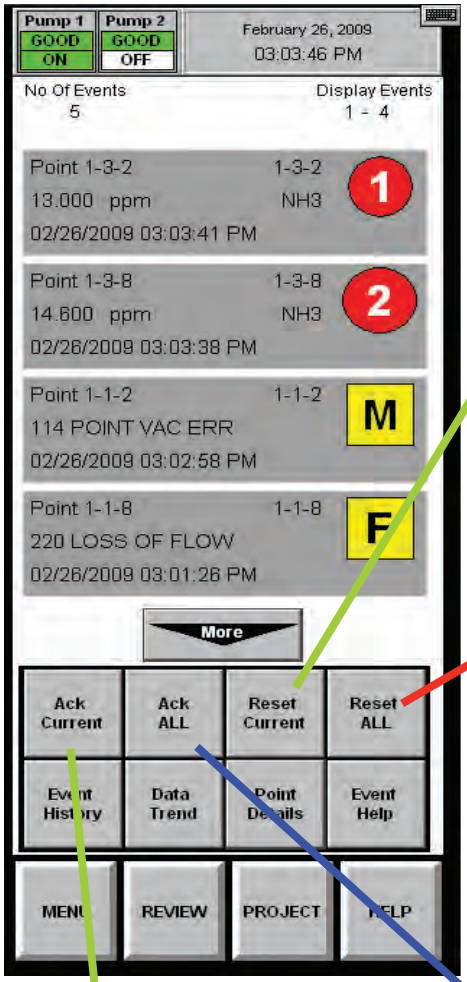


Figure 4-14. ChemCam Database

4.5.4 Event List

With the Event List, view and acknowledge active alarms and faults. Vertex M displays the newest event at the top of the list. Scroll through the events with

the Back and More buttons. To select an event as the current event, touch the event. The current event will have a green border.

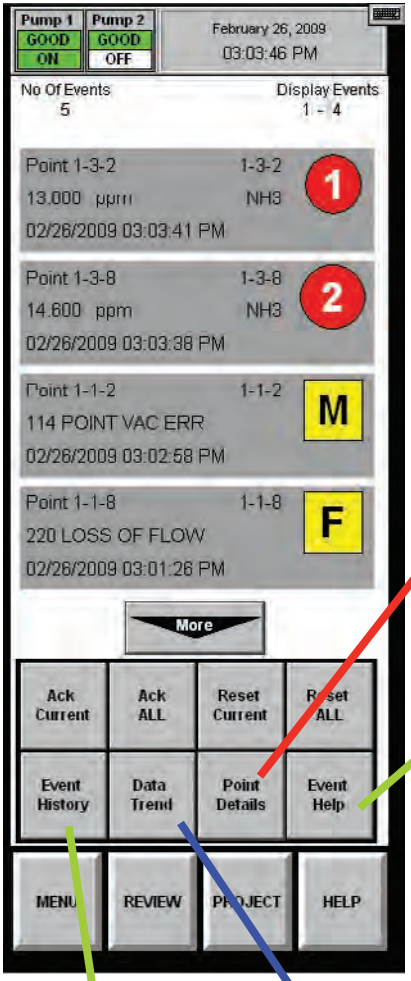


Reset Current
Clears the active event from the list. If the problem has not been resolved, events will continue to occur.

Reset All
Clears all events from the list. Reset All is not instantaneous. Vertex M may not remove events from the list for several seconds.

Ack All
Acknowledges an operator has seen all of the events

Ack Current
Acknowledges an operator has seen the current event



Point Details
Displays point detail for current selected point

Event Help
Displays the HTML help file designated for the point. Point help files are linked in the configuration utility.

Event History
Opens the Event History window

Data Trend
Opens the Data Trend window

4.6 Menu Buttons

Use the buttons in Menu to perform:

- 4.6.1 Run Time Options
- 4.6.2 Flow Calibration
- 4.6.3 Maintenance. See also Section 5 Maintenance.
- 4.6.4 Diagnostics
- 4.6.5 Service
- 4.6.6 Security Access
- 4.6.7 Configuration. See also Section 3.6 Configuration Utility.

4.6.1 Run Time Options

Use the Run Time Options Window to perform one of the following four functions:

- Start or stop an analyzer from monitoring
- Enable or temporarily disable a point
- Enable or temporarily disable an alarm
- Enter a comment event into the event list

A point or alarm disabled in the Run Time Options window will remain disabled until it is again enabled in this window. However, an event window will open to remind operators the alarm or point is no longer providing coverage. The event will occur after the timeout period set in the configuration window.

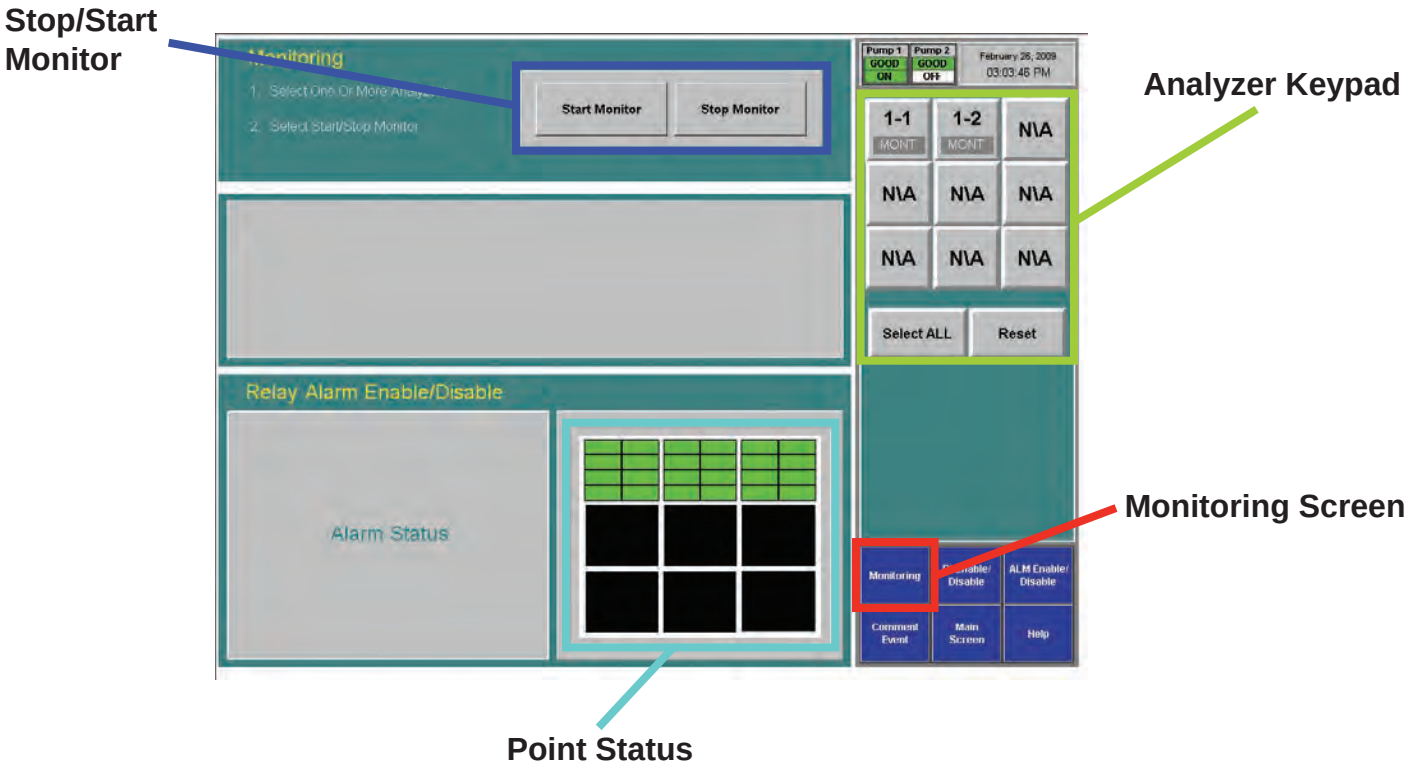
Vertex M always displays the following items in the Run Time Options window.

To Start or Stop an Analyzer from Monitoring

Stopping an analyzer from monitoring prevents the system from triggering false alarms during testing and maintenance.

1. Choose Monitoring from the function buttons at the bottom of the screen.
2. Select the analyzer(s) from the keypad. The selected analyzer(s) will turn dark gray on the keypad.
3. Choose Stop or Start Monitor to change the state of the analyzer.

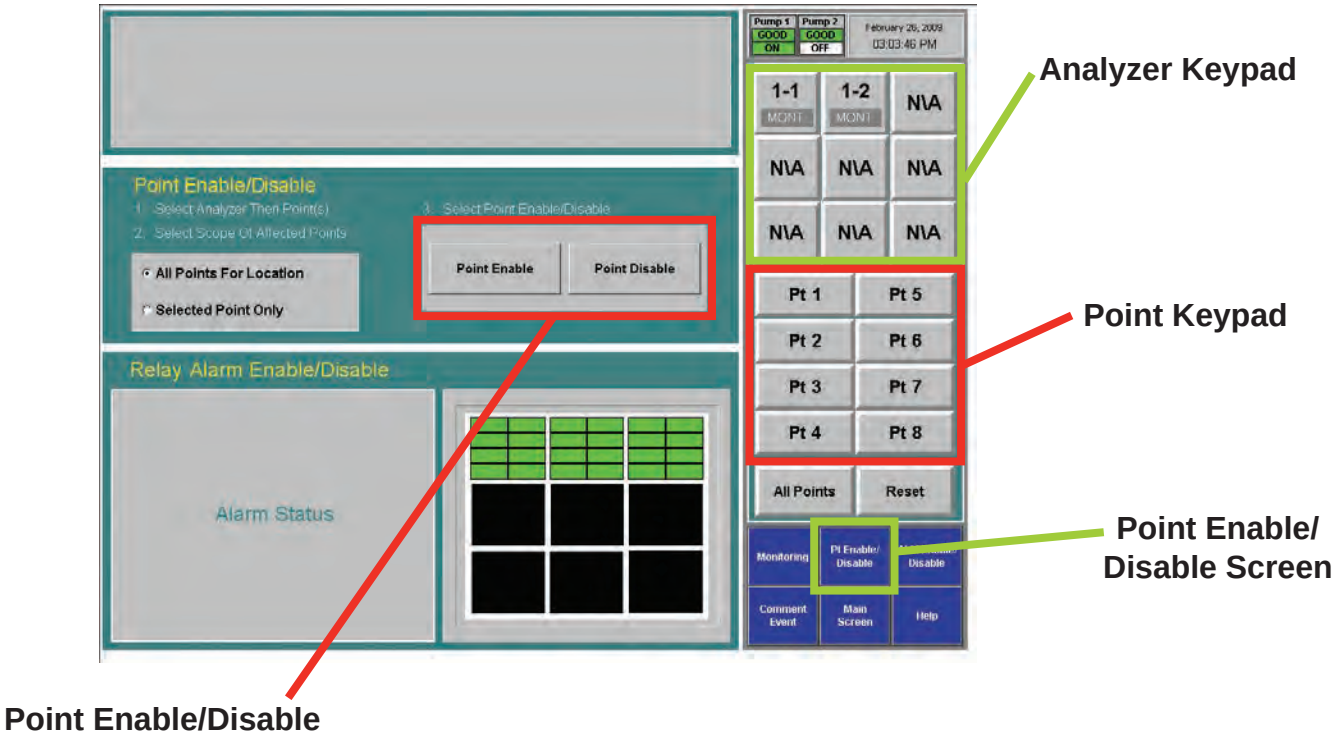
The status indicator changes to reflect the current status on the main screen, and on the analyzer button on the keypad.



To Disable or Enable a Point

Disabling a point prevents the system from triggering false alarms during testing and maintenance. Vertex M will not perform point specific fault checks on disabled points.

1. Choose Point Enable/Disable from the function buttons.
2. Select the analyzer and point from the keypad. The selected point buttons turn dark gray on the keypad.



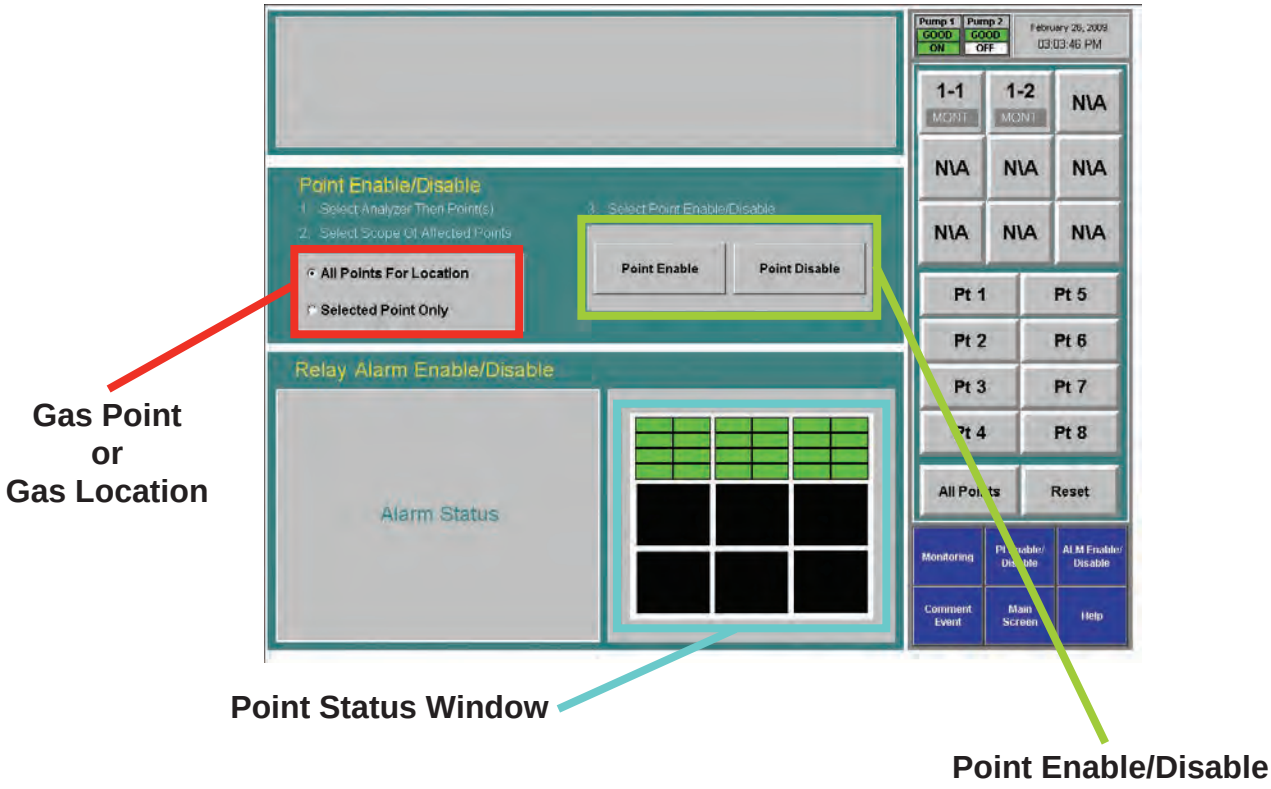
3. Choose Selected Point Only to enable / disable a single point

   or

   Choose All Points for Location to enable / disable all of the points monitoring a location.

4. Touch Point Enable or Point Disable to change the state of the point.

   A disabled point turns light grey. An enabled point is green in the point status window.



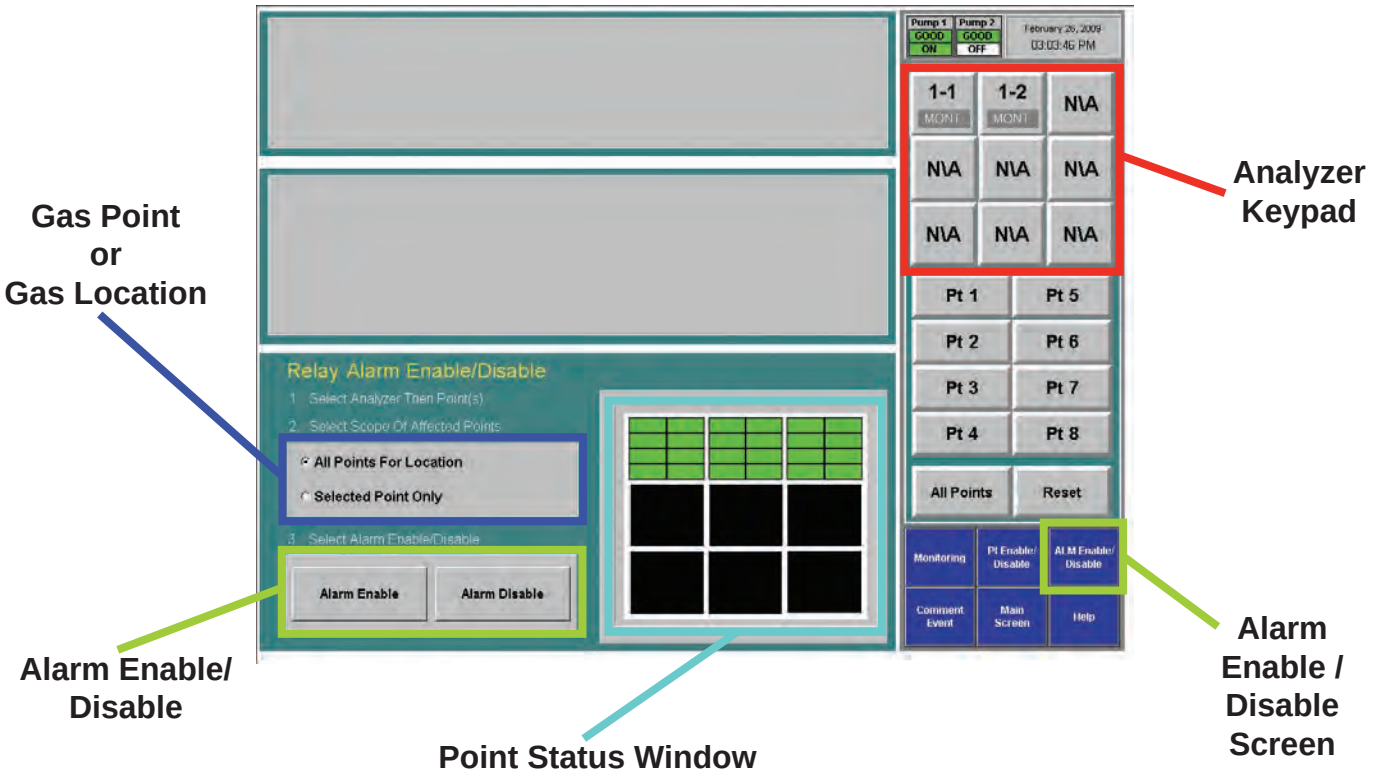
To Disable or Enable Alarms

Disabling alarms prevents the system from triggering false alarms during testing and maintenance.

1. Select the analyzer and point from the keypad. The selected points turn dark gray on the keypad.
2. Choose Selected Point Only to enable / disable an alarm on a single point

   or

   Choose All Points for Location to enable / disable all of the alarms associated with a location.
3. Touch Alarm Enable or Alarm Disable to change the state of the point. A disabled alarm turns light blue. An enabled alarm turns green in the point status window.

