# Vertex Continuous Gas Monitor

Honeywell

MDA Scientific

# Operating Manual

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## Vertex Continuous Monitor Symbols

| Symbol | Description |
|---|---|
| \| | Power on |
| ○ | Power off |
| NOTICE | Potential damage to the device or other property, maintenance procedures, and “refer to manual” instructions. |
| ⚠ CAUTION | Lifting instructions, low clearances, slipping/tripping hazards, minor corrosive dangers. Also used when defining personal protective equipment (gloves, dust masks, etc.) |
| ⚠ WARNING | Personal injury risk: machinery hazards around guarded equipment, moving parts, crush/pinch hazards, flying debris, and arc flash hazards. |
| ⚠ DANGER | The most dangerous or potentially lethal hazards: unguarded equipment, confined space entrances, and lockout labels. |
| ⚡ | Caution: possibility of electric shock |
| ♨ | Caution: hot surface |
| ⏚ | Protective conductor terminal (ground terminal) |

## EMC Considerations

Your Honeywell Analytics continuous gas monitor 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 monitor could result in increased emissions and higher vulnerability to other radiated fields.

Following the guidelines in this EMC Considerations section will ensure your monitor maintains the highest degree of EMC integrity. The guidelines listed apply only to I/O emissions and do not apply to A.C. and D.C. monitor power connections.

## FCC Compliance Statement

⚠ **CAUTION:** Changes or modifications not expressly approved could void your authority to use this equipment.

This device complies with Part 15 of the FCC Rules. Operation to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

## Industry Canada Statement

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d’Industrie Canada applicables aux appareils radio exempts de licence. L’exploitation est autorisée aux deux conditions suivantes : (1) l’appareil ne doit pas produire de brouillage, et (2) l’utilisateur de l’appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d’en compromettre le fonctionnement.

## 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. In addition, ensure local electrical code requirements are met.

The following cable parameters must be considered:

| | |
|---|---|
| **Braid** | Must have a minimum 90% coverage |
| **Foil** | When used with braid, provides 100% coverage<br>Do not use foil alone. It has a tendency to break. |
| **Twisted Pair** | Provides for cancelling of magnetic fields |
| **Stranded Pair** | Provides the greatest surface area |
| **Shield Termination** | Continuation of the shield to the cabinet earth ground is most important.<br>For discrete wire terminations, pigtails to the cabinet (connector) ground should be extremely short (absolutely no greater than three inches).<br>For multiconductor connector terminations, only 360° shielded shells should be used. |

**Note:**

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

## Connectors

All qualification and certification of Honeywell Analytics 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 in 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 monitor.

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# 1 Introduction

## 1.1 System Overview

The Honeywell Analytics Vertex™ System continuously monitors up to 72 remote locations for toxic gases. It responds to gases that exceed programmed levels by:

- Triggering alarms and opening event windows to warn operators of high or low concentrations
- Triggering relays to external devices
- Displaying the location, gas type and gas concentration
- Storing the alarm information in a database

The Vertex System provides fast response to a wide range of gases. Each location may be up to 400 ft (122 m) from the Vertex System. The system uses one or more of Honeywell Analytics' Chemcassette® analyzers, with or without pyrolyzer, to provide a monitoring system tailored to meet the requirements of the facility.

The Vertex System incorporates a range of redundant and protective features for maximum uptime:

- Intelligent analyzer modules allow one to stop monitoring with no effect on the remaining modules
- Power supplies are redundant
- Pumps are redundant
- The system powers up in the same state as when powered down
- Filters, Chemcassettes® and major components in one of the analyzers can be replaced while the remaining analyzers continue to function

Operation can be through an LCD touch screen or through a local area network (LAN).

Chemcassette® is a registered trademark of Honeywell Analytics, Inc.

### 1.1.1 Manufacturer

The Vertex System is manufactured by:
Honeywell Analytics Inc.
405 Barclay Boulevard
Lincolnshire, IL 60069 USA
www.honeywellanalytics.com

### 1.1.2 General Safety

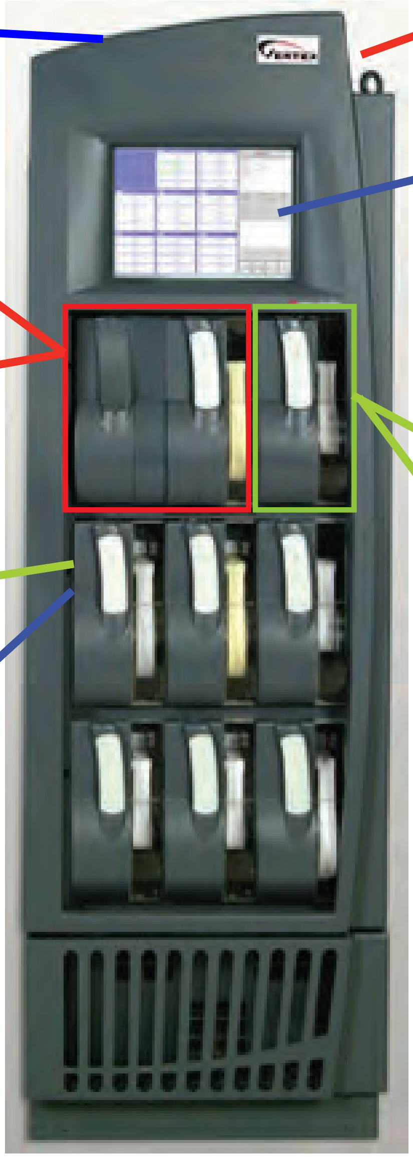
Follow all installation and operational instructions to ensure the safe and reliable operation of this unit.

If this monitor is used in a manner not specified by Honeywell Analytics Inc., the protection provided by the equipment may be impaired.

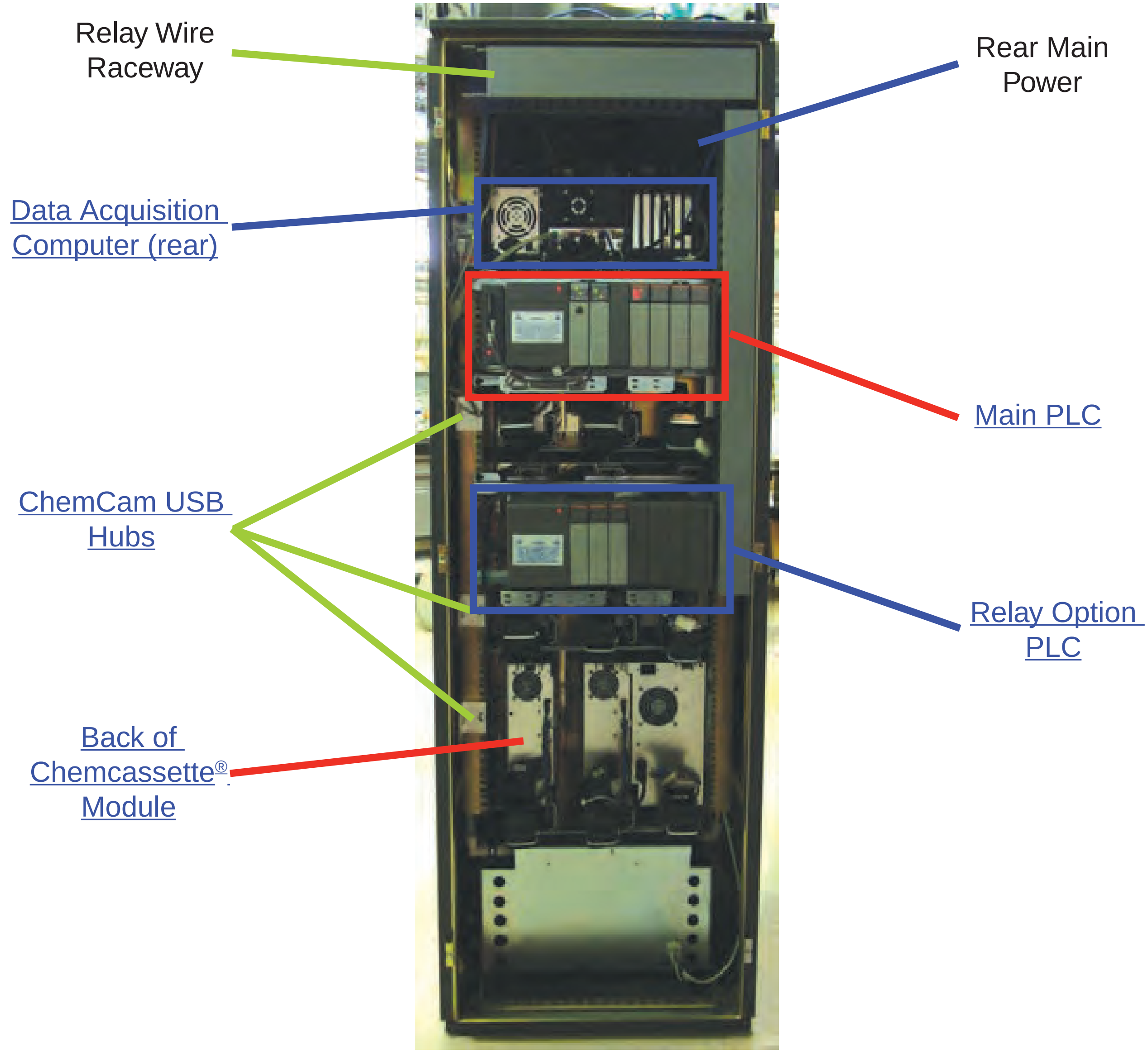
## 1.2 System Components

The following photos illustrate Vertex System components, ports, connections and controls. From the main front and back photos, click on the labels to see the detail photos.

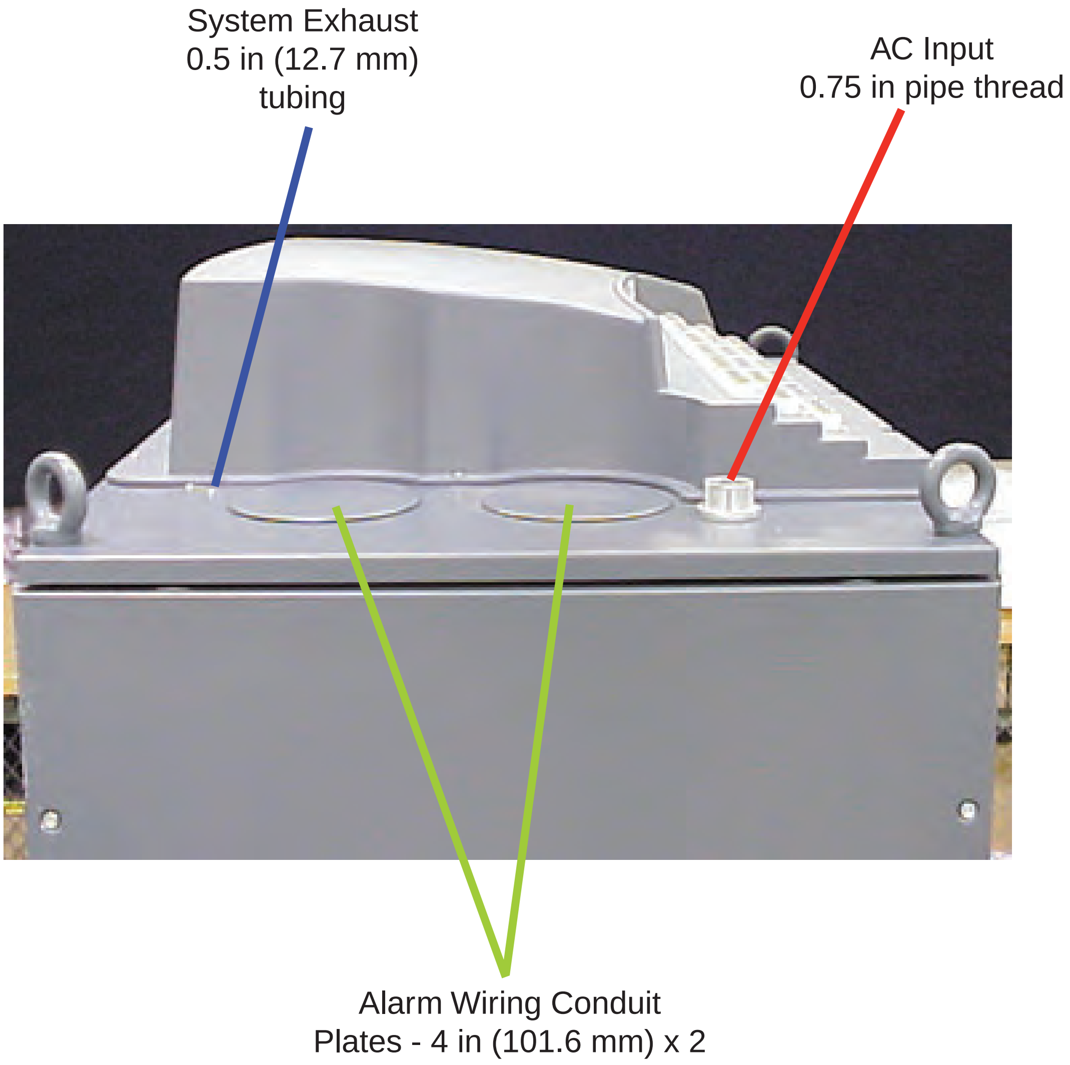
## 1.2.1 Vertex Front


Sample Tubing Connections (detail)
Exhaust and Wiring Ports
System Controls (behind screen)
Pyrolyzer Analyzer
Module Front Door Closed (detail)
Universal Chemcassette® Analyzer
Analyzer Side Panel (exterior)
Analyzer Front
Analyzer Side Panel (interior)

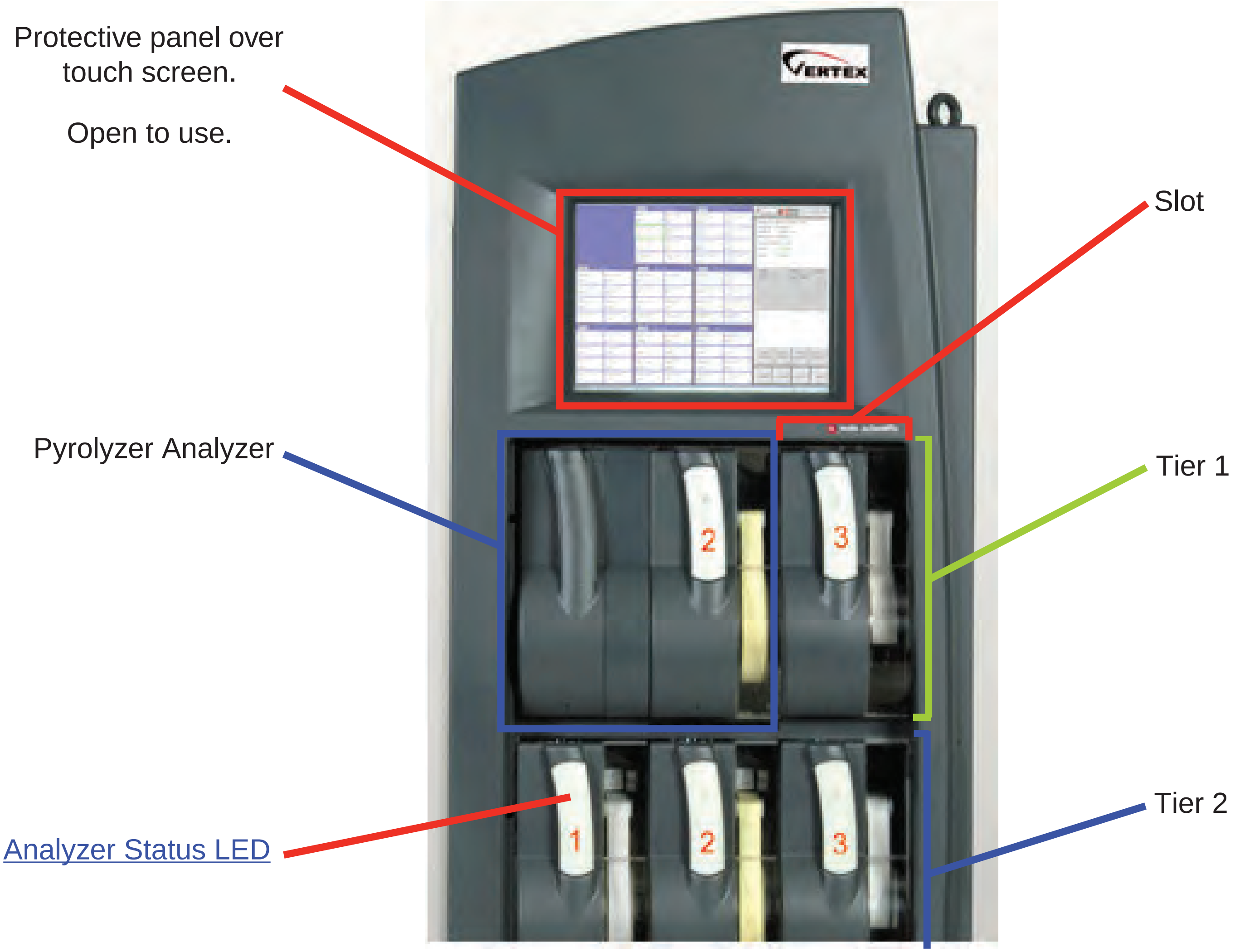
## 1.2.2 Vertex Back


Relay Wire Raceway
Rear Main Power
Data Acquisition Computer (rear)
Main PLC
ChemCam USB Hubs
Relay Option PLC
Back of Chemcassette® Module

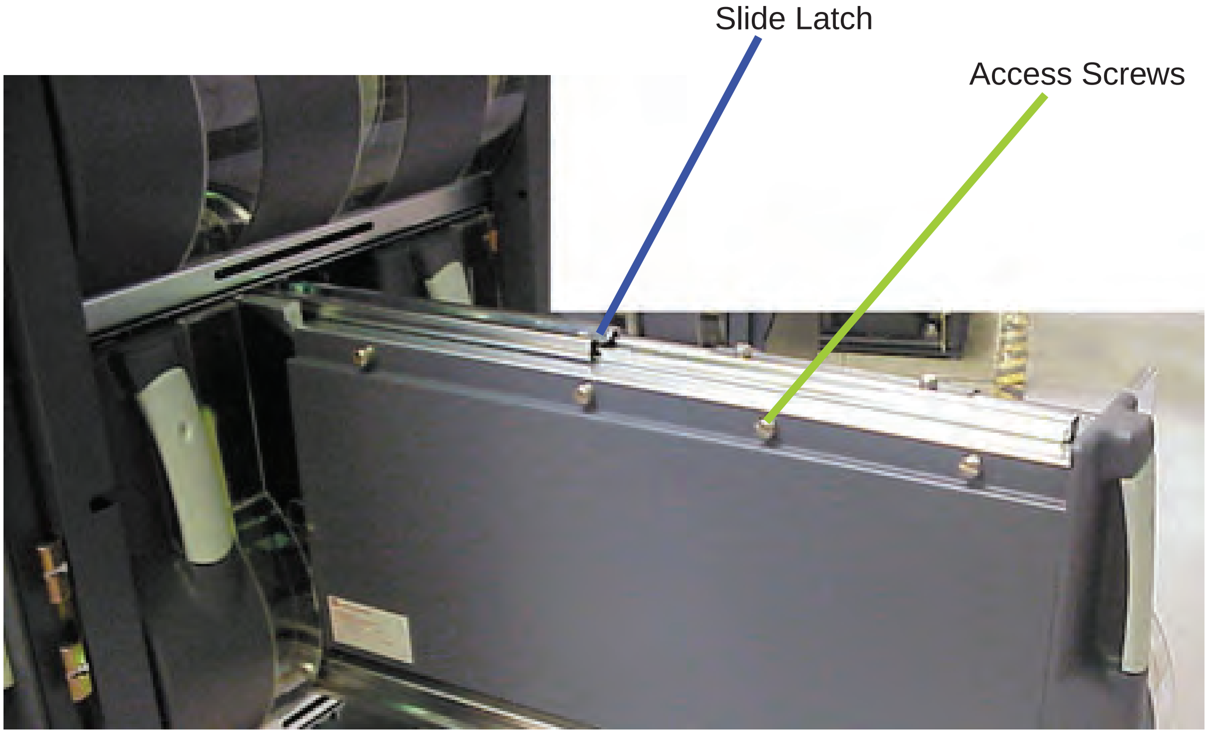
## 1.2.3 Exhaust and Wiring Ports


System Exhaust
0.5 in (12.7 mm)
tubing
AC Input
0.75 in pipe thread
Alarm Wiring Conduit
Plates - 4 in (101.6 mm) x 2

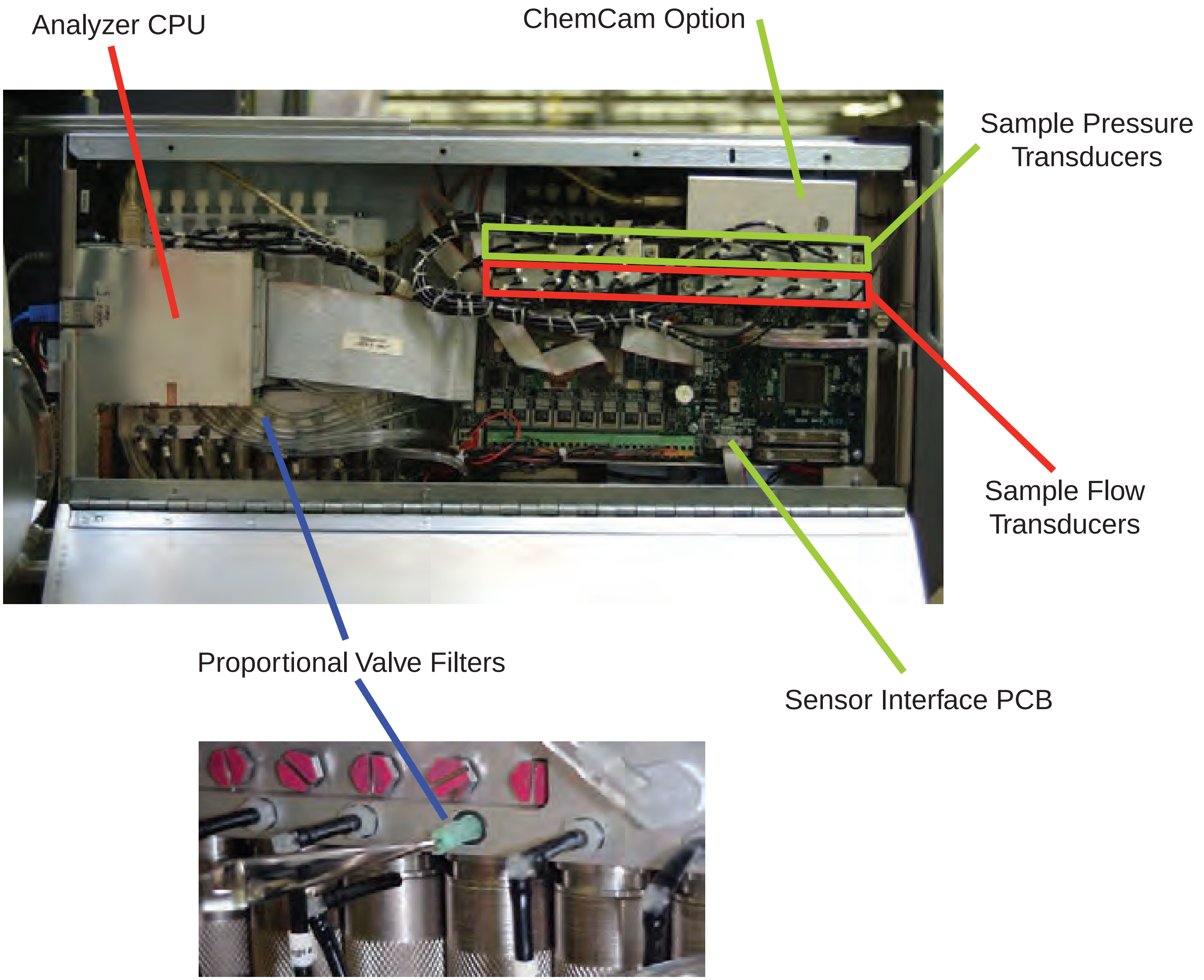
## 1.2.4 Module Front - Door Closed


Protective panel over touch screen.
Open to use.
Pyrolyzer Analyzer
Analyzer Status LED
Slot
Tier 1
Tier 2
VERTEX
1
2
3

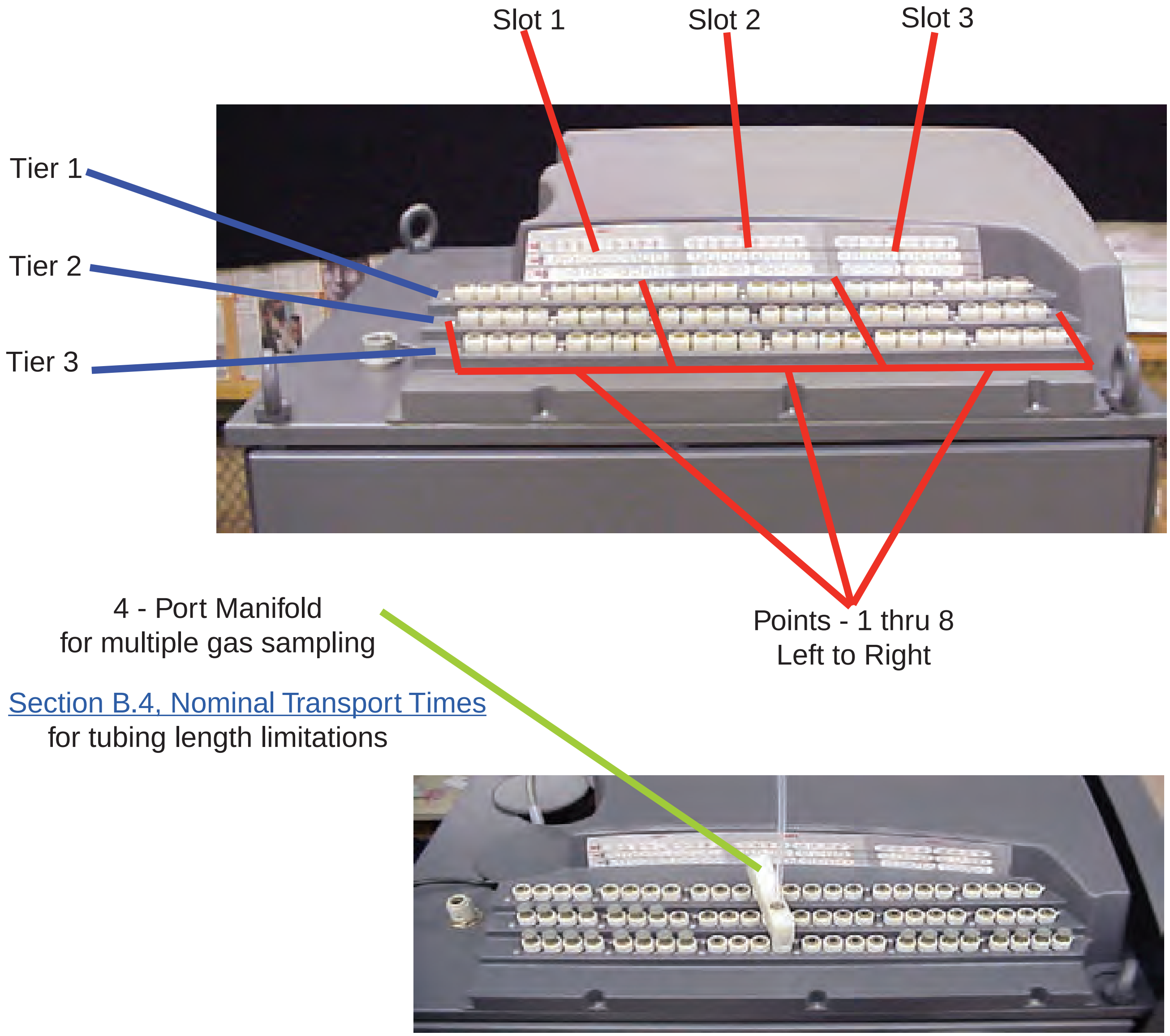
## 1.2.5 Analyzer Side Panel (exterior)


Slide Latch
Access Screws

## 1.2.6 Analyzer Side Panel (interior)


Analyzer CPU
ChemCam Option
Sample Pressure Transducers
Sample Flow Transducers
Proportional Valve Filters
Sensor Interface PCB

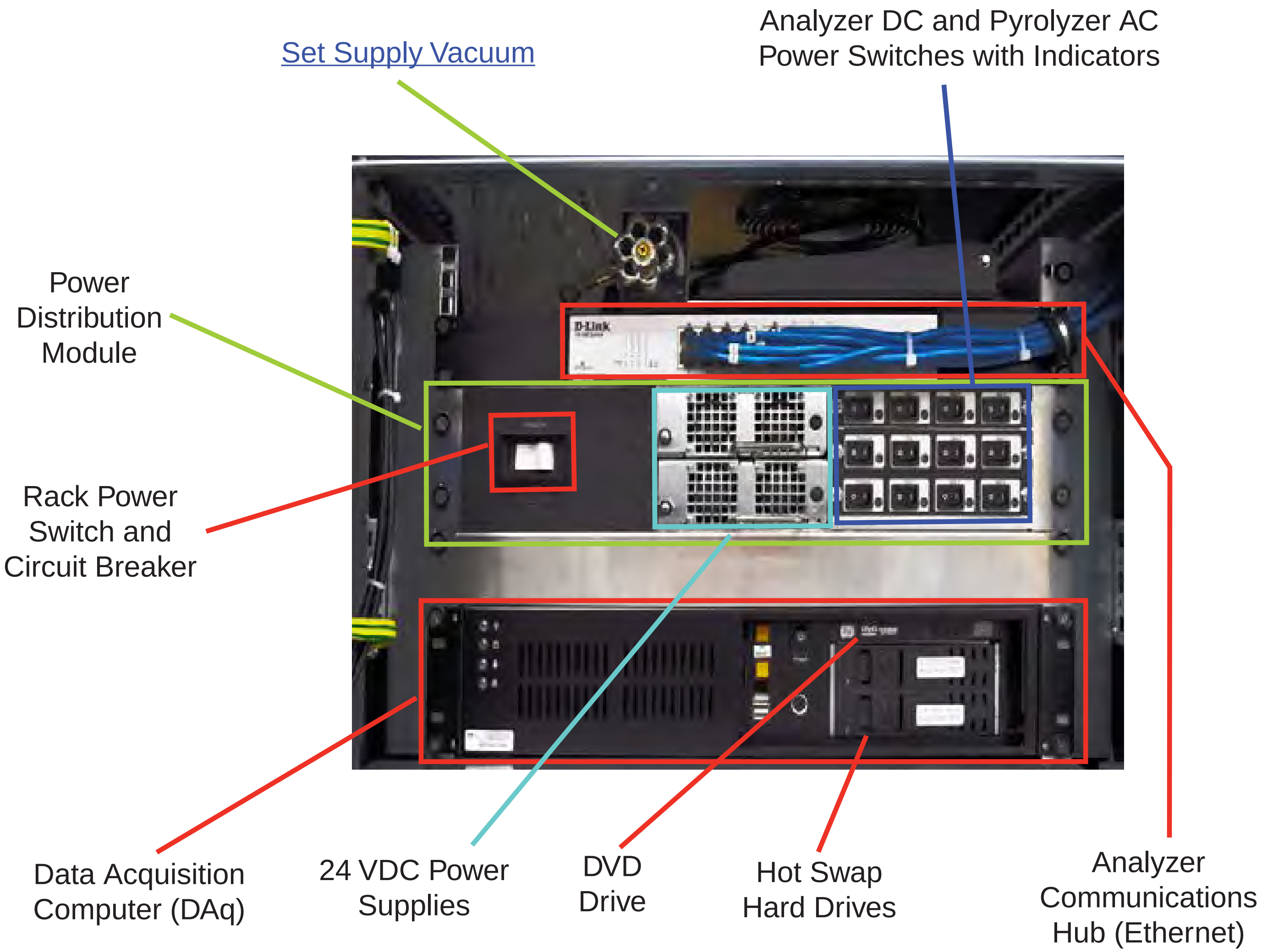
## 1.2.7 Sample Tubing Connections (detail)


Slot 1
Slot 2
Slot 3
Tier 1
Tier 2
Tier 3
Points - 1 thru 8
Left to Right
4 - Port Manifold
for multiple gas sampling

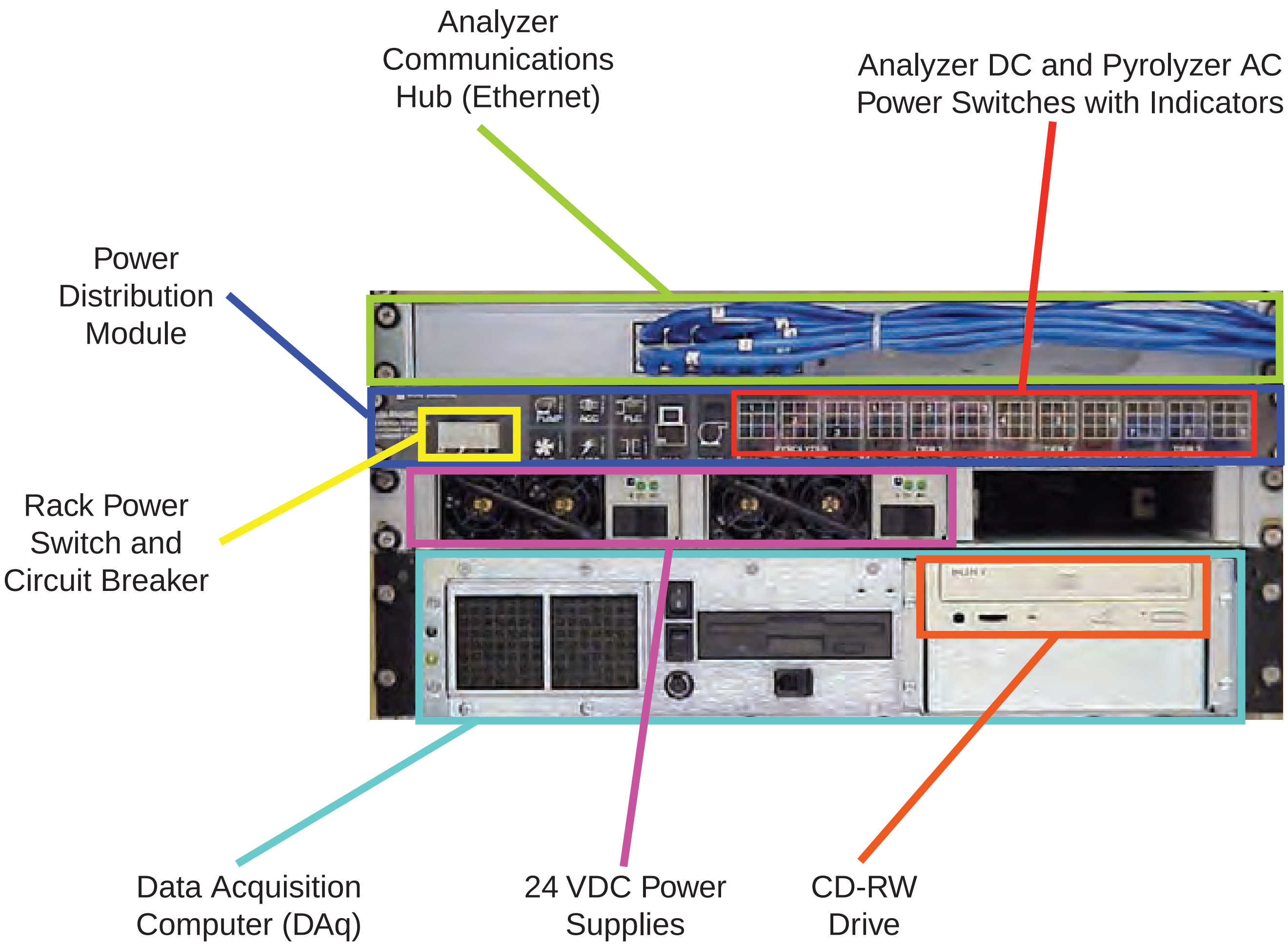
See Section B.4, Nominal Transport Times
for tubing length limitations

## 1.2.8 System Controls (behind screen)

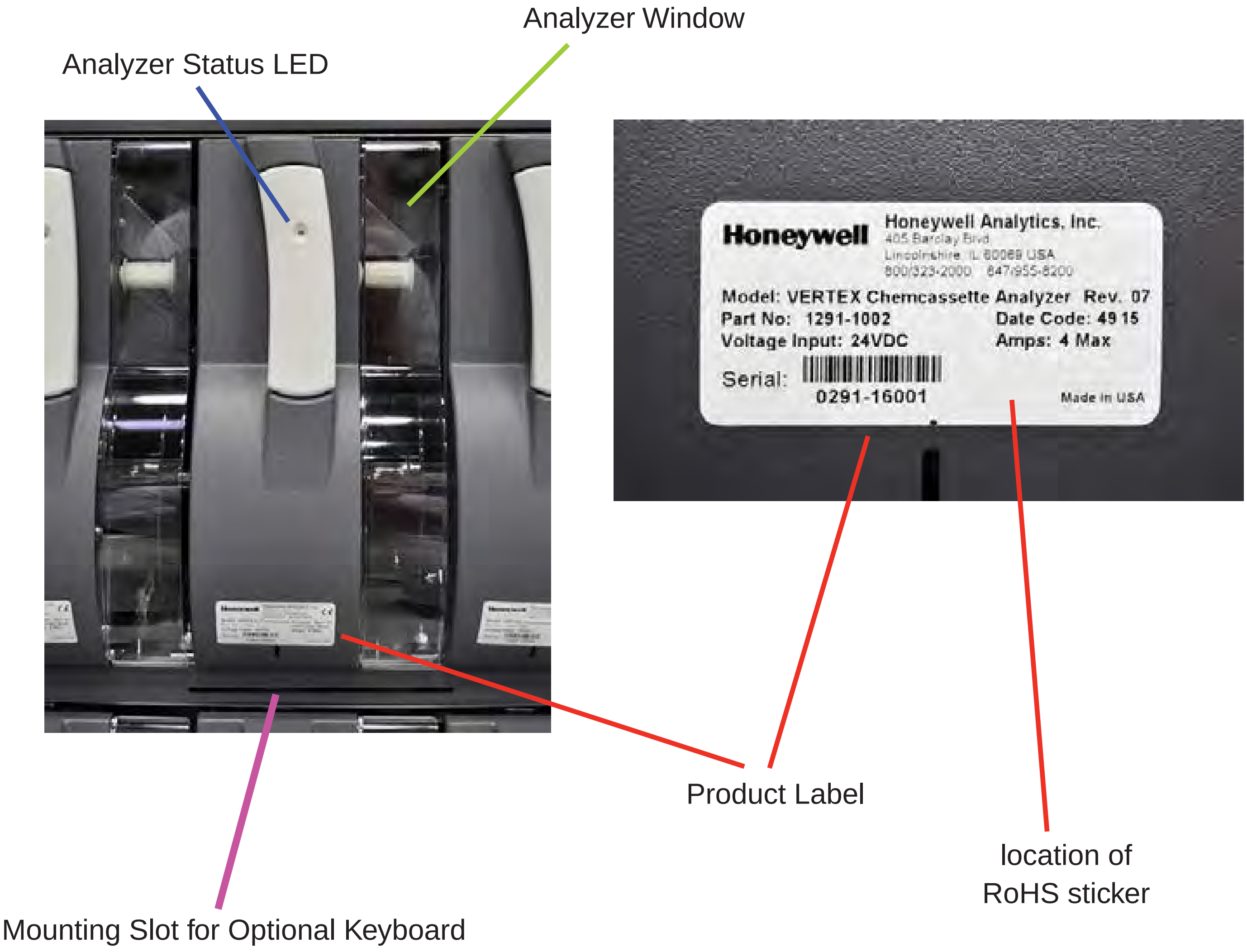
Series 2 Units


Set Supply Vacuum
Analyzer DC and Pyrolyzer AC Power Switches with Indicators
Power Distribution Module
Rack Power Switch and Circuit Breaker
Data Acquisition Computer (DAq)
24 VDC Power Supplies
DVD Drive
Hot Swap Hard Drives
Analyzer Communications Hub (Ethernet)

Series 1 Units


Analyzer Communications Hub (Ethernet)
Analyzer DC and Pyrolyzer AC Power Switches with Indicators
Power Distribution Module
Rack Power Switch and Circuit Breaker
Data Acquisition Computer (DAq)
24 VDC Power Supplies
CD-RW Drive

## 1.2.9 Analyzer Front


Analyzer Window
Analyzer Status LED
Product Label
location of RoHS sticker
Mounting Slot for Optional Keyboard

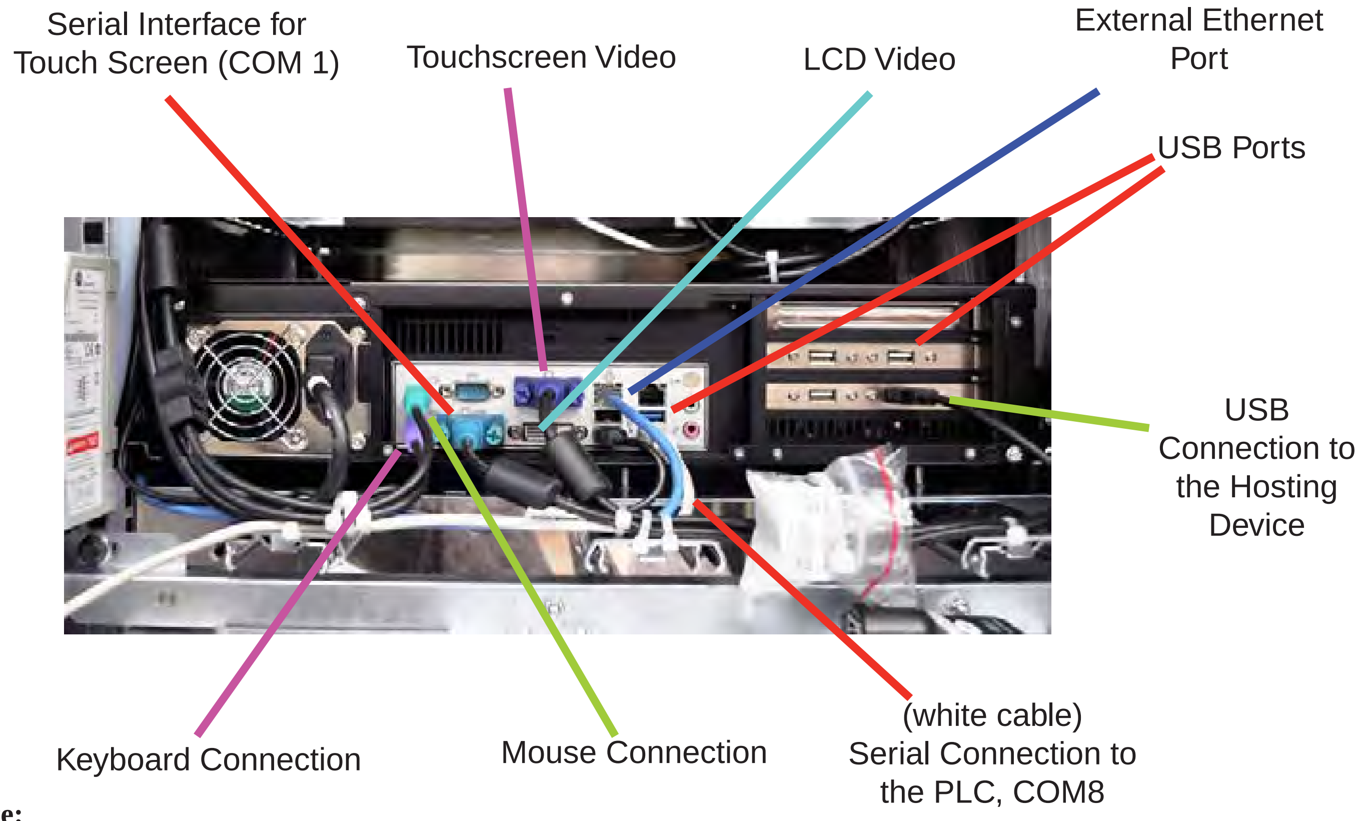
Honeywell

Honeywell Analytics, Inc.
405 Barclay Blvd
Lincolnshire, IL 60069 USA
800/323-2000 847/955-8200

Model: VERTEX Chemcassette Analyzer Rev. 07
Part No: 1291-1002 Date Code: 49 15
Voltage Input: 24VDC Amps: 4 Max
Serial: 0291-16001
Made in USA

## 1.2.10 Data Acquisition Computer (rear)

Series 2 Units


Serial Interface for Touch Screen (COM 1)
Touchscreen Video
LCD Video
External Ethernet Port
USB Ports
USB Connection to the Hosting Device
Keyboard Connection
Mouse Connection
(white cable) Serial Connection to the PLC, COM8

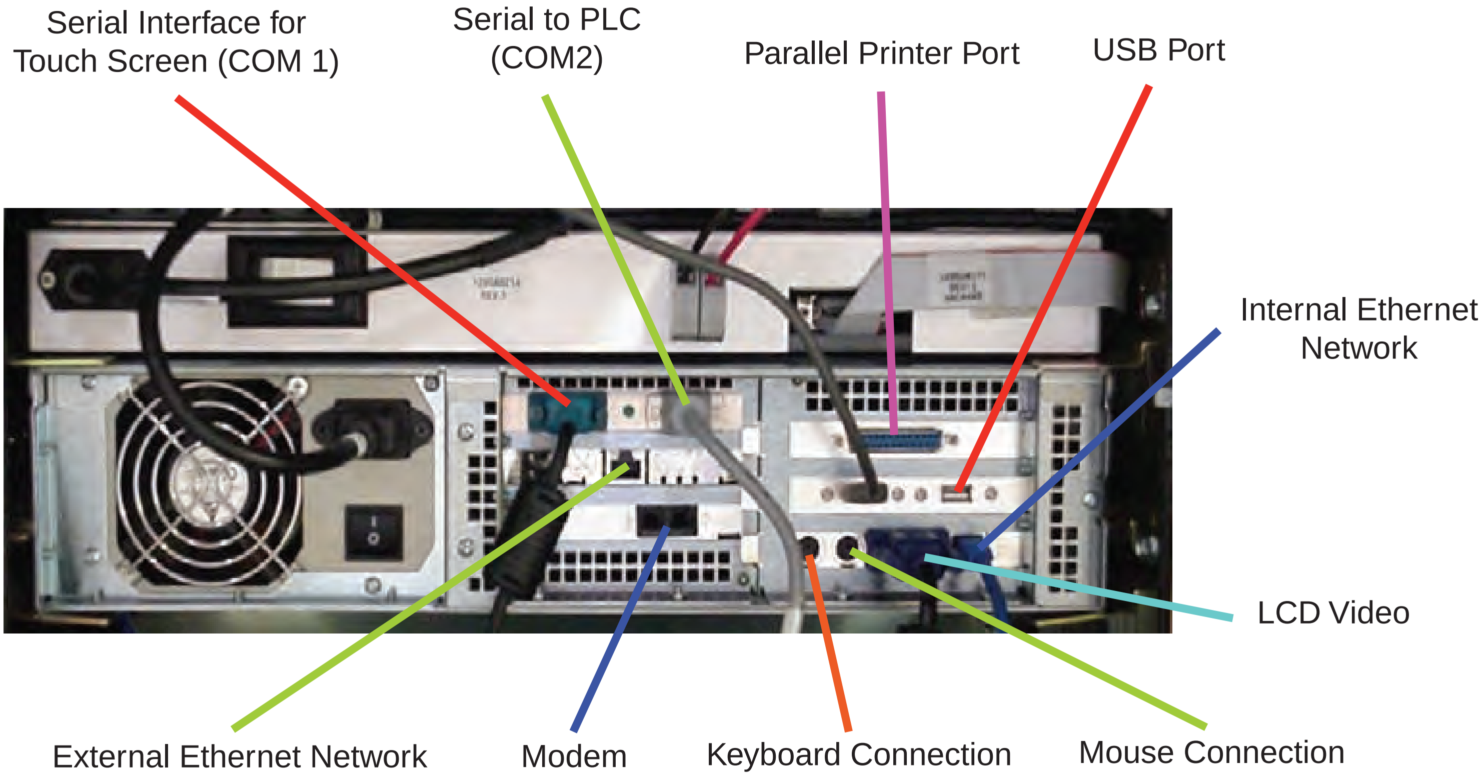
**Note:**

This photo shows a typical port configuration. Port and slot locations on your monitor may vary.

**Caution:**

Restrict access to the USB port to reduce the risk of malicious software being introduced.

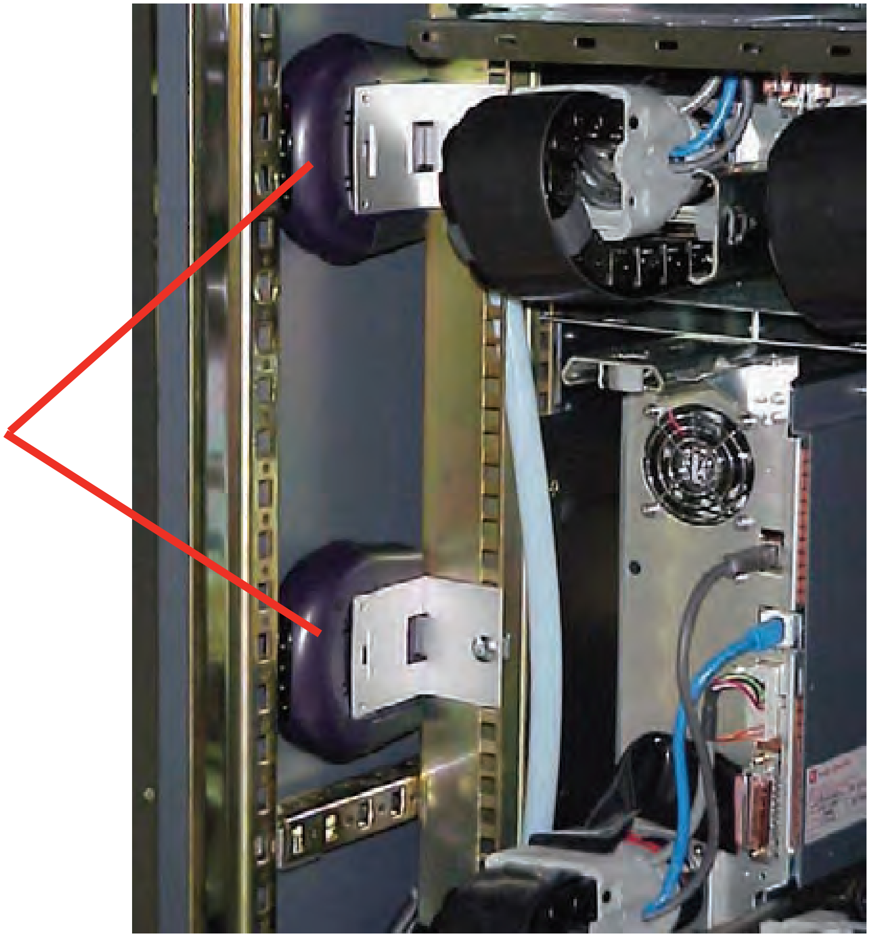
## Series 1 Units


Serial Interface for Touch Screen (COM 1)
Serial to PLC (COM2)
Parallel Printer Port
USB Port
Internal Ethernet Network
LCD Video
External Ethernet Network
Modem
Keyboard Connection
Mouse Connection

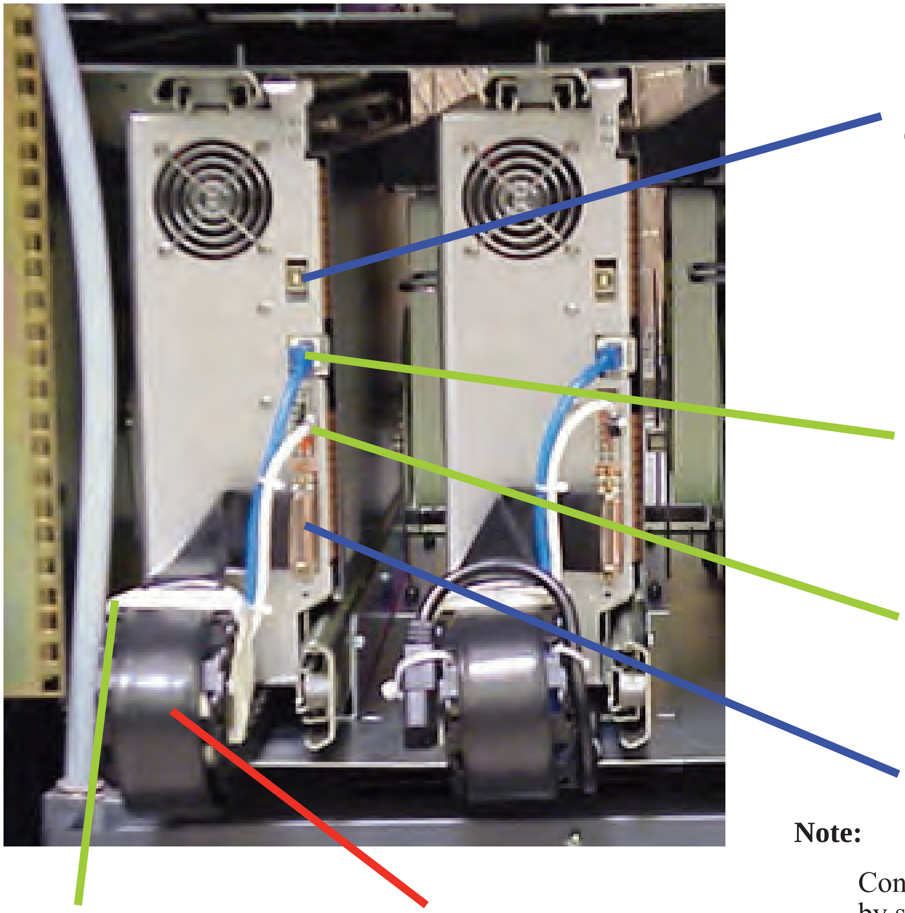
**Note:**

This photo shows a typical port configuration.
Port and slot locations on your monitor may vary.

## 1.2.11 ChemCam USB Hub


ChemCam
USB Hubs
(3)

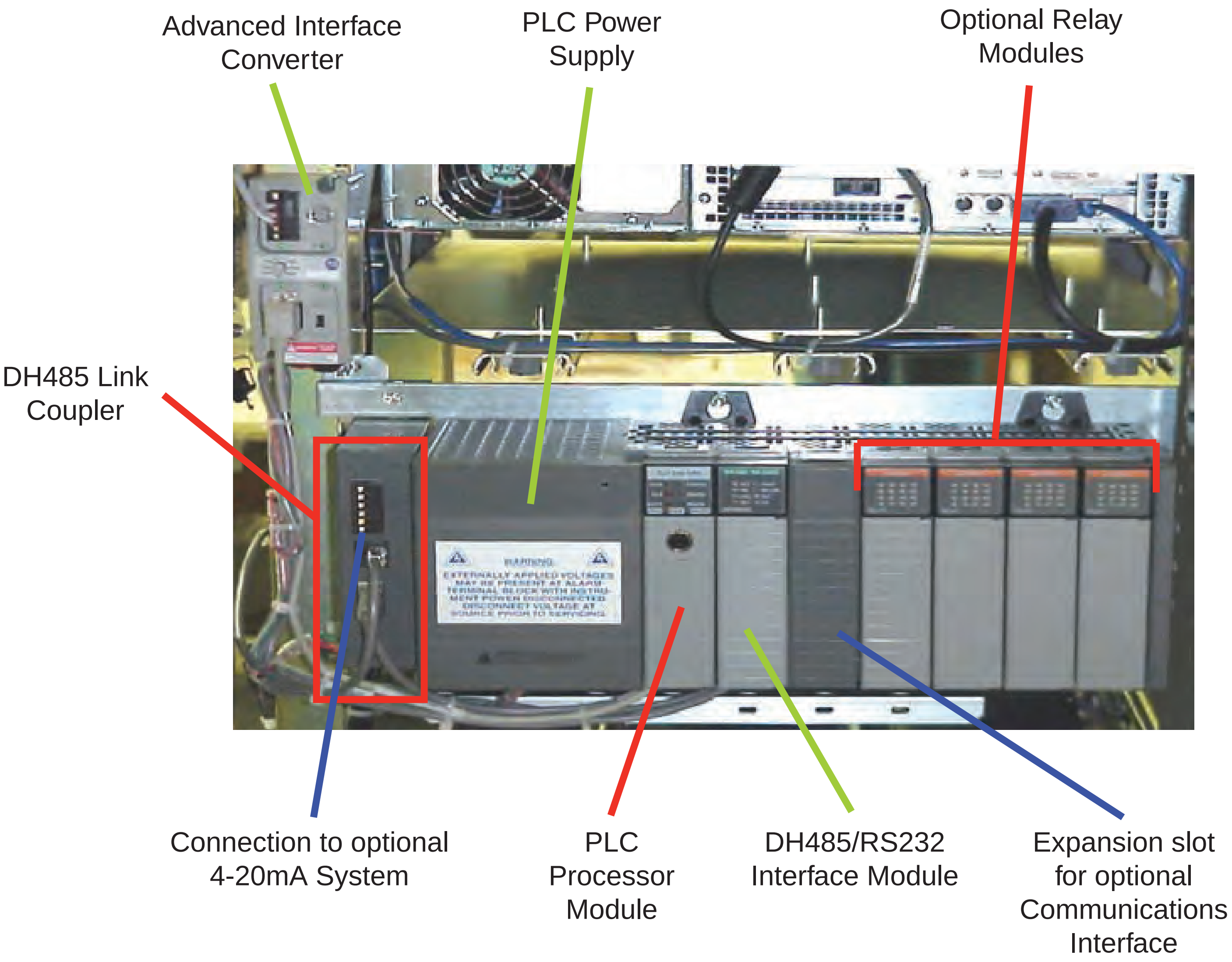
## 1.2.12 Back of Chemcassette® Module


ChemCam USB Connection (option)
Analyzer Communications (Ethernet)
Analyzer 24V Power Supply
Multifunction Connector
Circular Tubing Harness
Cable Carrier

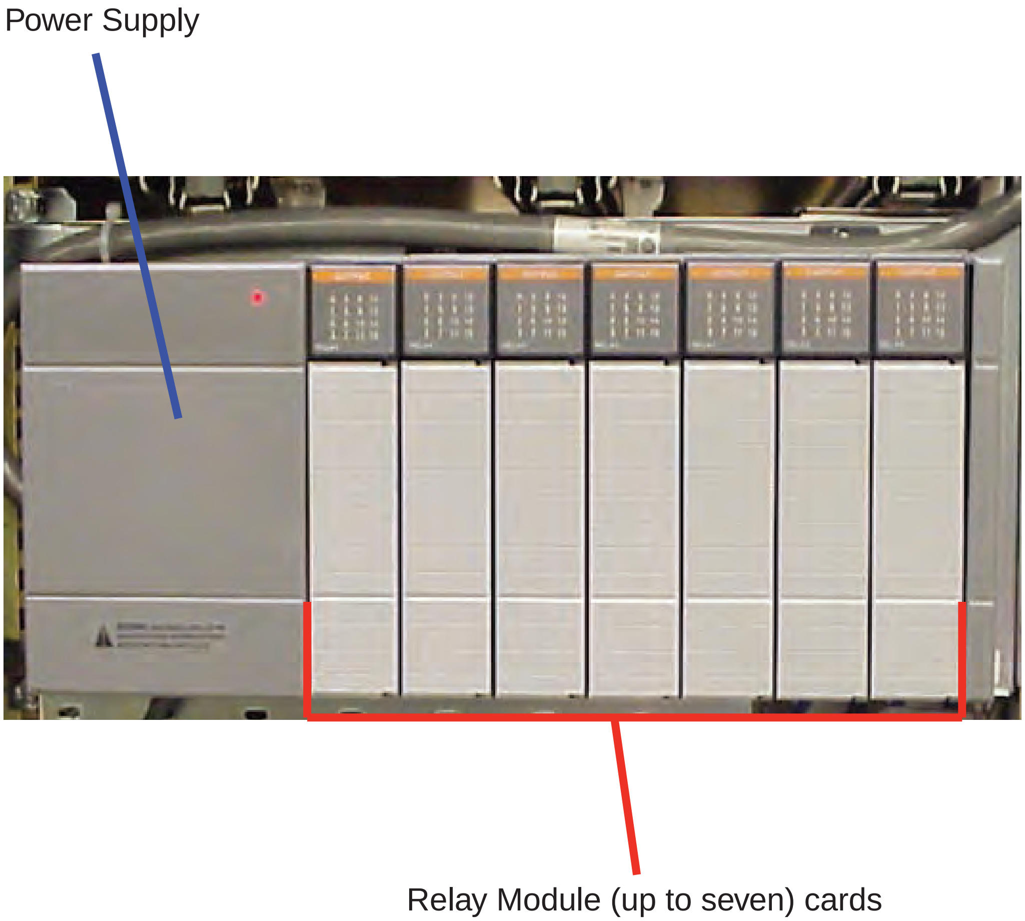
**Note:**

Connection secured by slide latch. Push up to open. Push down to close.