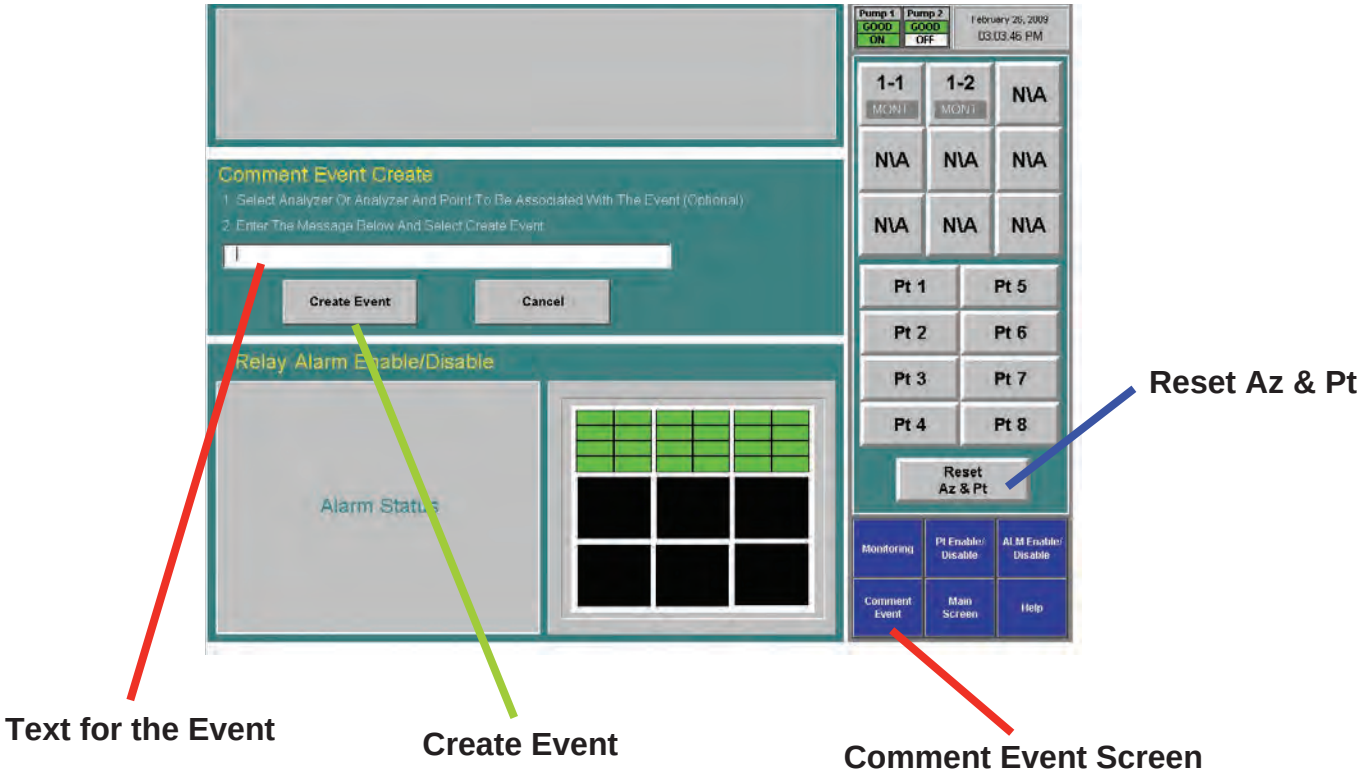


Comment Event

Use Comment Event to enter information about a point or analyzer that Vertex M would not automatically enter into the database. The comment is stored in Event History.

1. To enter a comment:
2. Touch Comment Event.
3. Enter the text for the event.
4. Choose analyzer and point to associate with the comment (optional).
5. Touch Create Event.

The comment event is associated with the analyzer and point selected on the keypads. To enter a comment independent of a point, choose Reset Az & Pt.



4.6.2 Flow Calibration

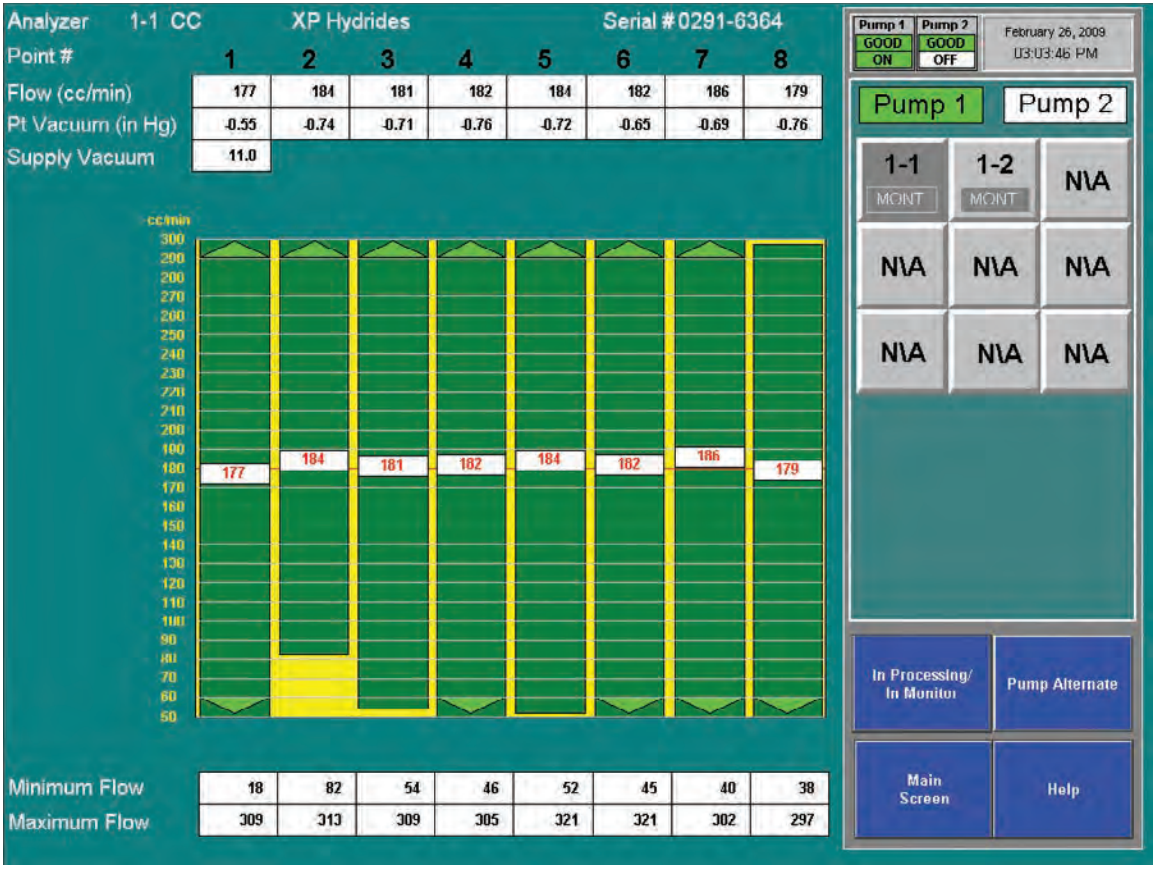
The Vertex M System requires exact flow rates and vacuum levels for accurate gas detection. Factors which affect proper flow setup are sample line length, the type of analyzer installed, the condition of the filters, and the supply vacuum level.

To open the Flow Calibration Window, choose Main Screen, Menu, Runtime Options, Calibration.

The Flow Calibration Window

The Flow Calibration window consists of three parts:

- Flow display
- Analyzer selection pad
- Function buttons


Analyzer 1-1 CC
XP Hydrides
Serial #0291-6364
Point # 1 2 3 4 5 6 7 8
Flow (cc/min) 177 184 181 182 184 182 186 179
Pt Vacuum (in Hg) -0.55 -0.74 -0.71 -0.76 -0.72 -0.65 -0.69 -0.76
Supply Vacuum 11.0
cc/min
300
290
280
270
260
250
240
230
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
177
184
181
182
184
182
186
179
Minimum Flow 18 82 54 46 52 45 40 38
Maximum Flow 309 313 309 305 321 321 302 297
Pump 1 GOOD ON
Pump 2 GOOD OFF
February 26, 2009
03:03:46 PM
Pump 1
Pump 2
1-1 MONT
1-2 MONT
N\A
N\A
N\A
N\A
N\A
N\A
In Processing/ In Monitor
Pump Alternate
Main Screen
Help

Flow Display

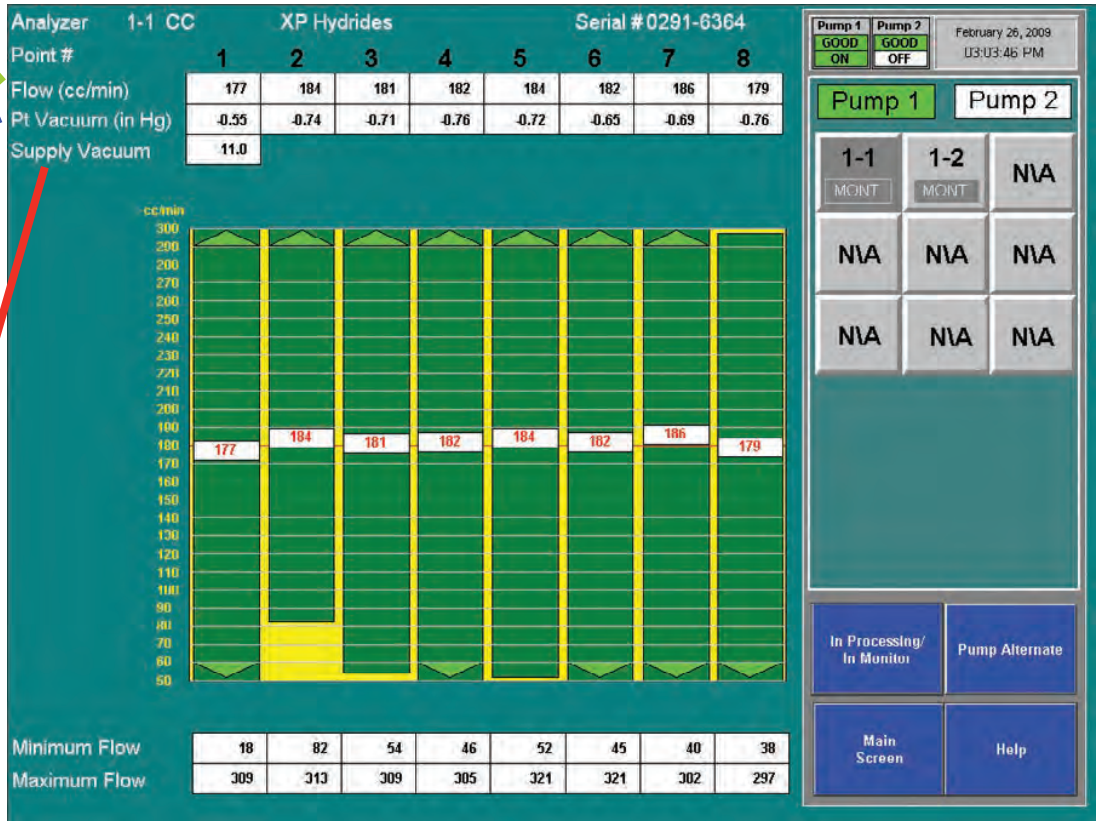
The flow display shows information critical to verifying the flow rate for each point.

Choose the analyzer from the selection pad in the upper right-hand corner. The eight points display their flow.

Flow (cc/min)
The real-time sample flow to the point

Point Vacuum (in Hg)
Pt. Vacuum indicates the restriction from sample line length and the pressure developed by shared lines

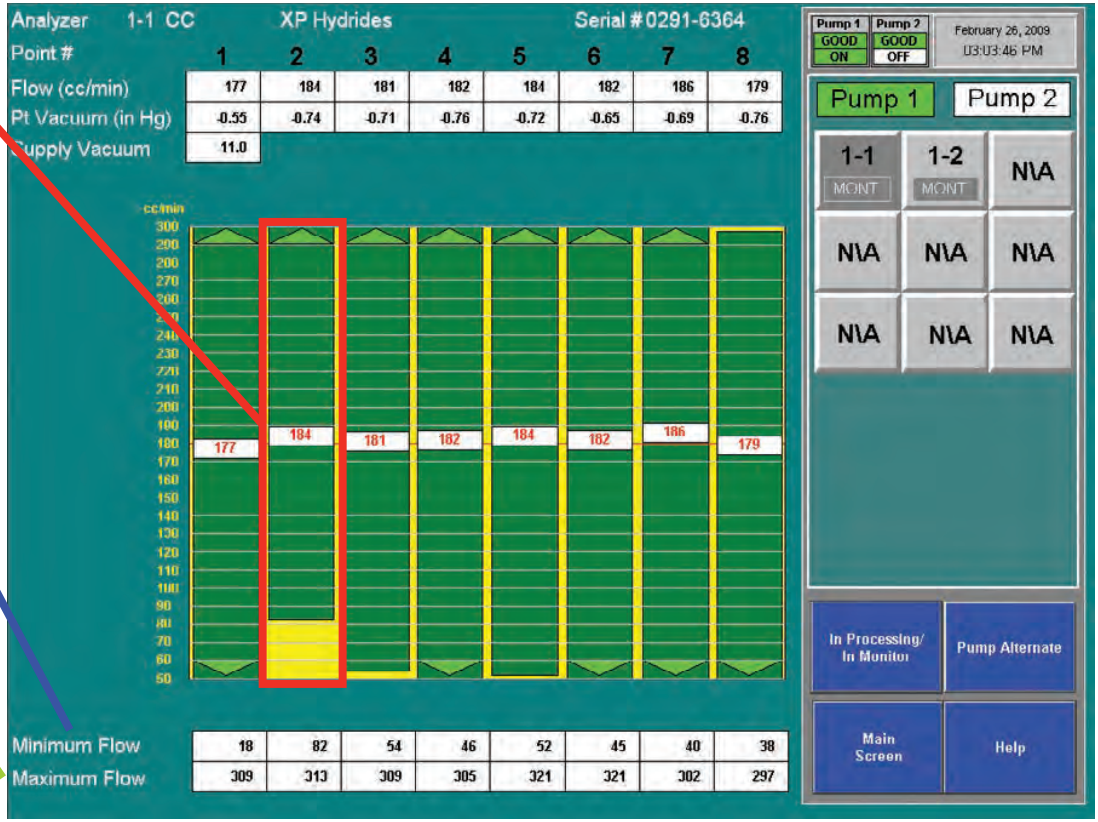
Supply Vacuum
Typical supply vacuum is 10-13 inches Hg



Proportional Value Range
A vertical green bar displays the dynamic range over which the proportional valve can adjust the flow rate. Indicated numerically by Minimum Flow and Maximum Flow.

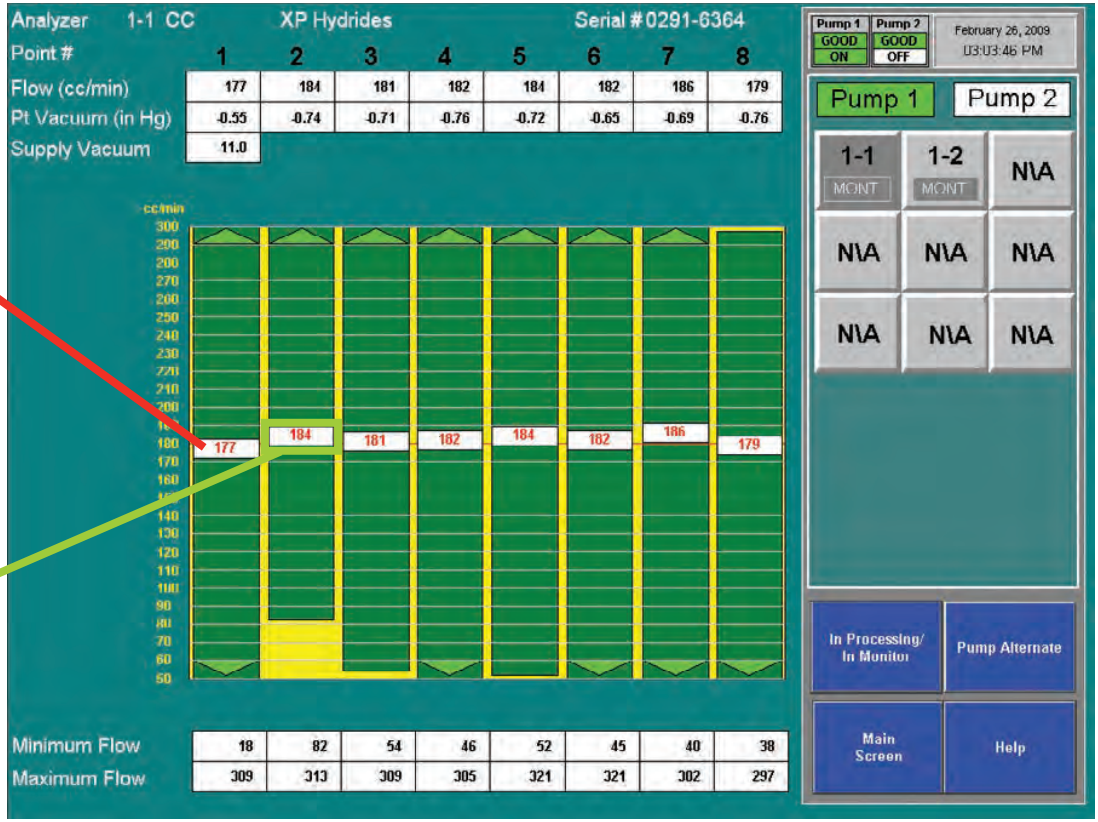
Minimum Flow
The minimum flow possible with the attached sample line and orifice

Maximum Flow
The maximum flow possible with the attached sample line and orifice



Target Flow
A horizontal red line indicates the target flow rate required by the Vertex M System for correct analysis. The target flow rate is 180 cc/min +/-5% (171-189 cc/min)

Flow Rate
A floating white box indicates the actual flow rate. The position of the box graphs the flow; the numerical value of the flow is displayed in the box.



Function Buttons

Selection Pad

Pump Alternate
Toggles between pumps 1 and 2

Auto Balance
Characterizes the control range of the proportional value

Auto Balance the Flow Rate

Note:

All analyzers should be in Monitor except for the one being Auto Balanced.

Perform an Auto Balance for the following reasons:

- When a line length is changed
- If end-of-line filters are replaced
- The gas family changes
- When a new Chemcassette® is installed
- When analyzers are added to a Vertex M rack

To perform an Auto Balance:

1. Make sure Chemcassette® is installed.
2. Set analyzer to idle (not monitoring). See Section 4.6.1 Run Time Options for the procedure.
3. If not already open, touch Main Screen, Menu, Calibration. The Flow Diagnostic window opens.
4. Choose analyzer from the selection pad in the upper right-hand corner.
5. Touch the Auto Balance function button. Vertex M will characterize the flow between minimum and maximum. This data will be used to set the flow to 180 cc/min. when you return the analyzer to monitor mode. Autobalancing takes approximately 130 seconds to complete.
6. If required, repeat for other analyzers.

Note:

If Vertex M cannot adjust the flow to the proper range (150 to 210 cc per minute at worst case condition) consult Honeywell Analytics service.

Flow Calibration During Auto Balance

Selection Pad

Pump Alternate
Toggles between pumps 1 and 2

4.6.3 Maintenance

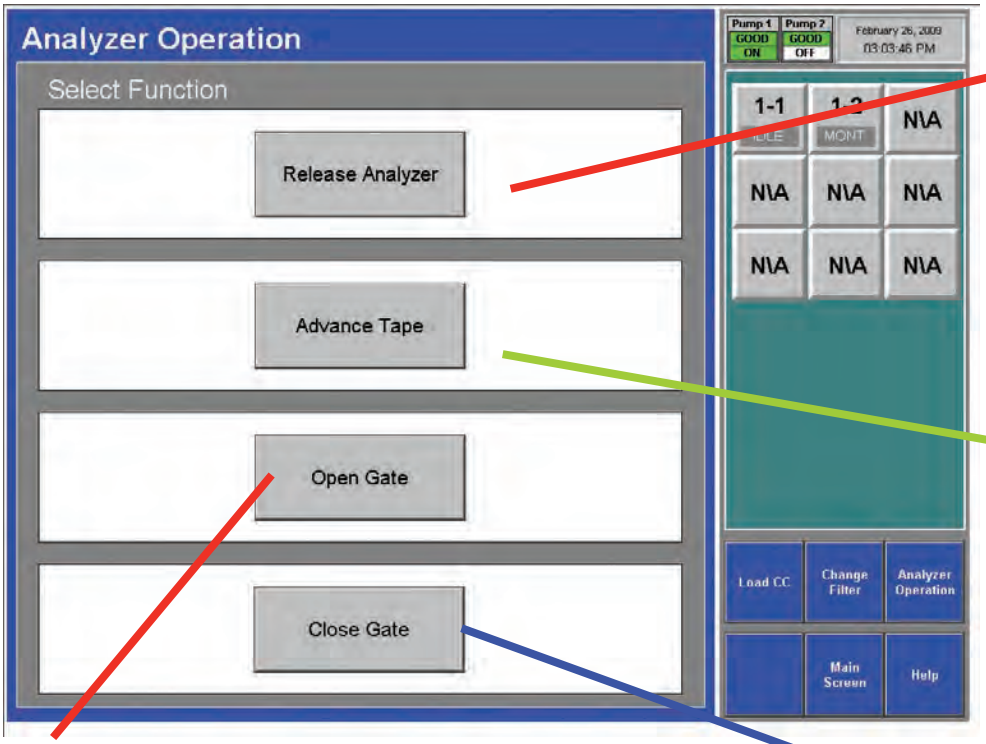
Use the Maintenance window to:

- Load and change Chemcassette® tape. See Section 5.3.4 Change Chemcassette® Tape.
- Change filters. See Section 5.3.3 Replace Filters.
- Analyzer operation utilities (see the following pages)

Analyzer Operation Window

The Analyzer Operation provides four utility functions which may be useful when performing service on an analyzer.

- Tape Advance and Release Analyzer can be performed while analyzer is in monitor.
- Open Gate and Close Gate can only be performed in idle mode



Release Analyzer
Unlocks analyzer so that you may slide it out of the cabinet

Advance Tape
Pulls a fresh section of tape into the detection head. Press once to see stains developed on points 1-4. Press twice for points 5-8.

Open Gate
Opens the optics head to release tape

Close Gate
Closes optics head

To Open Gate

Set analyzer to idle in the Runtime Options window.

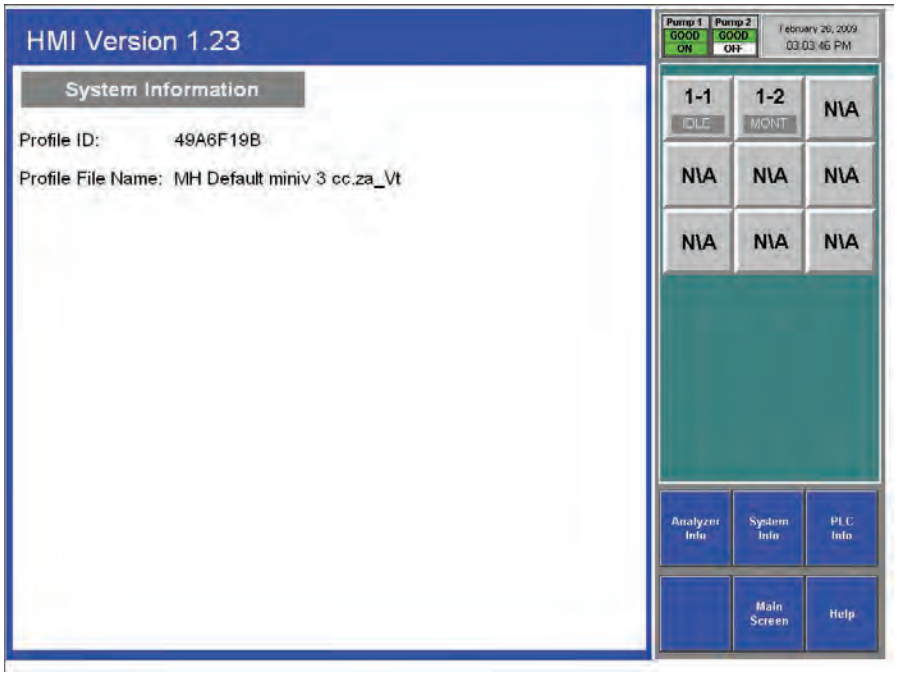
1. Touch Main Screen, Menu, Maintenance then Analyzer Operations.
2. Touch the module number on the module keypad.
3. Select Gate Open.
4. When finished, press Gate Close and return analyzer to monitor mode in Runtime Options window.4.6.4 Diagnostics

4.6.4 Diagnostics

Use the Diagnostics Window to review operational settings and information about either an individual analyzer or the Vertex M System. To open the Diagnostics Window, touch Menu and then Diagnostics.

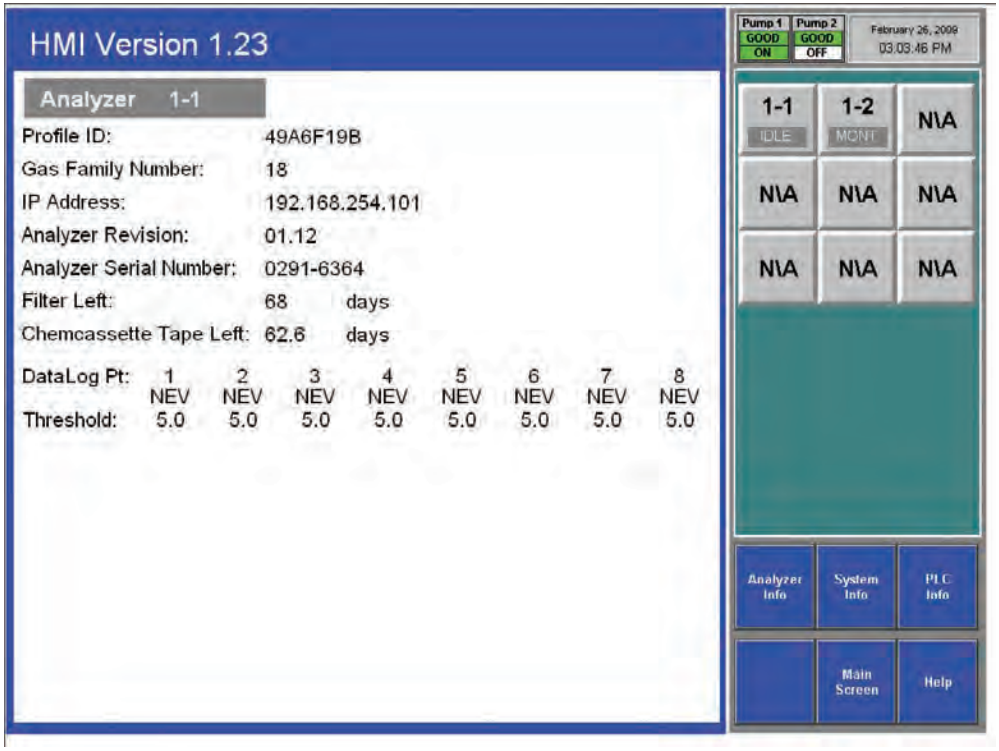
System Information - Displays the profile ID number, Profile name and other critical system information.

The Profile ID is a unique number generated whenever the Vertex M Profile Management utility saves a configuration file. Vertex M stores the ID number in the DAq, the PLC and each analyzer. If the profile ID numbers do not match, a fault is generated and monitoring will not start.



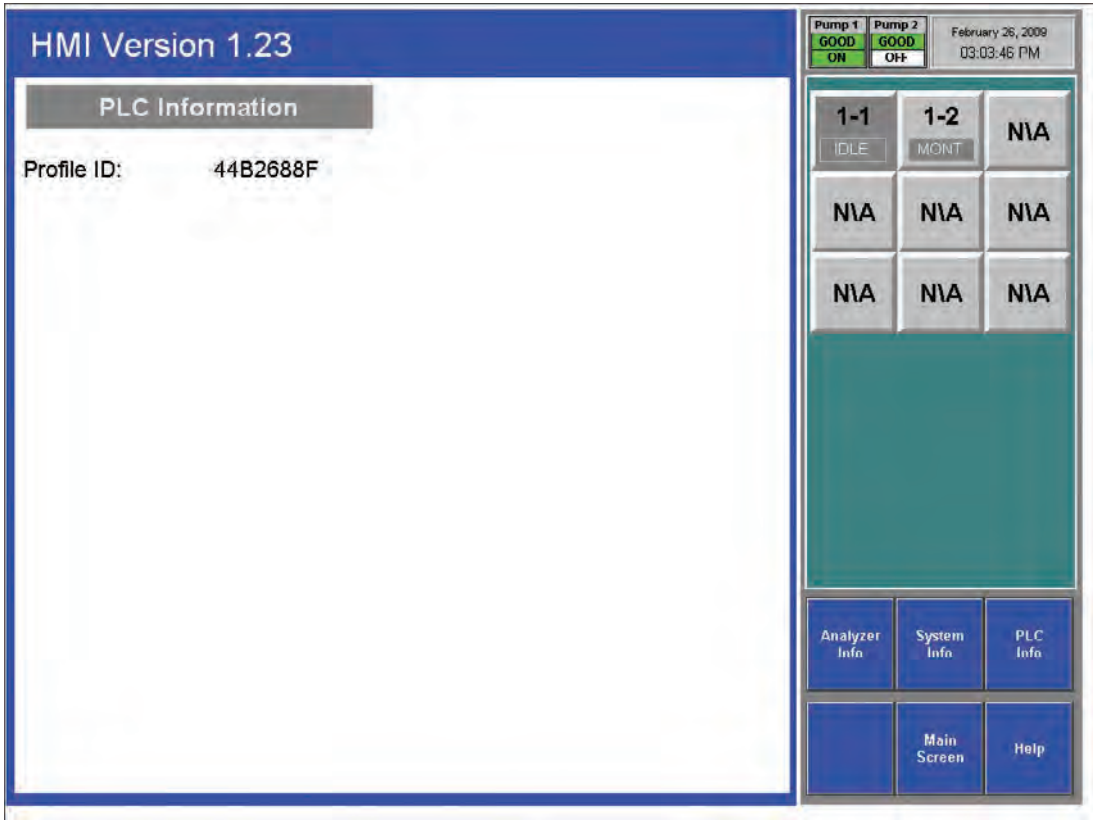
Choose the analyzer from the selection pad in the upper right-hand corner. Analyzer Information lists the following:

- Profile ID - The Profile ID is a unique number generated whenever the Vertex M Profile Management utility saves a configuration file. Vertex M stores the ID number in the DAq, the PLC and each analyzer. If the profile ID numbers do not match, a fault is generated and monitoring will not start.
- Gas family information
- Network IP address
- Analyzer software version number
- Analyzer Serial Number
- Time remaining on filter
- Time remaining on Chemcassette® tape
- Data logging settings for the analyzer
- Pyrolyzer analyzers will also display the pyrolyzer temperature.



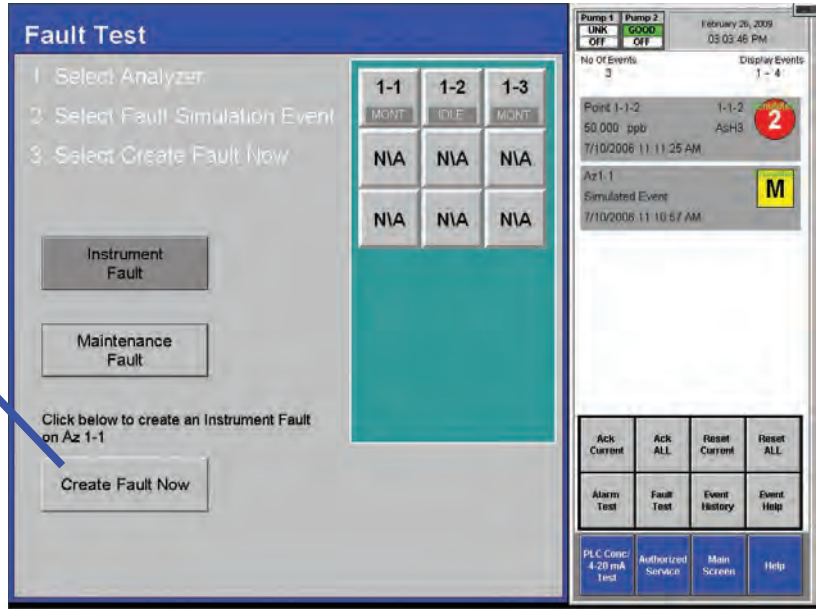
PLC Information

Displays the profile ID number in the PLC.



4.6.5 Service

The Service Window provides a means to trigger the fault and alarm relays.



Create Fault Now
The Create Fault Now button will only become visible after an analyzer and fault level are selected. Touch the button to generate simulated fault.

Fault Test

Use the Fault Test to verify operation of fault relays.

Note:

The fault test simulates an actual fault condition and the Vertex M System activates fault relays. Notify appropriate personnel that you plan to conduct a fault test.

To conduct a fault test:

1. Choose Main Screen, Menu, Service and then Fault Test.
2. Choose the analyzer for the fault test.
3. Choose either Instrument Fault or Maintenance Fault.
4. Choose Create Fault Now to activate the relay or relays connected to the selected analyzer and a fault will appear in the event list.
5. To continue testing, repeat steps 2 through 4.

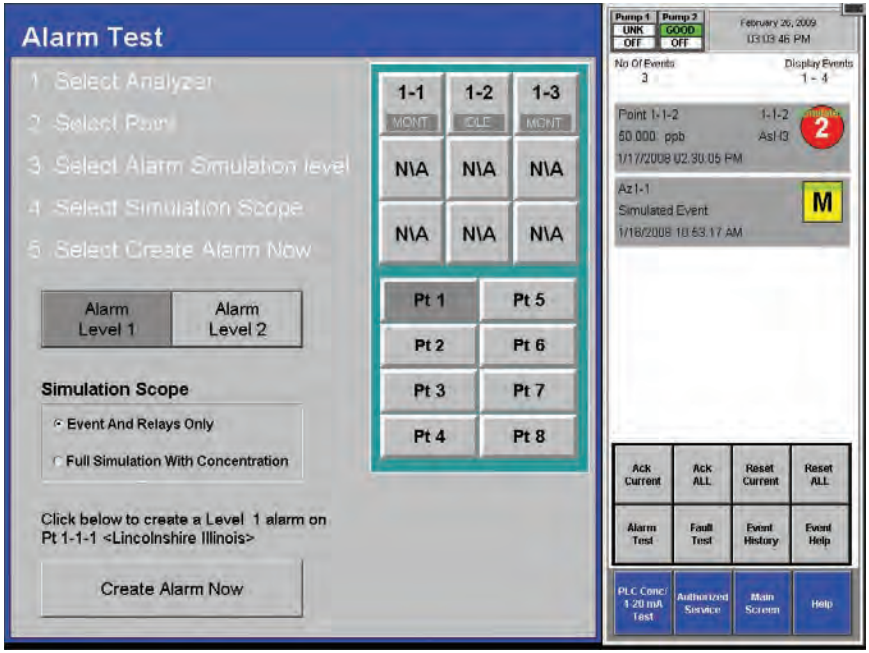
See Section 4.5.4 Event List to clear events.

Alarm Test

Use the alarm test to simulate a gas concentration for any analyzer.

Note:

The alarm test simulates an actual alarm condition and the Vertex M System activates all alarm relays. Notify appropriate personnel that you plan to conduct an alarm test.



To conduct an alarm test:

1. Choose Main Screen, Menu, Service and then Alarm Test.

2. Choose the analyzer and point for the alarm test.

3. Choose an alarm level and a simulation scope. Either scope will cause an alarm to be reported on the control network, on the relays (if equipped) and on the relevant OPC tag. Furthermore, either scope will cause creation of a simulated alarm event in the event list.

4. However, if “Full Simulation With Concentration” is selected then a gas concentration will also be reported on the control network, on the associated OPC tag, on the point detail screen, and in the event. This concentration will correspond to the alarm 1 or 2 threshold concentration, depending on which is simulated. The alarm threshold concentration is set via the configuration utility as described in Section 3.6.4 Configure Point. The Create Alarm Now button becomes visible only after the prerequisite selections of analyzer, point and alarm level have been made. Pressing the Create Alarm Now button creates the simulated alarm. The above screen contains examples of how alarm simulation works. A concentration of 50 ppb is being reported over the control network and OPC on point 2-2-3. The value 50 ppb is the alarm 2 threshold for this point from the configuration profile. However no concentration is being reported for 2-2-5 because the scope was set to Event And Relays Only when this event was generated. Pressing the Create Alarm Now button above will create a level 2 alarm with concentrations on point 2-2-4.

5. To continue testing, repeat steps 2 and 3.

If you choose to simulate a Level 2 alarm, you will trigger both Level 1 and 2 relays.

See Section 4.5.4 Event List to clear events.

4-20 mA Test

Use the 4-20 mA test to test or calibrate external devices connected to the optional 4-20 mA PLC.

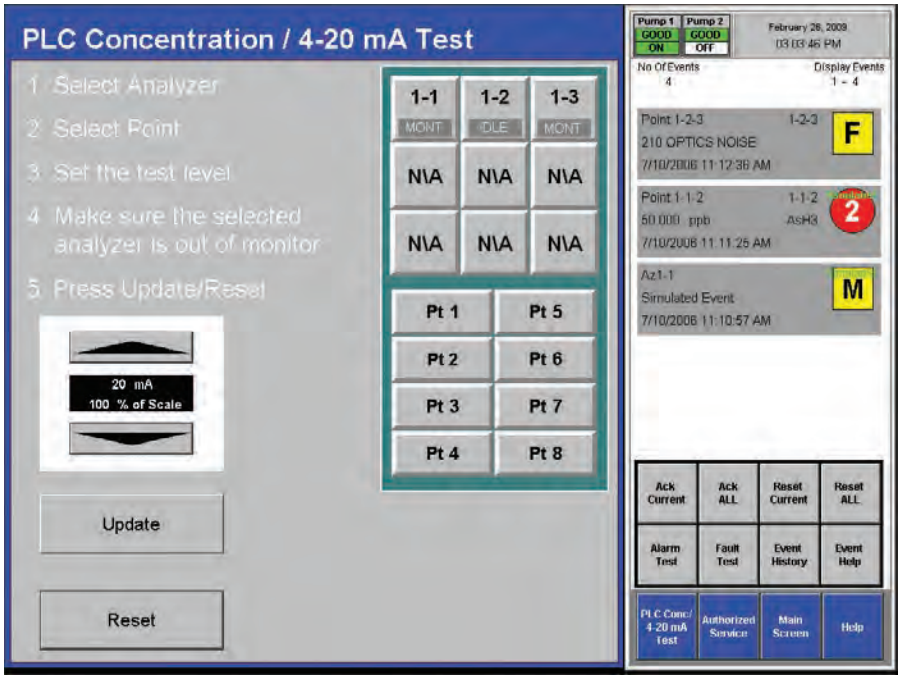
Note:

The 4-20 test generates an actual current output on the optional 4-20 mA PLC. Notify appropriate personnel that you plan to conduct a test.

To conduct a 4-20 mA test:

1. Choose Main Screen, Menu, Service and then 4-20 mA Test.
2. Choose the analyzer and point for the alarm test.
3. Use the up and down arrows to set the current level. Touch 20 mA Test to start the test. Touch Reset to stop the test.
4. To continue testing, repeat steps 2 and 3.

See Section 4.5.4 Event List to clear events.



4.6.6 Security Access

Access to Vertex functions is granted according to a permission list which is stored in an HMI user account. See Section 4.4.1 Log in and Log out and Section 4.4.2 Changing Password for more information about HMI-level security. Only users authorized to access Security Setup may create or change user accounts. The system administrator assigns permission to Security Window and other protected functions by using the Security Setup menu.

The Vertex System is pre-programmed with two user accounts: “default” and “administrator”. The administrator password is “administrator”. Quotation marks should be included.

The default user account is pre-programmed to have full access. The default account “security access” bit and other bits must be turned off to make HMI-level security effective.

Note

The Security Setup function is only accessible if the user ID currently logged in has Security Setup bit set to Y (yes), or activated.

Several user accounts can be created with limited access rights to allow personnel to install Chemcassettes®. These accounts need not use the administrator password and thus cannot be used to deactivate monitoring for long periods.

Nonetheless, Chemcassette® installation requires monitoring interruption and human intervention. The Vertex can be set up to issue a fault if this intervention is not performed within a set time span. See Set Timeout Values in Section 3.6 Confiiguration Utility for more information.

To protect against errors by personnel who are only authorized to install Chemcassettes®, many of the permission bits must be set to “off” as shown in brown in Figure 4-47. The “Maintenance” bit must be set to “on”. Additionally, the administrator password should be set to something less obvious than “administrator”.