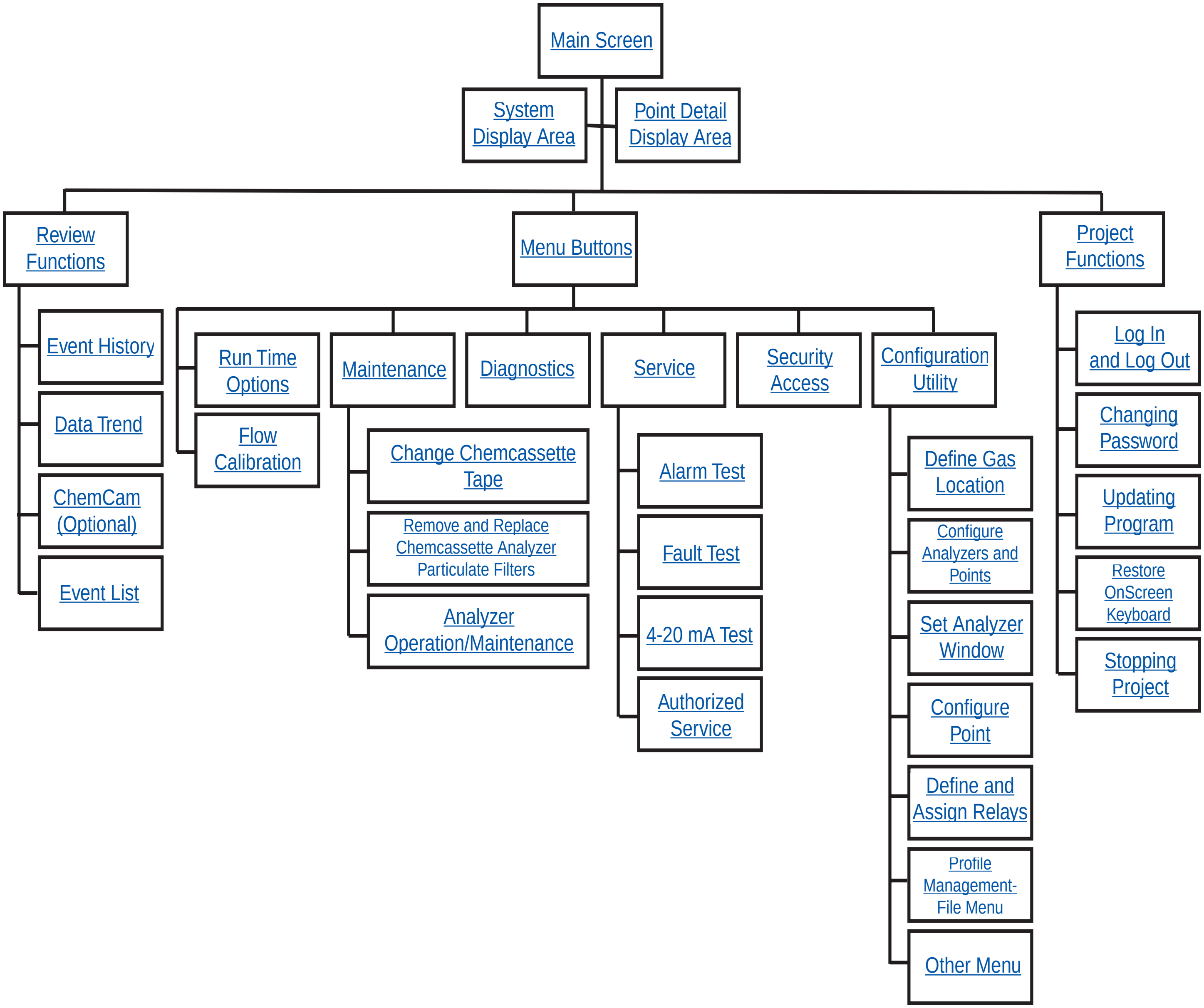
## 1.2.13 Main PLC


Advanced Interface Converter
PLC Power Supply
Optional Relay Modules
DH485 Link Coupler
Connection to optional 4-20mA System
PLC Processor Module
DH485/RS232 Interface Module
Expansion slot for optional Communications Interface

### 1.2.14 Relay Option PLC


Power Supply
Relay Module (up to seven) cards

## 1.3 Menu Map


Main Screen
System Display Area
Point Detail Display Area
Review Functions
Menu Buttons
Project Functions
Event History
Data Trend
ChemCam (Optional)
Event List
Run Time Options
Flow Calibration
Maintenance
Change Chemcassette Tape
Remove and Replace Chemcassette Analyzer Particulate Filters
Analyzer Operation/Maintenance
Diagnostics
Service
Alarm Test
Fault Test
4-20 mA Test
Authorized Service
Security Access
Configuration Utility
Define Gas Location
Configure Analyzers and Points
Set Analyzer Window
Configure Point
Define and Assign Relays
Profile Management-File Menu
Other Menu
Log In and Log Out
Changing Password
Updating Program
Restore OnScreen Keyboard
Stopping Project

## 1.4 Analyzer Modules

The Vertex System is populated with one or more types of analyzer modules. Each system may contain Chemcassette® modules or Pyrolyzer modules. Modules are installed in slots on one of three tiers. Each tier includes three slots for a total of nine slots in a Vertex System.

| | | | |
|---|---|---|---|
| Tier 1 | CC | CC | CC |
| | PYRO | | |
| Tier 2 | CC | CC | CC |
| | PYRO | | |
| Tier 3 | CC | CC | CC |
| | PYRO | | |
| | Slot 1 | Slot 2 | Slot 3 |

**Table 1-1: Module Tier Structure**

Chemcassette® modules occupy one slot each. However, Pyrolyzer Chemcassette® modules are to be installed in slots 1 and 2. Pyrolyzer configuration and status information will appear in slot 2.

| | Number of Points | Installed into Slots | Total Possible per Vertex System |
|---|---|---|---|
| Chemcassette® | 8 | 1, 2 or 3 | 9 |
| Pyrolyzer | 8 | 1 and 2 Only | 3 |

**Table 1-2: Required Slots**

Examples of possible combinations in a Vertex System:

- Nine Chemcassette® modules
- Three Chemcassette® modules, three pyrolyzer Chemcassette® modules

Your monitor will include only those modules specified at time of ordering.

## 1.5 Sampling System

Each Analyzer module is a monitoring center for sampling lines from sample locations. As they apply to the Vertex System, the words point, line and location require definition:

- A location is a place to be monitored
- Sample atmosphere runs from the location to the Vertex System via a line
- Each of the 72 sample tubing connections on the Vertex System corresponds to a point. A sample line can be connected directly to a single point or multiple points via a 4-port manifold

The system draws air simultaneously from all locations. Two different types of flow are:

- Transport flow: high-velocity, large-volume air movement through the lines
- Sample flow: air admitted to the Chemcassette® detection system

The high speed of transport flow allows rapid monitoring and response time when using long lines from monitored locations to the Vertex System. A small portion of the transport flow (sample flow) is analyzed to determine concentration levels.

The complete sampling and monitoring system consists of the following components:

- Sample lines to all monitored locations
- Flow connections through quick-connect ports in bulkheads on top of unit
- Moving cable and connectors
- Vacuum pumps
- Analyzers incorporating manifolds, Chemcassette® and filters
- Flow controlling proportional valve
- Top exhaust port

There are 72 inlets, one for each monitored location. One exhaust port is also located on top of the Vertex cabinet.

## 1.6 Chemcassette® Detection System

The Chemcassette® Analyzer module is a self-contained, microprocessor controlled analyzer that occupies one slot in a Vertex tier. Sample lines and the vacuum source are connected to the Chemcassette® via a single 10-tube connector.

The system powers up in the same state as when powered down. Data is stored in the module's memory until the data acquisition computer retrieves it.

The Vertex Analyzer modules use the Honeywell Analytics' Chemcassette® optical detection system. Analyzer modules sample and detect a specific gas or family of gases.

- Each eight-point Analyzer module:
- Manages Chemcassette® tape transport
- Provides optical detection of stain
- Directs sample flow through the Chemcassette®
- Stores data for retrieval by the data acquisition computer

Components of the detection system include:

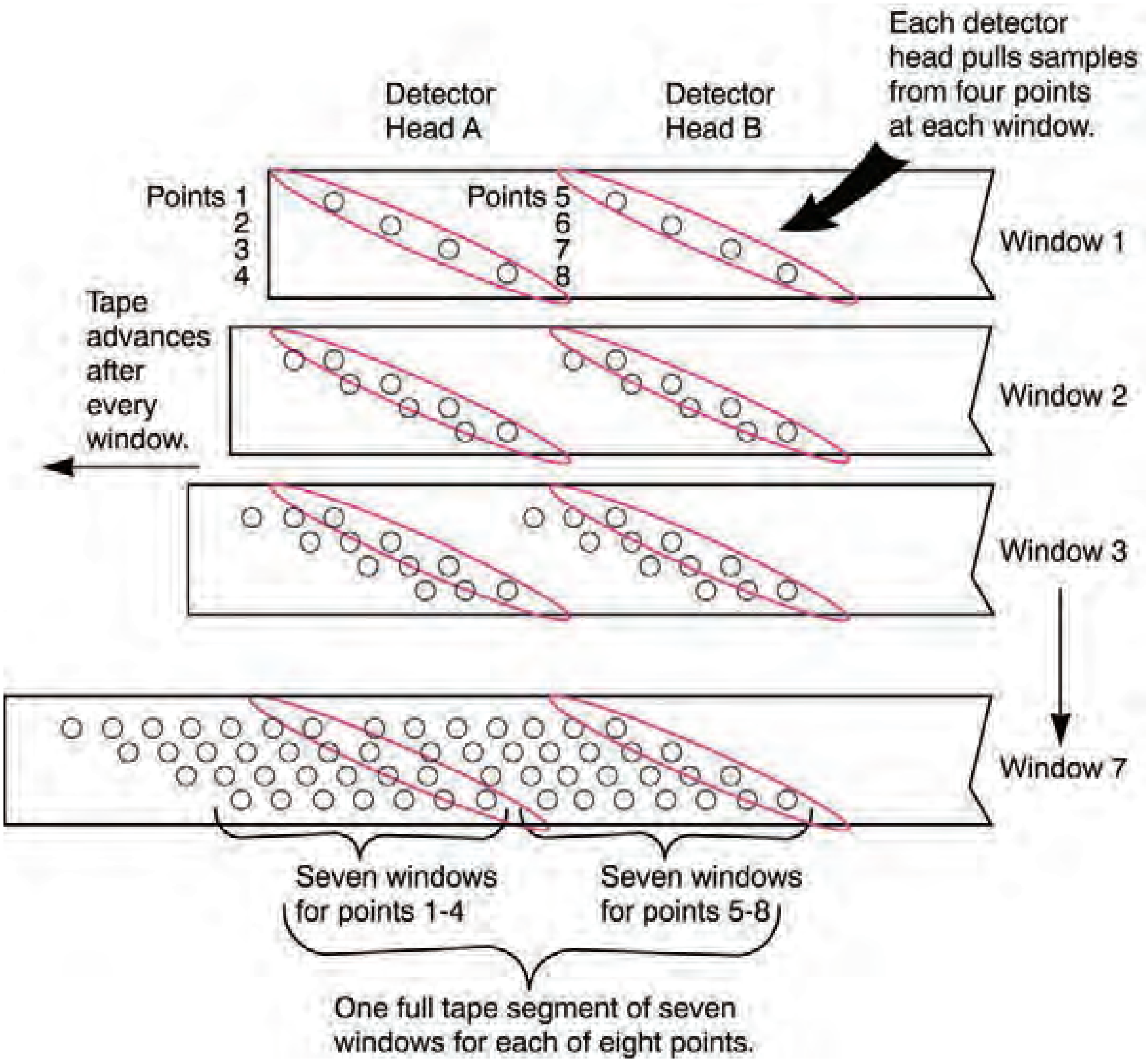
- Chemcassette® detection tape
- Optics and electronics for the detection system
- Chemcassette® tape transport mechanism
- Self adjusting proportional valves

### 1.6.1 Detector Optics

The heart of the Chemcassette® module is an optical detection system that measures a stain that develops on the Chemcassette® tape in the presence of a target gas. Each eight-point Analyzer module has two detection heads, each with four individual detectors.

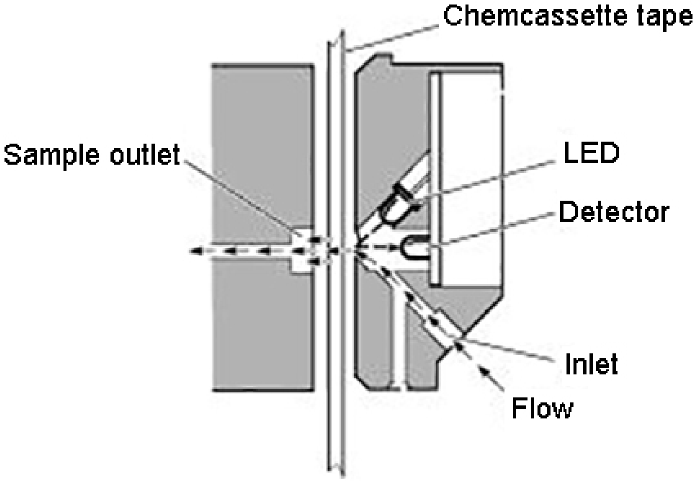
### 1.6.2 Stain Pattern

The following chart shows the stain pattern of sample detection on the Chemcassette® tape.

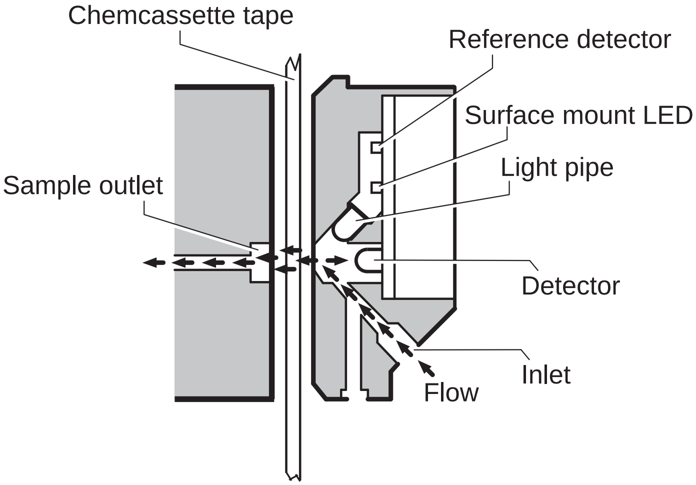

Detector Head A
Detector Head B
Each detector head pulls samples from four points at each window.
Points 1 2 3 4
Points 5 6 7 8
Window 1
Tape advances after every window.
Window 2
Window 3
Window 7
Seven windows for points 1-4
Seven windows for points 5-8
One full tape segment of seven windows for each of eight points.

When monitoring a location, the system detects and measures a specific gas or a family of gases in the sample. The microprocessor in the analyzer module interprets the data and responds appropriately.

In the legacy detection system, the sample enters the inlet and passes through the Chemcassette tape to the sample outlet. The target gas in the sample flow reacts with the tape and produces a stain density proportional to the gas concentration. An LED in the detector head illuminates the sample stain and the detector then optically measures the stain.


Chemcassette tape
Sample outlet
LED
Detector
Inlet
Flow

**Legacy Detection System**


Chemcassette tape
Reference detector
Surface mount LED
Light pipe
Sample outlet
Detector
Inlet
Flow

**CLO Detection System**

In the Closed Loop Optics (CLO) detection system, a reference detector monitors and controls the intensity of the LED.

The microprocessor in the Chemcassette analyzer module interprets the stain. It then calculates and stores a precise concentration level in the module's memory. Gas concentrations are reported in parts-per-million (ppm), parts-per-billion (ppb) or milligrams-per-cubic-meter (mg/m$^3$).

## 1.6.3 Chemcassette® Tapes

Chemcassette® tapes are tagged with a radio frequency identification (RFID) tag to automatically identify the following:

- Serial number
- Gas family/ tape type
- Revision level
- Expiration date of the tape
- Chemcassette® leader parameters

The module uses a leader on the Chemcassette® tape to allow calibration of the optics every time a new tape is installed. This feature can be bypassed.

## 1.6.4 Optional ChemCam

The ChemCam is a small video camera located between the take-up reel and the optic head on the module. It provides a means to observe alarm level stains.1.6.5 Sample Filters

The Chemcassette® module includes three types of filters in the sample flow system. Particulate filters protect the internal precision orifice from dust particles. An acid filter is used on the common line to the pumps. Both types of filters are located in a removable filter block on the side of the Chemcassette® module. An internal particulate filter protects each proportional valve.

## 1.6.6 Cooling Fans and Filters

Series 1 Analyzers had two fans and one filter. All Series 2 analyzers have one fan and no filter.

## 1.7 Pyrolyzer Module Detection System

The pyrolyzer module is similar to the standard Chemcassette® module except that it detects nitrogen trifluoride (NF3). The sample passes through a high temperature heater (pyrolyzer) which converts the $NF_3$ to hydrogen fluoride (HF). The hydrogen fluoride is then detected with a standard or XPV mineral acids Chemcassette® tape. Detection is identical to the Chemcassette® module.

The correlation algorithm between HF and $NF_3$ is programmed into the module so the monitor displays the $NF_3$ concentration.

The Vertex pyrolyzer module detects $NF_3$ only and cannot be bypassed to detect mineral acids.

The right filter compartment houses eight particulate filters and one acid scrubber, which are identical to the standard Chemcassette® filters. The left filter compartment houses eight charcoal filters which remove the following compounds:

Freon 12
Freon 13
Freon 21
Freon 113
Freon 114
Freon 116
HF
HCl
$Cl_2$

Freon® is a registered trademark of E.I. du Pont de Nemours & Company (DuPont).

The charcoal filters may also remove other compounds. Contact Honeywell Analytics for a complete list. Charcoal filters have a part number (P/N 1874-0139) unique to the pyrolyzer module.

The Vertex Pyrolyzer requires two adjacent slots on one tier and always occupies Slot 1 and 2. The bottom rail and latch must be removed from slot 1 to install pyrolyzer.

### 1.7.1 Pyrolyzer Fan

The Pyrolyzer has a fan that provides cooling to the pyrolyzer.

**Note:**

> Series 2 Pyrolyzer Analyzers (P/N 1291-2002) have a 230V pyrolyzer which is not compatible with Series 1 rack systems (enclosures P/N 1290-0300 and 1290-0302). Series 1 Pyrolyzer Analyzers (P/N 1291-2000) were 120V. These are compatible with the Series 2 rack systems (1290-0019).

## 1.8 Vacuum Pumps

Two field-replaceable pumps provide a redundant vacuum source for the transport and sample flow system. One pump in the system draws vacuum while the other is idle. The pump exhaust connects to the manufacturing facility central toxic exhaust system.

**Note:**

> The exhaust line from the Vertex should not exceed 50 feet.

The pumps are located in the bottom of the Vertex System cabinet inside a sound-deadening enclosure to reduce noise. Three cooling fans circulate air over the pumps.

The Vertex System draws cooling air in through a filter mounted on the pump module access door.

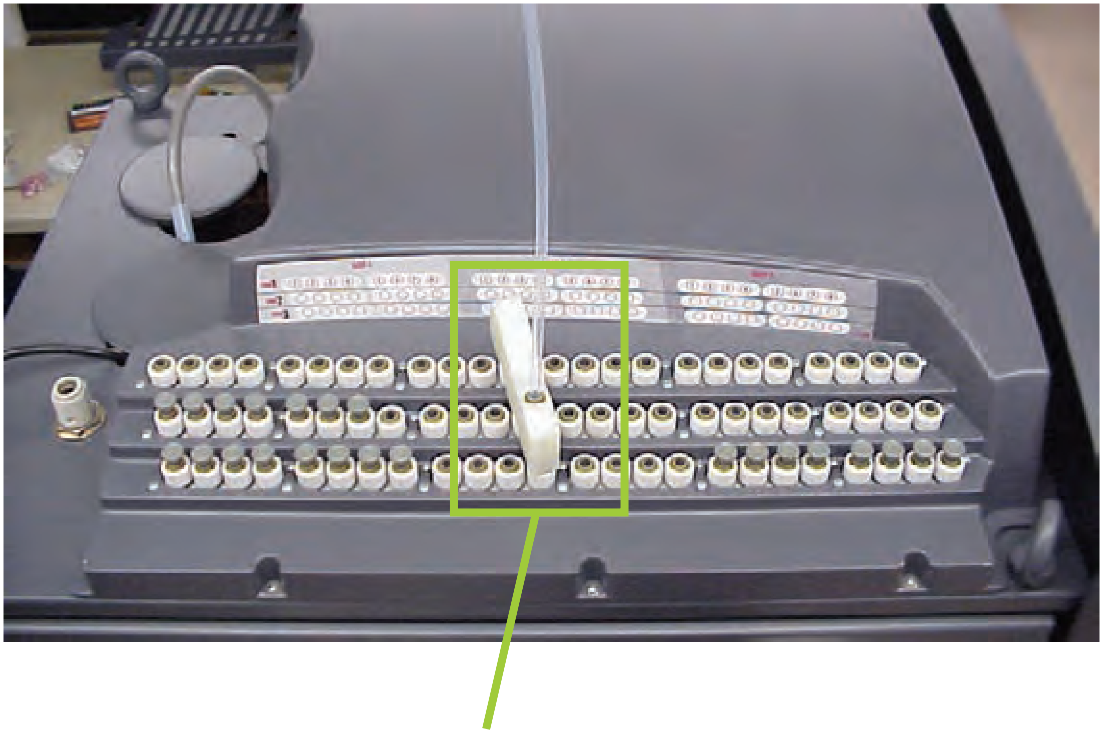
### Pump Status Indicator

See Pump Status Indicator under Section 4.3.1 System Display Area

## 1.9 Multiple Gas Monitoring

A Vertex System equipped with two or more types of Analyzer modules can monitor more than one gas (or groups of gases such as hydrides or mineral acids) at a location.

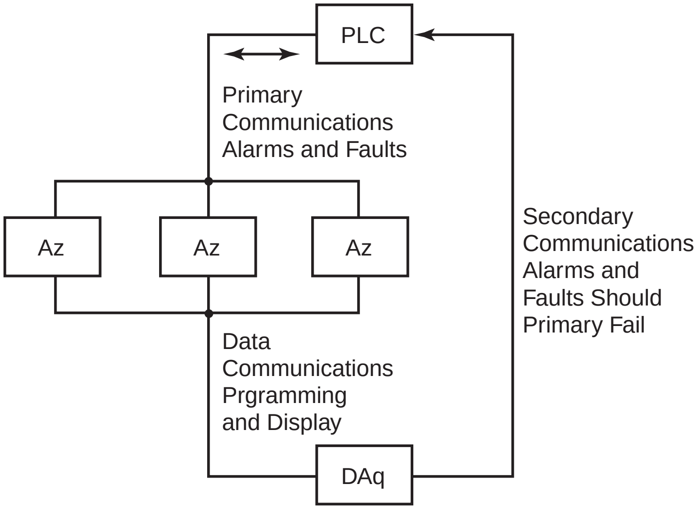
Each Vertex Analyzer module can monitor only one gas family (such as hydrides or mineral acids).



Optional Four-port manifold for multiple-gas monitoring.

# 1.10 Control System

The Vertex control system is a redundant system consisting of a central data acquisition computer (DAq), a programmable logic controller (PLC) and one or more analyzer modules.


PLC
Primary
Communications
Alarms and Faults
Az
Az
Az
Secondary
Communications
Alarms and
Faults Should
Primary Fail
Data
Communications
Prgramming
and Display
DAq

**Communications Path**

Above is a simplified block diagram of the communications path of the control system. The analyzer modules and PLC are microprocessor controlled and contain non-volatile memory.

## 1.10.1 Data Acquisition Computer

The data acquisition computer (DAq) is the central processor for the Vertex System. It configures the analyzers, stores data and provides a network interface for data transfer to other computers.

System display and operator control is through an on-screen keyboard or an optional external keyboard.

⚠ **CAUTION**

**OPC on TCP/IP via Ethernet not recommended for alarm annunciation.**

## 1.10.2 Programmable Logic Controller

The Programmable Logic Controller (PLC) is the control system path between the DAq and the individual analyzers. The PLC polls the analyzers for current information, activates relays which may be connected to external alarms and provides external communications.

# 2 Installation

## 2.1 Introduction

The installation and initial start-up procedure for the Vertex System consists of seven steps, described in this and the following sections:

- 2.2 Surveying the Installation Site
- 2.3 Optional Floor Mounting
- 2.4 Installing Sample Lines / Filters
- 2.5 Installing Pump Exhaust Line
- 2.6 Electrical Power
- 2.7 Data Acquisition System
- 2.8 Wiring Alarm Relays

## 2.2 Surveying the Installation Site

A survey of the site helps you make important decisions before installing your Vertex System. Topics in this section assist you with appropriate placement of the Vertex System and in determining if you have special filtering needs at the sampling location.

The site should:

- Be remote from the monitored location, not sharing the atmosphere
- Have sufficient ventilation for cabinet cooling
- Have power available
- Be indoors in an area that is not subject to wide variations in temperature and humidity.

**Note:**

The specified humidity is 20-65% RH and a temperature between 59°F to 95°F (15°C to 35°C).

**Note:**

Refer to Appendix A, Installation Drawings for lifting/mounting information.

### 2.2.1 Placement of the Vertex System

Install the Vertex System in an environmentally-protected setting remote from the manufacturing or storage locations that it monitors.

You can place the Vertex System up to 400 ft. (122 m) from sample locations.

### 2.2.2 Exposure to Dust and Humidity

Exposure to corrosive gases or materials, excess moisture, dust and other unusual environmental conditions could seriously hamper the unit's monitoring ability and could cause damage to it.

Allow room around the Vertex System for ventilation and servicing.

### 2.2.3 Sample Transport Time

Install the Vertex System central to all 72 sample locations to achieve equal sample transport times during monitoring. The shorter the sample line, the shorter the response time. If monitoring a critical location, it may be desirable to place the monitor near that critical area to reduce sample transport time for that location. See Appendix B, Specifications, for transport times.

### 2.2.4 Monitor Dimensions

Monitor dimensions are important factors in monitor placement. The Vertex System is 24 in. (61 cm) wide, 34-1/2 in. (88 cm) deep and 76 in. (193 cm) in height. The system with 9 analyzers weighs about 1000 pounds (454 kg). Allow for 24 in. (61 cm) door swing; 18 in. (44.3 cm) at rear and 5 in. (12.3 cm) on sides. Allow clearance above the monitor for installing sample lines.

### 2.2.5 Sample Locations

Before installing the Vertex System, evaluate the sampling locations to determine if excessive dust or moisture are present. An external filter must be used in all locations. Make sure you use the correct filter. Dust may be a result of construction as well as manufacturing activities. Moisture may occur from rain entering a line at an outdoor sampling location or from condensation caused by temperature fluctuations. Water condensation in the sample lines could cause false alarms.

**Note:**

> Variables such as airflow, the molecular weight and temperature of the sample gas, and the physical conditions of the areas being monitored influence the placement of the sampling locations. You may need to consult your company's industrial hygienist or safety officer before installing sample lines to determine your company's policy related to sampling locations and monitoring of the desired sample gas.

### 2.2.6 Sample Line Particulate Filter Use

See Appendix B, Specifications, to determine which filter type should be used at the location.

## 2.3 Optional Floor Mounting

For added protection with optional floor mounts, prepare floor anchors to secure the base of the cabinet and prevent tipping. See Appendix A, Installation Drawings for floor mounting instructions.

## 2.4 Installing Sample Lines/ Filters

Use only FEP Teflon® tubing to assure proper sample transport. Other types of tubing are not sufficiently inert. See Appendix B, Specifications, for tube specifications. FEP tubing can be ordered from Honeywell Analytics.

Install sample lines from each location to the top of the Vertex System. This procedure involves:

- 2.4.1 Sample Line Installation Requirements
- 2.4.2 Sample Line Connections
- 2.4.3 Installing Sample Line Particulate Filters

Teflon® is a registered trademark of E.I. du Pont de Nemours & Company (DuPont).

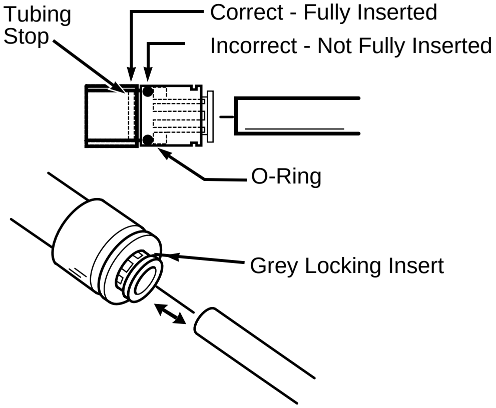
Honeywell Analytics supplies FEP grade Teflon tubing with all new monitors. This tubing is manufactured to our own strict specifications,and has been purged of all byproducts of the manufacturing process. On occassion, users have supplied their own FEP type tubing. Should you choose to use your own tubing, be advised that some brands of FEP tubing off-gas small amounts of HF, which can be detected on start up by Honeywell Analytics monitors configured for detecting mineral acids gases (HBr, HCl, HF, NF3). Before enabling building alarm systems, make certain that 1) you have installed the correct Chemcassette®, and 2) your monitor reads zero.