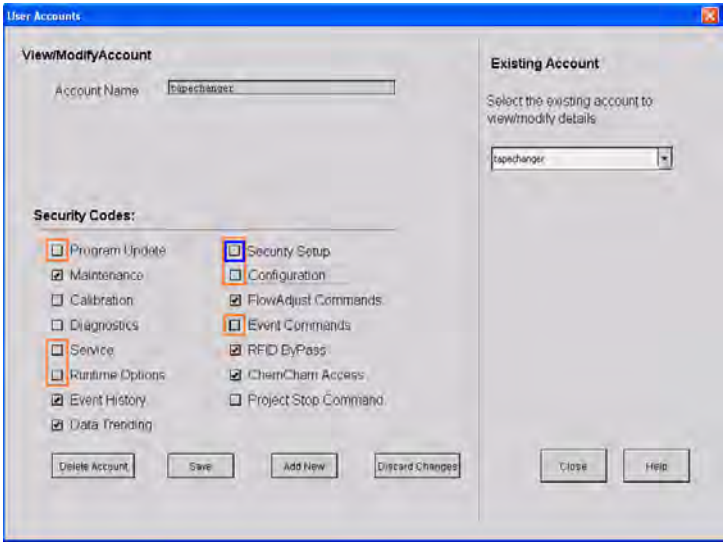


Figure 4-15. Modifying User Accounts

4.6.7 Configuration

Before the Vertex M System can begin monitoring, you must create a configuration profile. Use the Configuration menu to create a new configuration profile or modify an existing profile.

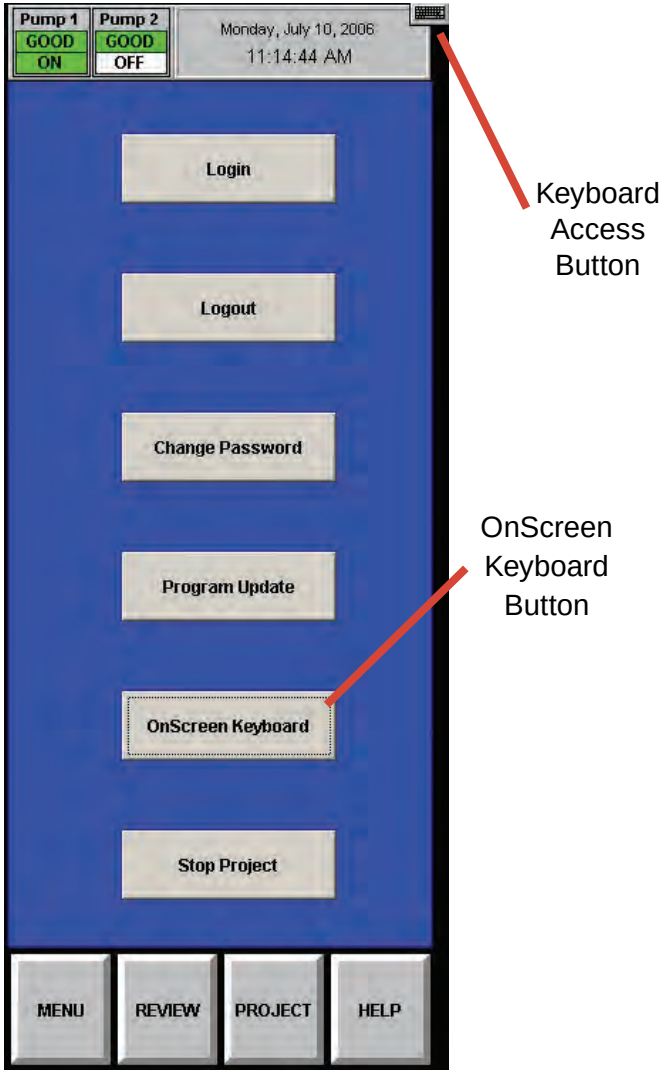
Section 3.6 Configuration Utility for the procedures on using the Configuration window.

4.7 OnScreen Keyboard

The Vertex M display provides an onscreen keyboard for data entry.

4.7.1 Restore OnScreen Keyboard

If keyboard is hidden, restore it with the OnScreen Keyboard button from the Project Menu.



5 Maintenance

5.1 Introduction

This section describes routine maintenance procedures including general monitor maintenance and Chemcassette® and pyrolyzer analyzer maintenance.

The Maintenance chapter includes:

- 5.3 Chemcassette® Analyzer Maintenance
- 5.4 Replacing an Analyzer
- 5.5 Remove and Replace Pyrolyzer Filters
- 5.6 Remove and Install Pumps
- 5.7 Remove and Install Power Supplies
- 5.8 Clean the Touch Screen
- 5.9 PLC Module Battery Backup Check
- 5.10 File Maintenance
- 5.11 Optics Cleaning

Most of the procedures in this section use functions in the Maintenance Window. To reach the Maintenance Window, touch Main Screen, Menu and then Maintenance.

5.2 Maintenance Schedules

Perform maintenance following the schedule in Table 5-1. See Appendix A Replacement and Consumable Items for part numbers of maintenance items

Item	Schedule
Sample line filters (end of line)	3-6 months
Teflon Corrosive Filter Membrane (end of line)	1 month
Teflon Corrosive Filter	3 months
Cabinet filter (located in front of pump module)	3 months or as needed
Pump vane replacement	2 years operation per pump
Pump stem and o-ring	6 months
Proportional valve filter (inside analyzer)	1 year
Particulate Filters	3-6 months
Pyrolyzer Freon Filter	1 month or as needed
Acid Scrubber Filter	6 months
Alternate Pumps	6 months
Optics Cleaning	1 year or as needed
System File Maintenance	1 year or as needed

Table 5-1. Suggested Maintenance Schedule

5.3 Chemcassette® Analyzer Maintenance

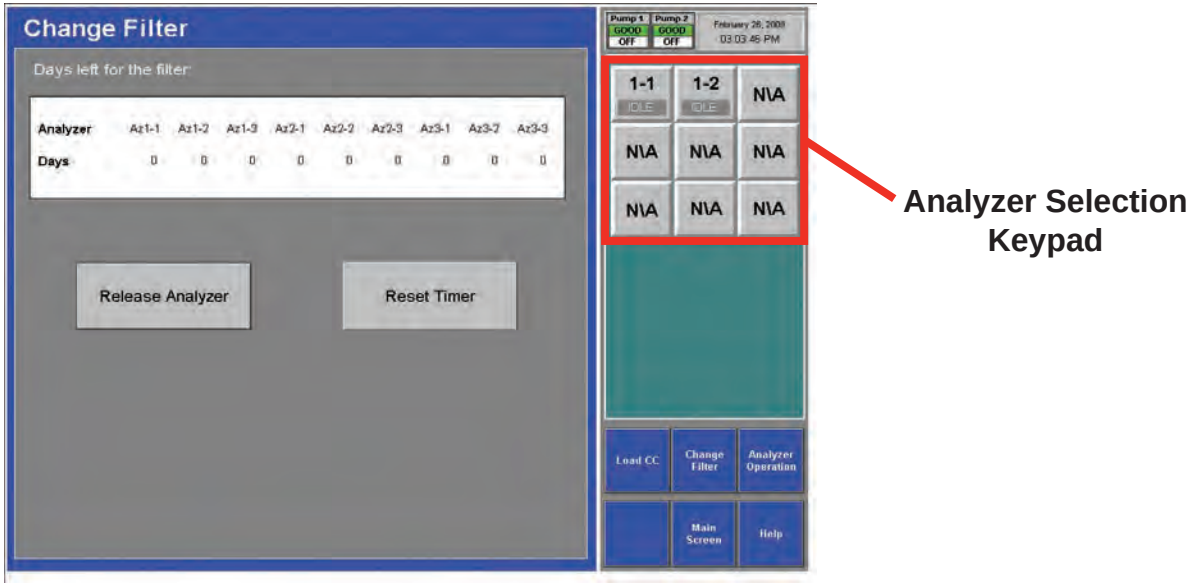
This section describes maintenance and handling procedures for the Chemcassette® analyzer. Unless noted otherwise, these procedures apply to both the Universal Chemcassette® and the pyrolyzer model analyzers.

5.3.1 Remove and Replace Analyzer Particulate Filters

The Vertex M Chemcassette® analyzer uses various filters to protect the unit from particles and potentially damaging gases. Table 5-1 provides maintenance information about filters.

The Vertex M Analyzer houses filters in a filter magazine. Use the following procedure when replacing filters.

1. Set analyzer to idle in the Runtime Options window.
2. Touch Main Screen, Menu, Maintenance and then Change Filter.
3. Touch the Analyzer module number in the Analyzer selection keypad.
4. Touch Release Analyzer.
5. Slide analyzer out of cabinet until filter compartment is visible.



5.3.2 Remove Filters

Figure 5-1. Analyzer Filter Door

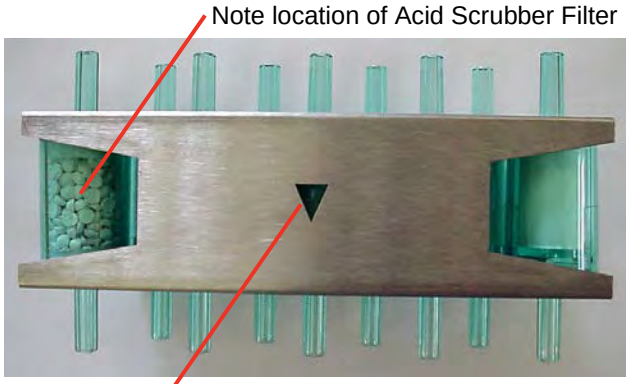


Figure 5-2. Vertex M Filter Magazine

1. Open filter compartment by rotating the latch downwards and pulling handle down until door is at a 90˚ angle to the analyzer.
2. Remove filter magazine by grasping the magazine with thumb and middle finger and pulling straight out.

Load Filters in Magazine

1. Remove and discard used filter elements.
2. Position new filters in magazine with the filter flow direction arrow pointing down. Press into place.

5.3.3 Replace Filters

Figure 5-3. Analyzer Filter Door

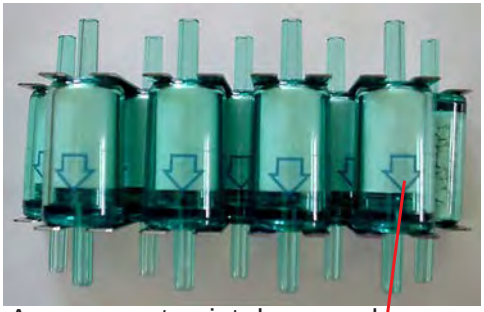


Figure 5-4. Vertex M Filters

1. Insert magazine into filter compartment.
2. Note orientation of arrow on side of magazine.
3. Close compartment door.

Return to Service

1. Press Reset Timer button on Change Filter screen.
2. Push analyzer into cabinet.
3. Return analyzer to monitor mode in Runtime Options window.

5.3.4 Change Chemcassette® Tape

Change the Vertex M Chemcassette® tape for any of the following reasons:

- Scheduled end-of-tape service
- Low Chemcassette® warning (fault 102)
- Chemcassette® has expired (fault 109)
- End of Chemcassette® (fault 203)
- Transport error

Preparation

1. Reset End of Chemcassette® event if present.
2. Touch Main Screen, Menu and then Maintenance.
3. Touch the module number in the Maintenance window.
4. Touch Load CC. Follow the on-screen instructions which will guide you through the following sequence.

Change Chemcassette® Tape

1. Pull analyzer out of cabinet.
2. Remove the old Chemcassette®.
3. Install new tape. Verify the RFID tag is aligned with the RF sensor.

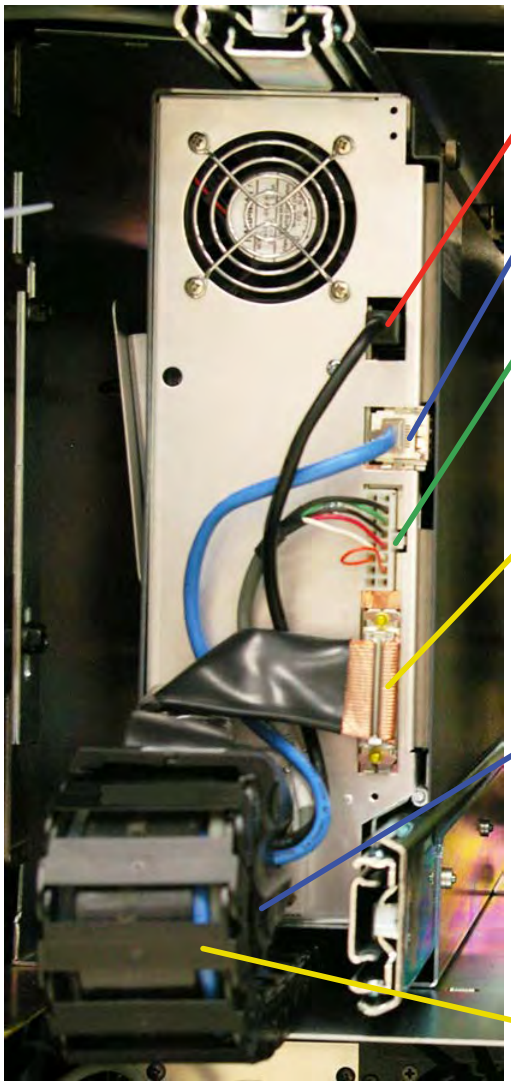
   Touch the NEXT button to read RF sensor.
4. Thread tape leader.
5. Position leading alignment mark on Chemcassette® tape under front edge of optic head.
6. Touch the NEXT button to verify optics. The tape advances as the Vertex M verifies the optics.
7. Push the analyzer into the cabinet.

5.4 Replacing an Analyzer

The Vertex M rack is designed for quick replacement of major components. You may replace both the Chemcassette® and pyrolyzer analyzers while other analyzers continue to monitor.

5.4.1 Disconnecting Cables

In steps 4 and 5 of the sequence that follows, you will need to disconnect the circular tubing harness and four electrical cables from the back of the analyzer. You need to reach around to the back of the analyzer as shown in this photo. In disconnecting or reconnecting the harness and cables, note the following:



ChemCam USB Connection
(Optional)

Analyzer Communications
(reconnect this cable first)

Analyzer 24V
Power Supply

To disconnect, depress the
lock tab on the power connector
and pull to release

Multi-Function
Connector

NOTE:
Connection secures by slide latch.
Push up to open, down to close.

Circular Tubing Harness

To disconnect, rotate the red tab
on the tubing connector to the
open position and pull the connector off

To reconnect, align the ports on the
connector, seat the connector fully then
rotate the red tab to “lock”.

Cable Carrier

5.4.2 Remove Analyzer

1. Set analyzer to idle in the Runtime Options window.

   Touch Main Screen, Menu, Maintenance and then Analyzer Operation.

   Select the analyzer which you will replace. Touch Release Analyzer.
2. Open the front door and turn off power for the analyzer (and pyrolyzer switch if you are replacing a Pyrolyzer).
3. Pull analyzer out of cabinet. Locks on the slides limit the analyzer travel.
4. Reach behind analyzer and remove four electrical cables.
5. Unlock and remove tubing harness.
6. Unlatch the slides.
7. Support the analyzer and remove it from the slides.

5.4.3 Install Analyzers

1. Reach into the slot and position cables out of the way.
2. Place analyzer on slides. Push in until locks engage.
3. Slide Analyzer out until fully extended.
4. Reach behind the analyzer; connect and lock the tubing harness.

Note:

When reconnecting the analyzer, connect the Analyzer Communications cable to the analyzer first.

5. Connect the Analyzer Communications, 24V Power Supply, Multifunction Connector and ChemCam cables.
6. Carefully push analyzer partially into the cabinet and then pull out to verify all cables move freely and the slides lock. Repeat in and out action to loosen slide. Push analyzer into cabinet.

Return to Service

1. Open the front door and turn analyzer power switch (and pyrolyzer power switch if neccessary) on.
2. Re-install Configuration Profile.
3. Install Chemcassette®.
4. Return analyzer to monitor mode in Runtime Options Menu.

5.5 Remove and Replace Pyrolyzer Filters

The pyrolyzer version of the Chemcassette® detects nitrogen trifluoride by "cracking" or breaking it down with high temperatures. Heating nitrogen trifluoride converts it to hydrogen fluoride which the Vertex M pyrolyzer detects with a standard mineral acid Chemcassette®. The pyrolyzer heaters and associated control circuits are maintenance items not found in the Universal Chemcassette® analyzer.

This section describes maintenance procedures unique to the pyrolyzer analyzer.

There are eight filters in the pyrolyzer not found on the Universal Chemcassette® analyzer. The additional filters are filled with charcoal to remove Freon and other similar compounds from the sample gas before it is "cracked" in the pyrolyzer. The acid scrubber and particulate filters are identical to the standard Vertex M Chemcassette® filters.

1. Set analyzer to idle in the Runtime Options window.
2. Touch Main Screen, Menu, Maintenance and then Analyzer Operation.
3. Touch the module number in the Maintenance window.
4. Touch Release Analyzer.
5. Slide Analyzer out until fully extended.

Freon filters are located on the left side of the analyzer.

5.5.1 Remove Filters

Figure 5-5. Pyrolyzer Filter Door

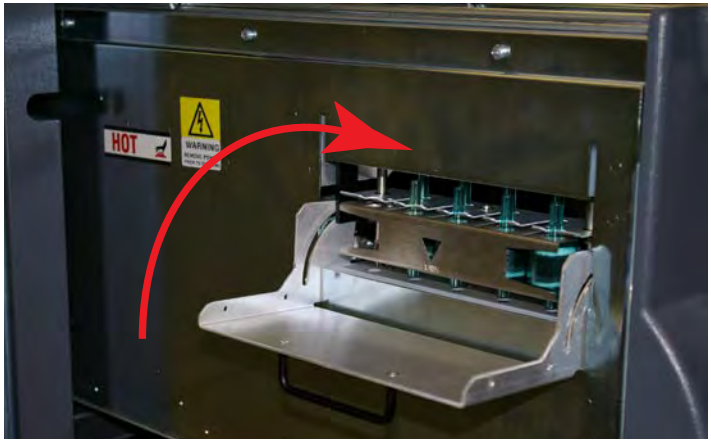
Figure 5-6. Vertex M Pyrolyzer Filter

1. Open filter compartment by pulling handle down until door is at a 90˚ angle to the analyzer.
2. Remove filter magazine by grasping the magazine with thumb and middle finger and pulling straight out.

Load Filters in Magazine

1. Remove and discard used filter elements.
2. Position new filters in magazine such that the long nipples are up and press into place. Note direction of flow arrows.

5.5.2 Replace Filters



1. Note orientation of arrow on side of magazine.
2. Insert magazine into filter compartment.
3. Close compartment door

Return to Service

1. Push analyzer into cabinet.
2. Return analyzer to monitor mode in Runtime Options window.

5.6 Remove and Install Pumps

The Vertex M System includes two vacuum pumps. One pump operates while the other is idle. You may replace a defective pump while the other pump continues to operate.

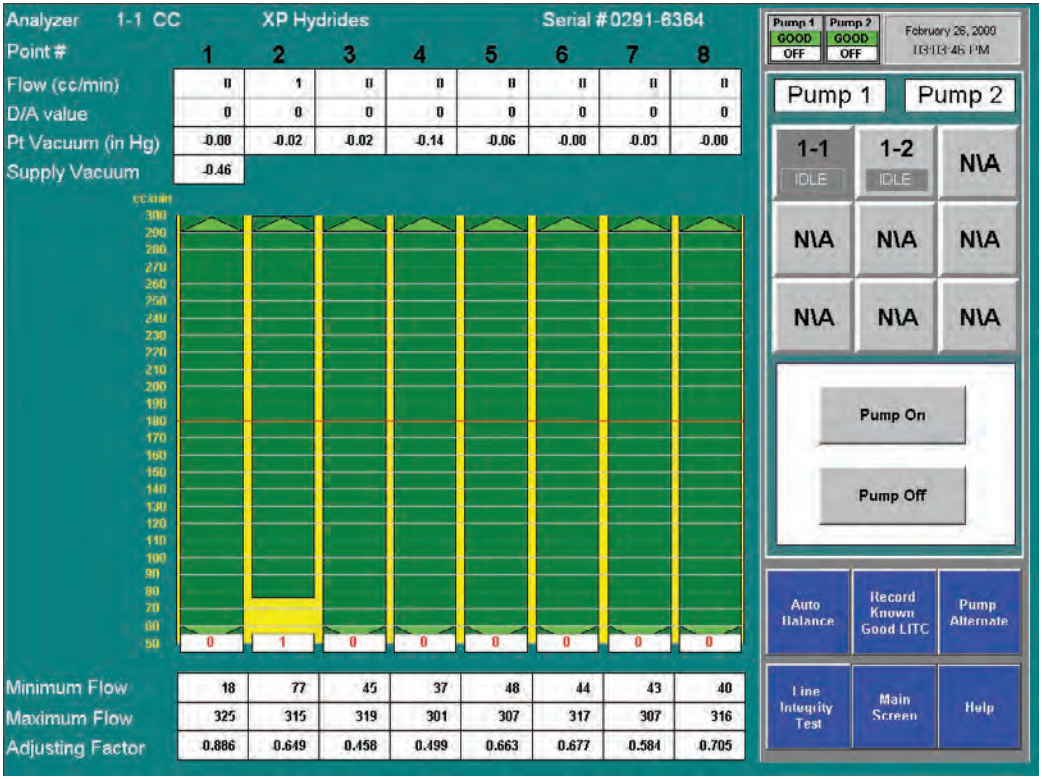
Note:

> You may replace a pump only when the system places it in standby. Do not replace an operating pump.

To equalize wear on the pumps, alternate the operating pump every 6 months.

To change operating pump without manually stopping monitoring touch the Main Screen, Menu, Service, Authorized Service buttons and then the Pump Alternate button.

The operating pump indicator is green or yellow; the indicator for the pump in idle is white.


Analyzer 1-1 CC
XP Hydrides
Serial # 0291-6364
Point #
1 2 3 4 5 6 7 8
Flow (cc/min)
D/A value
Pt Vacuum (in Hg)
Supply Vacuum
-0.46
Minimum Flow
Maximum Flow
Adjusting Factor
Pump 1 GOOD OFF
Pump 2 GOOD OFF
February 26, 2009
Pump 1
Pump 2
1-1 IDLE
1-2 IDLE
N\A
Pump On
Pump Off
Auto Balance
Record Known Good LITC
Pump Alternate
Line Integrity Test
Main Screen
Help

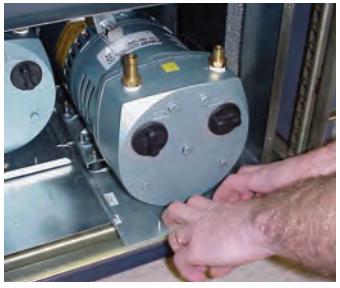
5.6.1 Remove Pump

1. Open lower cabinet door and remove filter.
2. Turn thumbscrews counterclockwise to release and open pump enclosure door.
3. Push slide plate to disengage.

Then pull fittings up to remove from pump.

4. Pull up on slide-release button.

5. Slide pump out of enclosure.



CAUTION

The pump may be hot. To avoid burns, allow it to cool or wear protective clothing before handling it.

CAUTION

Operating the system with the exhaust fitting improperly installed or with one of the pumps removed can result in exposure to toxic gases from remote sampling areas.

To prevent exposure:

- Insert ½ Plug (P/N 0235-0168) into the fittings of the pump that was removed for service.
- Inspect the pump fittings to ensure that the surface is free from score marks and scratches that could compromise the O-ring seal.
- Fully seat the removable fitting on the pump after installation.
- On pumps, verify that the slide plate button extends and mechanically secures the fitting.

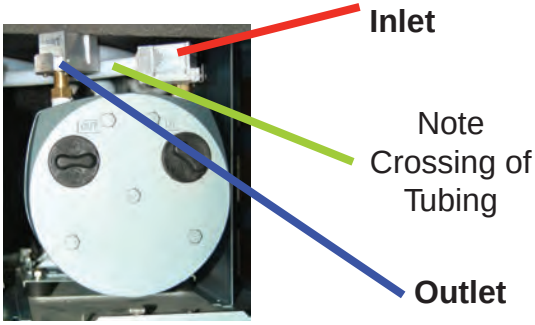
With the system running, verifty the leak integrity with a small amount of leak test fluid.

5.6.2 Install New Pump

1. Slide pump assembly into enclosure.

2. Push pump completely into enclosure until the release button locks into the bottom of the enclosure.

4. Push on slideplate to re-install on to fitting



3. Close and fasten the pump enclosure door, install filter, and close lower cabinet door.

WARNING

Adjacent pump may be hot. To avoid burns, allow to cool or wear protective clothing before handling either pump.

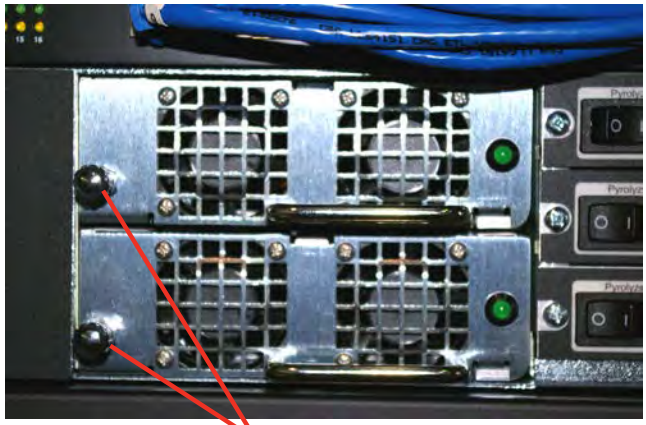
5.7 Remove and Install Power Supplies

5.7.1 Remove Supply

Two replaceable modules provide power for the Vertex M System. A fully populated Vertex M will operate with one supply. You may replace the defective supply while the system continues to monitor.

Preparation

1. Open front door.
2. Identify inoperative power supply.
3. Turn locking knob counter-clockwise to disengage catch.
4. Firmly pull power supply to remove from housing.



5.7.2 Replace Supply

1. Insert new supply in housing.
2. Verify handle is on the left of the power supply.
3. Seat firmly into place.
4. Verify latch or locking knob has locked supply in the housing.
5. Tug on handle to verify supply is firmly seated.

5.8 Clean the Touch Screen

Clean the touch screen display with a lightly moistened towel. Do not spray cleaner directly onto the glass. Excess liquid will run down the screen and interfere with operation.

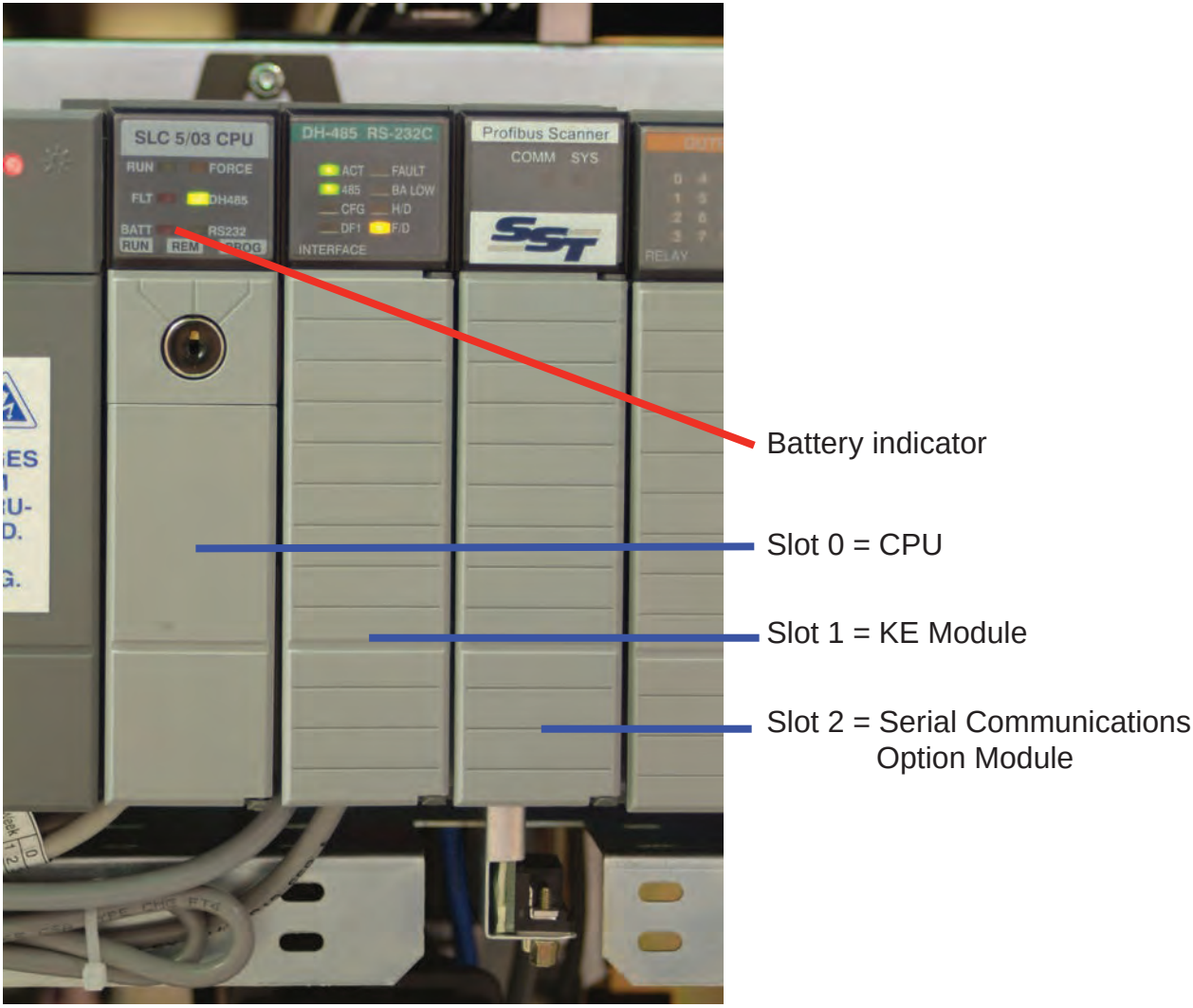
Reference your touch monitor manual for any additional information.

5.9 PLC Module Battery Backup Check

1. For status of battery locate indicator as shown in photo on the left.
2. If battery indicator is illuminated the battery has failed. Contact HA Service for corrective action.

Note:

Some serial communication cards (located in slot 2) do not have battery backup.



5.10 File Maintenance

This section describes the procedure for making backup copies of Vertex M database files:

1. Touch Project then Stop Project to stop the Vertex M application. You must have appropriate access rights to perform this step.
2. Make an offline backup copy of the files listed below in _.

The following files on the Vertex M should be copied to either a backup location on your local area network, removable media or a CD-R/CD-RW disk.

Note:

Some backup media may change the files to “read only” and may require an additional step of changing the “Attributes” within the file properties to make them usable.

Empty databases for the Event, Concentration and ChemCam databases can be found in the Databases folder on the Vertex M Technical Manual CD.

File Name	Purpose	Location
*.za_Vt	Configuration Profiles	C:\HMI\P_Util
CM72Data.dsn	ODBC Datasource for Event Database	C:\HMI
ConcData.dsn	ODBC Datasource for Concentration Database	C:\HMI
ChemCam.dsn	ODBC Datasource for ChemCam Database	C:\HMI
CM72.mdb *	Event database	C:\HMI
CM72Conc.mbd*	Concentration Database	C:\HMI
ChemCam.mdb *	ChemCam Database	C:\HMI\ChemCam
* Required if stored locally on the Vertex M System		
NOTE: Database files are size limited to a maximum of 2Gb.		

Table 5-2. File Locations

5.11 Optics Cleaning

Clean Chemcassette® optics annually or whenever optics verification error occurs.

Required equipment:

- Compressed air

Note:

Do not use “canned air” near Pyrolyzer gas based detectors, the halogenated gasses may trigger alarms. Instead, use N_2 or a compressed source that is free of oils and contaminants.

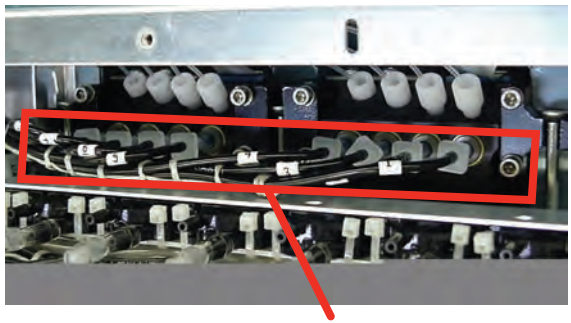
- Open the Optics Block Gate
- Remove the Chemcassette®
- Open the Vertex M side panel
- Remove tubing (shown in photo) one at the time and blow out with compressed air.
- Re-secure side panel and reload Chemcassette®

Note:

Remove and clean one port at a time to insure proper orientation of tubing. Do not remove the capillary tubing (microtubes).

CAUTION

Failure to replace and retighten hardware after service can adversely affect monitor performance and electromagnetic radiation compliance (EMC). Make certain all fasteners are reinstalled and firmly fastened.



Remove these tubes one at a time for cleaning

6 Troubleshooting

6.1 Introduction

This chapter helps you determine the source of Vertex M System fault or failure and provides you with a corrective action. There are three general indications that service or maintenance is necessary:

- General failure to operate properly. See Section 6.2 General System Problems.
- Maintenance faults. See Section 6.3 Maintenance Faults.
- Instrument faults. See Section 6.4 Instrument Faults.

Maintenance and instrument faults are Vertex M System self-diagnostic messages. They alert you to operation abnormalities by displaying a message with a brief description. The Vertex M System also stores the faults in the event history list.

Also included in this chapter are information events which are records of non-fault activities that may aid in troubleshooting. See Section 6.5 Information Events. Information events include:

- Maintenance activities
- Alarm simulations
- User log in and log out
- Configuration changes

If a fault or failure does not appear in the troubleshooting chart, or if you require further assistance, call Honeywell Analytics Service. Provide the maintenance or instrument fault code number when calling.

In the event of a DAq failure See Section If additional or replacement Vertex M Analyzers are purchased without specifying the LIT option, no faults will be generated for the lack of the option in the new analyzer. However, an “INFO” message will be logged in the Event History each time the LIT option is invoked. Existing analyzers configured for LIT will be unaffected..

6.2 General System Problems

This section applies to problems and solutions that are not reported by the Vertex M software.

LCD Display		
Symptom	**Problem**	**Recovery**
No display	Faulty connection at DAq	Check connection at SVGA connector on back of DAq
	Faulty connection at display	Check connection on back of display
	No power to display	Check power cable between power distribution box and display power supply
	Screen saver or Energy Star feature enabled	Touch the LCD screen Press a key on the keyboard Disable screen saver and Energy Star setting in Windows control panel
Display distorted or wrong size	Incorrect settings in Windows control panel	Use Windows control panel to set display to 1028 x 768 display
"No signal" on screen	Data acquisition computer not operational	Turn on data acquisition computer power switch
Touchscreen		
Symptom	**Problem**	**Recovery**
No response from touch screen	Faulty connection at DAq	Check cable connection at serial port
	Faulty connection at display	Check cable connection on back of display
	COM1 not assigned	Check assignment for COM1 in Windows control panel
	Incorrect touch screen driver settings	Restore setting in ELO Windows control panel
Data Acquisition Computer		
Symptom	Problem	Recovery
No green power light	Power switch	Turn power switch on
		Turn circuit breaker on
		Check power cable
Keyboard and Touchpad		
Symptom	**Problem**	**Recovery**
"Optional Keyboard not detected" message	Keyboard only recognized by Windows at start up	Plug in keyboard and restart system
Single key not responding	Defective keyboard	Replace keyboard
Keyboard not responding with any key	Faulty connection	Check keyboard connection on back of data acquisition computer
	Defective keyboard	Replace keyboard
Touch pad not responding	Faulty connection	Check mouse connection on back of data acquisition computer
	Defective touch pad	Replace keyboard

Communications		
Symptom	**Problem**	**Recovery**
Vertex M not appearing on network	Incorrect network connection	Check cable connection to Ethernet port Note: Use only the Ethernet connection on the back of the data acquisition computer. The Ethernet hub in the Vertex M System is only for Vertex M internal use.
	Windows not configured for network	Use Windows Network control panel to configure network Vertex M computer name is Vertex_293-xxxx Default workgroup is “Workgroup”
ChemCam		
Symptom	**Problem**	**Recovery**
No image from one or more ChemCam	Defective camera	Contact Honeywell Analytics
	Defective USB port	Use any other spare USB port
Poor image quality	Camera settings are incorrect or illumination LED has failed	Contact Honeywell Analytics

6.3 Maintenance Faults

A maintenance fault indicates the Vertex M System requires attention but is continuing to monitor. When a maintenance fault occurs, the following actions take place within the Vertex M System:

- The LED indicator flashes yellow on the analyzer with the fault. See Table 6-1. Analyzer Status LEDs.
- A yellow fault indicator appears on the main screen
- The event list and event history are updated
- Maintenance Fault relays associated with this analyzer will activate

Event Number	Event List Desc. (Short)	Event History Description	Data Field	Problem	Possible Cause	Recovery
101	FLOW ADJ ERR LOW	Low Flow After Adjustment	cc/min. of error	Point Flow reading can not reach 150 cc/min.		Verify range of valve by performing Auto Balance calibration Identify possible cause if maximum flow is below 240 cc/min.
					Condensation	Check internal lines for moisture Purge as required
					Internal proportional valve filter clogged	Replace particulate filter at manifold
					Proportional valve failure	Replace Valve
					Supply vacuum insufficient (less than 7 in. Hg)	Plug pneumatic connector in unused slots Exhaust tubing restricted Service or switch pumps
				Excessive point vacuum	Sample line restricted End of line filter plugged Too many analyzers sharing one sample line Sample Line too long I.D. too small Poor gate seal	Clear restriction Replace filter Reduce number of analyzers on same Line Correct sample line issue Contact Honeywell Analytics Service
102	LOW CC WARNING	Chemcassette Low	Days Remaining	Chemcassette counter decremented to less than 120 windows	Less than one day remains on Chemcassette	Replace Chemcassette

Event Number	Event List Desc. (Short)	Event History Description	Data Field	Problem	Possible Cause	Recovery
103	TIMEOUT IDLE	Timeout Of Monitor	0.0	Analyzer in IDLE, LOAD CC, FLOW	Out of Monitor time limit has been exceeded	Press RESET to reinitialize timer.
					User error	Enter Monitor using Runtime Options Return analyzer to Monitor Mode
					Time limit too short	Change time limit in Configuration Profile
104	TIMEOUT PNT DIS	Timeout Run-time Point Disable	0.0	Operator error	Point disabled longer than time limit setting in the Configuration Profile	Press RESET to reinitialize timer Restore point to Monitor Mode
					Time limit too short	Change time limit in Configuration Profile
105	TIMEOUT ALM DIS	Timeout Run-time Alarm Disable	0.0	Operator error	Point disabled longer than time limit setting in the Configuration Profile	Press RESET to reinitialize timer Restore point to Monitor Mode
					Time limit too short	Change time limit in Configuration Profile
106	POS PNT PRESSURE	Positive Point Pressure	Pressure in. Hg	Positive pressure between sampling location and monitor	Point pressure above atmospheric pressure while in idle	Relieve/reduce pressure
				Transducer error	Calibration error	Contact Honeywell Analytics Service
					Defective sensor	Contact Honeywell Analytics Service
				Offset incorrect		Contact Honeywell Analytics Service
108	FLOW ADJ ERR HI	High Flow After Adjustment	cc/min.	Flow cannot be adjusted below 210 cc/min.	Debris in proportional valve	Verify range of valve Perform Auto Balance to clear debris
					Debris or defective valve Proportional valve held open	Replace with 0235-1279
109	CC EXPIRED	Chemcassette Passed Expiration Date	0.0	Operator error	Chemcassette installed past its expiration date	Replace Chemcassette
				Chemcassette expired	Expiration date reached	Replace Chemcassette