## 2.4.1 Sample Line Installation Requirements

Follow the general requirements listed below when installing sample lines.

- Sample lines should not exceed 400 ft. (122 m) in length.
- Route all lines as direct as possible to improve transport time. See Appendix B, Specifications, for transport times.
- Avoid running sample lines through areas of great temperature extremes, such as adjacent to steam or chiller lines.
- Sample lines should not be crimped, bent to less than a 12 in. (30.5 cm) radius, or placed in an area where weight could collapse the tubing. Sample lines should be easily accessible for periodic inspection.
- Where possible, leave as many bends exposed for periodic visual inspection of the line for kinked or damaged tubing.
- Check each sample line installation for seal integrity after completing installation of the Vertex System. See Section 3.9, Leak Checking Sample Lines, for the leak check procedure. Also use this procedure to detect leaking or severed tubing after events, such as construction, which may have affected the integrity of the tubing.
- Unused sample line port(s) may be blocked by the user with a plug, or a particulate filter may be installed to keep the system clean. If using a plug, make sure system vacuum level is adjusted.
- If an analyzer is installed in the Vertex with a Chemcassette tape, the optics may need cleaning before activating a previously unused point(s).

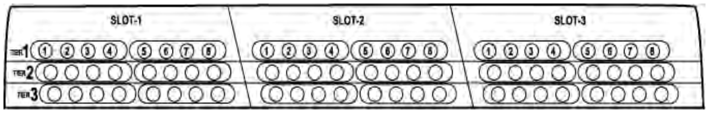
## 2.4.2 Sample Line Connections



**Sample Line Inlet Connections**

To prepare for installation of sample lines, remove the FEP Teflon tubing from the installation kit. The top of the unit includes 73 connections:

- 72 Sample Inlets
- (Point legend follows and is in proper sequence.)
- Exhaust Outlet (See Section 2.5, Installing Pump Exhaust Line, for connection.)



**Point Legend**

**Note:**

Always perform a leak check after installing sample lines. See Section 3.9, Leak Checking Sample Lines, for the leak check procedure.

Each inlet has a quick connect/disconnect fitting with an internal O-ring and an external grab ring. To install a tube into a sample line inlet, insert the tube far enough into the fitting to ensure that the tube has passed through both the external grab ring and the internal O-ring and is firmly seated against the stop. The insertion depth for a correctly installed sampling line is 1/2 in. to 5/8 in. (12 mm -16 mm). Verify the insertion depth by holding the tube and marking with your thumb where it emerges from the fitting. Remove the tube to measure the insertion depth.

**CAUTION**

**Improper installation of the tube into the connector results in dilution of the sample.**

## 2.4.3 Installing Sample Line Particulate Filters

Attach a sample line filter to the sampling end of the line for all locations.

**CAUTION**

**Keep in mind that excess amounts of dirt in the filters reduces the sample flow, raises sample vacuum and may affect concentration readings of the analyzer.**

See Appendix B, Specifications, to determine the proper filter type to use with each target gas.

## 2.5 Installing Pump Exhaust Line

This section describes exhaust connections and installation. The Vertex System is equipped with a vacuum pump that is located in the bottom of the Vertex System cabinet. The pump exhaust line connects to the manufacturing facility central toxic exhaust system.

### 2.5.1 Exhaust Line Installation Requirements

Follow the general requirements listed below when installing exhaust lines.

The length of the line should not exceed 50 ft. (15 m). If longer distances are required, contact Honeywell Analytics.

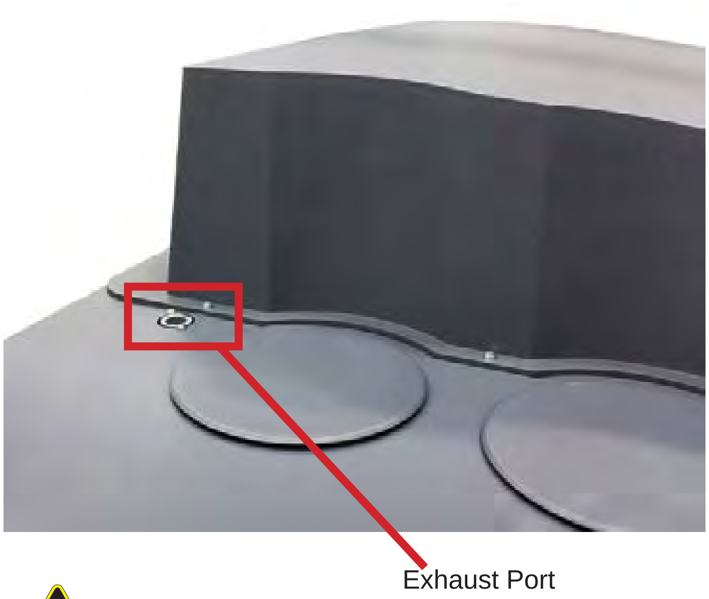
Do not crimp exhaust lines, or place them in an area where weight could collapse the tubing, or bend them to less than a 12 in. (30.5 cm) radius.

Where possible, leave as many bends exposed for periodic visual inspection of the line for kinked or damaged tubing.

Varying exhaust pressure can induce pump failure or flow faults.

### 2.5.2 Exhaust Line Connection

The instrument includes 20 ft. (6 m) of 3/8 in. (10 mm) I.D. x 1/2 in. (13 mm) O.D. Teflon tubing. Insert the tubing into the exhaust port on the top of the unit to the depth of 0.9 in. (23 mm).



**CAUTION**

**Leaks in the exhaust tubing connection can cause exposure to toxic gases from remote sample areas.**

To ensure a leak-free installation:

- Use a polypropolene tube with outside diameter 0.375 in. (9.525mm) +/-.005 in. (0.127mm).
- Verify that the external surface of the tube is free of score marks and scratches that could compromise the O-ring seal used in the fitting over the insertion depth.
- Cut the tube end perpendicular to its length 0.062 inches (1.5 mm) from its end.

- Insert the tube in the fitting to a depth of 0.95 in. (24.13mm) ±0.05 inches (1.27mm)

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

## 2.6 Electrical Power

The Vertex System requires a connection to a source of electrical power. An easily accessible service disconnect/power switch must be installed near the instrument, and the switch must be marked as the main disconnect for the Vertex unit.

The following warning must be displayed at the switch:

**WARNING**

**Hazardous voltages may exist at the Alarm Contacts in this unit with the power switch turned off. Insure power is disconnected at the source prior to servicing alarm contacts.**

### 2.6.1 Connecting AC Power

AC Source Requirements:

- Operating Voltage: 230 VAC ± 10% (under load) @ 50/60 Hz; 15 Amps maximum, single phase.

The Vertex System requires a dedicated AC circuit rated at 230 volts, 50/60 Hz, 15 Amp single phase providing hot, neutral, and ground lines. Line voltage should fluctuate no more than ± 10%. The external switch must be clearly labeled and installed in accordance with local electrical codes. Input power cable should be #14 AWG minimum. The safety ground wire must be the same or larger gauge as the line wires. Connect AC power connection to the two-position terminal block in the rear panel of the power module. Connect ground wire to the threaded stud on the side rail of the rack.

See Figure 1.

**Note:**

Testing has shown that using 208/220VAC phase-to-phase power source instead of the recommended 230VAC phase-to-neutral, can result in voltage excursions on the system ground. The excursions can cause damage to components in the analyzers or PLC. This type of damage is most likely to occur during system power cycles or in cases where the supply power is not a clean source.-up. For applications where 230 VAC single phase power is not available, Honeywell Analytics offers transformers to provide the necessary power. See Section 2.6.3 Vertex Transformer Installation for complete information.

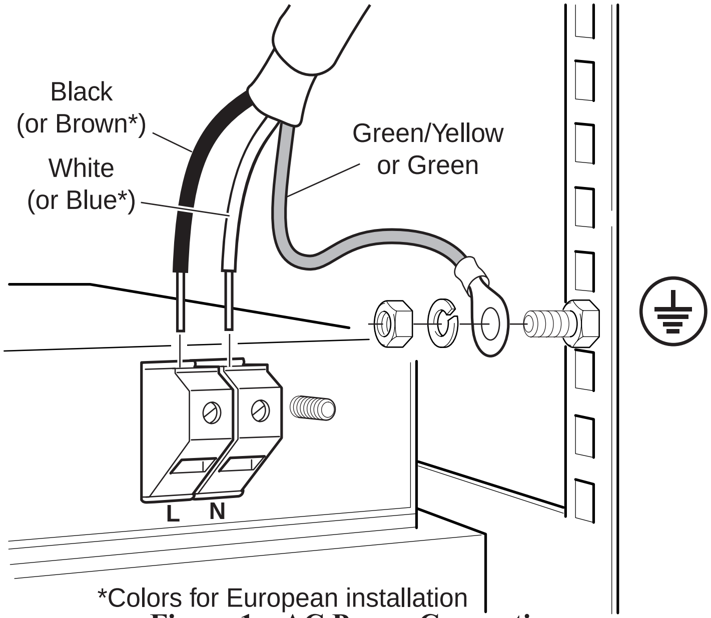

Black
(or Brown*)
White
(or Blue*)
Green/Yellow
or Green
L
N
*Colors for European installation

Figure 1 – AC Power Connection

## 2.6.2 Verifying Proper AC Power Connection

Before powering up the Vertex®, verify the connections using a multimeter to determine the connections are correct and correct voltages are present at the power connection.

**Note:**

> Series 1 and Series 2 Vertex® power connection points differ slightly in their appearance and are illustrated in Figures 2 and 3 below.

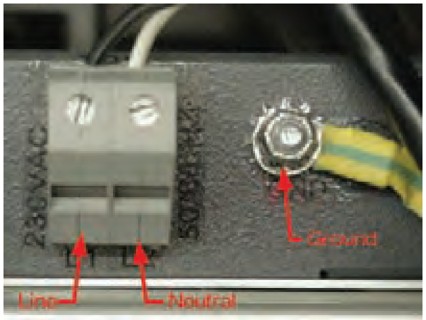

230 VAC
Line
Neutral
Ground
GND

Figure 2 – Vertex® Series 1

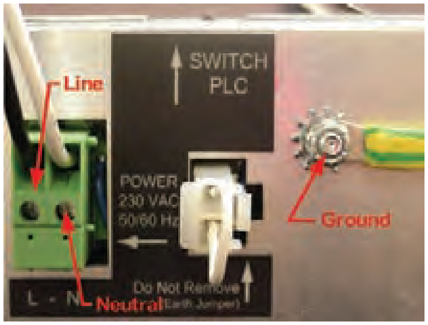

SWITCH
PLC
Line
POWER
230 VAC
50/60 Hz
Ground
L - N
Neutral
Do Not Remove
(Earth Jumper)

Figure 3 – Vertex® Series 2

### Verifying Line Connection:

Touch the red multimeter lead to the line/hot connection and touch the black lead to the ground lug (see Figure 4). The meter should display a voltage verifying the presence of 230 VAC.

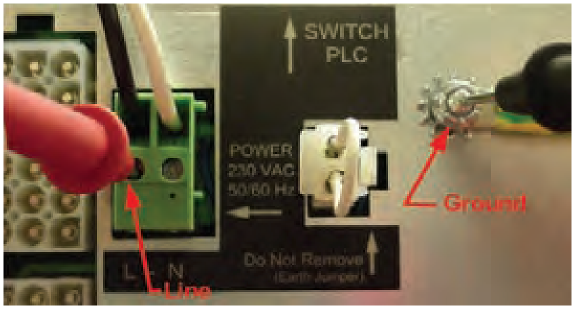

SWITCH
PLC
POWER
230 VAC
50/60 Hz
Ground
Do Not Remove
(Earth Jumper)
L - N
Line

Figure 4 – Verifying Line Connection

## Verifying Neutral Connection:

Touch the red multimeter lead to the neutral connection and touch the black lead to the ground lug (see Figure 5). The voltage value should not exceed 5 VAC.

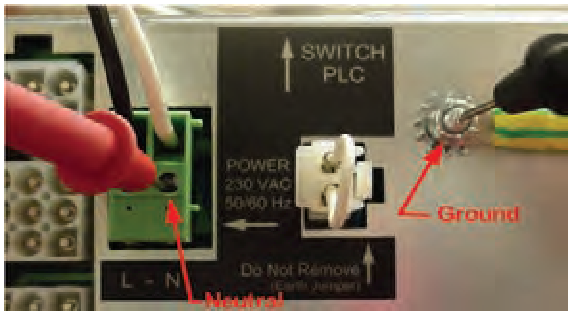

SWITCH
PLC
POWER
230 VAC
50/60 Hz
Ground
Do Not Remove
(Earth Jumper)
L - N
Neutral

Figure 5 – Verifying Neutral Connection

## Verifying Operating Voltage:

Touch the red multimeter lead to the line/hot connection and touch the black lead to the neutral (see Figure 6). The meter should display a voltage value of 230 VAC ±10%.

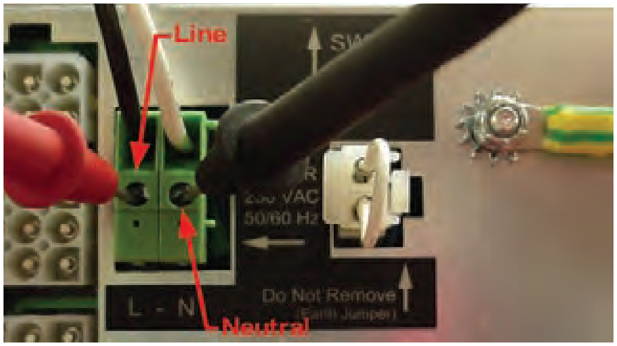

Line
230 VAC
50/60 Hz
Do Not Remove
(Earth Jumper)
L - N
Neutral

Figure 6 – Verifying Line to Neutral

**Note:**

After confirming line and neutral connections and the operating voltage is within the specified range, power up the Vertex® and check the operating voltage again to assure the voltage under load is within the specified range for safe operation.

## 2.6.3 Vertex Transformer Installation

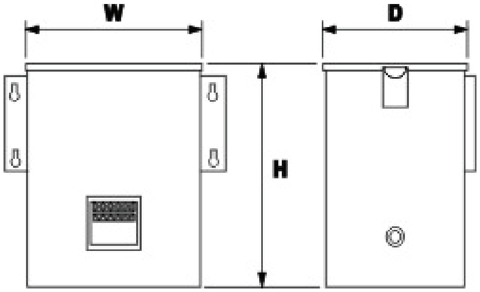
The directions and diagrams enclosed herein are intended to illustrate the proper installation and wiring of transformers designed to step-down or step-up site voltage to proper levels for Vertex® operation. The information provided has been gathered from Sola/Hevi-Duty for use with their products as specified in this document. For more information on these transformer units, refer to www.solaheviduty.com or Sola Hevi-Duty Technical Services 1-800-377-4384.

These instructions are for high voltage equipment operating life safety equipment. Only qualified electricians or approved Honeywell Analytics service representatives should perform these tasks. Honeywell Analytics is not liable for any damages caused by incorrect installation by unauthorized or unqualified third parties, of electrical apparatus to the Vertex® monitor

### Design Characteristics

- UL-3R enclosures for indoor and outdoor service
- Electrostatically shielded for quality power on sizes 1 KVA and larger
- UL class 180°C insulation system, 115°C temperature rise under full load
- Conduit knockouts for side entry into wiring compartment
- Copper lead wire terminations
- Units are encapsulated with electrical grade silica sand

### Design Style



Style 4

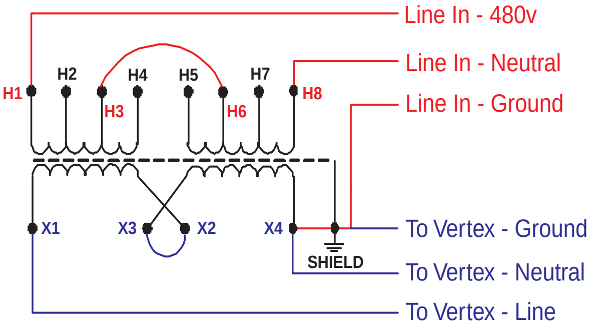
| HA Part Number | Catalog Number | KVA | H | W | D | Ship Wt |
|---|---|---|---|---|---|---|
| 0060-1020 | HS5F5AS | 5 | 17 | 14 | 9 | 104 |
| 0060-1021 | HS12F5AS | 5 | 17 | 14 | 9 | 104 |

| HA Part Number | Primary Amps | Secondary Amps |
|---|---|---|
| 0060-1020 | 20.8/10.4 | 41.6/20.8 |
| 0060-1021 | 18.0 | 41.6/20.8 |

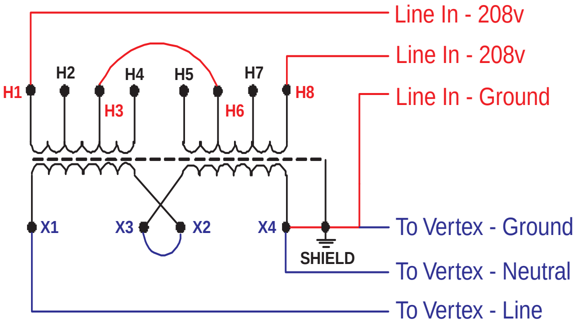
## Step-Down Wiring

0060-1020 as Step-Down Transformer 480v to 240v

240 x 480 Volt Primary, 120/240 Volt Secondary, Taps: 2, 2½% FCAN & FCBN


Line In - 480v
Line In - Neutral
Line In - Ground
H1
H2
H3
H4
H5
H6
H7
H8
X1
X3
X2
X4
SHIELD
To Vertex - Ground
To Vertex - Neutral
To Vertex - Line

Single 480VAC Line In


Line In - 208v
Line In - 208v
Line In - Ground
H1
H2
H3
H4
H5
H6
H7
H8
X1
X3
X2
X4
SHIELD
To Vertex - Ground
To Vertex - Neutral
To Vertex - Line

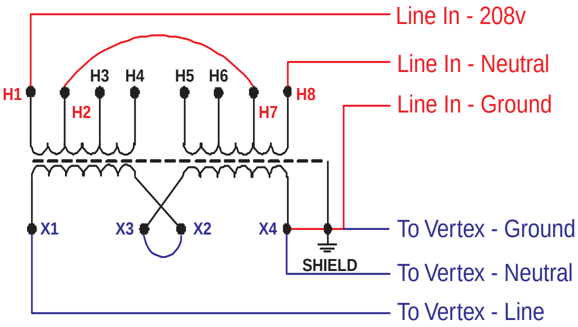
2 208VAC Lines In

| Primary Voltage | Interconnect | Connect Lines to: |
|---|---|---|
| 480 | H3 to H6 | H1 and H8 |
| **Secondary Voltage** | **Interconnect** | **Connect Lines to:** |
| 240 | X2 to X3 | X1 and X4 |
| *Connect X4 to Ground and Shield | | |

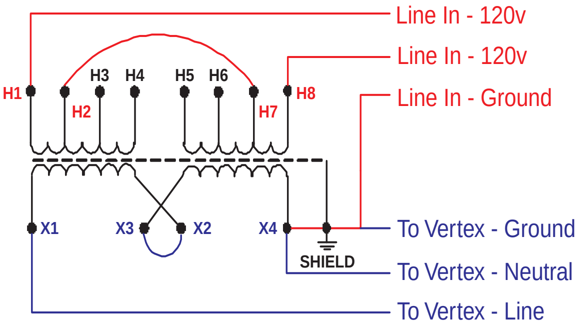
## Step-Up Wiring

0060-1021 as Step-Up Transformer 208v to 240v

120/208/240/277 Volt Primary, 120/240 Volt Secondary, Taps: None


Line In - 208v
Line In - Neutral
Line In - Ground
H1
H2
H3
H4
H5
H6
H7
H8
X1
X3
X2
X4
SHIELD
To Vertex - Ground
To Vertex - Neutral
To Vertex - Line

Single 208VAC Line In

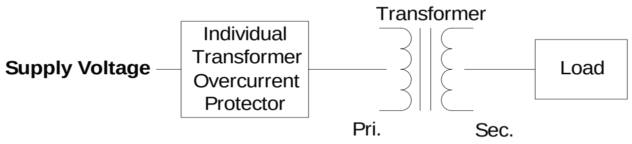

Line In - 120v
Line In - 120v
Line In - Ground
H1
H2
H3
H4
H5
H6
H7
H8
X1
X3
X2
X4
SHIELD
To Vertex - Ground
To Vertex - Neutral
To Vertex - Line

2 120VAC Lines In

| Primary Voltage | Interconnect | Connect Lines to: |
|---|---|---|
| 208 | H2 to H7 | H1 and H8 |
| **Secondary Voltage** | **Interconnect** | **Connect Lines to:** |
| 240 | X2 to X3 | X1 and X4 |
| *Connect X4 to Ground and Shield | | |

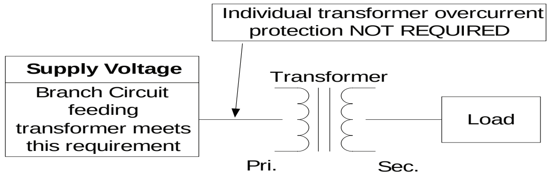
## Overcurrent Protection

1. Primary protection only is required if the transformer is single-phase and the secondary has only two wires. Overcurrent protection rating and location are shown below.


Supply Voltage
Individual Transformer Overcurrent Protector
Transformer
Pri.
Sec.
Load

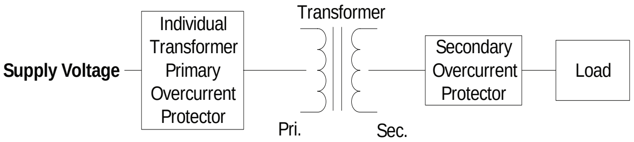
| Primary Current | Overcurrent Protection Rating |
|---|---|
| Less than 2 amps | 300% of maximum |
| 2 to 9 amps | 167% of maximum |
| 9 amps or more | 125% of rated primary current (or next highest standard rating) |

2. If the branch circuit feeding the transformer has overcurrent protection to meet the individual protection requirements in Example 1, then individual transformer protection is not required.


Individual transformer overcurrent protection NOT REQUIRED
Supply Voltage
Branch Circuit feeding transformer meets this requirement
Transformer
Pri.
Sec.
Load

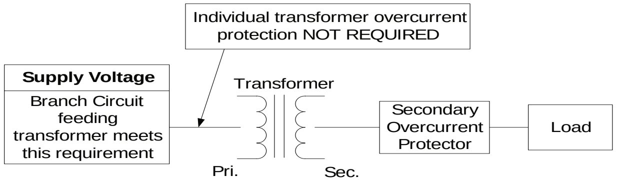
| Primary Current | Overcurrent Protection Rating |
|---|---|
| Less than 2 amps | 300% of maximum |
| 2 to 9 amps | 167% of maximum |
| 9 amps or more | 125% of rated primary current (or next highest standard rating) |

1. Primary and secondary protection is required if the transformer has more than two wires on the secondary circuit.


Supply Voltage
Individual Transformer Primary Overcurrent Protector
Transformer
Pri.
Sec.
Secondary Overcurrent Protector
Load

| Primary Current | Secondary Current | Overcurrent Protection Rating |
|---|---|---|
| 250% Primary Current | Less than 9 amps | 167% of maximum |
| Not more then 250% | 9 amps or more | 125% of rated primary current (or next highest standard rating) |

2. If the branch circuit feeding the transformer has overcurrent protection to meet the individual primary overcurrent protection requirements in Example 3, then individual primary protection is not required. Secondary OCP is required as shown below.


Individual transformer overcurrent protection NOT REQUIRED
Supply Voltage
Branch Circuit feeding transformer meets this requirement
Transformer
Pri.
Sec.
Secondary Overcurrent Protector
Load

| Primary Current | Secondary Current | Overcurrent Protection Rating |
|---|---|---|
| 250% Primary Current | Less than 9 amps | 167% of maximum |
| Not more then 250% | 9 amps or more | 125% of rated primary current (or next highest standard rating) |

### 2.6.3.1 Specification Guide for Transformers - 2.6.3.1 Low Voltage, Special Purpose, Dry Type (600 Volt class) - 15 KVA and larger

**General**

Single and three phase distribution transformers (600 Volt and below)

- Provide and install, as referenced on the electrical plans, enclosed dry type transformers as manufactured by Sola/Hevi-Duty or approved equal.

**Standards**

- Transformers must be listed by Underwriters Laboratory, certified with Canadian Standards Association and designed, constructed and rated in accordance with NEMA ST 20 and applicable IEEE & OSHA specifications.

**Construction**

Cores

- All transformer cores shall be constructed of low loss, high quality, electrical grade laminate steel. By design, the flux density is to be kept well below the saturation level to reduce audible sound level and minimize core losses. The core volume shall allow operation at 10% above rated primary voltage at no load without exceeding the temperature rise of the unit.

Coils

- Coil conductors shall be either aluminum or copper and must be continuous. The entire core and coil assembly shall be impregnated with a thermal setting varnish and cured to reduce hot spots in the coils and seal out moisture. Coils with exposed magnet wire will not be acceptable. Transformers shall have common core construction.
- All transformers shall incorporate a faraday (electrostatic) shield between primary and secondary windings for the attenuation of voltage spikes, line noise and voltage transients.
- Transformers shall be provided with six 2.5% full capacity taps – two above and four below primary rated voltage.
- General purpose transformers are classified as isolation transformers.

Enclosures

- Transformer enclosures shall be constructed of heavy gauge sheet steel and coated with a grey powder paint finish (ANSI 61). Ventilated transformer enclosures shall be UL/NEMA Type 1 rated and UL/NEMA Type 3R rated for outdoor use with the addition of a weather shield. This information must be listed on the transformer nameplate.
- Maximum transformer enclosure temperature will not exceed 650C rise above a 400C ambient under full load.

- Transformers must have vibration isolators located between the core and coil assembly and the transformer enclosure to reduce audible sound levels caused from magnetostriction of the transformer core. No externally located vibration dampening pads shall be used as they tend to increase audible noise. Ventilated transformers are to be floor mounted to a concrete pad.
- The transformer enclosure must be grounded by the installer in accordance with the latest edition of the National Electric Code and any local codes or ordinances.

Performance

- Audible sound levels will not exceed limits established in NEMA ST 20:

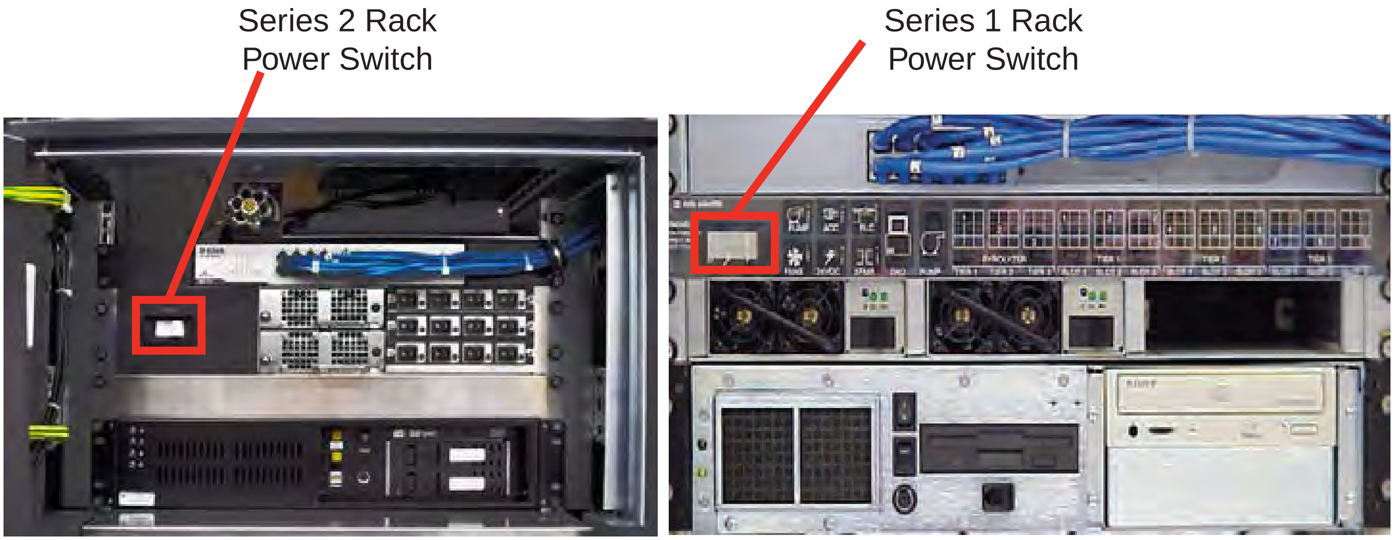
  10 to 50 KVA 45 db
  51 to 150 KVA 50 db
  151 to 300 KVA 55 db
  301 to 500 KVA 60 db

- Transformers, 15 KVA to 500 KVA, shall incorporate a UL recognized 2200C insulation system and exhibit a maximum 1500C temperature rise above a maximum ambient of 400C under full load.

## 2.6.4 Power On/Off

An internal rack power switch is located behind the touch screen door.

After performing self-diagnostics, the Vertex System main screen opens and the system returns to the same state it was in prior to power down.



**Rack Power Switch**

**WARNING**

**Hazardous voltages may exist at the Alarm Contacts in this unit with the power switch turned off. Insure power is disconnected at the source prior to servicing alarm contacts.**

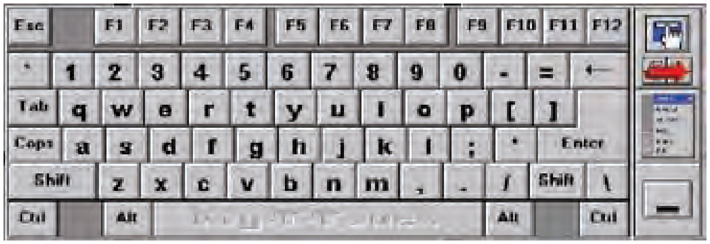
## 2.7 Data Acquisition System

The data acquisition computer or DAq is the main computer in the Vertex System. System display and operator control are through an LCD touch screen with on-screen keyboard.

The on-screen keyboard operates similar to a standard keyboard except when using modifier keys (CTRL, ALT, or SHIFT).

To use modifier keys:

1. Touch the modifier key. The key changes to show the modifier key is locked down.
2. Press the second key of the key combination.

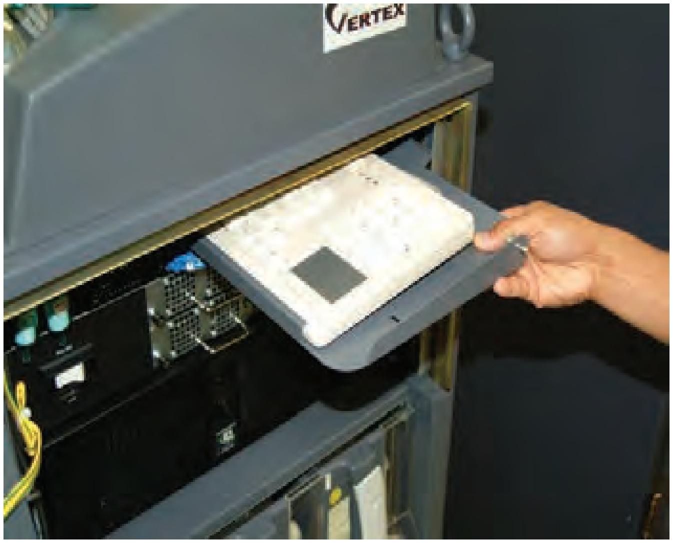

Esc F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12
` 1 2 3 4 5 6 7 8 9 0 - = ←
Tab q w e r t y u i o p [ ]
Caps a s d f g h j k l ; ' Enter
Shift z x c v b n m , . / Shift \
Ctrl Alt Alt Ctrl

On-screen Keyboard

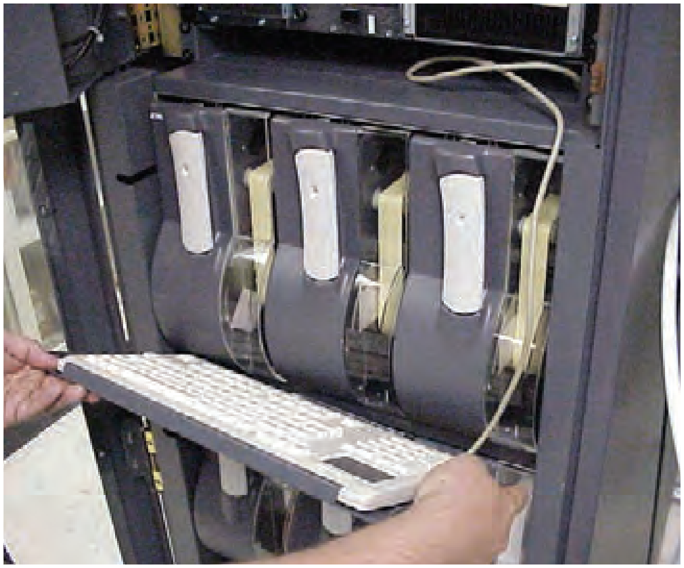
### 2.7.1 Optional Keyboard

An optional keyboard, with touch pad, is stored behind the display. Use the keyboard to enter text fields at the unit or as a backup to the touch screen.

See illustrations.



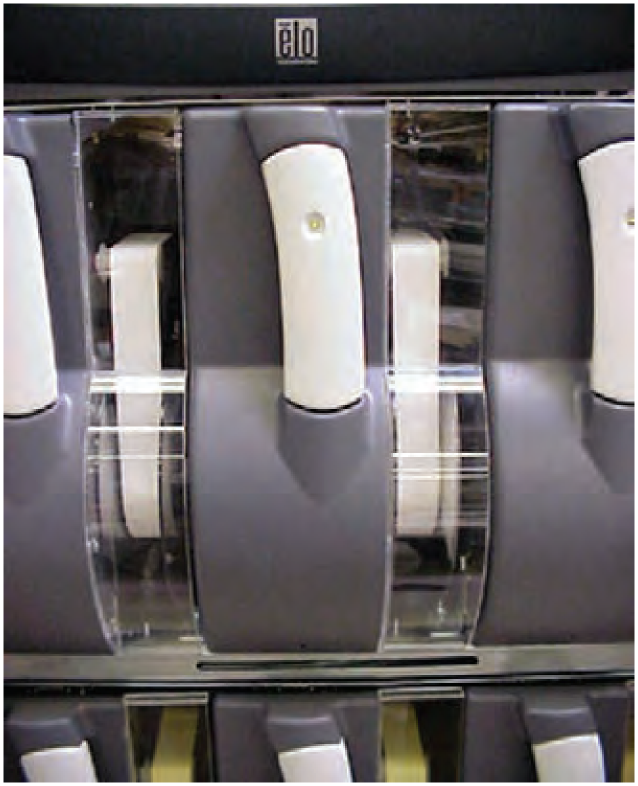
Keyboard Storage



**Hooking keyboard to the front of the system**

To install the keyboard:

1. Open the display.
2. Remove keyboard from storage shelf. All cables are connected.

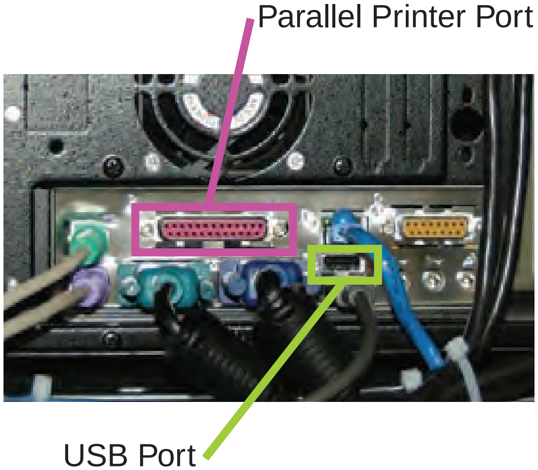


Hook front of keyboard tray into slot under first tier of analyzers.

1. While holding keyboard tray, push locking pins toward center of tray.
2. Align locking pins with holes in side rail of cabinet.
3. Release pins to lock tray into side of rails of cabinet.
4. Close and latch display.

## 2.7.2 Printer

The Vertex System software can be programmed to print to either a network or local printer. To install a local printer, connect it to the parallel printer port as shown. You may also use the USB port. The correct printer driver must also be installed.

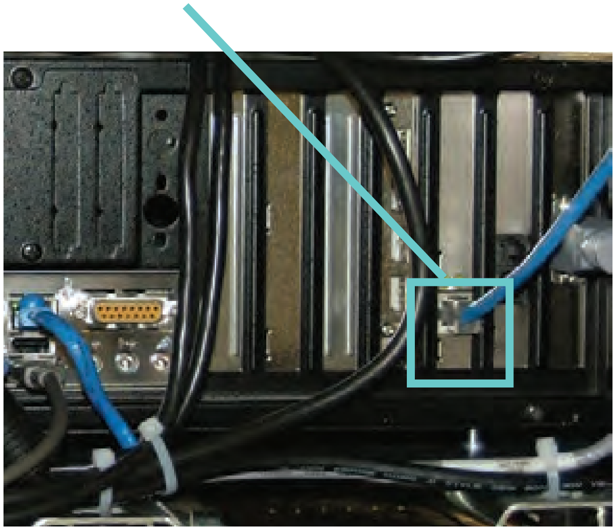


**Printer Connections**

## 2.7.3 External Network Connection

The Vertex System can be connected to an external Ethernet network at the port shown.

External Ethernet Connector

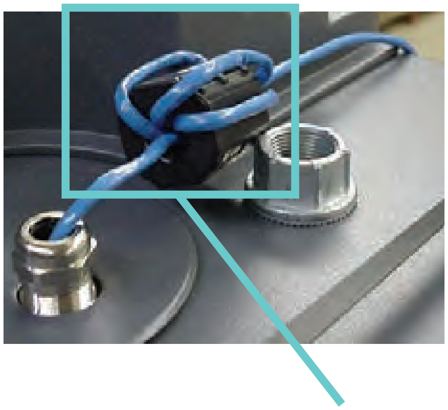


⚠ **CAUTION**

**Do not connect an external network to the Vertex Ethernet hub. Use only the external Ethernet connection (as shown above) on the back of the data acquisition computer. Connecting an external network to the hub will impair monitoring capability.**

**Note:**

To maintain EMC certification, the ethernet cable should make 4 loops through the supplied ferrite cable clamp. The clamp should remain on the outside of the Vertex enclosure.



External Ethernet Ferrite

## 2.7.4 Network Computer Security

The Vertex relies on the RSView system of accounts and passwords to prevent unauthorized tampering as described in section 4.6.6 of this manual. Microsoft Windows provides its own system of accounts and passwords. However RSView32 requires that Windows be run in an account with administrator privileges. Attempting to run the Vertex RSView32 application in a Windows account without administrator privileges will cause error messages to be displayed. The Vertex should be treated and secured as any other networked PC by maintaining the appropriate virus protection and remaining current with Microsoft updates. Use an external hardware firewall to isolate the monitor from malicious Ethernet traffic.

## 2.8 Wiring Alarm Relays

This section describes relay:

- Contacts
- Ratings
- Wiring guidelines

**WARNING**

**Use caution when servicing the PLC terminal blocks. Power to contacts is supplied externally. See Appendix E, Optional Relay Specifications, for alarm relay voltage and contact rating guidelines.**

### 2.8.1 Relay Contacts

The Vertex System has form-A, single-pole, single-throw relays that activate external alarm devices. Contacts are available for each circuit to accommodate installation of external devices.

Relay panels are located at the back of the Vertex System. See Appendix E, Optional Relay Specifications, for for information.

### 2.8.2 Wiring Guidelines

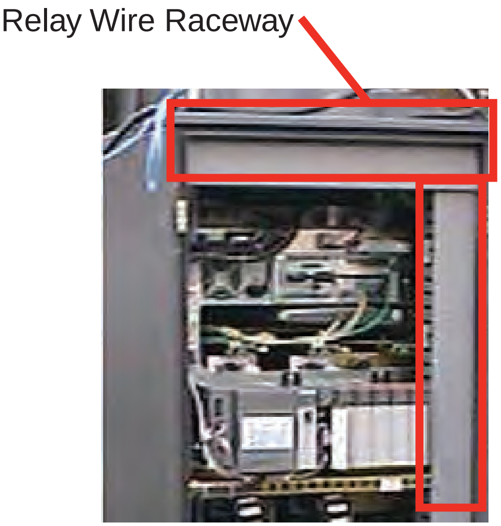
To wire the alarm relays:

- Use agency approved wire (such as NRTL in the U.S.) with 300 volt insulation.

**CAUTION**

**Make sure there is proper separation between the 230 volt power supply and alarm wiring.**

- Route relay wiring through raceway and out through the top of the cabinet.



- Use shielded cable or conduit.

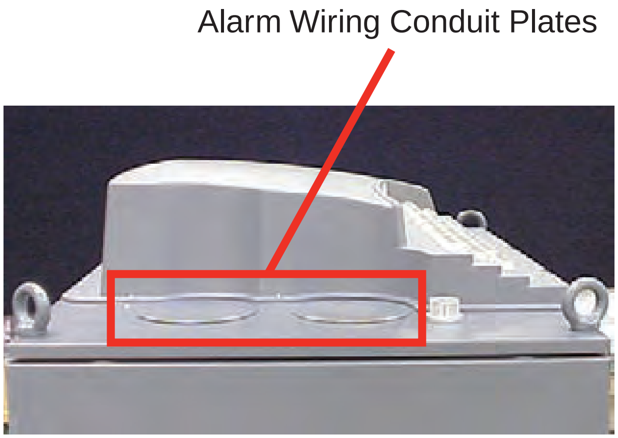
**CAUTION**

**Failure to replace and retighten hardware after servicing can adversely affect monitor performance and EMC compliance. Make certain all fasteners are reinstalled and firmly tightened. This will ensure a proper ground.**

- Use a single, solid or stranded wire (not exceeding 14 gauge or 2.5 mm2) per terminal block connection.
- Do not switch DC current with the relay contact unless you are using counter electromotive force (CEMF) protection such as a suppression diode.
- Do not use the Vertex System power supply for external alarm power.

**Note:**

Make sure all connections comply with applicable RFI/EMI standards.



## Validating the System

The Vertex and Chemcassette products' design, manufacture, and recommended maintenance ensure the correct operation of the system. For validation or commissioning after installation by gas exposure, these Technical Notes are available upon request from Honeywell Analytics:

1998-0837 *Calibration and Verification*

1998-0219 *Detector Testing  Protocols*

# 3 Startup

# 3.1 Startup

This section describes the Vertex System startup sequence.

## 3.1.1 Initial Startup

Use this section to turn on your Vertex System and to configure the analyzer modules for specific gas locations. There are six parts to this startup procedure:

- 3.5 Power Up
- 3.6 Start Program
- 3.7 Configuration Utility
- 3.8 Load Tape
- 3.9 Leak Checking Sample Lines
- 3.10 Verify Flow Rates and Supply Vacuum

## 3.1.2 Factory Configuration

Honeywell Analytics loads all software on the DAq at the factory. The Universal Chemcassette® Analyzers are configured for the mineral acid family of gases and the Pyrolyzer Analyzers for $NF_3$. You will need to configure each point for the target gases at your facility.

## 3.2 Getting Started

Before startup and configuration, gather the following information:

- The location to which each point is connected
- Target gas at each location
- Alarm levels
- Relay configuration

## 3.3 Verify Installation

Ahead of the startup sequence, make sure that the following installation steps have been completed:

- Sample lines
- Exhaust line
- AC power connection
- Relay wiring

See Section 2, Installation, for connection details.

## 3.4 Startup Sequence

The following sections describe the startup sequence:

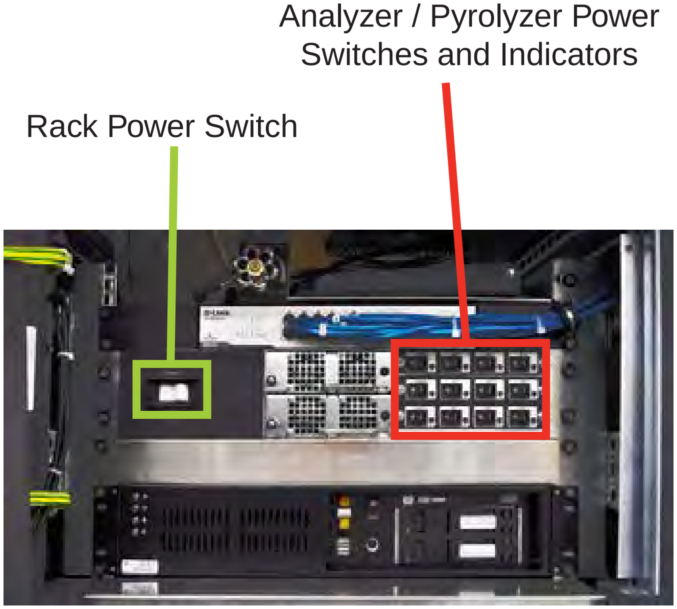
- 3.5 Power Up
- 3.6 Start Program
- 3.7 Configuration Utility
- 3.8 Load Tape
- 3.9 Leak Checking Sample Lines
- 3.10 Verify Flow Rates and Supply Vacuum

## 3.5 Power Up

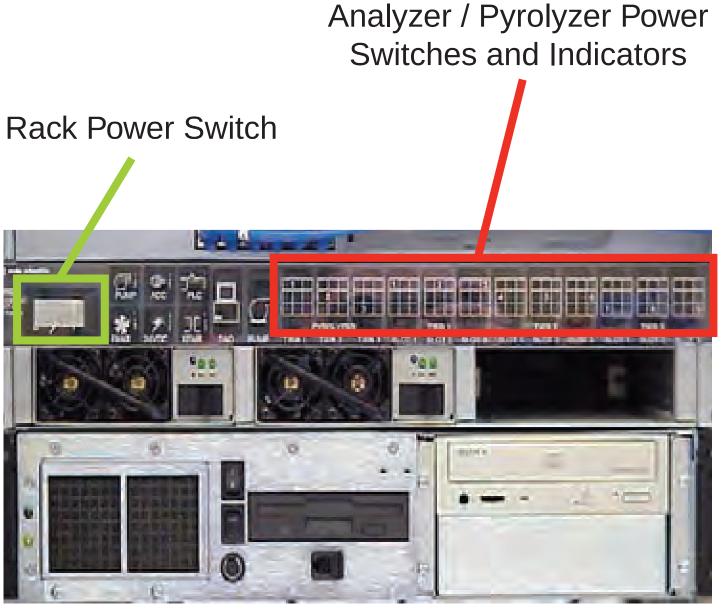
Use the rack power switch behind the touch screen door to power up the Vertex System.

1. Open touch screen door.
2. Turn on rack power switch.
3. Turn on power switch to appropriate analyzers.
4. Close and latch touch screen door.

After 15 seconds, the analyzer status LEDs sequence four times through all colors.


Analyzer / Pyrolyzer Power Switches and Indicators
Rack Power Switch

Series 2 Units


Analyzer / Pyrolyzer Power Switches and Indicators
Rack Power Switch

Series 1 Units

After the initial color sequence, the Analyzer LEDs show system status. The following chart matches analyzer status with LED signals.

| 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 3-1: Analyzer Status LEDs**

## 3.6 Start Program

Upon power-up, the DAq automatically starts Windows and loads the Vertex program. After the two-to-three minute startup sequence, the Vertex main screen opens.

**Note:**

> Any time the Vertex System is powered up, loss of communications may cause maintenance faults.

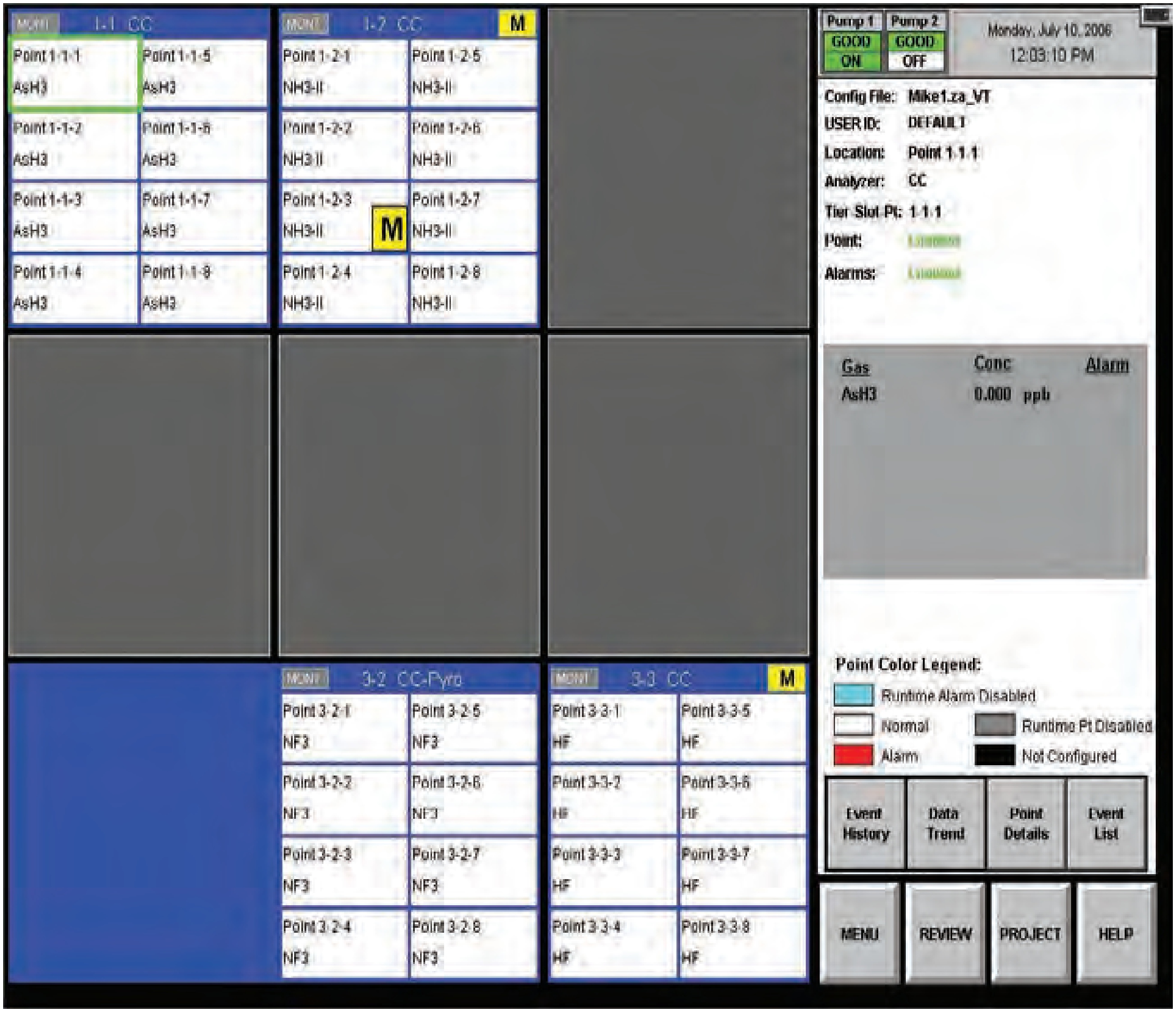
See Section 4.5.4, Event List, for instructions to clear faults.

**Note:**

> Use the Windows Date/Time Properties dialog box to change the time zone, time and date on your Vertex System. Stop project if adjusting time and time zone. Once complete restart project.

⚠ CAUTION

Do not change language in Windows setup.


MONT 1-1 CC
Point 1-1-1 AsH3
Point 1-1-2 AsH3
Point 1-1-3 AsH3
Point 1-1-4 AsH3
Point 1-1-5 AsH3
Point 1-1-6 AsH3
Point 1-1-7 AsH3
Point 1-1-8 AsH3
MONT 1-2 CC
M
Point 1-2-1 NH3-II
Point 1-2-2 NH3-II
Point 1-2-3 NH3-II
M
Point 1-2-4 NH3-II
Point 1-2-5 NH3-II
Point 1-2-6 NH3-II
Point 1-2-7 NH3-II
Point 1-2-8 NH3-II
MONT 3-2 CC-Pyro
Point 3-2-1 NF3
Point 3-2-2 NF3
Point 3-2-3 NF3
Point 3-2-4 NF3
Point 3-2-5 NF3
Point 3-2-6 NF3
Point 3-2-7 NF3
Point 3-2-8 NF3
MONT 3-3 CC
M
Point 3-3-1 HF
Point 3-3-2 HF
Point 3-3-3 HF
Point 3-3-4 HF
Point 3-3-5 HF
Point 3-3-6 HF
Point 3-3-7 HF
Point 3-3-8 HF
Pump 1
GOOD
ON
Pump 2
GOOD
OFF
Point Color Legend:
Runtime Alarm Disabled
Normal
Runtime Pt Disabled
Alarm
Not Configured
Event History
Data Trend
Point Details
Event List
MENU
REVIEW
PROJECT
HELP

Monday, July 10, 2006
12:03:10 PM

Config File: Mike1.za_VT
USER ID: DEFAULT
Location: Point 1.1.1
Analyzer: CC
Tier Slot Pt: 1.1.1
Point: [illegible]
Alarms: [illegible]

| Gas | Conc | Alarm |
|---|---|---|
| AsH3 | 0.000 ppb | |

Vertex Main Screen

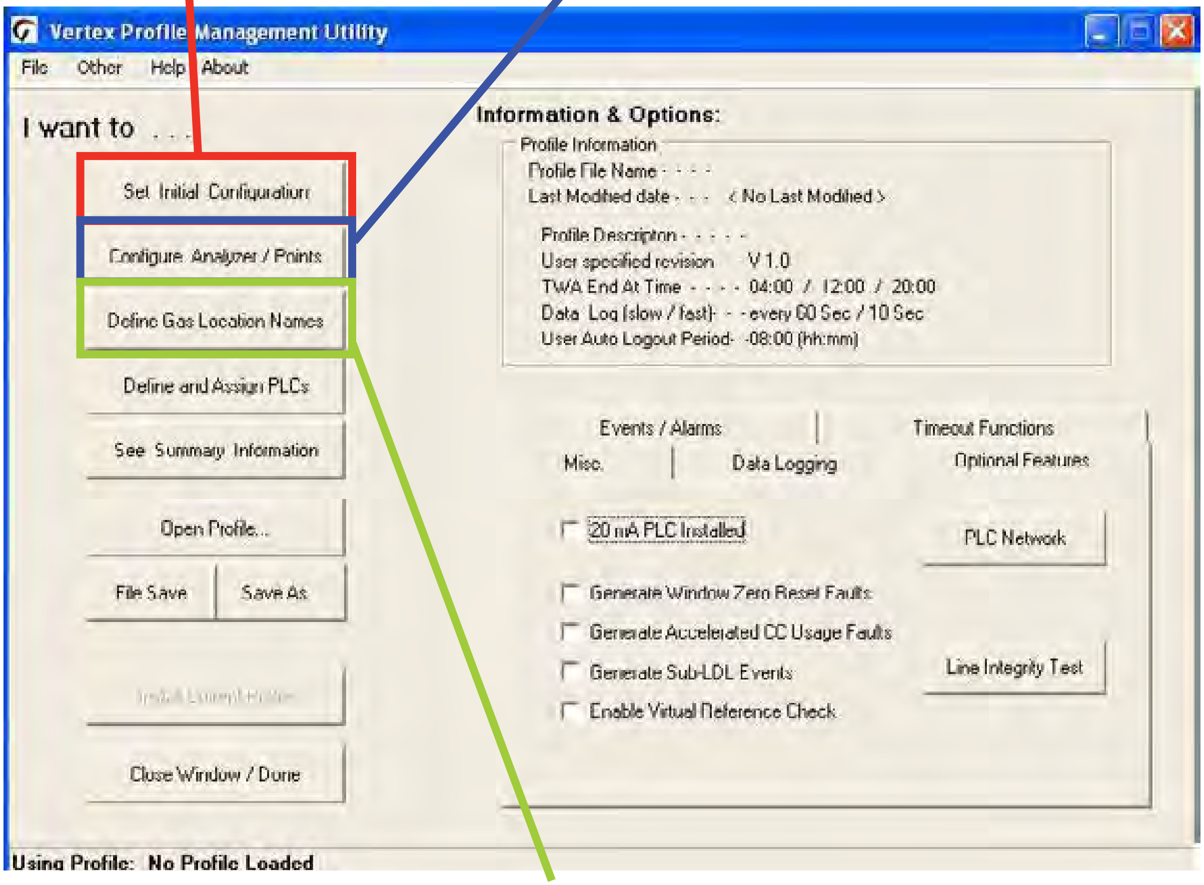
## 3.7 Configuration Utility

Before the Vertex System can begin monitoring, you must create a configuration profile. The configuration profile stores all of the monitor settings in a single file on the hard drive. Configuration profiles include system level information, point settings and analyzer information. Use the Configuration menu to create a new configuration profile or modify an existing profile.

To open the Configuration Menu, touch Main Screen, Menu and then Configuration.

**Set Initial Configuration**
Enter information and set parameters common to all points and modules.

**Configure Analyzer / Points**
Defines the type of analyzer module installed in each slot. Designates the target gas. Sets alarm levels for each point.


Vertex Profile Management Utility
File
Other
Help
About
I want to . . .
Set Initial Configuration
Configure Analyzer / Points
Define Gas Location Names
Define and Assign PLCs
See Summary Information
Open Profile...
File Save
Save As
Install Current Profile
Close Window / Done
Events / Alarms
Timeout Functions
Misc.
Data Logging
Optional Features
PLC Network
Line Integrity Test

Information & Options:

Profile Information
Profile File Name - - -
Last Modified date - - - < No Last Modified >
Profile Description - - - - -
User specified revision V 1.0
TWA End At Time - - - - 04:00 / 12:00 / 20:00
Data Log (slow / fast) - - every 60 Sec / 10 Sec
User Auto Logout Period - 08:00 (hh:mm)

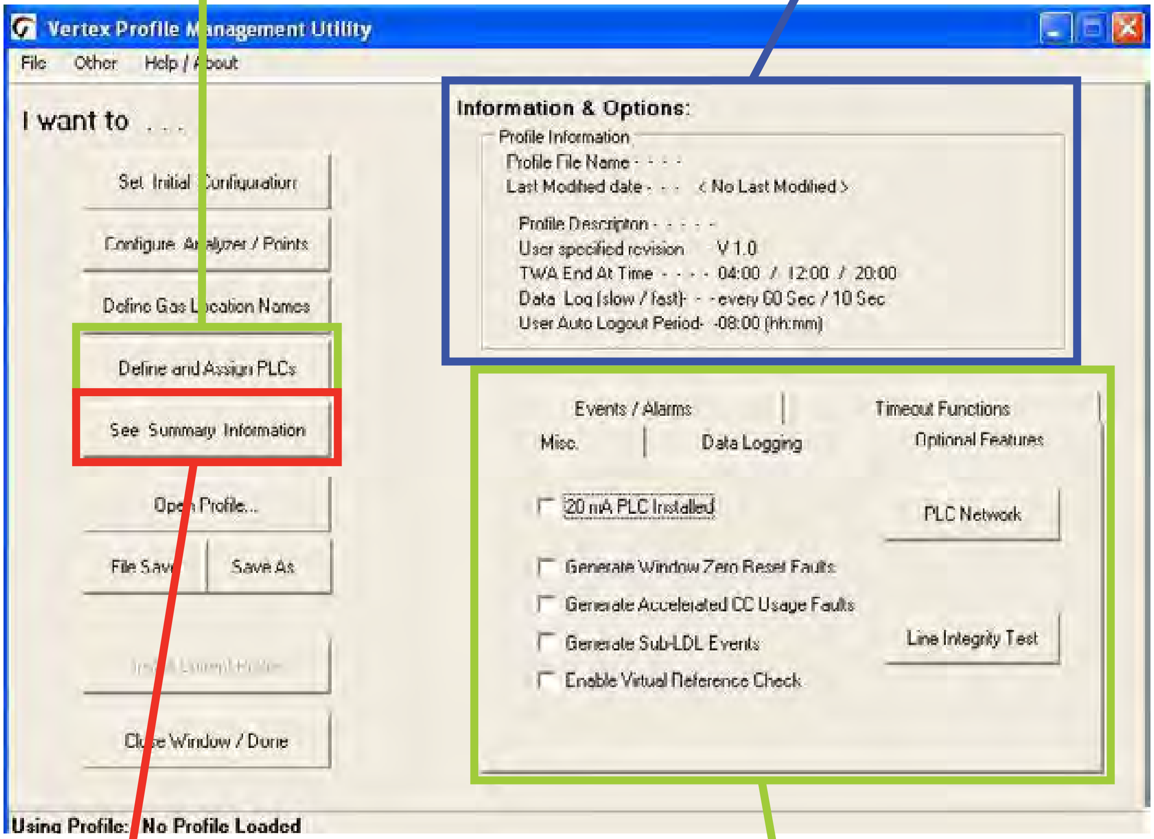
☐ 20 mA PLC Installed
☐ Generate Window Zero Reset Faults
☐ Generate Accelerated CC Usage Faults
☐ Generate Sub-LDL Events
☐ Enable Virtual Reference Check

Using Profile: No Profile Loaded

**Define Gas Location Names**
Enter the short and long name for each monitored location.

**Define and Assign PLCs**
Associate relays with software alarms and faults; associate optional 4-20 mA output with points.