Event Number	Event List Desc. (Short)	Event History Description	Data Field	Problem	Possible Cause	Recovery
111	DACS COM FAIL	No Communication from PC To Az	0.0	Ethernet communications	Communications to DACS interrupted longer than 20 seconds	Check Ethernet cable at rear of analyzer Check Ethernet hub connection and operation Check Ethernet connection to DACS Restart DACS to clear OPC driver problem
112	SWAPPED BAD PUMP	Single pump failed and swapped	Number of bad pump - 1 or 2	Pump swap has occurred because vacuum levels fell below 6 in. Hg	Pump failure	Rebuild/Replace non-operating pump
					Unused slots not plugged	Install 1295-0404 connector plug on unused slot
					Large 0.018 in transport flow orifices installed	Replace all orifices with 0.015 in orifices (p/n 1290K0009 per Analyzer)
					Check valve on inactive pump leaking	Replace check valve
						Contact Honeywell Analytics Service
113	OPTICS MAINT	Optics Drive High-Cleaning Req	Drive	LED drive required to set zero too high		Clean optics Contact Honeywell Analytics Service
				Tape leader installed improperly	Leader not centered (Pts 1 or 5 error)	Reload Chemcassette and recalibrate using leader
					Autozero performed while tape on light or dark gray portion of leader	Reload Chemcassette and recalibrate using leader
					Dirt in optics	Clean optics block
114	POINT VAC ERR	Excessive Point Vacuum	in. Hg	Sample vacuum is greater than 5 in. Hg vacuum for longer than 5 seconds	End of line filter clogged	Replace clogged end of line filter
					Sample line kinked	Isolate by disconnecting possible crimped sample line
					Maximum line length exceeded on a shared sample line	Isolate shared sample line Review limits number of analyzers, tubing ID vs. Length (See Table B.2)
					Crimped tube in cable carrier	Identify crimps in tubing harness by checking pressure with analyzer closed vs. open

Event Number	Event List Desc. (Short)	Event History Description	Data Field	Problem	Possible Cause	Recovery
115	AZ SW DIAGNOSTIC	Az Software Diagnostic	0.0	Analyzer failed to enter monitor after pump swap	Control related fault is issued because of an improper control response from another analyzer	Verify all analyzers enter monitor mode successfully
116	PUMP OVER-TEMP	Pump Over Temperature	0.0	Pump module Temperature exceeded	Clogged Filter	Replace air filter
					Fan Failure	Check fans in pump module
					Line voltage less than 208 VAC	Verify main line voltage
117	PUMP EXHAUST HI	High Exhaust Pressure	0.0	Exhaust Manifold pressure greater than 9 in. Hg (4.4 PSI)	Kinked exhaust	Check exhaust tubing for kinks or restrictions
					Exhaust tubing length exceeds 50 ft. (15 m.)	Reroute to reduce length or change to a larger diameter sample line
118	POWER SUPPLY	Power Supply Fail/missing	0.0	Redundant supply not available	Failure	Replace with supply 0060-0020
119	BAD OPTICS TEMP	Optics Temperature Out Of Range	Sum of error codes 1.0 to 64.0	1.0: Front block reads <0˚C	Cold Environment	Relocate Vertex M
				2.0: Front block reads >60˚C	Electronic problem	Replace front optics block
				4.0: Front block reads 45-60˚C	Cooling air failure	Change air filter, replace fan
					Hot environment	Relocate Vertex M
				8.0: Rear block reads <0˚	Cold environment	Relocate Vertex M
				16.0: Rear block reads >60˚	Electronic problem	Replace rear optics block
				32.0: Rear block reads 45-60˚C	Cooling air failure	Change air filter, replace fan
					Hot environment	Relocate Vertex M
				64.0: Two blocks disagree by 10˚C	Electronic problem	Observe Log1 output to identify defective block, replace
120	CHANGE FILTERS	Filter Timer Expired	0.0	Filter time in configuration profile elapsed	Maintenance reminder, no malfunction	Change filter and reset timer
121	CABLE PROBLEM	Multifunction Cable Problem	varies	DB-25 disconnected at rear of some analyzer		Connect cable

Event Number	Event List Desc. (Short)	Event History Description	Data Field	Problem	Possible Cause	Recovery
122	LIT NO REF	LIT has no reference	bitmask of points skipped, 1-255	Analyzer has no record or correct cracking pressure	Point was disabled in configuration when previous LIT characterization was performed	Perform characterization or disable LIT test for point in configuration
123	LIT CHAR FAIL	LIT Characterization failed	Observed cracking pressure (in Hg)	Inadequate cracking pressure measured during characterization	Check valve not installed	Install check valve or disable LIT test in config
					Sample tubing cut or leaking	Replace tubing
124	LINE FAIL	Sample line leak detected	Observed cracking pressure (in Hg)	Inadequate cracking pressure measured during the monitoring by the optional Line Integrity Test	Sample tubing cut or leaking	Replace tubing
					Ambient pressure at sampled point differs from Vertex M exhaust by more than 0.3 in Hg (1 KPa)	Revise installation
						Disable LIT for affected point
					Check valve not seating	Replace check valve
125	LIT COORDINATION	Coordination failure during LIT	Error code 1.0 - 6.0	LIT test not performed because analyzers could not coordinate the test	Some analyzers were in LOADCC or other special mode	None needed
					Software anomaly	If repeated, notify Honeywell Analytics Service
126	OPTICS DEBRIS	Possible debris in optics block	Diagnostic Counter	Optics signal has been erratic on at least 3 windows	Debris in optics block	Clean optics block as shown in Section 5.11

Event Number	Event List Desc. (Short)	Event History Description	Data Field	Problem	Possible Cause	Recovery
127	AUTOBALANCE FAIL	Flow Autobalance Failed	No. of Failed Attempts	Detailed failures can be determined by the data from the accompanying info event(s) by using the table below.		
			11 to 23	Adjusting factor out of range	Anomaly encountered	Repeat Auto balance
					Faulty valve	Contact HA Service
			30	Adjusting factor varies between 3 spots	Anomaly encountered	Repeat Auto balance
					Other	Contact HA Service
			41 to 43	Inadequate flow	Insufficient vacuum (<8 in Hg)	See recovery for Fault 112
					Excessive pressure drop in tubing	See recovery for Fault 114
					Faulty valve	Contact HA Service
			51 to 53	Excessive minimum flow	Debris in valve	Repeat Auto balance
					Faulty valve	Contact HA Service
128*	WINDOW ZERO RESET	Window Zero Reset	Diagnostic Counter	Same as Fault 126	Same as Fault 126	Same as Fault 126
129	ACCEL. CC USAGE	Acclerated Chemcassette Usage	Time since last Chemcassette advance	Chemcassette advancing more often that expected	Low level background gas below lower detectable limit	Locate source of background gas
130	VR FAILED	Virtual Reference Test Failed	Sample Counter	Tape reflectance differs slightly between windows	Old tape	Contact HA Service if this occurs frequently
					Ambient gas concentration	

*Dependent on the setting in the Configuration menu.

6.4 Instrument Faults

An instrument fault indicates a loss of monitoring on one or more points. When an instrument fault occurs, the following actions take place within the Vertex M System:

The LED indicator flashes yellow on the analyzer with the fault. See Table 6-1. Analyzer Status LEDs.

- A yellow fault indicator appears on the main screen
- The fault is entered into the event list and event history
- Instrument Fault relays associated with this analyzer will activate

Event Number	Event List Desc. (Short)	Event History Description	Data Field	Problem	Possible Cause	Recovery
202	HIGH BACKGROUND	High Background	Optical signal counts	Bad Chemcassette	Chemcassette discolored	Check optics values in event history
					Moisture on Chemcassette	Check optics values for last Chemcassette load in event history
				Chemcassette tracking/ installation error	Errors occurring on points 1 and 5 or 4 and 8 only indicate a tracking problem	Check guide position Reload Chemcassette using maintenance analyzer operation
				Optics block dirty	Dust	Clean optics
203	END OF CC	End Of Chemcassette	0.0	Insufficient Chemcassette motion detected	End of Chemcassette	Replace Chemcassette
					Chemcassette broken	Rethread Chemcassette (See Section 5.3.4 Change Chemcassette® Tape)
					Faulty tape encoder	Service analyzer
					Advance motor failure	Service analyzer
					Gate opening insufficient	Service analyzer
205	FAIL WR HW CONF	Failure Writing Hardware Config		Failure writing hardware configuration	Non-volatile memory failure in analyzer CPU	Service or replace analyzer
206	FAIL RD HW CONF	Failure Reading Hardware Config		Failure reading hardware configuration	Non-volatile memory failure in analyzer CPU	Service or replace analyzer
207	PYRO FAILURE	Pyrolyzer Failure	Internal Temp	Pyrolyzer failure	Heater element Fuse failure Thermocouple Failure	Service or replace analyzer
208	PYRO OVERTEMP	Skin Over-Temperature	1 or 2 Pyrolyzer number	Pyrolyzer skin temperature greater than 105°C	Fan failure in analyzer	Replace fan
					Sensor failure	Replace sensor

Event Number	Event List Desc. (Short)	Event History Description	Data Field	Problem	Possible Cause	Recovery
209	GATE TIMEOUT	Gate Motor Timeout	0.0	Gate motor timeout 7 seconds	Gate position sensor not activated before timeout	Check motor operation using Maintenance/ Analyzer Operations/ Open Gate or Close Gate
					Motor does not operate	Check motor connections to sensor interface PCB in analyzer
					Bad sensor or cable	Check sensor connection on PCB Contact Honeywell service
210	OPTICS NOISE	Optics Noise	Counts	Optics Noise	Poor grounding	Contact Honeywell service
					Optics block cover loose	Retighten or reinstall as required
211	OPTICS FAILURE	Optics Failure	Counts	Count values from optics reading exceeded limits	Cable disconnected	Check cable Contact Honeywell service
					Optics board defective	Contact Honeywell service
					Sensor interface defective	Contact Honeywell service
					Optics LED not properly calibrated	Perform Load CC Operation to recalibrate
212	GAS TABLE ERROR	Gas Table Error		Gas table corrupt or missing	No configuration loaded	Reinstall Configuration Profile
215	HIGH PYRO FLOW	High Pyrolyzer Flow	flow cc/min.	Proportional valve failure	Debris in valve	Replace valve
				Improperly characterized proportional valve	Change in flow system configuration	Perform Auto Balance operation
				Static flow reading	Transducer failure	Service or replace analyzer
216	OPTICS DRIVE LOW	Optics Drive Low	Drive counts	Drive value below allowable threshold	Problem in optics block or sensor interface electronics	Service or replace analyzer
217	OPTICS DRIVE HI	Optics Drive High	Drive counts	Drive value above allowable threshold	Problem in optics block or sensor interface electronics	Service or replace analyzer

Event Number	Event List Desc. (Short)	Event History Description	Data Field	Problem	Possible Cause	Recovery
218	OPTICS READING HI	Optics Reading High	Optics counts	Drive value above allowable threshold	Problem in optics block or sensor interface electronics	Service or replace analyzer
219	DOUBLE PUMP FAIL	Double Pump Failure	Number of last pump failed - 1 or 2	Pump unable to produce 6 in Hg vacuum while Fault 112 active.	See causes for Fault 112	See recoveries for Fault 112
					Circuit breaker tripped	Circuit breakers are self resetting.
						Contact Honeywell Service
220	LOSS OF FLOW	Loss of Flow	cc/min.	Flow less than 180 cc/min.		Perform Auto Balance after any service
				On point 1 or 1 and 5 only	Tape tracking problem	Reload Chemcassette
				Obstruction	Condensation in system	Purge internal lines
					Internal valve filter	Replace filter
					Proportional valve	Replace valve
					Clogged micro tube	Replace tube **Note:** Calibration required
					Clogged freon filter (Pyrolyzer)	Replace freon filter
				Pneumatic integrity compromised	Gate not fully closing	Gate adjustment loose, pivot binding
					Optics block loose	Tighten optics block fasteners
221	AZ SW DIAGNOSTIC	Az Software Diagnostic	0.0	Pump control conflict between one or more analyzers	Power cycled at random on multiple analyzers operating alternate pumps	Cycle power to resynchronize system
223	AZ SW DIAGNOSTIC	Az Software Diagnostic	0.0	Pump control conflict between one or more analyzers	Power cycled at random on multiple analyzers operating alternate pumps	Cycle power to resynchronize system
225	INVALID PT PRES	Point Pressure Out Of Range	in. Hg	Sample pressure out of range	Miscalibrated sensor board or defective transducer	Replace Analyzer
					Positive pressure at sample location	Determine cause of pressure
226	INVALID SUP PRES	Supply Pressure Out Of Range	in. Hg	Manifold pressure out of range	Miscalibrated sensor board or defective transducer	Replace Analyzer

Event Number	Event List Desc. (Short)	Event History Description	Data Field	Problem	Possible Cause	Recovery
228	NO PYRO MAINS PWR	No Pyrolyzer Mains Power	1	No mains power at points 5-8	Internal thermal fuse opened	Check cooling fan, replace thermal fuse
			2	No mains power at points 1-4		
			3	No mains power at all 8 points	Pyro mains switch not on	Turn on pyro mains switch
					Circuit breaker tripped	Breaker is self resetting
					Power connector disconnected	Check connection on back of Analyzer
					Defective transformer	Replace transformer
229	OPTICS CFG ERR	Invalid Optics Configuration	Error code	Microprocessor in optics block reports problem.	Chemleader read failed	Reread Chemleader. Cycle power to analyzer. Update software in optics block.
230	COM FAIL TO PLC	No Communication From PLC To Az	0.0	No communication from PLC	Communication has timed out to PLC	Cycle power to the analyzers and reload Configuration Profile
						Check FLT light on PLC
					Connection at rear of analyzer	Check 25-pin, multifunction cable at the rear of the analyzer
					Check cable connections to the PLC	Check cable connection at chassis from carrier
231	DRV ADJ FAIL	AUTO LED Adjustment Failed	Optics counts	LED adjustment failed	Tape incorrectly loaded	Reload and retry tape load
					Dirty optics block	Service or replace analyzer
					Bad optics PCB set	Service or replace analyzer
					Bad RFID tag	Load new Chemcassette
232	BAD Q-FACTOR	Q-Factor Out Of Range	Q-Factor	Q-Factor out of range	Chemcassette leader not tight or improperly positioned during white to light gray calibration	Reload Chemcassette
					Bad RFID tag	Load new Chemcassette
					Dirty optics block	Clean and recalibrate
					Bad optics PCB set	Service or replace analyzer

Event Number	Event List Desc. (Short)	Event History Description	Data Field	Problem	Possible Cause	Recovery
233	FAIL OPT VERIFY	Optics Verification Failed	Adj Cnts	Optics Verification Failed	Chemcassette leader not tight or improperly positioned during light gray to dark gray calibration	Reload Chemcassette
					Bad RFID tag	Load new Chemcassette
					Dirty optics block	Clean and recalibrate
					Bad optics PCB set	Service or replace analyzer
234	GRAY FAILED	Light Gray Read Failed	Optics Cnts	Optics values of this field were outside limits	Chemcassette leader not tight or improperly positioned during light gray to dark gray calibration	Reload Chemcassette
					Bad RFID tag	Load new Chemcassette
					Dirty optics block	Clean and recalibrate
					Bad optics PCB set	Service or replace analyzer
235	AZ SW VER WRONG	Analyzer software version mismatch	0	Software mismatch		Reload program to all analyzers Contact Honeywell service
237	AZ VACUUM LOW	Inadequate Analyzer Vacuum	Observed vacuum in in Hg	Individual analyzer observes inadequate vacuum, stops monitoring	Fault 219 has triggered.	Recover from Fault 219, then reset Fault 237
					Circular tubing harness disconnected	Connect circular tubing harness
					Tubing pinched	Correct tubing dress in cable carrier
						Contact Honeywell Service
238	OP SW MISMATCH	Optics block software mismatch.	0	The two optics blocks are not running the same software version.	Program update done incorrectly.	Reload program to both optics blocks.
239	OPTICS COMM FAIL	Optics block communication failure	Error code	Analyzer is not able to communicate with the optics block.	Cable disconnected. Software anomaly. Defective optics block.	Check the 14 pin cable connection on the sensor board. Cycle power to analyzer. Contact Honeywell service.
240	OPTICS REF FAIL	Optics reference limit exceeded	Reference value signal	The signal detected at the reference photodiode is out of range.	Degraded optics block.	Contact Honeywell service.

Event Number	Event List Desc. (Short)	Event History Description	Data Field	Problem	Possible Cause	Recovery
241	OPT REF ADJ TIMEOUT	Optics reference adjustment timeout	Error code	Optics block self-adjustment timeout.		Cycle power to analyzer. Contact Honeywell service.
270	COM AZ # # BROKEN	OPC To Az ## Communica-tions Broken		Analyzer not responding to OPC driver polling request	Analyzer powered down	Check switch on power module
					Ethernet cable not connected	Check Ethernet connection at the back of the analyzer Move cable to different port on Ethernet hub
301	PLC-COM BROKEN	PLC-Com Broken		PLC fails to respond to DAq communication	Cable connection problem	Check serial communications on DAq COM2 Check serial cable on PLC 1747-KE See Section 1.2.7 Data Acquisition Computer (rear) See Section 1.2.9 Main PLC
					Loss of PLC power	Check power connections for PLC
302	AZ-BAD PROF ID	AZ has wrong profile loaded		Profile ID in analyzer does not match current configuration in use	Configuration not properly loaded	Reinstall current Configuration Profile
303	PLC-BAD PROF ID	PLC Has Wrong Profile loaded		Profile ID in PLC does not match current configuration in use	Configuration not properly loaded	Reinstall current Configuration Profile
304	PLC SYSTEM FAULT	PLC System Fault	PLC Error Code	A fault has occurred on the PLC that prevents the PLC program from running	Faulty or missing PLC module PLC is not properly configured	Contact Honeywell Analytics Service
305	DATA LOG FAILED	Unable To Log Conc Data		Failure to store concentration data in the database	Local database file has reached size limit (1GB maximum size for Access database).	Enable automatic database purge or adjust database purge settings to purge old data
413	CMD ERR AZ #-#	Cmd Error Az #-#		Analyzer not responding DAq Communica-tions	Cable connections	Check Ethernet connections
					Analyzer missing or powered down	Remove analyzer from Configuration Profile

6.5 Information Events

The Vertex M System enters informational and other non-fault events into the event history database. These do not require any action by the user.

Use the event history to check the status of the monitor.

Event Type In History	Event History Message	Possible Cause
ALM SIMULATE	Various	An alarm was artificially created. See Section 4.6.6 Security Access.
ALM 1	Concentration > AL1	Gas concentration exceeded limit
ALM 2	Concentration > AL2	Gas concentration exceeded limit
ALM WARNING	Concentration > Warning	Gas concentration exceeded lower detection limit
AZ NO RECORD	Various	A fault was cleared in the DAq for which the analyzer has no record
AZ PROGRAM INSTALL	Various	The analyzer program update process was started
CALIBRATION	Command – Valves Auto Balance	Auto Balance was started
CONFIG INSTALL	Various	The configuration profile installation was started
DEFAULT RESET	Various	A fault was cleared in the DAq from an analyzer that is no longer present in the rack
FAULT SIMULATE	Various	A fault was artificially created. See Section 4.6.6 Security Access.
INFO	20 mA Loop Test Ended	User initiated action
INFO	20 mA Loop Driven for Test	User initiated action
INFO	Window Zero Reset	Optics defect detected and corrected
INFO	Analyzer accepts new location	Analyzer moved
INFO	Analyzer Powered Up	User initiated action
INFO	Az Button Resets Alm&Flts	Internal override pushbutton operated
INFO	Az Button Starts Monitoring	Internal override pushbutton operated
INFO	Az Button Stops Monitoring	Internal override pushbutton operated
INFO	Clock Adjusted By DAq PC	Normal drift or clock set on DAq
INFO	Flow Auto Balance Performed	User initiated action
INFO	Hardware Configuration Changed	Auto Balance, Load CC, New Location or Pump Alternated

Event Type In History	Event History Message	Possible Cause
INFO	LED Drive Adjusted	Load CC
INFO	Monitoring stopped for no pts	All points disabled by faults
INFO	New Chemcassette Was Installed	User initiated action
INFO	New Sector Started	Normal maintenance
INFO	Optics Verified Successfully	Load CC
INFO	Program Loaded	User initiated action
INFO	Pump Selection Resynchronized	Analyzer installed in different system
INFO	Q-Factor Set	Load CC
INFO	Rebooted W	Watchdog reboot of analyzer
INFO	Run-Time Alarm Disable	User initiated action
INFO	Run-Time Alarm Disable Cancel	User initiated action
INFO	Run-Time Point Disable	User initiated action
INFO	Run-Time Point Disable Cancel	User initiated action
INFO	Start Monitor	User or power restored
INFO	Stop Monitor	User or instrument fault
INFO	User Requested Pump Switch	User initiated action
INFO	OPC Driver Started	The DAq booted
INFO	OPC Driver Shut Down	User initiated action
INFO	CPLD Programmed Successfully	A new program has been loaded into the sensor board CPLD chip
INFO	CPLD Program Failed	An attempt to load a new program into the sensor board CPLD chip failed
INFO	RFID Read Skipped	User loaded new Chemcassette but skipped reading the RFID tag by pressing <next>
OPC	No Ack Echo From Az n-n	Communications problem to analyzer
OPC	No Cmnd Socket Sent To Az n-n	Communications problem to analyzer
OPC	OPC To Az n-n Communication Broken	Communications problem to analyzer
OUT OF ALARM	Various	Non-latching alarm level decreased because of decrease in gas concentration
PLC CONF INSTALL	Various	Download PLC Configuration was started
RESET ALM n	Various	Latching alarm level decreased because user pressed RESET CURRENT or RESET ALL
RESET ALM SIMULATE	Various	Analyzer acknowledges command to reset an artificial alarm OR fault
RESET INST FAULT	Various	Analyzer acknowledges command to reset an instrument fault
RESET MAINT FAULT	Various	Analyzer acknowledges command to reset a maintenance fault
USER RESET	Various	A user pressed RESET CURRENT or RESET ALL
INFO	Flow Corrected	Flow on one window of tape improper

6.5.1 LIT-Related Informational Events

Event Type In History	Event History Message	Possible Cause
INFO	Command - Perform LIT Char	User pressed “START LIT CHAR” button
INFO	LIT Characterization Performed	Analyzer completed LIT characterization. If data field non-zero, this indicates the observed cracking pressure in inches Hg.
INFO	Command - Unscheduled LIT	User pressed “START LIT TEST”
INFO	Line Integrity Test Performed	Analyzer completed an integrity test. The data field contains the observed cracking pressure in inches Hg.
INFO	Analyzer Lacks LIT	Other analyzers in the rack performed a Line Integrity Test but this analyzer was purchased without the option.