**Information**
A display of key parameters about the Vertex System.


Vertex Profile Management Utility
File
Other
Help / About
I want to . . .
Set Initial Configuration
Configure Analyzer / Points
Define Gas Location Names
Define and Assign PLCs
See Summary Information
Open Profile...
File Save
Save As
Close Window / Done
Information & Options:
Events / Alarms
Timeout Functions
Misc.
Data Logging
Optional Features
PLC Network
Line Integrity Test

Profile Information
Profile File Name - - - -
Last Modified date - - - < No Last Modified >
Profile Description - - - - -
User specified revision V 1.0
TWA End At Time - - - - 04:00 / 12:00 / 20:00
Data Log (slow / fast)- - - every 60 Sec / 10 Sec
User Auto Logout Period- -08:00 (hh:mm)

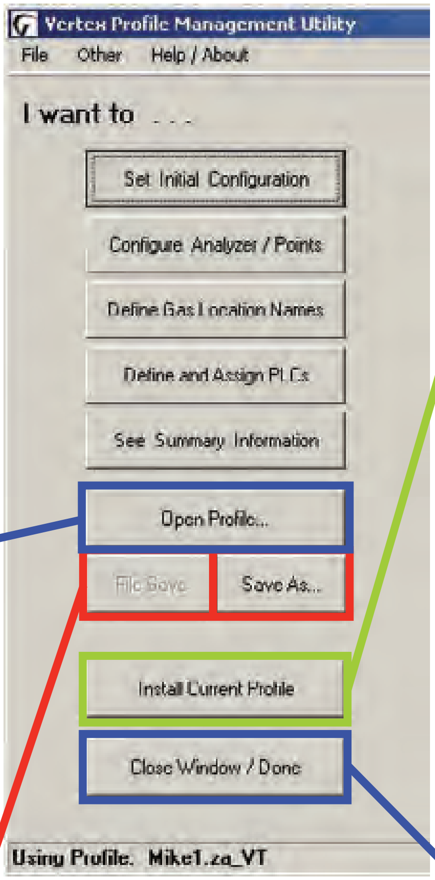
☐ 20 mA PLC Installed
☐ Generate Window Zero Reset Faults
☐ Generate Accelerated CC Usage Faults
☐ Generate Sub-LDL Events
☐ Enable Virtual Reference Check

Using Profile: No Profile Loaded

**See Summary Information**
A tabular listing of the configuration profile.

**Options**
Select a tab to enter information and set parameters common to all points and modules.

**Install Profile Status**
During the installation process, a dialog box will be shown that indicates the status and final result of the installation.


Vertex Profile Management Utility
File
Other
Help / About
I want to . . .
Set Initial Configuration
Configure Analyzer / Points
Define Gas Location Names
Define and Assign PLCs
See Summary Information
Open Profile...
File Save
Save As...
Install Current Profile
Close Window / Done

Using Profile. Mike1.za_VT

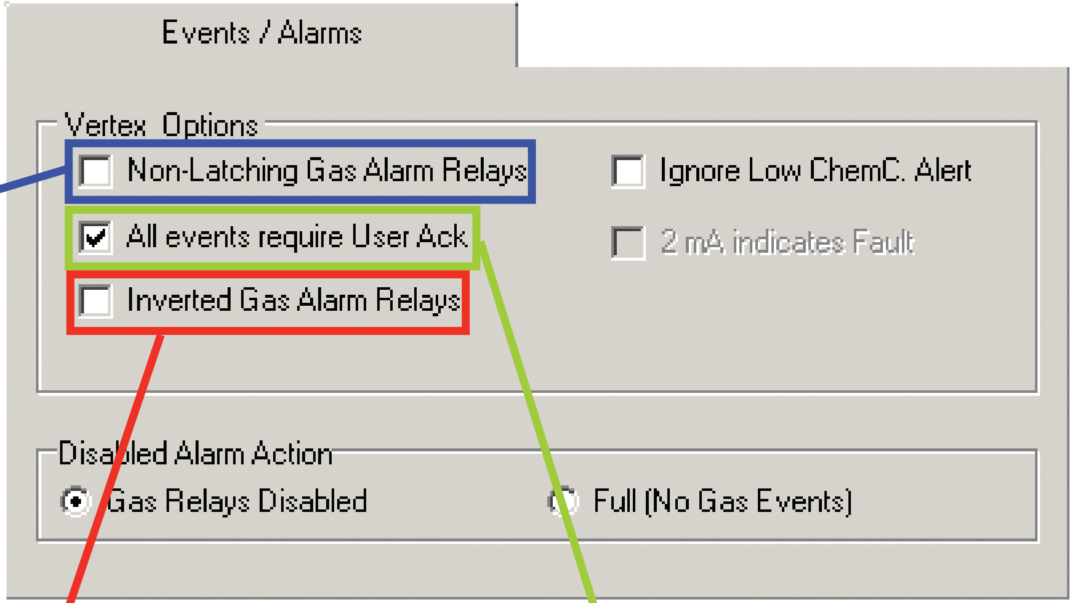
**Install Current Profile**
Not active while creating configuration profiles on a computer other than the one running the Vertex system. Loads the current configuration settings into the appropriate analyzers and PLCs. If the Vertex System is in a monitoring state, the program will open a dialog box to verify that it is okay to take the Vertex System out of monitor during the profile installation.

**Open Profile...**
Opens a previously saved profile.

**File Save/Save As...**
Saves current profile on disk. Vertex will prompt you to save changes when closing the Configuration window.

**Close Window/Done**
Exits Configuration setup

**Non-Latching Gas Alarm Relays**
A latching gas alarm relay activates when a gas concentration reaches a level 1 or level 2 alarm setting. The relay remains activated until an authorized operator resets the alarm. Non-latching gas alarm events clear themselves as soon as the gas concentration drops below the alarm setting.



Vertex Options

- ☐ Non-Latching Gas Alarm Relays
- ☑ All events require User Ack
- ☐ Inverted Gas Alarm Relays
- ☐ Ignore Low ChemC. Alert
- ☐ 2 mA indicates Fault

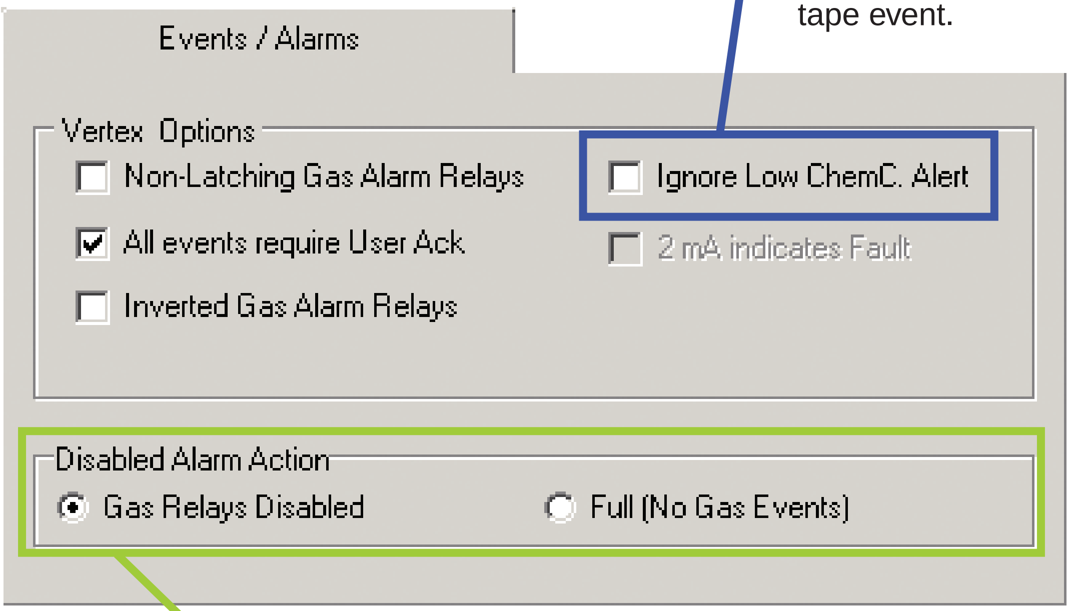
Disabled Alarm Action

- ● Gas Relays Disabled
- ○ Full (No Gas Events)

**Inverted Gas Alarm Relays**
Vertex alarm relays, by default, are normally open (de-energized) when no alarm condition exists. If this option is checked, the alarm relays will be normally closed (energized) when there is no alarm. Fault relays are not affected by this option and are always normally closed (energized) unless a fault condition exists.

**All events require User Ack**
When selected, non-latching alarm events will not be removed from the event list until an authorized user acknowledges the event. Fault and latching alarm events are not affected by this option, since an authorized user must reset these events and a reset also serves as an acknowledgement.

Vertex software tracks the amount of Chemcassette® tape remaining on the supply reel and triggers a low tape event when less than 24 hours of tape remain. Choosing “Ignore Low ChemC. Alert” disables the low tape event.



Events / Alarms

Vertex Options

- ☐ Non-Latching Gas Alarm Relays
- ☑ All events require User Ack
- ☐ Inverted Gas Alarm Relays
- ☐ Ignore Low ChemC. Alert
- ☐ 2 mA indicates Fault

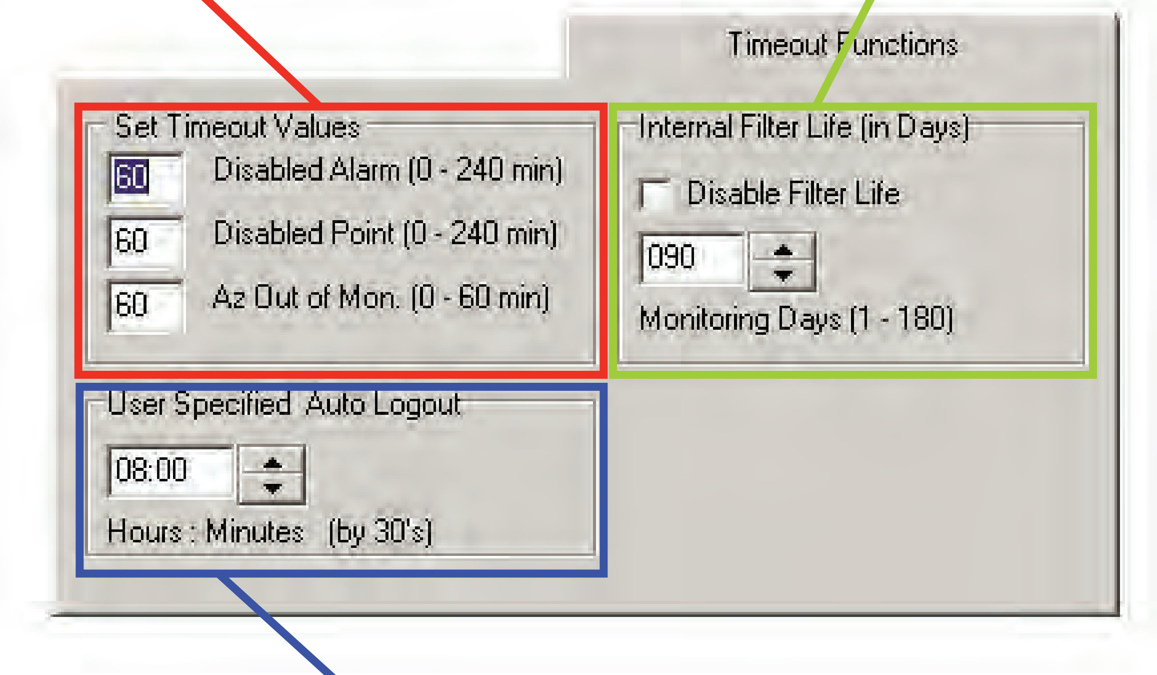
Disabled Alarm Action

- ● Gas Relays Disabled
- ○ Full (No Gas Events)

**Disabled Alarm Action - Gas Relays Disabled or Full (No Gas Events)**
This setting effects the operation when alarms are disabled using the Runtime Options screen. If “Full” is selected, Vertex will not generate an alarm event for the affected point(s) and none of the associated actions such as relay actuation will occur. Otherwise, the alarm events will be generated normally when using data output options but, the alarm relays ONLY will not be activated in response to the event. When utilizing data output options, it is highly recommended that “Full” be selected to prevent unnecessary alarms.

**Set Timeout Values**
Authorized users may temporarily disable alarms from activating and points from monitoring. A point or alarm that is disabled longer than the timeout limit will cause a maintenance fault which will call attention to locations excluded from monitoring. Enter a period of time up to displayed minutes or 0 to disable the maintenance fault.

**Internal Filter Life (in Days)**
Set the number of days the filters will last before they need to be replaced. When the target is reached, this setting will trigger a maintenance fault to replace filter.

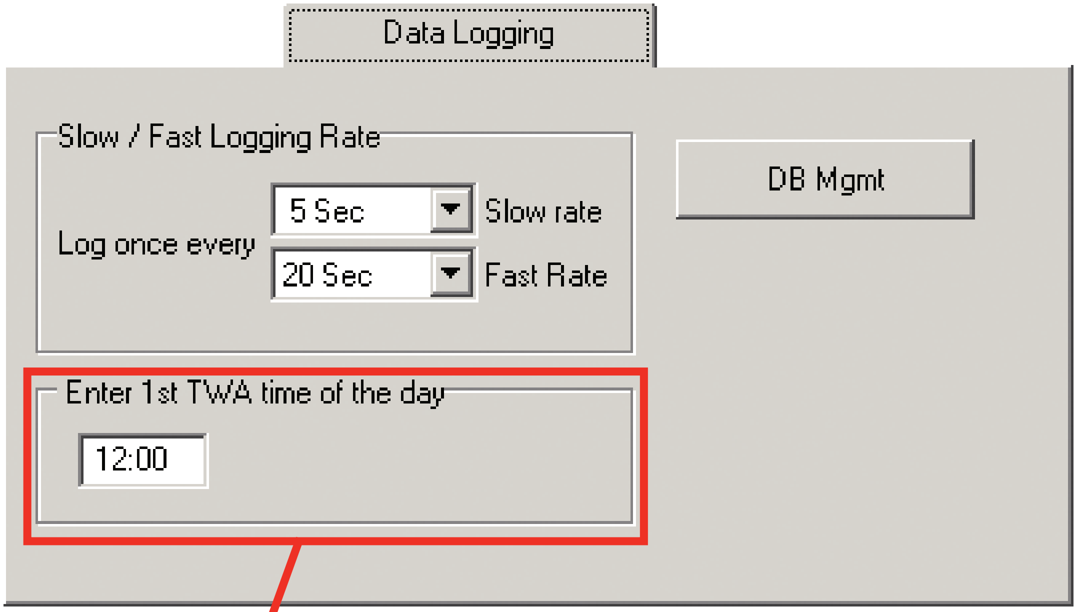


Set Timeout Values
60 Disabled Alarm (0 - 240 min)
60 Disabled Point (0 - 240 min)
60 Az Out of Mon. (0 - 60 min)

Internal Filter Life (in Days)
☐ Disable Filter Life
090
Monitoring Days (1 - 180)

User Specified Auto Logout
08:00
Hours : Minutes (by 30's)

**User Specified Auto Logout**
Users remain logged in until the auto logout period lapses. The auto logout period ranges from 30 minutes to 24 hours. A warning displays prior to auto logout.



Slow / Fast Logging Rate

Log once every 5 Sec Slow rate

20 Sec Fast Rate

Enter 1st TWA time of the day

12:00

**1st TWA Time**

Use to set times for the beginning and end of each 8-hour, Time Weighted Average (TWA) period. Use this option to associate the TWA periods with shifts or any other regular event. The system calculates and displays the TWA after each 8-hour TWA cycle.

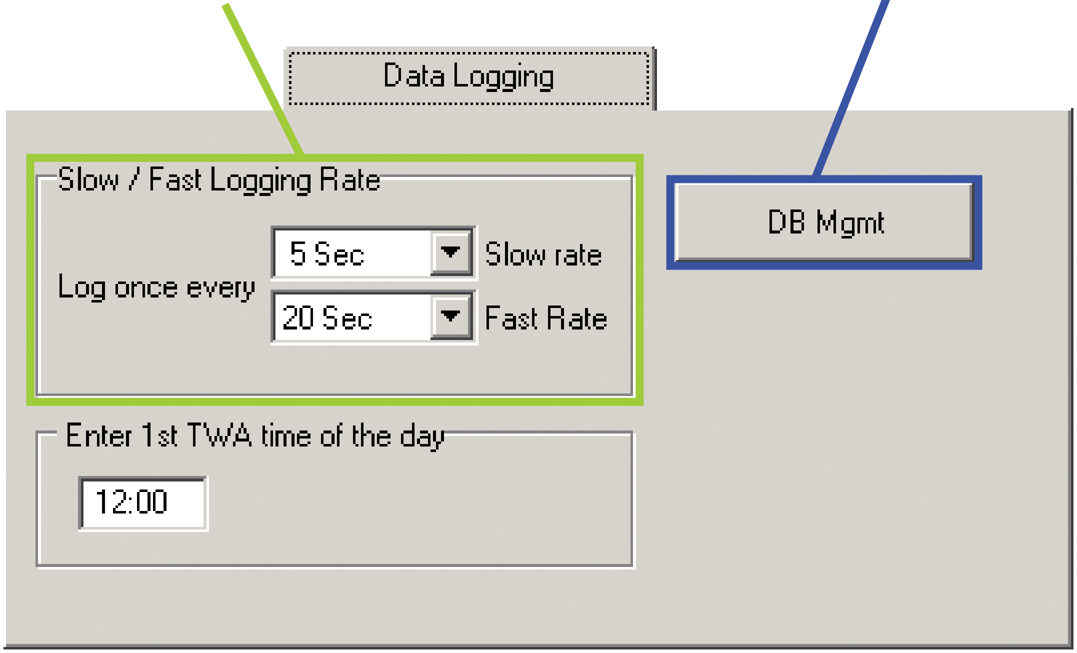
The default setting is 04:00 indicating that the Vertex will run three successive TWA periods from 04:00 to 11:59, 12:00 to 19:59, 20:00 to 03:59. Remember, the Vertex System uses a 24-hour clock. For example, to set the first TWA to 3:00 P.M., enter 15:00. If you view the profile information for this example, you will see the TWA End At Time is 07:00/15:00/23:00. The system automatically sets the beginning times of the second and third TWA periods at 8-hour intervals from the time entered for the first TWA period.

**Logging Rate**

The Logging Rate option sets the frequency that Vertex enters gas concentration data into the database. The system logs data at a slow rate unless a gas concentration rises above the threshold set in the point configuration window. Once the concentration reaches the threshold, Vertex logs at a faster rate. Logging period options are 5, 10, 30, 60, or 120 seconds for the slow rate and 5, 10, 15, 20, 30, or 45 seconds for the fast rate. (See Section 3.7.4, Configure Point, for instructions to set logging frequency.)

**DB Management**

Sets the time period to maintain historical event and concentration data before purging. Set the purge period in Database Management to prevent a large number of records to accumulate.



Log once every: 5 Sec (Slow rate), 20 Sec (Fast Rate)

Enter 1st TWA time of the day: 12:00

**Note:**

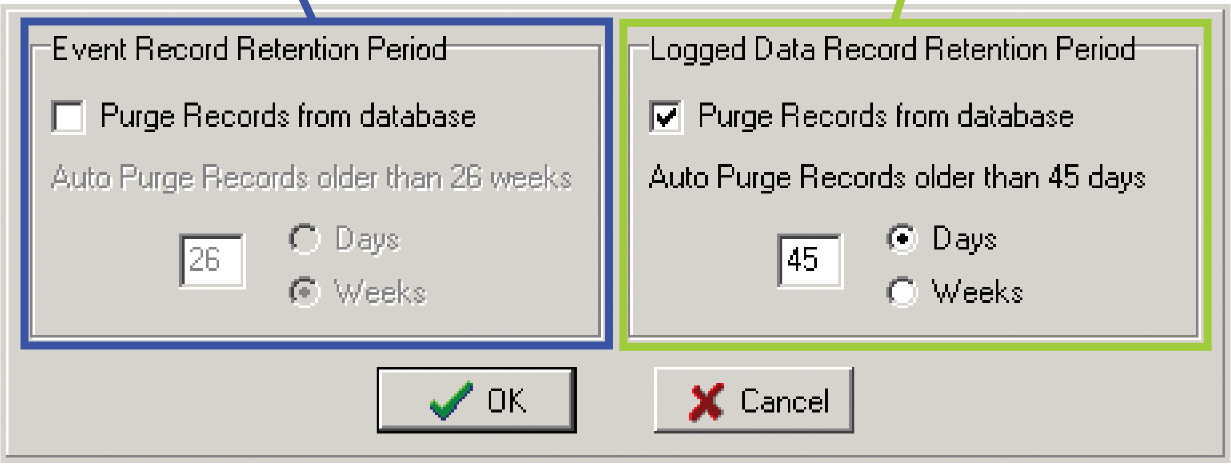
Setting the Vertex System to continuously log concentration data on a nine-analyzer system requires approximately 35 megabytes of disk storage per day at the fastest logging rate of once every 5 seconds. Purge data often to avoid filling available disk space.

### Database Management-Retention Periods

Retention periods are selected as either days or weeks. Valid entries for the period are positive numbers from 1-99. Vertex will not recalculate the values when the unit is changed. For example, if the purge period is 14 days and you change “days” to “weeks”, Vertex will set the period to 14 weeks. Vertex performs the record purge as the data acquisition computer clock passes midnight.

**Event Record Retention Period**
When selected, Vertex automatically purges events from the database after the designated period.

**Logged Data Record Retention Period**
When selected, Vertex automatically purges concentration records from the database after the designated period.



Event Record Retention Period

☐ Purge Records from database

Auto Purge Records older than 26 weeks

26 ○ Days ● Weeks

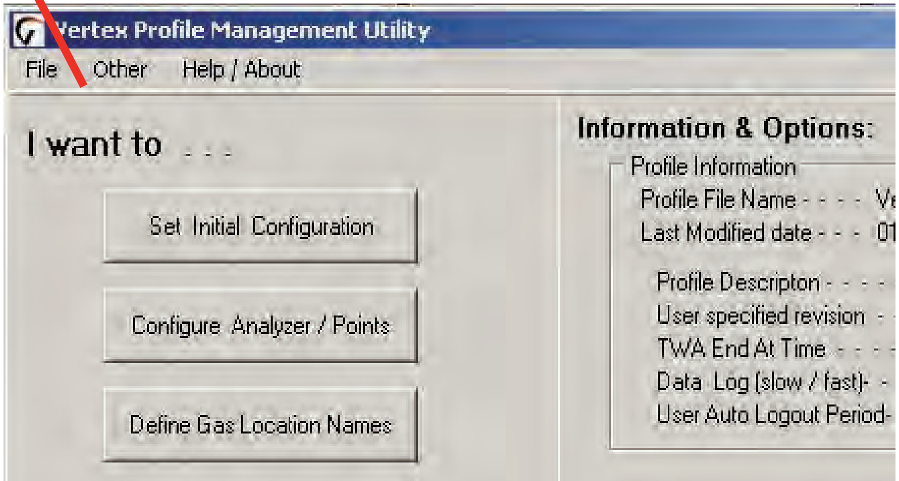
Logged Data Record Retention Period

☑ Purge Records from database

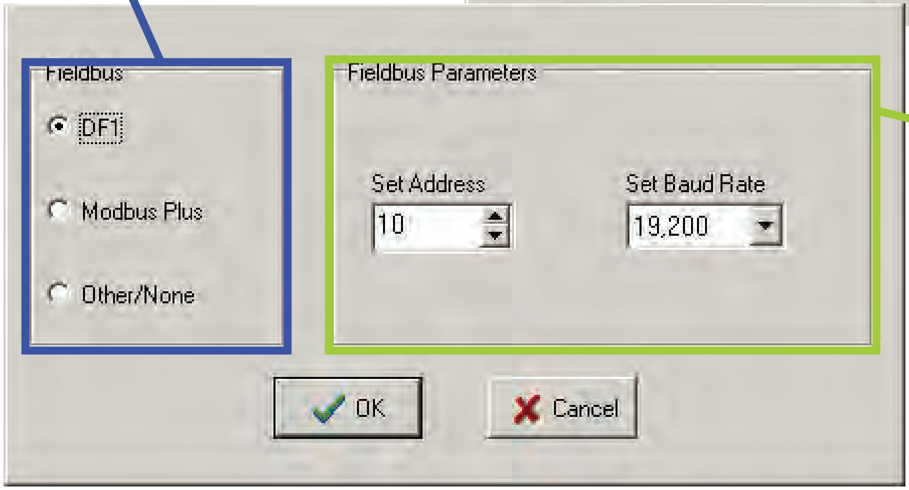
Auto Purge Records older than 45 days

45 ● Days ○ Weeks

**20 mA PLC Installed**
An optional 20 mA current-loop alarm system is available from Honeywell Analytics. A separate cabinet houses the 20 mA PLC (programmable logic controller). Choose “20 mA PLC Installed” if this option is part of your system. Connecting relays and current loop outputs is covered by the manual for the PLC modules.


Vertex Profile Management Utility
File
Other
Help / About
I want to . . .
Set Initial Configuration
Configure Analyzer / Points
Define Gas Location Names
Information & Options:
Profile Information
Profile File Name - - - Ve
Last Modified date - - - 01
Profile Descripton - - - -
User specified revision -
TWA End At Time - - -
Data Log (slow / fast)- -
User Auto Logout Period-

**Fieldbus**
Use this setting to select the PLC network interface that is installed.


Fieldbus
Fieldbus Parameters
OK
Cancel

Fieldbus:
● DF1
○ Modbus Plus
○ Other/None

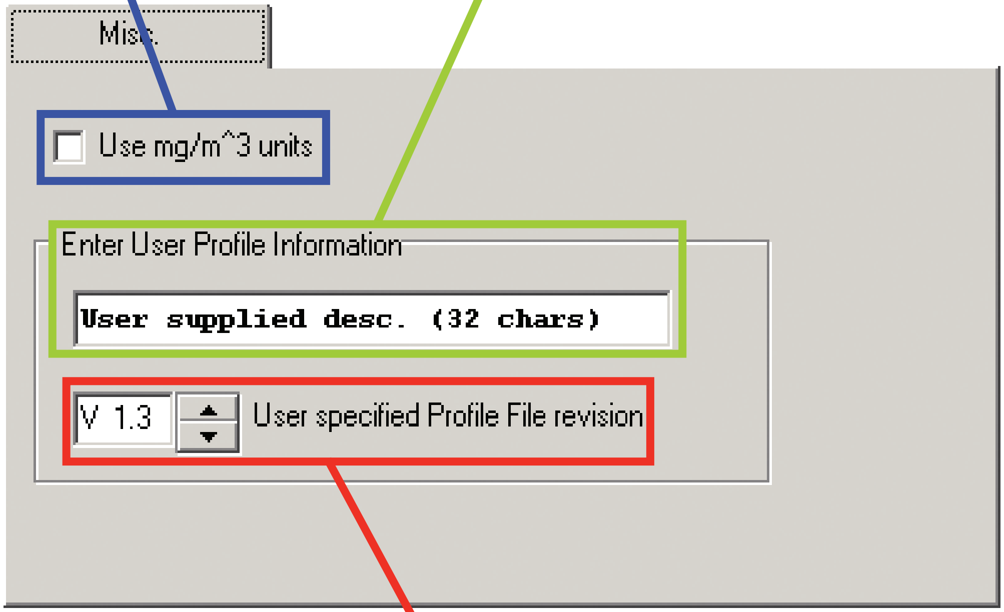
Set Address: 10

Set Baud Rate: 19,200

**Fieldbus Parameters**
These settings allow the user to change network specific parameters such as address and baud rate

**Use mg/m3 units**
Select to display concentrations in milligrams per cubic meter. If this option is not selected, Vertex displays concentrations in parts-per-million (ppm) or parts-per-billion (ppb).

**Profile Description**
Enter a descriptive name for the configuration profile. You may use up to 32 characters.



☐ Use mg/m^3 units

Enter User Profile Information

User supplied desc. (32 chars)

V 1.3 User specified Profile File revision

**User File Rev**
Allows the user to assign a revision number to a configuration profile. The profile revision number is not associated with software version numbers.

### 3.7.1 Define Gas Location

Use Define Gas Location to edit the list of locations. Assign a long and a short name for each location.

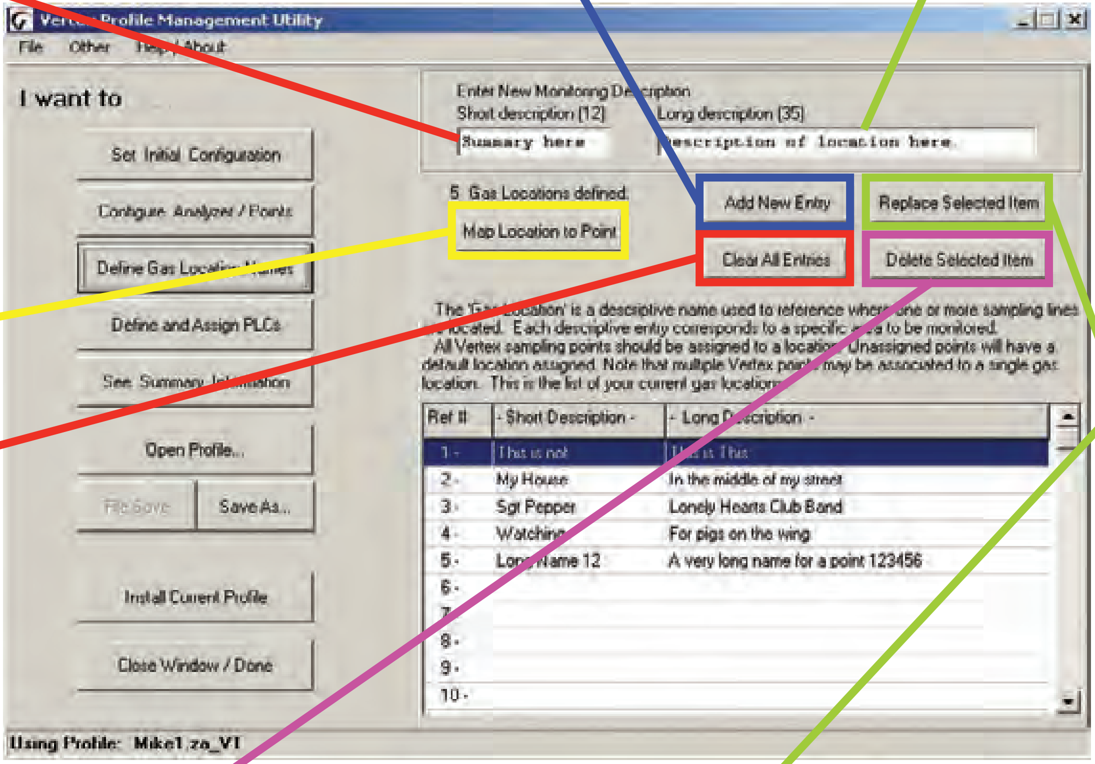
**Short names**
Enter up to 12 characters. Vertex displays the short name where space does not permit the display of the long name.

**Map Location To Point**
Brings up Location Map window.

**Clear All Entries**
Clears every entry in the list.

**Add New Entry**
Creates a new entry in the gas location list using the entered short and long names.

**Long names**
Enter up to 35 characters.


Vertex Profile Management Utility
File
Other
Help / About
I want to
Set Initial Configuration
Configure Analyzer / Points
Define Gas Location Names
Define and Assign PLCs
See Summary Information
Open Profile...
File Save
Save As...
Install Current Profile
Close Window / Done
Add New Entry
Replace Selected Item
Clear All Entries
Delete Selected Item
Map Location to Point

Enter New Monitoring Description

Short description (12): Summary here

Long description (35): Description of location here

5 Gas Locations defined.

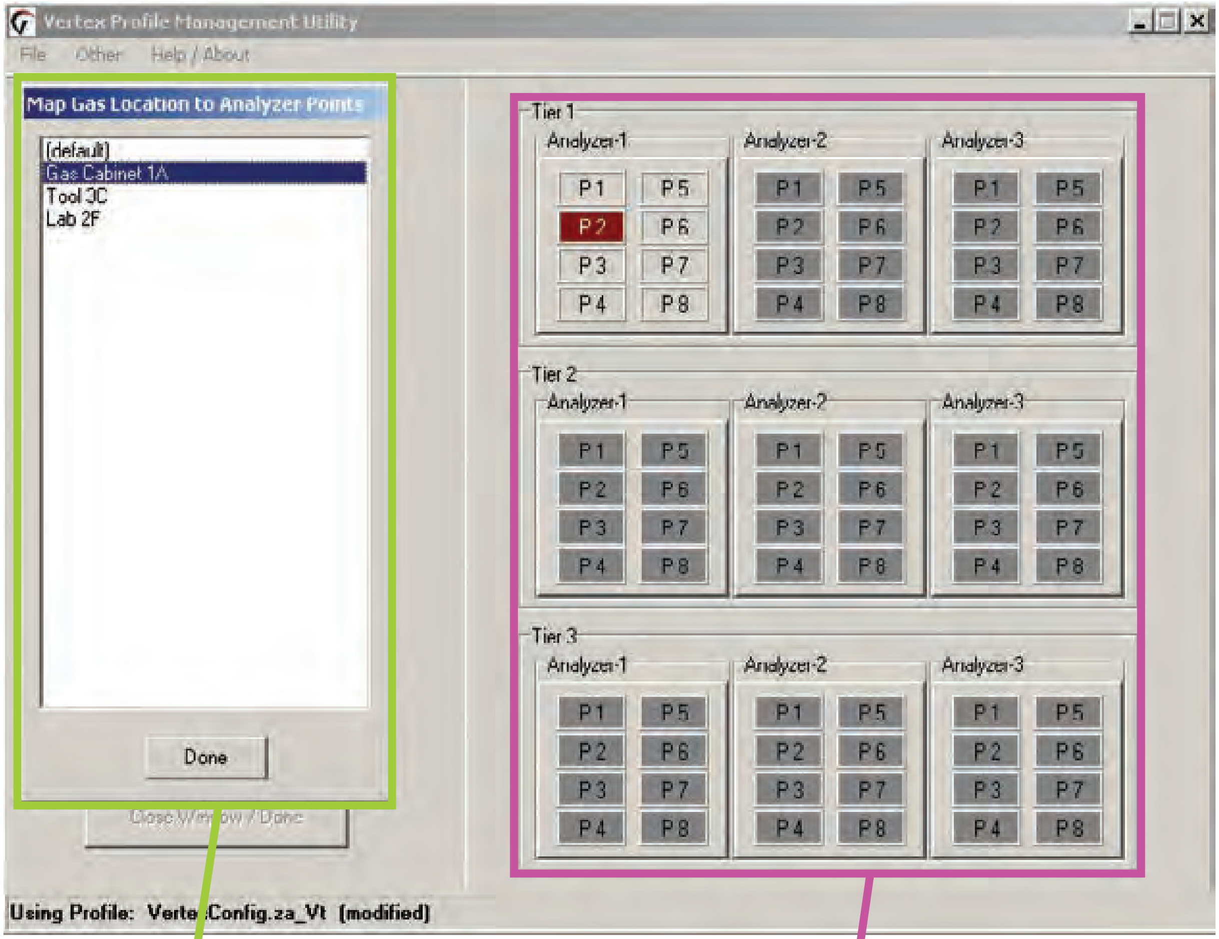
The 'Gas Location' is a descriptive name used to reference where one or more sampling lines are located. Each descriptive entry corresponds to a specific area to be monitored.
All Vertex sampling points should be assigned to a location. Unassigned points will have a default location assigned. Note that multiple Vertex points may be associated to a single gas location. This is the list of your current gas locations.

| Ref # | - Short Description - | - Long Description - |
|---|---|---|
| 1 - | This is not | This is This |
| 2 - | My House | In the middle of my street |
| 3 - | Sgt Pepper | Lonely Hearts Club Band |
| 4 - | Watching | For pigs on the wing |
| 5 - | Long Name 12 | A very long name for a point 123456 |
| 6 - | | |
| 7 - | | |
| 8 - | | |
| 9 - | | |
| 10 - | | |

Using Profile: Mike1.za_VI

**Delete Selected Item**
Removes the selected line from the location list.

**Replace Selected Item**
Replaces the selected line in the gas location list with the information in the short and long name text boxes.


Vertex Profile Management Utility
File
Other
Help / About
Map Gas Location to Analyzer Points
(default)
Gas Cabinet 1A
Tool 3C
Lab 2F
Done
Close Window / Done
Tier 1
Tier 2
Tier 3
Analyzer-1
Analyzer-2
Analyzer-3
P 1
P 2
P 3
P 4
P 5
P 6
P 7
P 8

Using Profile: VertexConfig.za_Vt (modified)

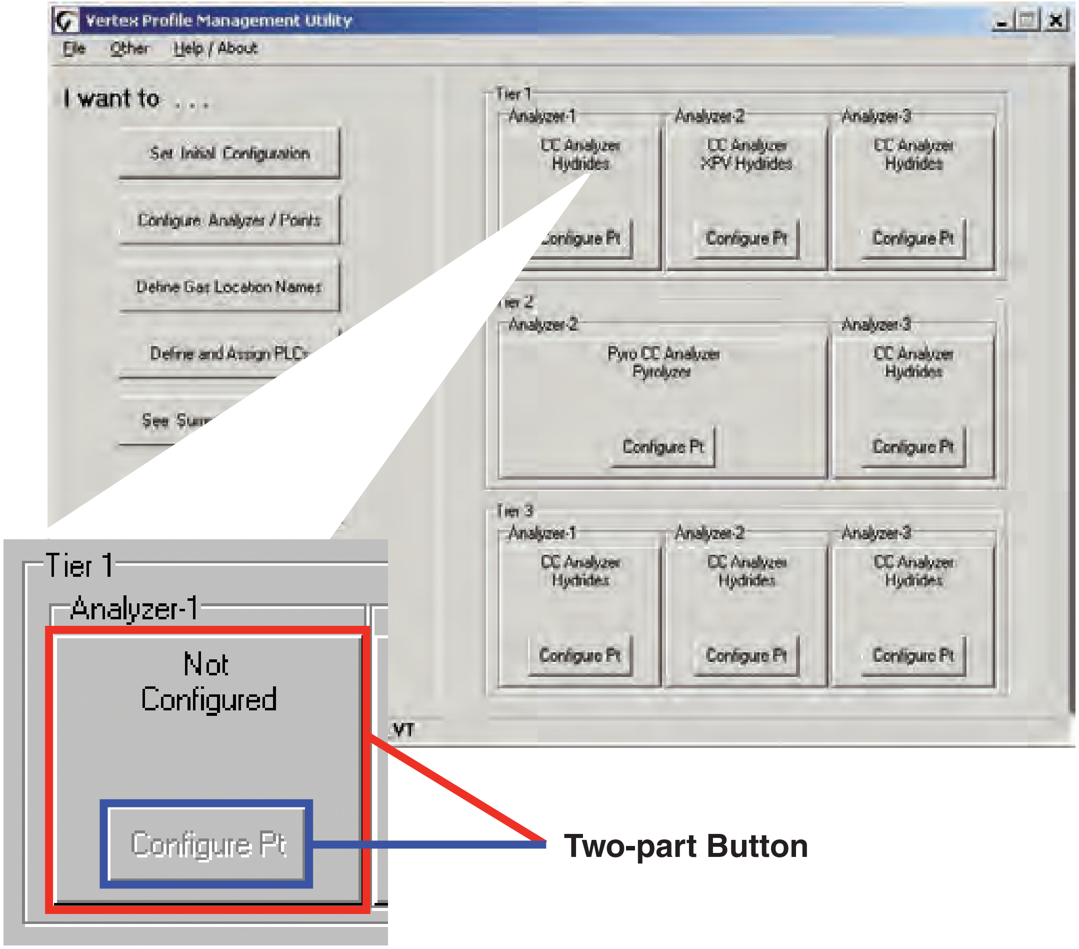
**Gas Location List**
Select desired gas location from this list. For points with no assigned location, select (default). Points assigned to default location will automatically be given location names based on the point's position in the Vertex.

**Point Map**
Select point to add or remove it from the selected location. Up to 3 points can be assigned to each location.

## 3.7.2 Configure Analyzers and Points

Press “Configure Analyzer/Points” to change the right side of the Configuration window to a display representing physical layout of the Vertex System. Each slot is represented by a two-part button.

When you have configured an analyzer, the top of the button displays the type of analyzer and the gas family. The bottom of the button is a second button for configuring each point within the analyzer.


Vertex Profile Management Utility
File
Other
Help / About
I want to . . .
Set Initial Configuration
Configure Analyzer / Points
Define Gas Location Names
Define and Assign PLCs
See Sum
Tier 1
Analyzer-1
CC Analyzer Hydrides
Configure Pt
Analyzer-2
CC Analyzer XPV Hydrides
Configure Pt
Analyzer-3
CC Analyzer Hydrides
Configure Pt
Tier 2
Analyzer-2
Pyro CC Analyzer Pyrolyzer
Configure Pt
Analyzer-3
CC Analyzer Hydrides
Configure Pt
Tier 3
Analyzer-1
CC Analyzer Hydrides
Configure Pt
Analyzer-2
CC Analyzer Hydrides
Configure Pt
Analyzer-3
CC Analyzer Hydrides
Configure Pt
VT
Tier 1
Analyzer-1
Not Configured
Configure Pt

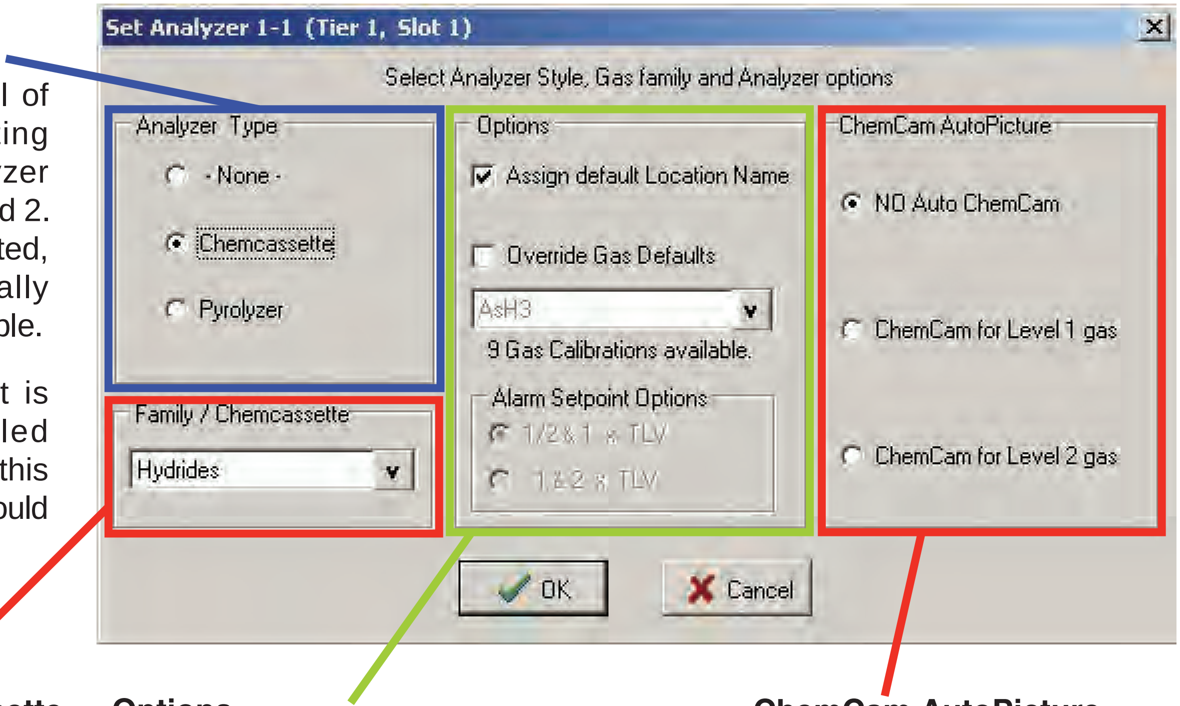
**Two-part Button**

## 3.7.3 Set Analyzer Window

To configure the type of analyzer slot, press the top of the button representing the slot. The Set Analyzer Window opens.

**Analyzer Type**
Choose the model of analyzer populating the slot. A pyrolyzer takes up slots 1 and 2. If pyrolyzer is selected, slot 1 automatically becomes unavailable.

Any analyzer that is physically installed but configured on this screen to "None" should be de-energized.



Set Analyzer 1-1 (Tier 1, Slot 1)

Select Analyzer Style, Gas family and Analyzer options

Analyzer Type
- ○ - None -
- ● Chemcassette
- ○ Pyrolyzer

Family / Chemcassette: Hydrides

Options
- ☑ Assign default Location Name
- ☐ Override Gas Defaults

AsH3

9 Gas Calibrations available.

Alarm Setpoint Options
- ● 1/2 & 1 x TLV
- ○ 1 & 2 x TLV

ChemCam AutoPicture
- ● NO Auto ChemCam
- ○ ChemCam for Level 1 gas
- ○ ChemCam for Level 2 gas

**Family/Chemcassette**
Choose the family of target gases. Target gases for all eight points in the analyzer must be in the same family of gases

**Options**
When you choose a family of gases, Vertex enters default settings into the profile. Selecting "Override Defaults" allows you to change the target gas type, alarm levels and the location assignment. For more information, see the Detectable Gases table (Section C).

**ChemCam AutoPicture**
If the optional ChemCams are installed, select under what condition a picture of the Chemcassette® stain will be automatically taken.

### ChemCam AutoPicture

When either ChemCam for Level 1 or Level 2 gas is selected, a gas alarm signals the Vertex System to store a picture of the stain the next time it advances the Chemcassette® tape. When the tape advances, the tape stops with the stain under the camera, the ChemCam takes a picture and then advance continues. The ChemCam field of view is only wide enough to capture four points on one picture. See Section 4.5.3, Optional ChemCam, for additional information on ChemCam features and functions.

**Note:**

- This activity will consume additional tape
- Some faint stains may not be visible via the camera

## 3.7.4 Configure Point

The Configure Point window provides the following options for each point:

- Select the specific target gas
- Designate the location of the target gas
- Set alarm levels
- Enable/disable point
- Configure concentration logging
- Configure point-specific event help
- Set PLC full-scale concentration

When all of the entries are correct for the point, use either the point selection buttons or choose Next Point/Last Point to scroll to the next point in the analyzer. Press Done when all settings are entered.

### Lower Detection Limit (LDL) level

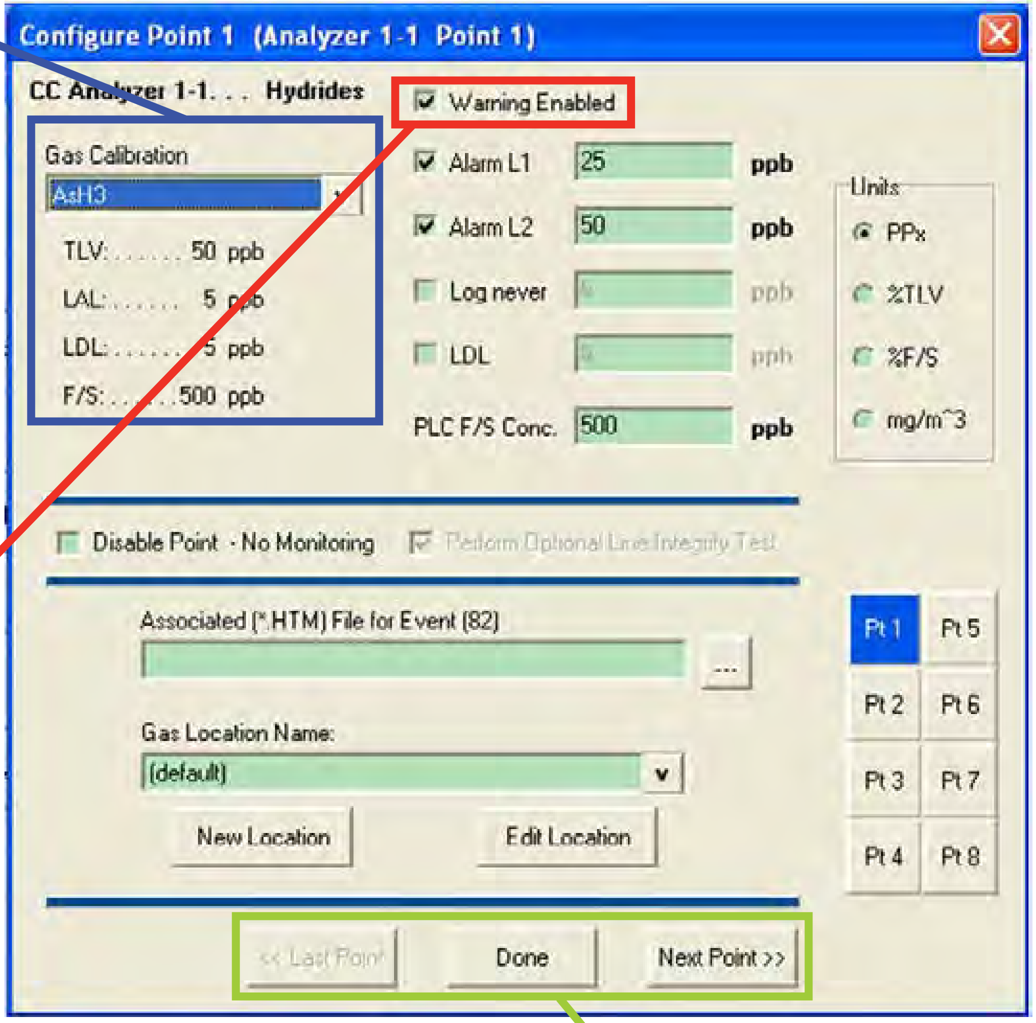
The monitor loads the default LDL level when a target gas is chosen. See Appendix C - Detectable Gases for a list of default LDL levels. The user-configured LDL can be disabled by unchecking the checkbox. When the user-configured LDL is disabled, the Vertex system will use the default LDL level. A new level may be entered only within the range of the Vertex detection system.

Make the gas assignments before changing the LDL level. Changing the gas automatically resets LDL level settings to the factory defaults. The Vertex system will not allow invalid or inappropriate entries to be made while setting the LDL level.

These are examples of invalid attempts that will be rejected:

- LDL level setting is greater than half of TLV level
- LDL level setting is smaller than default LDL level
- LDL level setting is greater than alarm 1 setting or alarm 2 setting
- LDL level setting is greater than concentration logging setting level
- LDL level setting is greater than PLC F/S Conc. setting level.

**Gas Calibration**
Select the target gas from the dropdown list. Only the gases valid for the family of gases chosen for the designated tape will appear.



Configure Point 1 (Analyzer 1-1 Point 1)

CC Analyzer 1-1. . . Hydrides

Gas Calibration: AsH3

TLV: . . . . . . . 50 ppb

LAL: . . . . . . . 5 ppb

LDL: . . . . . . . 5 ppb

F/S: . . . . . . .500 ppb

☑ Warning Enabled

☑ Alarm L1: 25 ppb

☑ Alarm L2: 50 ppb

☐ Log never: ppb

☐ LDL: ppb

PLC F/S Conc.: 500 ppb

Units: ● PPx ○ %TLV ○ %F/S ○ mg/m^3

☐ Disable Point - No Monitoring

☑ Perform Optional Line Integrity Test

Associated (*.HTM) File for Event (82):

Gas Location Name: (default)

Warning
Select Warning to create an alarm when a gas concentration exceeds the Lower Detection Limit (LDL). See Appendix C - Detectable Gases, for a complete list of LDLs. Warnings appear as a "W" on the main screen with no relay actions.

Last Point / Done / Next Point Buttons

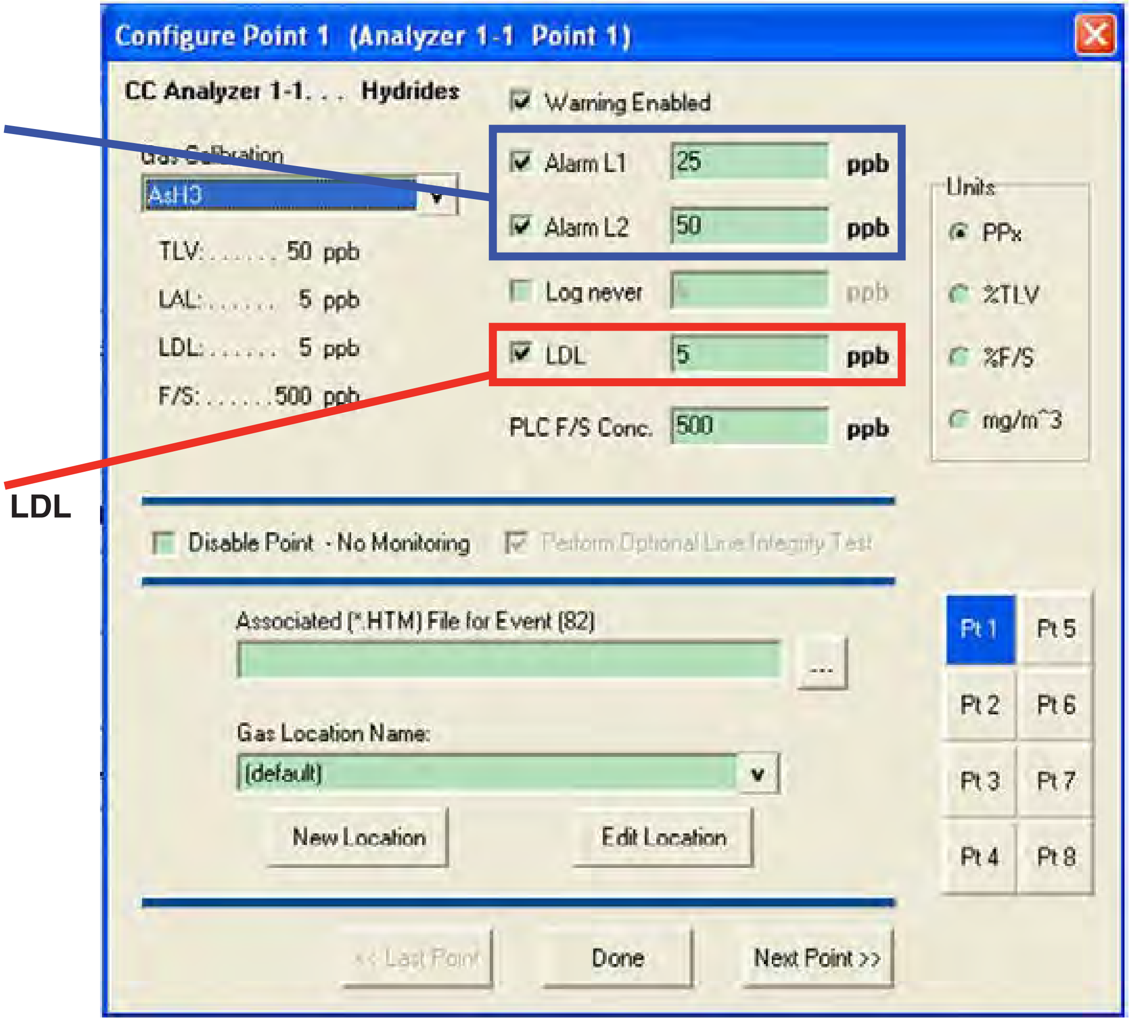
### Alarm Level 1 and Alarm Level 2

Vertex loads default alarm levels when you choose a target gas. See Appendix C - Detectable Gases, for a list of default alarm levels. You may enter new levels only within the range of the Vertex detection system.

Make the gas assignments before changing alarm levels. Changing the gas automatically resets alarm level settings to the factory defaults.

The Vertex System will not allow you to make invalid or inappropriate entries while setting alarm levels. Following are three examples of invalid attempts the Vertex System will reject:

- The alarm setting for Alarm Level 1 is greater than the setting for Alarm Level 2
- An alarm setting is less than the lowest alarm level for that target gas
- An alarm setting is greater than the full scale for that target gas



Alarm Level 1
Alarm Level 2

User-programmable LDL
(see page 3-25)

Configure Point 1 (Analyzer 1-1 Point 1)

CC Analyzer 1-1. . . Hydrides

Gas Calibration: AsH3

TLV: . . . . . . . 50 ppb
LAL: . . . . . . . 5 ppb
LDL: . . . . . . . 5 ppb
F/S: . . . . . . .500 ppb

☑ Warning Enabled
☑ Alarm L1 25 ppb
☑ Alarm L2 50 ppb
☐ Log never 5 ppb
☑ LDL 5 ppb
PLC F/S Conc. 500 ppb

Units
● PPx
○ %TLV
○ %F/S
○ mg/m^3

☐ Disable Point - No Monitoring
☑ Perform Optional Line Integrity Test

Associated (*.HTM) File for Event (82)

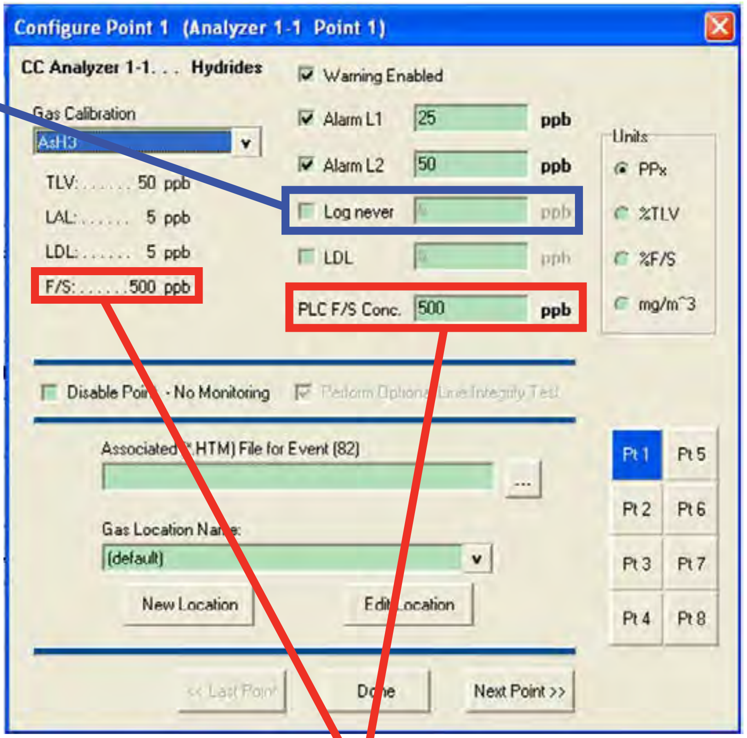
Gas Location Name: (default)

...
New Location
Edit Location
Pt 1
Pt 5
Pt 2
Pt 6
Pt 3
Pt 7
Pt 4
Pt 8
<< Last Point
Done
Next Point >>

**Log never/Log always/Log if**
This option sets the frequency that Vertex enters data into the data log.

**Note:**

> Setting the Vertex System to continuously log concentration data on a nine-analyzer system requires approximately 35 megabytes of disk storage per day. Purge data often to avoid filling available disk space.