Note:

If additional or replacement Vertex M Analyzers are purchased without specifying the LIT option, no faults will be generated for the lack of the option in the new analyzer. However, an “INFO” message will be logged in the Event

History each time the LIT option is invoked. Existing analyzers configured for LIT will be unaffected.

6.6 Manual Analyzer Override

The Vertex M Analyzer is equipped with a “Manual Override” button (Figure 6-1) in the event the communications to the Vertex M Data Acquisition (DAq) computer halts. This button activates only when the communications has completely ceased.

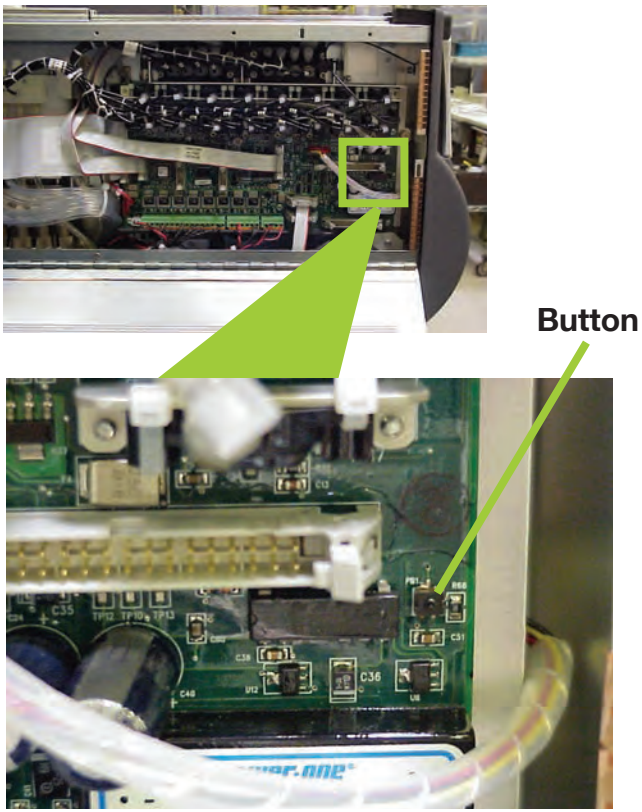


Figure 6-1. Vertex M Analyzer Manual Override Button Location

There are cases where the DAq appears to be “frozen” or “locked-up” (no response from the keyboard and/or any user invoked actions after a few moments) when in reality this is not the case. Events that could cause these symptoms include AC power surges or sags and improper shut-downs of the DAq that result in file corruption. As a result, future attempts to access these files can slow down the response of the DAq. To confirm a non-responsive DAq as opposed to frozen/locked-up, check the clock located in the upper right hand corner of the Vertex M HMI window (shown in Figure 6-2). If the clock is still advancing, then the DAq CPU is not frozen/locked-up and your local Authorized Service Center needs to be contacted for assistance.

Figure 6-2. Vertex M HMI Clock

On occasions, there may be the need to install a new Chemcassette® to continue monitoring your facility, or to reset alarms or faults. If the DAq is not responding, these tasks can be performed using the “Manual Override” button. An extra step may be required to “force” activation of the “Manual Override” button under the above mentioned conditions if the DAq computer is still communicating with the analyzers. The following instructions will instruct you on how to accomplish this task:

Note:

Performing this task will generate Maintenance Fault F111 – DACS COM FAIL

1. Manually release the Analyzer by sliding the Removal key into slot located in the bottom of the Analyzer front (key located in Software Binder shipped with each Vertex M rack) and slide the Analyzer out of the cabinet.

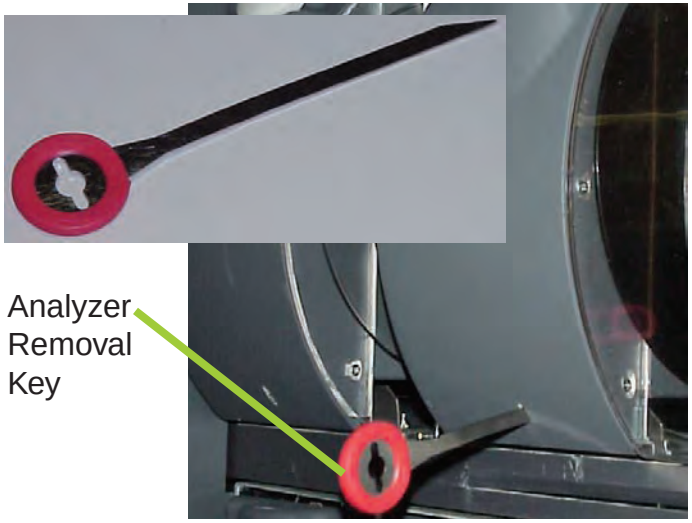


Figure 6-3. Vertex M Analyzer Removal Key and Slot Location

2. Locate the Ethernet cable on the rear panel and disconnect it.

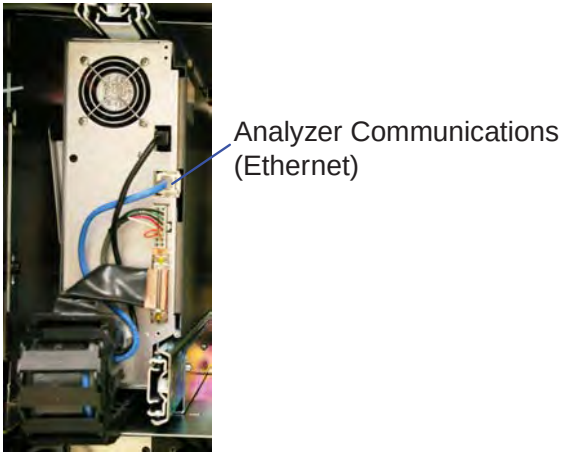


Figure 6-4. Analyzer Ethernet Communication Cable Location

3. Open the side of the Analyzer by unscrewing the 4 thumbscrews at the top of the left side.

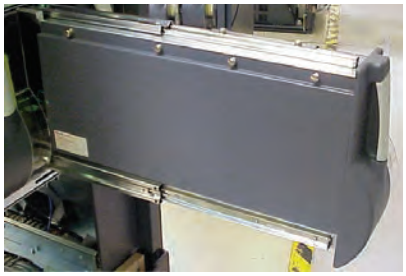


Figure 6-5. Analyzer

4. Approximately 20 seconds after the Ethernet Cable has been disconnected, the Analyzer will recognize that it has lost communications with the DAq and activate the “Manual Override” button shown in Figure 6-1. The LEDs on the front of the Analyzer will flash to show a Maintenance Fault per the LED status flash pattern shown in Table 6-1.

To reset faults and alarms:

Press and hold button for 1-3 seconds.

To Put Analyzer into Monitor mode:

Press and hold button for 4-9 seconds

To Exit Monitor and Open Gate:

Press and hold button for 10 seconds and above

5. Close and reattach the Analyzer cover, reconnect the Ethernet communications cable, and then slide the Analyzer into the cabinet.

Mon State	Alarm State	Fault State	time in millesconds		
			500	400	100
idle	0	none	black		green
		maintenance	amber		black
		instrument	amber	black	
	1	any	red		black
	2	any	red	black	
pyrolyzer warmup	0	none	green	black	
		m or i	green	black	amber
	1	any	green	black	red
monitoring	0	none	green		black
		maintenance	amber		green
		instrument	amber	green	
	1	any	red		green
	2		red	green	
primary program invalid			amber black amber black amber black amber black amber black		
unpowered			black		
lockup			green		
			amber		
			red		

Table 6-1. Analyzer Status LEDs

A Installation Drawings

A.1 Introduction

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REV	DATE	DESCRIPTION OF REVISION	CAD	CHKD.
4	12/15/15	REVISED FRONT AND REAR ACCESS REQUIREMENTS SHT2, PER ECO 8772	RC	
3	09/17/12	EXHAUST TUBING: TEFLON WAS POLYETHYLENE SHT3, PER ECO 8142	JT	
2	06/30/10	ADDED WEIGHT SHT2, ADDED HA PART #'s ON SHT3, CORRECTED LINE/GND/NEUT CALLOUT SHT 4 PER ECO 7829	RC	
1	02/27/09	RELEASED FOR PRODUCTION/	JAT	
A	11/20/08	DRAWN/	DJB	

REVISION RECORD

FIRST PARENT P/N: | DRAWING RELEASE NO.:

Honeywell

DO NOT SCALE DRAWING.

THIS DRAWING AND THE INFORMATION CONTAINED HEREIN ARE PROPRIETARY TO HONEYWELL ANALYTICS INC. AND SHALL NOT BE USED IN WHOLE OR IN PART WITHOUT THE EXPRESS WRITTEN PERMISSION OF HONEYWELL ANALYTICS INC..

TOLERANCES UNLESS OTHERWISE SPECIFIED
INCH [MM]
X/X ± 1/32 [0.79]
.X ± .015 [0.38]
.XX ± .010 [0.25]
.XXX ± .005 [0.13]
ANGLES ± 1°

DRAWING TITLE: VERTEX M INSTALLATION DRAWING

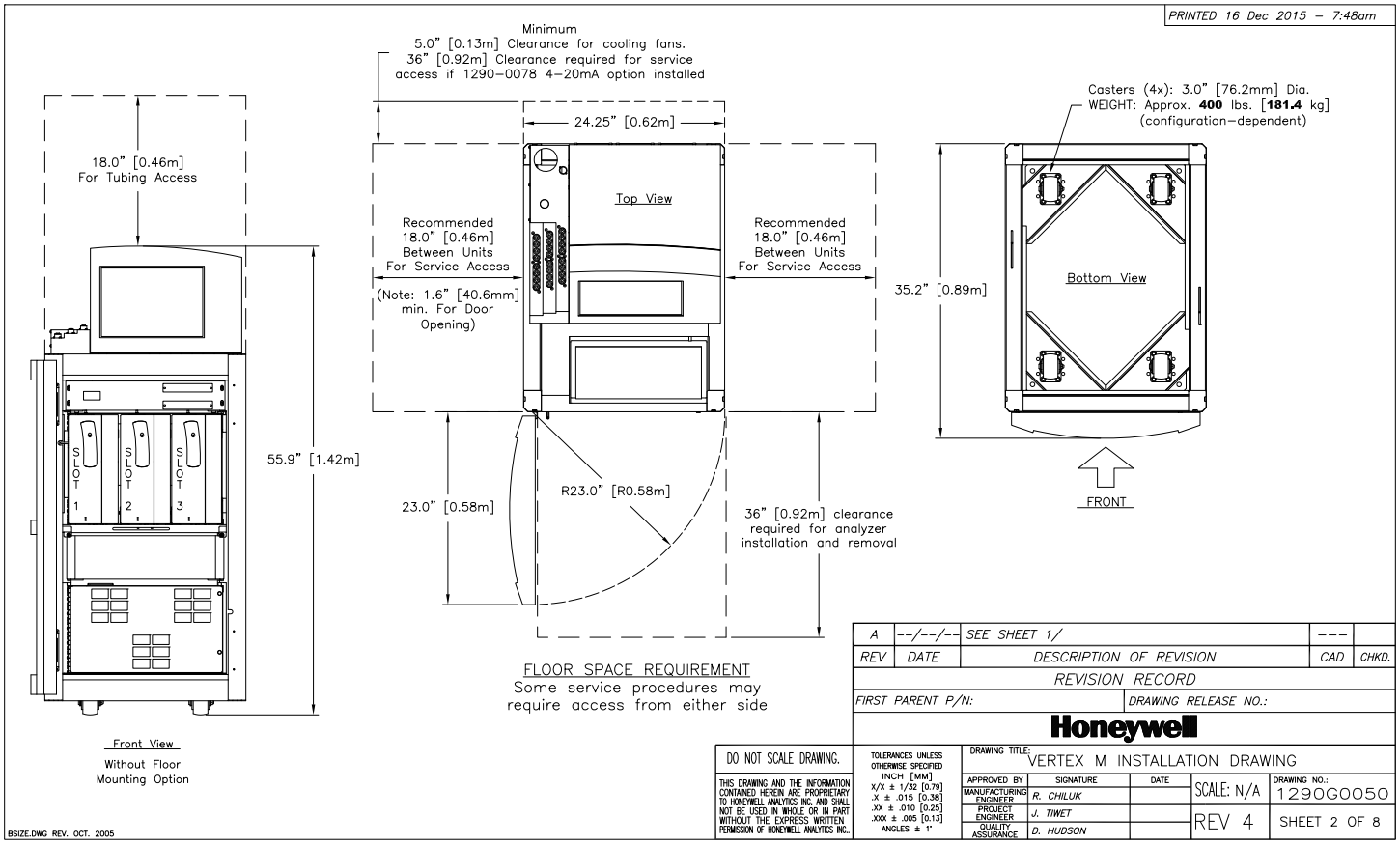
APPROVED BY	SIGNATURE	DATE
MANUFACTURING ENGINEER	R. CHILUK	6-30-10
PROJECT ENGINEER	J. TIWET	7-6-10
QUALITY ASSURANCE	H. CHROMCZAK	7-9-10

SCALE: N/A | DRAWING NO.: 1290G0050

REV 4 | SHEET 1 OF 8

BSIZE.DWG REV. OCT. 2005

A.2 Floor Space Requirements



A.3 General Considerations and Cooling

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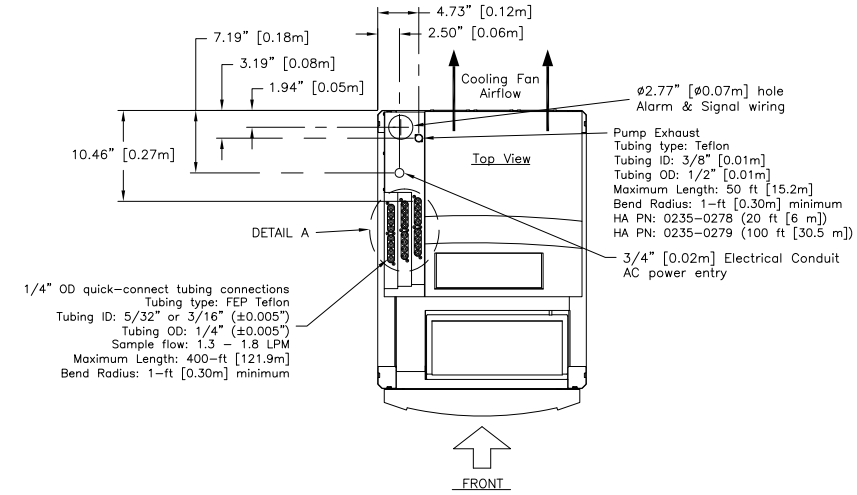
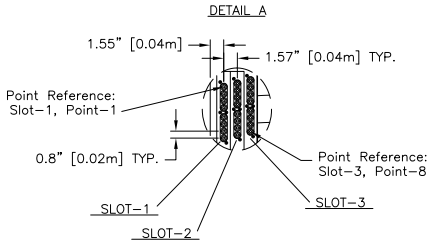
General Connections & Cooling

Refer to sheet–5 for EMC Considerations





1. Table: Transport Times in Seconds

O.D.		0.25" Outside Diameter Tubing							
I.D.		0.156"(Medium Wall)I.D. ①				0.190"(Thin Wall)I.D. ②			
Length in Feet		100	200	300	400	100	200	300	400
Length in meters		30.5m	61.0m	91.4m	121.9m	30.5m	61.0m	91.4m	121.9m
# of Analyzers Per line	1	15	30	45	60	22	45	67	89
	2	8	15			11	22	34	45
	3	5		Pressure Limited		7	15	Pressure Limited	
Nominal Transport Time in Seconds 1.3–1.8 Liters per Minute per Point (1.5 LPM nominal)									
Pressure limited areas: expected pressure to exceed 5 inHg									

① HA PN: 0235–0157 (0.156" I.D.), 400–ft [121.9m] roll

② HA PN: 0235–0109 (0.190" I.D.), 1000–ft [304.8m] roll

2. Sample Line Filter Recommendations:

Refer to Manual, Section B.1, for filter requirements for specific gases.

HA PN: 780248 Dust Filter (One per line) – TYPE–A

HA PN: 1830–0055 Filter for Corrosive Gases – TYPE–B (One per line)

HA PN: 0235–1072 Replacement "corrosive" filter elements (Pack of 100)

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A	--/--/--	SEE SHEET 1/	---	

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.XX ± .010 [0.25]
.XXX ± .005 [0.13]
ANGLES ± 1°

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PROJECT ENGINEER	J. TIWET	
QUALITY ASSURANCE	D. HUDSON	

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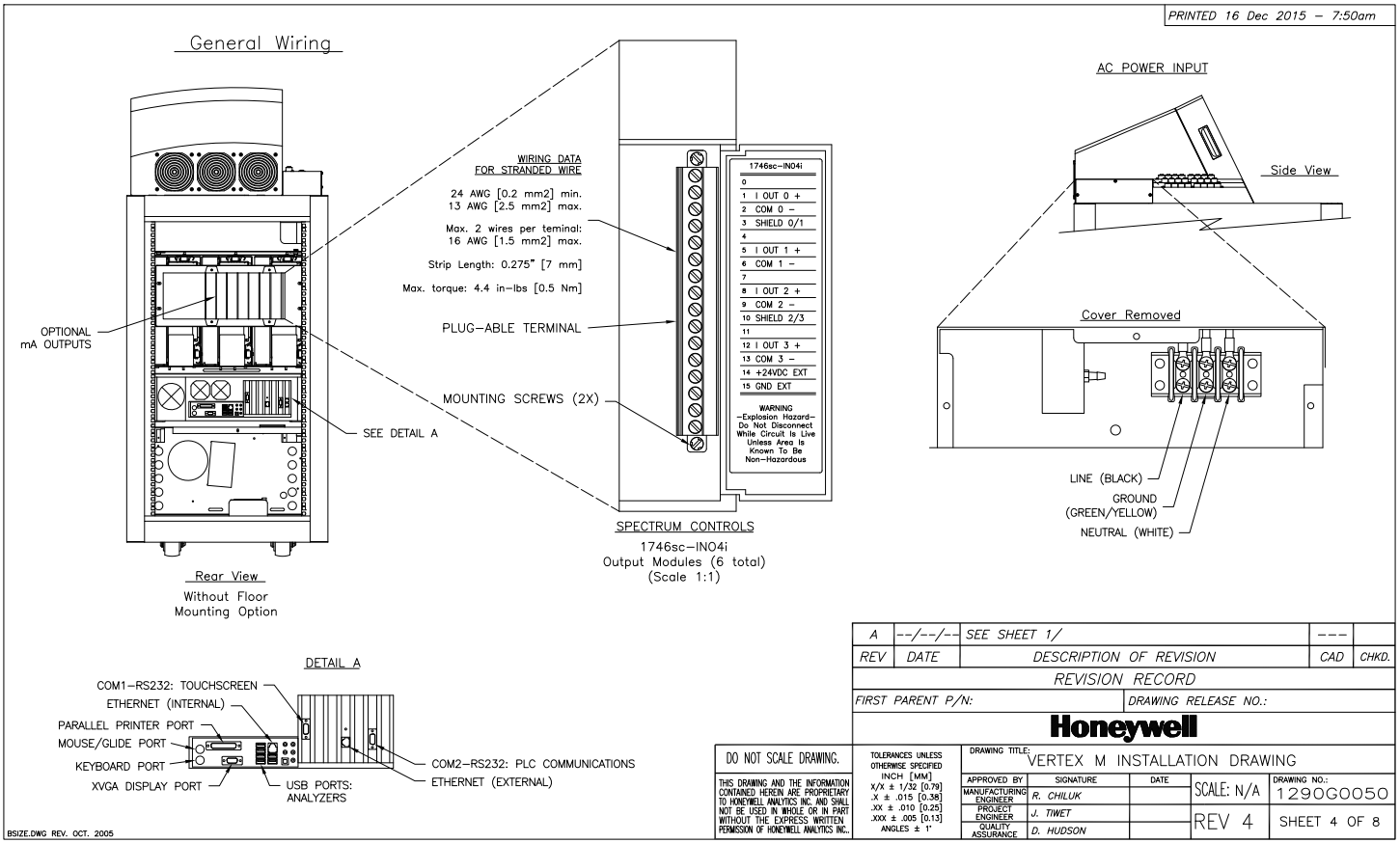
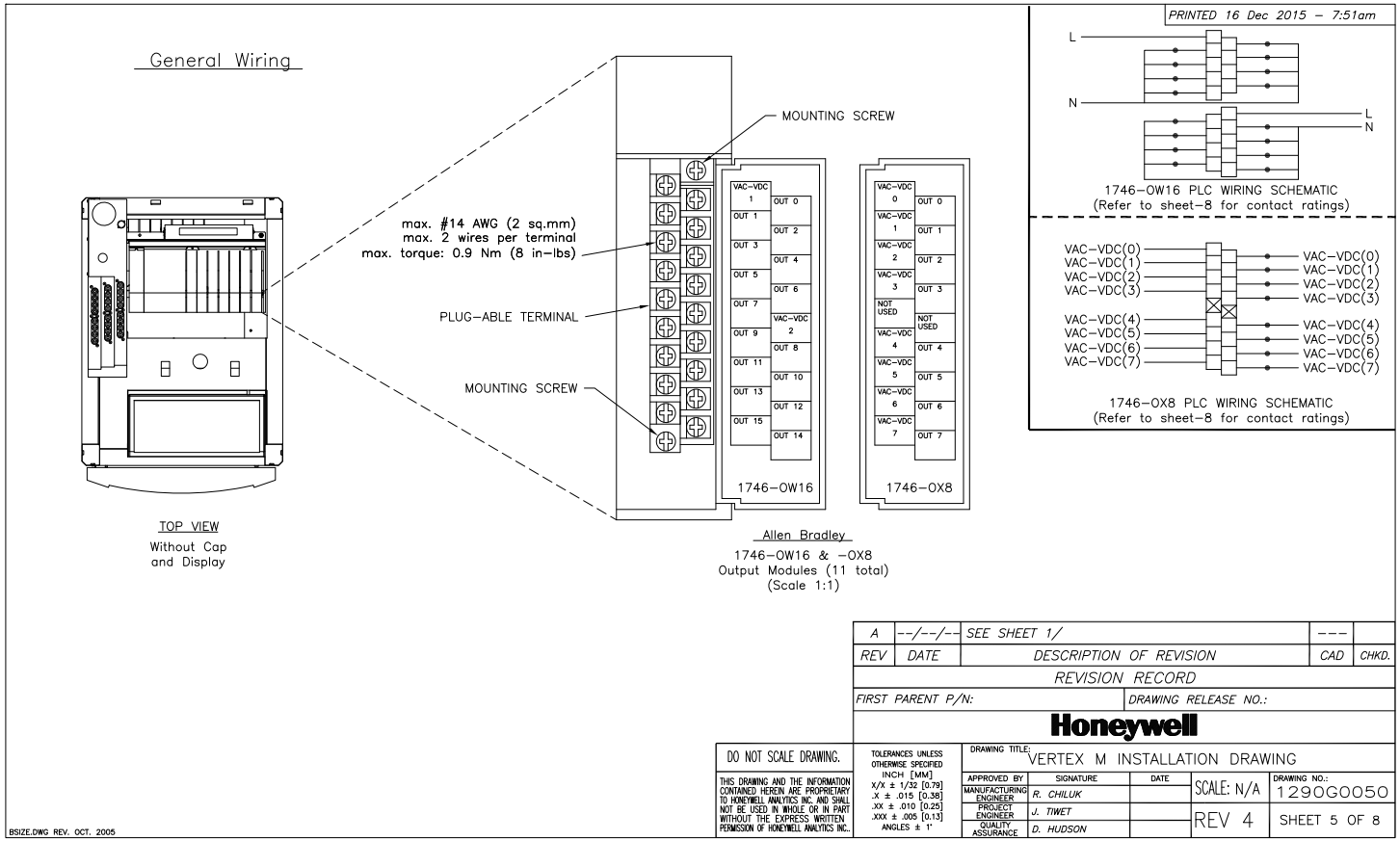
BSIZE.DWG REV. OCT. 2005

A.4 General Wiring




General Wiring
MOUNTING SCREW
max. #14 AWG (2 sq.mm)
max. 2 wires per terminal
max. torque: 0.9 Nm (8 in-lbs)
PLUG-ABLE TERMINAL
MOUNTING SCREW
1746-OW16
1746-OX8
TOP VIEW
Without Cap
and Display
Allen Bradley
1746-OW16 & -OX8
Output Modules (11 total)
(Scale 1:1)
PRINTED 16 Dec 2015 - 7:51am
L
N
1746-OW16 PLC WIRING SCHEMATIC
(Refer to sheet-8 for contact ratings)
VAC-VDC(0)
VAC-VDC(1)
VAC-VDC(2)
VAC-VDC(3)
VAC-VDC(4)
VAC-VDC(5)
VAC-VDC(6)
VAC-VDC(7)
1746-OX8 PLC WIRING SCHEMATIC
(Refer to sheet-8 for contact ratings)
A --/--/-- SEE SHEET 1/ --- ---
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QUALITY ASSURANCE D. HUDSON
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SHEET 5 OF 8
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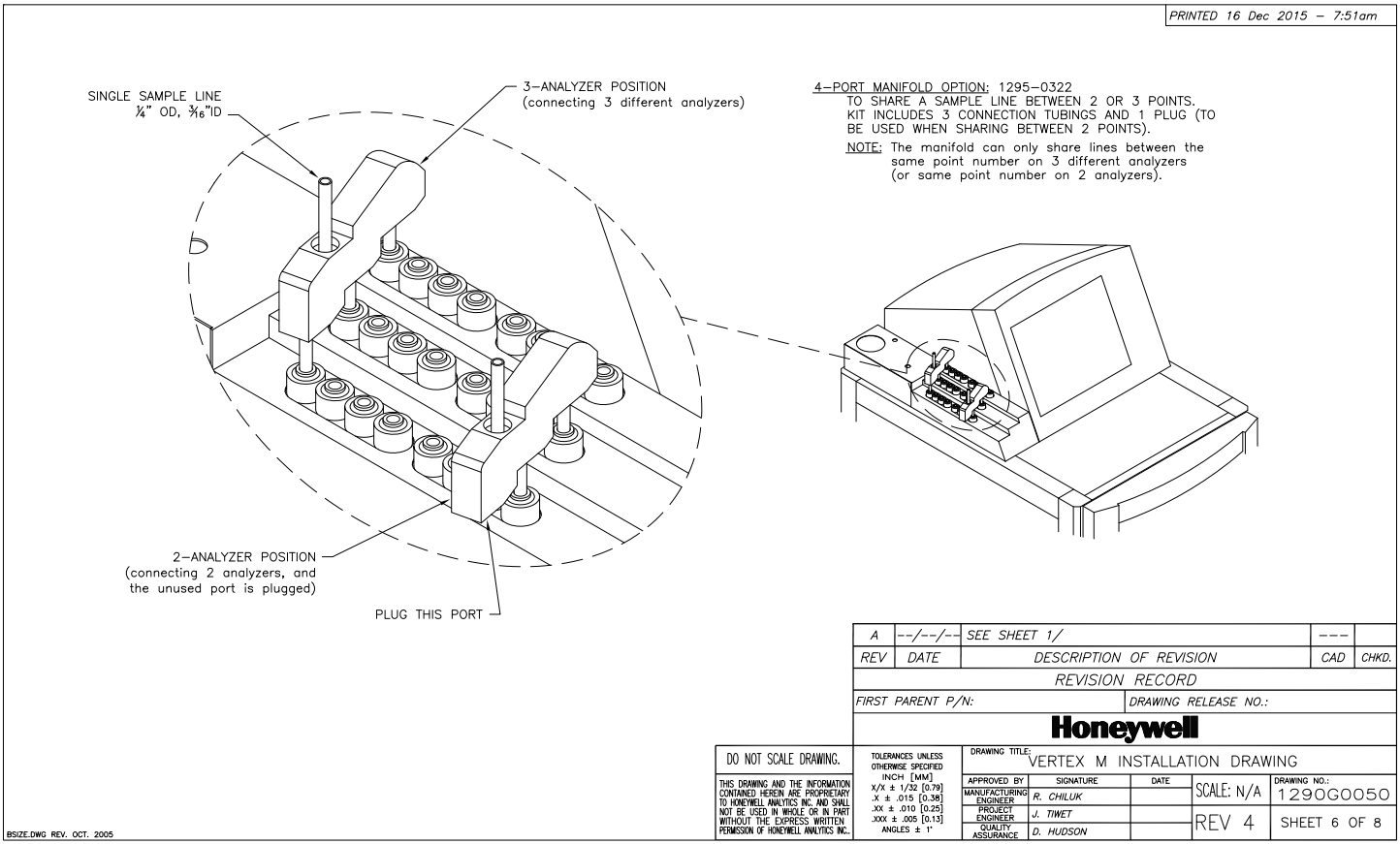
A.5 4-Port Manifold Option



A.6 Floor Mounting Option

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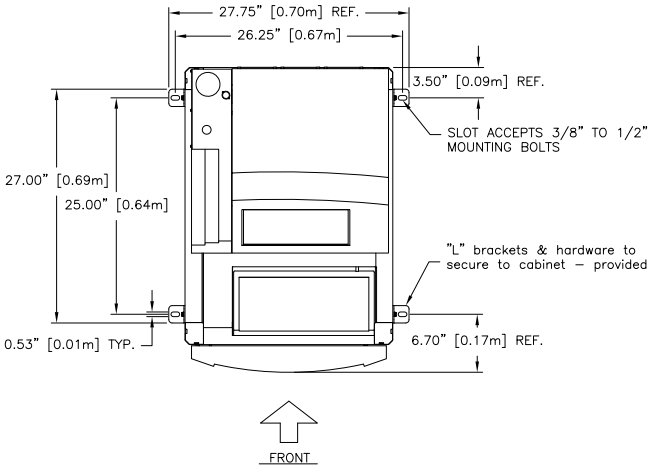

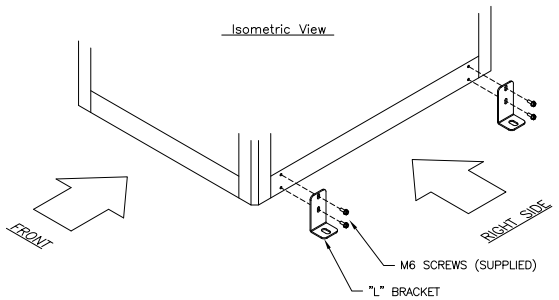

1290K0064
Floor Mounting Option

NOTES:
1. Hardware are provided to secure "L" brackets to the base of Vertex–M and to a cement floor.

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.XXX ± .005 [0.13]
ANGLES ± 1°

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EMC Consideration

Overview Your Zellweger Analytics MDA Scientific Instrument has been designed to comply with applicable Electromagnetic Compatibility (EMC) standards at the time of manufacture. The design includes filtering, shielding and bypassing techniques. At the time of certification, simulated customer Input/Output (I/O) schemes were tested.
All methods used in your equipment for emission suppression and reduction of susceptibility are interactive. Modifications to the instrument will most likely result in increased emission and higher vulnerability to other radiated fields.
Following the guidelines in this EMC Considerations section will ensure your instrument maintains the highest degree of EMC integrity. The guidelines list apply only to I/O emissions and do not apply to A.C. and D.C. instrument power connections.

Cabling At a very minimum, all cables should include a braided shield. Ideal results have been obtained with twisted pair cabling which has a foil shield surrounding each pair plus foil and 90% braid shielding around the bundle. While this yields the best results, it can be very expensive. In addition, ensure local electrical code requirements are met.

Cabling Type The following cable parameters must be considered:

Braid Must have a minimum 90% coverage
Foil When used with braid, provides 100% coverage.
Note: Do not use foil alone. It has a tendency to break.

Twisted Pair Provides for canceling of magnetic fields.
Stranded Pair Provides the greatest surface area.

MDA Scientific product testing uses >90% braid with foil (around the bundle); twisted pair; stranded 24 AWG (minimum wiring for all qualification and certification testing.)

Shield Termination Continuation of the shield to the cabinet is most important.

For discrete wire termination, pigtails to the cabinet (connector) ground should be extremely short (absolutely no greater than three inches).

For multiconductor connector terminations, only 360° shielded shells should be used.

Connectors All qualification and certification of MDA Scientific products were achieved with high quality connectors, providing 360° shield coverage. These connectors generally had metal shells.

Failure to properly secure the connector to the equipment will result high emission levels. Also, poorly constructed or improperly assembled connectors can be a high source of radiated noise and provide a path for external signals into the instrument.

1. OPERATING VOLTAGE:
SINGLE-PHASE PROVIDING HOT, NEUTRAL & GROUND LINES
110/220 VAC ±10%, (UNDERLOAD) 50/60Hz, 15 AMP
3000 VA/3500 WATTS/12,000 BTU/Hr
AN EASILY ACCESSIBLE SERVICE DISCONNECT/POWER SWITCH MUST BE INSTALLED NEAR THE INSTRUMENT.

WARNING:
POWER SWITCH ON UNIT DOES NOT DISCONNECT ALL ELECTRICAL POWER.

2. WIRING: ELECTRICAL INSTALLATION MUST COMPLY WITH NEC, NFPA AND OTHER LOCAL CODES.

3. RELAY OUTPUT MODULES (1746-OW16, -OX8)

Specifications		1746-OW16 (RTB)	1746-OX8 (RTB)
Operating Category		ac/dc Relay	
Operating Voltage		5 to 265V ac 47 to 63 Hz/5 to 125V dc	
Number of Outputs		16	8
Points per Common		8	Individually Isolated
Backplane Current Draw	5V	0.170A	0.085A
	24V	0.180A	0.090A
Single Delay(max)-resistive load		on=10ms / off=10ms	
Off-State Leakage(max)		0 mA	
Load Current(min)		10 mA at 5V dc	
Continuous Current per Point① (max)		Refer to the Relay Contact Ratings-sheet 4	
Continuous Current per Module(max)		16.0A ac	②
Current per Common (max)		8.0A	

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4. RELAY CONTACT RATINGS FOR 1746-OW16:

Maximum Volts		Amperes① Make	Amperes① Break	Amps② Cont.	Volt-Amps Make	Volt-Amps Break
ac	240V ac	7.5A	0.75A	2.5A	1800 VA	180 VA
	120V ac	15.0A	1.50A			
dc	125V dc	0.22A③		1.0A	28 VA	
	24V dc	1.2A③		2.0A		

5. RELAY CONTACT RATINGS FOR 1746-OX8:

Maximum Volts		Amperes① Make	Amperes① Break	Amps② Cont.	Volt-Amps Make	Volt-Amps Break
ac	240V ac	15A	1.5A	5.0A	3600A	3600A
	120V ac	30A	3.0A			
dc	125V dc	0.22A③		1.0A	28 VA	
	24V dc	1.2A③		2.0A		

① Connecting surge suppression across your external load will extend the life of SLC 500 relay contacts. For recommended surge suppressors when switching ac inductive load, consult SLC 500 Modular Hardware Style Installation and Operation User Manual (Publication 1747-6.2) or the SLC 500 Fixed Hardware Style Installation and Operation User Manual (Publication 1747-6.21). Recommended surge suppression for switching 24Vdc inductive load is a 1N4004 diode reverse wired across the load.

② The continuous current per module must be limited so the module power does not exceed 1440VA.

③ For dc voltage application, the make/break ampere rating for relay contacts can be determined by dividing the 28 VA by the applied dc voltage. For example, 28VA/48V dc=0.58A. For dc voltage applications less than 14V, the make/break for relay contacts cannot exceed 2A.

RTB=Removal Terminal Block

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.X ± .015 [0.38]
.XX ± .010 [0.25]
.XXX ± .005 [0.13]
ANGLES ± 1°

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A Specifications

A.1 Introduction

Appendix B consists of the following sections:

- B.2 Filter Compatibility
- B.3 Physical Dimensions
- B.4 Nominal Transport Times

A.2 Filter Compatibility

The following table shows sample filter requirements.

If you are monitoring non-corrosive target gases, use filter type A, (P/N 780248), a sample line dust/ particulate filter.

For monitoring corrosive gases, such as chlorine (Cl_2), hydrogen fluoride (HF), hydrogen chloride (HCl), and hydrogen bromide (HBr), sample lines in a dusty environment or for outdoors, use filter type B, (P/N 1830-0055), or type C, (P/N 1991-0147) filter assembly for corrosive gases. The Teflon membrane particulate filter is designed to prevent dust and dirt greater than one micron from entering the sample line. Unlike standard particulate filters, it does not exhibit sample loss with corrosive monitoring.

The one micron Teflon membrane contained in the filter housing (P/N 0235-1072, 100 per pack) should be replaced every 30 days.

Filters have an arrow on the side of the filter pointing in the direction of airflow toward the Vertex M system. Replacement of filters is site dependent.

Filter A - P/N 780248

Filter B - P/N 1830-0055

Filter C - P/N 1991-0147

Symbol	Name	Filter Type A	Filter Type B	Filter Type C
NH_3	Ammonia		X	X
AsH_3	Arsine	X		
AsH_3 D	Arsine (Dry)	X		
AsH_3 LL	Arsine (Low level)	X		
BF_3	Boron Trifluoride		X	X
Cl_2	Chlorine		X	X
ClO_2	Chlorine Dioxide		X	X
Cl_2 LL	Chlorine (Low Level)		X	X
B_2H_6	Diborane	X		
DMA	Dimethylamine		X	X
F2	Fluorine		X	X
GeH_4	Germane	X		
HBr	Hydrogen Bromide		X	X
HBr LL	Hydrogen Bromide (Low Level)		X	X
HCl	Hydrogen Chloride		X	X
HCl LL	Hydrogen Chloride (Low Level)		X	X
HCN	Hydrogen Cyanide	X		
HF	Hydrogen Fluoride		X	X
HF LL	Hydrogen Fluoride (Low Level)		X	X
HI	Hydrogen Iodide		X	X
H2Se	Hydrogen Selenide	X		
H_2S	Hydrogen Sulfide	X		
H_2S LL	Hydrogen Sulfide (Low Level)		X	X
NO_2	Nitrogen Dioxide	X		
NF_3	Nitrogen Trifluoride	X		
$COCl_2$	Phosgene	X		
PH_3	Phosphine	X		
SiH_4	Silane	X		
SO_2	Sulfur Dioxide		X	X
TBA	Tert-butyl Arsine	X		
TBP	Tert-butyl Phosphine	X		
TDMAT	Tetrakis(DimethylAmino) Titanium		X	X

Table A-1. Sample Filter RequirementVertex M General Specifications