Configure Point 1 (Analyzer 1-1 Point 1)

CC Analyzer 1-1. . . Hydrides

Gas Calibration: AsH3

TLV: . . . . . . . 50 ppb
LAL: . . . . . . . 5 ppb
LDL: . . . . . . . 5 ppb
F/S: . . . . . . .500 ppb

☑ Warning Enabled
☑ Alarm L1 25 ppb
☑ Alarm L2 50 ppb
☐ Log never ppb
☐ LDL ppb
PLC F/S Conc. 500 ppb

Units: ● PPx ○ %TLV ○ %F/S ○ mg/m^3

☐ Disable Point - No Monitoring
☑ Perform Optional Line Integrity Test

Associated (*.HTM) File for Event (82)

Gas Location Name: (default)

| | Log Always | Log if >= | Log Never |
|---|---|---|---|
| If concentration is below configured threshold | logs at slow rate | not logged | not logged |
| If concentration is equal to or greater than configured threshold | logs at fast rate | logs at fast rate | not logged |

**PLC F/S Conc. (Data Output)**
Calibrates the Vertex current loop output or data concentration bits to correlate to the customer-specified output range (i.e.; milliamp output scaling or data output scaling to external PLC). The default value sets the full-scale point to the full-scale value of the gas calibration.

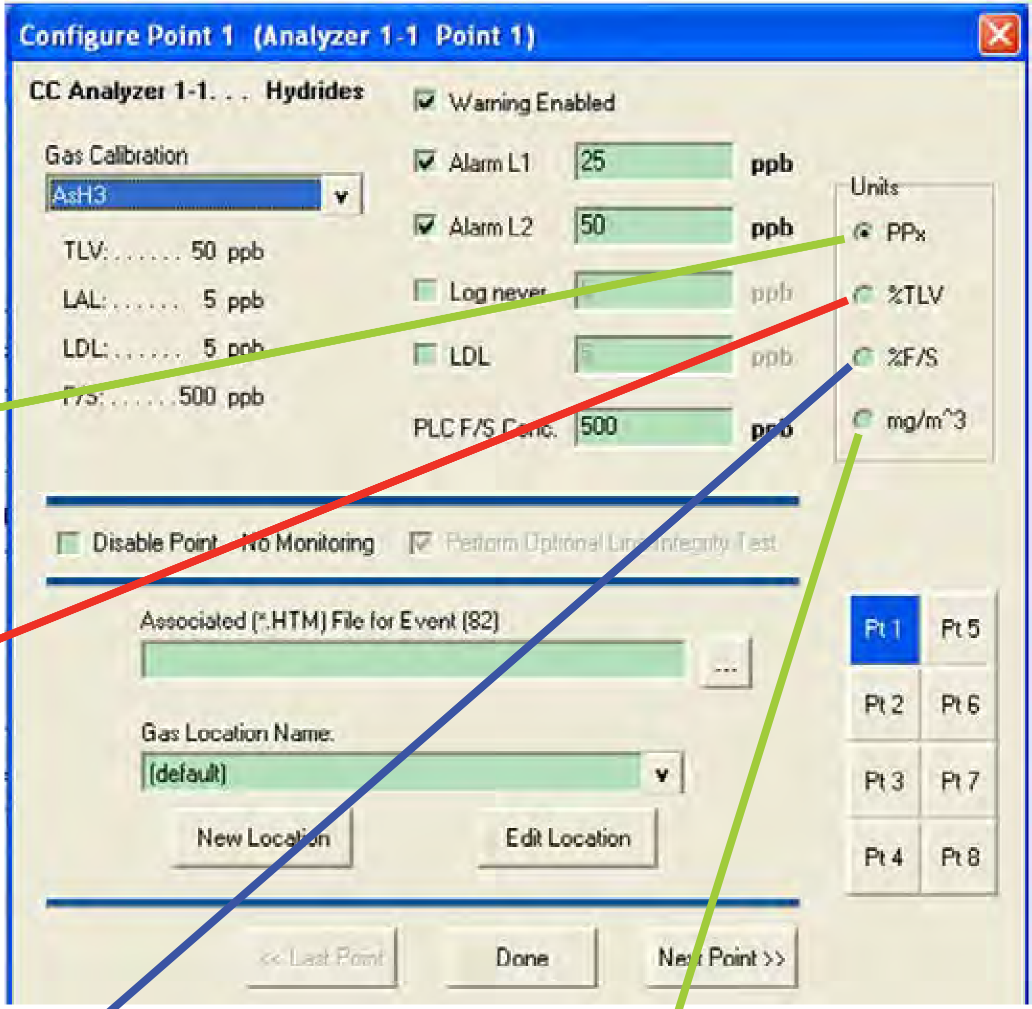
**Units**
Selects the unit of measure to display target gas concentrations. This selection applies to this screen only and does not effect displays during normal operation or events.

**Unit choices are:**

**PPx**
Parts-per-million or parts-per-billion.

See Appendix C - Detectable Gases, for definition.

**%TLV**
Displays target gas as a percentage of the threshold limit value. See Appendix C - Detectable Gases, for a list of the TLV for each target gas.



Configure Point 1 (Analyzer 1-1 Point 1)

CC Analyzer 1-1. . . Hydrides

Gas Calibration: AsH3

TLV: ....... 50 ppb
LAL: ....... 5 ppb
LDL: ....... 5 ppb
F/S: ....... 500 ppb

☑ Warning Enabled
☑ Alarm L1 25 ppb
☑ Alarm L2 50 ppb
☐ Log never ppb
☐ LDL 5 ppb
PLC F/S Conc. 500 ppb

Units
● PPx
○ %TLV
○ %F/S
○ mg/m^3

☐ Disable Point - No Monitoring
☑ Perform Optional Line Integrity Test

Associated (*.HTM) File for Event (82)

Gas Location Name: (default)

**%F/S**
Displays target gas concentration as a percentage of the full-scale concentration. See Detectable Gases, for a list of the full-scale concentration for each target gas.

**mg/m3**
Displays gas concentration in milligrams per cubic meter.

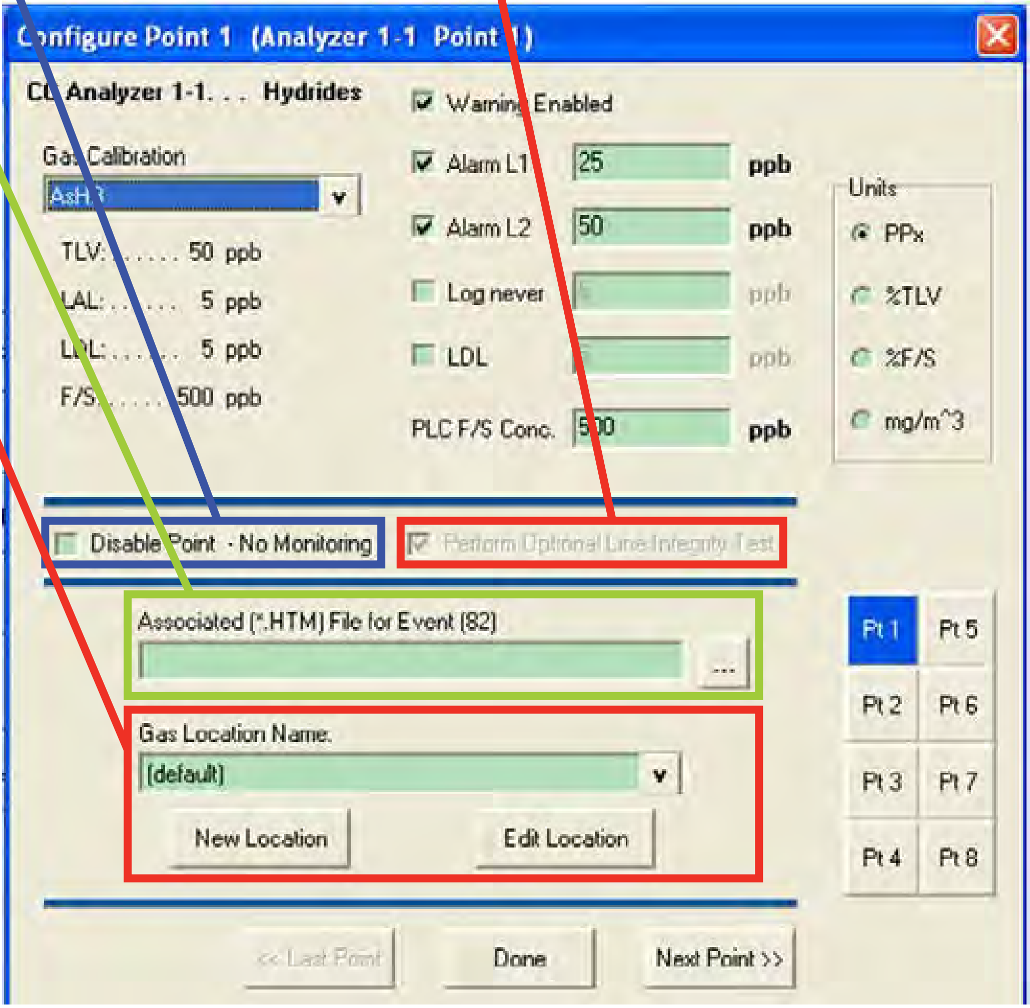
**Disable Point**
**No Monitoring**
Select “Disable Point” for points not needed.

**Associated (*.HTM) File**
You may link a user-generated HTML file to this point. Either type in the file name or touch the browse (…) button to bring up a file selection window.

**Gas Locations**
Use this field to label the location the point is monitoring. You may assign a name by one of three methods:

- Choose a name from the location list. See “Define Gas Location” for entering names in the list.
- Edit the selected location.
- Create a new location.

**Perform Optional Line Integrity Test**
Check this box to perform a sample line integrity test. See Appendix G - Line Intergrity Test Option



Configure Point 1 (Analyzer 1-1 Point 1)

CC Analyzer 1-1. . . Hydrides

Gas Calibration: AsH3

TLV: . . . . . 50 ppb
LAL: . . . . . 5 ppb
LDL: . . . . . 5 ppb
F/S: . . . . . 500 ppb

☑ Warning Enabled
☑ Alarm L1 25 ppb
☑ Alarm L2 50 ppb
☐ Log never 5 ppb
☐ LDL 5 ppb
PLC F/S Conc. 500 ppb

Units
● PPx
○ %TLV
○ %F/S
○ mg/m^3

☐ Disable Point - No Monitoring
☑ Perform Optional Line Integrity Test

Associated (*.HTM) File for Event (82)

Gas Location Name: (default)

### Generate Window Zero Reset Faults

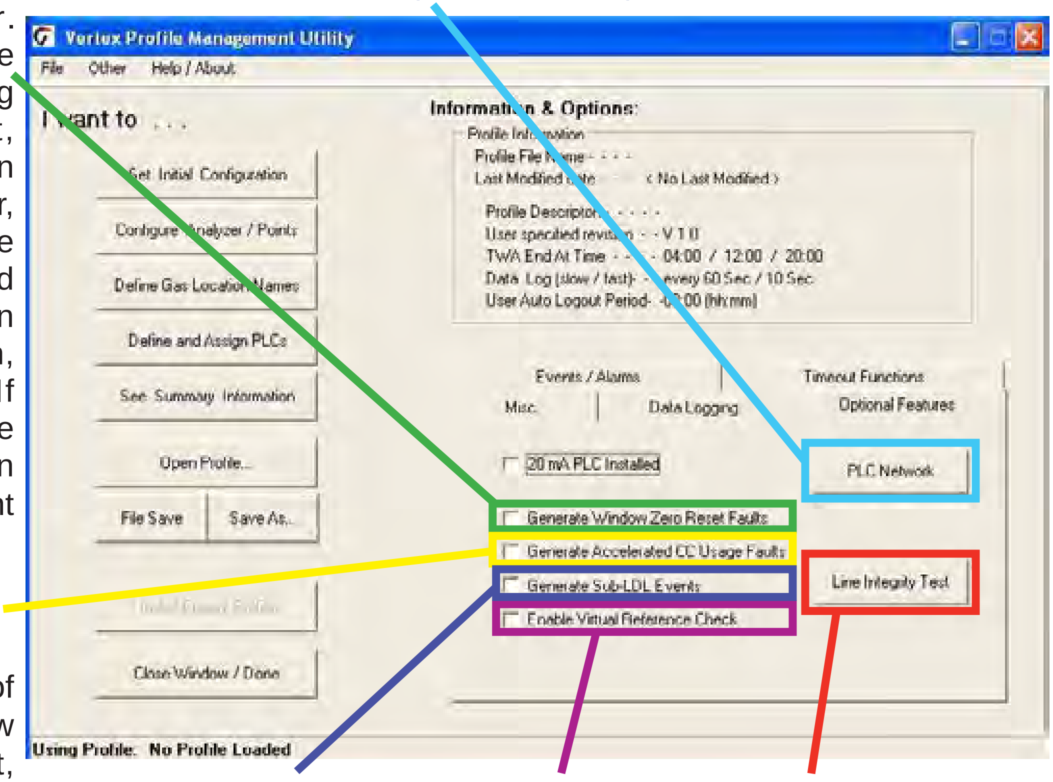
Window Zero Reset events are generated when unusual optics readings occur. Usually these are one-time events and present no long term issues. By default, these events generate an informational event. However, these events can sometime indicate conditions that could lead to a false concentration readings. For that reason, this option is provided. If selected, a maintenance fault will be generated when a Window Zero Reset event occurs.

### Generate Accelerated CC Usage Faults

If a low background level of gas is present that is below the lower detectable limit, a stain can develop on the tape while the Vertex reports zero concentration. This can cause the Chemcassette to be used up faster than expected. If the option is enabled, a maintenance fault will be generated if this condition exists.

### PLC Network

For setting communication parameters for the optional PLC Network interface. F.8 DF1 Interface (P/N1295-0343)
F.9 Modbus Plus Interface (P/N1295-0330)


Vertex Profile Management Utility
File
Other
Help / About
I want to . . .
Get Initial Configuration
Configure Analyzer / Points
Define Gas Location Names
Define and Assign PLCs
See Summary Information
Open Profile...
File Save
Save As...
Initial Preset Profile
Close Window / Done
Information & Options:
Profile Information
Events / Alarms
Timeout Functions
Misc.
Data Logging
Optional Features
PLC Network
Line Integrity Test
Using Profile: No Profile Loaded

Profile File Name - - - -
Last Modified Date - < No Last Modified >
Profile Description - - - - -
User specified revision - - V 1.0
TWA End At Time - - - - 04:00 / 12:00 / 20:00
Data Log (slow / fast) - every 60 Sec / 10 Sec
User Auto Logout Period - 00:00 (hh:mm)

☐ 20 mA PLC Installed
☐ Generate Window Zero Reset Faults
☐ Generate Accelerated CC Usage Faults
☐ Generate Sub-LDL Events
☐ Enable Virtual Reference Check

### Generate Sub-LDL Events

**Generates a warning alarm with 0 ppb/ppm concentration that may indicate the presence of gas below LDL.**

### Virtual Reference Function

See the following page.

### Line Integrity Test

Displays the optional Line Integrity Test configuration utility. See Appendix G - Line Integrity Option.

## Virtual Reference Function

The Virtual Reference option reduces the possibility that a non-gas event will result in a concentration or alarm. When enabled, it maintains a record of specific instrument operation and, in the event of a reading ¼ TLV or above, executes a confirmation before the concentration or alarm is issued. Once confirmed, measurements for the same event will not be affected. See software 1.25.5 release technote for further information.

The Virtual Reference function is user configurable by rack (it is disabled by default). It reduces the possibility that a non-gas event will result in a concentration or alarm. See the following table for the number of windows used and the time to confirm an event.

| Chemcassette | Number of Windows Pulled | Time to confirm (sec) |
|---|---|---|
| Hydrides | 3 | 15-25 |
| XP Hydrides | 3 | 15-25 |
| Mineral Acids | 6 | 30-40 |
| Cl2/Oxidizers (NO2) | 6 | 30-40 |
| Mineral Acids (Pyro) | 6 | 30-40 |
| Phosgene | 6 | 30-40 |
| XP Phosgene | 6 | 30-40 |
| Aliphatic Amines | 3 | 15-25 |
| Cl2/Oxidizers-III | 6 | 30-40 |
| Hydrogen Cyanide | 3 | 15-25 |
| Hydrogen Sulfide | 3 | 15-25 |
| XPVChlorine | 6 | 30-40 |
| Fluorine/Oxidizers | 3 | 15-25 |
| XP Ammonia | 3 | 15-25 |
| XP Mineral Acids | 6 | 30-40 |
| XPVMineral Acids (Pyro) | 6 | 30-40 |
| LL Sulfur Dioxide | 3 | 15-25 |
| XP4 Hydrides | 3 | 15-25 |
| XP4 Mineral Acids | 6 | 30-40 |
| XP4 Mineral Acids (Pyro) | 6 | 30-40 |
| XP4 Chlorine | 6 | 30-40 |
| XP4 Ammonia | 3 | 15-25 |
| XP4 Phosgene | 6 | 30-40 |

**Note:**

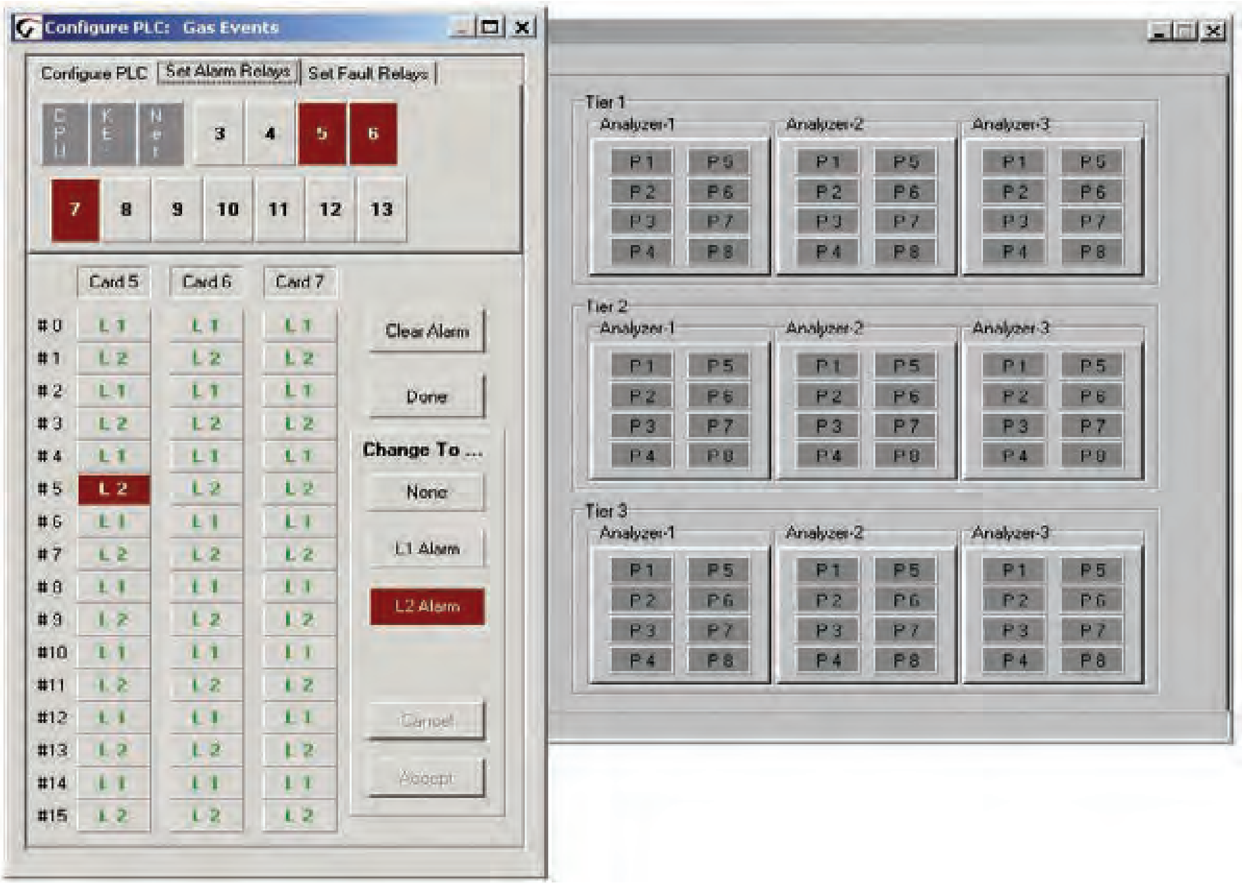
The Virtual Reference function is not used on CLO analyzers, even if enabled.

## 3.7.5 Define and Assign Relays

The Vertex System includes multiple programmable relays. You may associate relays with one or more alarms or faults to trigger external alarm devices or emergency equipment. Relays are located on relay cards; either 8 or 16 relays populate each card.

Vertex uses a two-part display to configure relays. The Configure PLC window displays the available relay cards and contacts. In a second window, Vertex also displays a representation of the analyzers installed in the system.

See Appendix E - Optional Relay Specifications, for a complete listing of alarm relay default settings.


Configure PLC: Gas Events
Configure PLC
Set Alarm Relays
Set Fault Relays
CPU
KE
Net
3
4
5
6
7
8
9
10
11
12
13
Clear Alarm
Done
Change To ...
None
L1 Alarm
L2 Alarm
Cancel
Accept
Tier 1
Tier 2
Tier 3
Analyzer-1
Analyzer-2
Analyzer-3
P 1
P 2
P 3
P 4
P 5
P 6
P 7
P 8

| | Card 5 | Card 6 | Card 7 |
|---|---|---|---|
| # 0 | L 1 | L 1 | L 1 |
| # 1 | L 2 | L 2 | L 2 |
| # 2 | L 1 | L 1 | L 1 |
| # 3 | L 2 | L 2 | L 2 |
| # 4 | L 1 | L 1 | L 1 |
| # 5 | L 2 | L 2 | L 2 |
| # 6 | L 1 | L 1 | L 1 |
| # 7 | L 2 | L 2 | L 2 |
| # 8 | L 1 | L 1 | L 1 |
| # 9 | L 2 | L 2 | L 2 |
| #10 | L 1 | L 1 | L 1 |
| #11 | L 2 | L 2 | L 2 |
| #12 | L 1 | L 1 | L 1 |
| #13 | L 2 | L 2 | L 2 |
| #14 | L 1 | L 1 | L 1 |
| #15 | L 2 | L 2 | L 2 |

## 3.7.6 Configure PLC

Use Configure PLC to enter the following:

- The number of relay cards installed
- The number of contacts per card
- The number of relays designated as fault relays.

### PLC Relay Cards

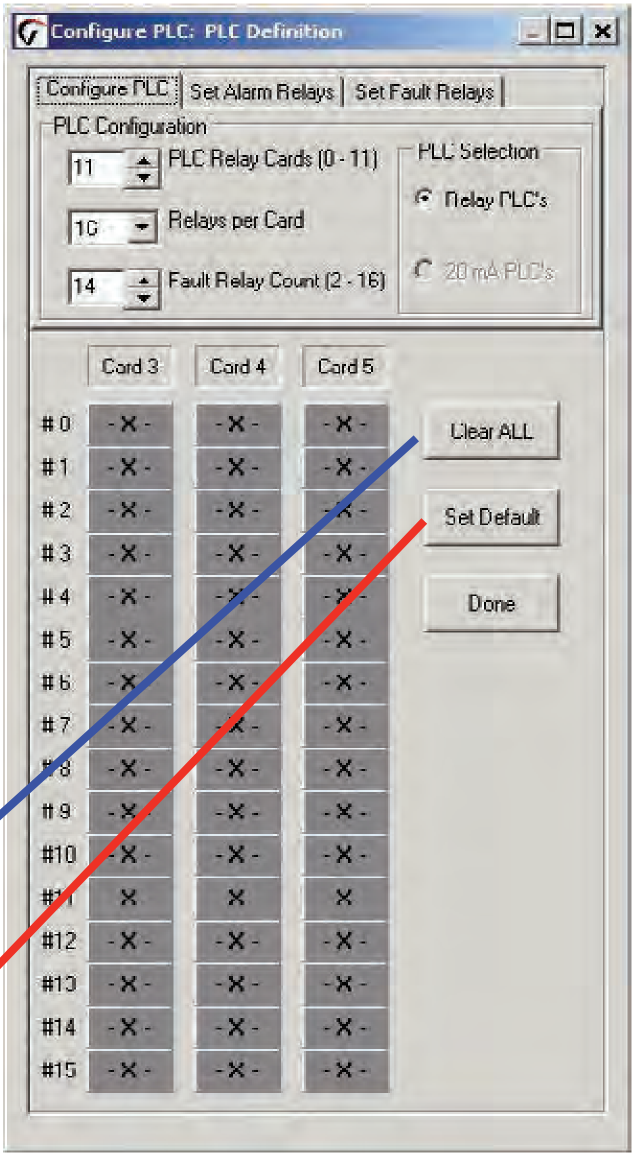
Up to 11 relay cards populate the Vertex System. The cards are numbered 3-13.

### Relays per Card

Relays are located on relay cards; either 8 or 16 relays populate each card.

- Cards with 16 relays share a common connection among groups of eight contacts.

Cards with 8 relays have 8 isolated contacts.


Configure PLC: PLC Definition
Configure PLC
Set Alarm Relays
Set Fault Relays
PLC Configuration
PLC Selection
Clear ALL
Set Default
Done

PLC Relay Cards (0 - 11): 11

Relays per Card: 16

Fault Relay Count (2 - 16): 14

● Relay PLC's

○ 20 mA PLC's

| | Card 3 | Card 4 | Card 5 |
|---|---|---|---|
| #0 | - X - | - X - | - X - |
| #1 | - X - | - X - | - X - |
| #2 | - X - | - X - | - X - |
| #3 | - X - | - X - | - X - |
| #4 | - X - | - X - | - X - |
| #5 | - X - | - X - | - X - |
| #6 | - X - | - X - | - X - |
| #7 | - X - | - X - | - X - |
| #8 | - X - | - X - | - X - |
| #9 | - X - | - X - | - X - |
| #10 | - X - | - X - | - X - |
| #11 | X | X | X |
| #12 | - X - | - X - | - X - |
| #13 | - X - | - X - | - X - |
| #14 | - X - | - X - | - X - |
| #15 | - X - | - X - | - X - |

**Clear All**
Erases the alarm and fault relay definitions

**Set Default**
Sets all relays to the initial default mappings

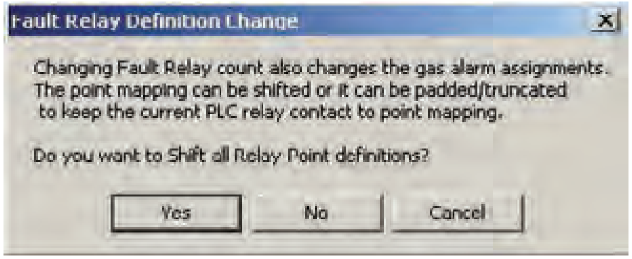
## Fault Relay Count

You may allocate from 2 to 16 relays for fault indicators.

**Note:**

> Set the number of fault relays before setting alarm relay definitions. If you change the number of fault relays, the current relay definitions become invalid and must be redefined.

When you change the number of fault relays, Vertex opens the Fault Relay Definition Change dialog box. Choosing Yes shifts the alarm definitions, choosing No pads the alarm definitions. Choose Cancel to return to the PLC configuration without changing the relay assignments.



Changing Fault Relay count also changes the gas alarm assignments. The point mapping can be shifted or it can be padded/truncated to keep the current PLC relay contact to point mapping.

Do you want to Shift all Relay Point definitions?

## Shift

Alarm relay definitions move down to fill the space created by fewer fault relays or move up to accommodate the additional fault relays.

Changing the number of fault relays from 14 to 16 will cause the alarm relay assignments to move two relays up. Card 5, relay 2 definition moves to card 5, relay 4; card 5, relay 3 moves to card 5 relay 5; card 5 relay 14 moves to card 6, relay 1, etc.

Changing the number of fault relays from 16 to 14 moves relay assignment down by 2 positions. Card 5, relay 4 definition moves to card 5, relay 2; card 5, relay 5 moves to card 5 relay 3; card 6, relay 1 moves to card 5, relay 15, etc.

## Pad

Padding leaves most alarm relay definitions unchanged. Some existing alarm definitions may be overwritten or undefined relays may become available.

Changing the number of fault relays from 14 to 16 will cause the alarm definitions on card 3, relay 14 and card 3, relay 15 to be overwritten by the fault relay assignments.

Changing the number of fault relays from 14 to 12 will result in two additional (and undefined) alarm relays being available at card 3 relays 12 and 13. Existing relay definitions are not moved.

### 3.7.7 Set Alarm Relays

A relay configured for a Level 1 trigger will activate for both Level 1 and Level 2 alarms. A Level 2 trigger will only activate for Level 2 alarms.

None of the relays are defined as general or point specific alarms until they are programmed or associated with one or more points in an analyzer.

**Note:**

> Set the number of fault relays before setting alarm relay definitions. If you change the number of fault relays, the current alarm relay definitions may change and must be redefined. See Section 3.7.6, Configure PLC.

Defining a point for association with a relay is a four-step process:

1. Choose the relays to which you want to associate with a point.
2. Choose L1 Alarm or L2 in the Change To... area.
3. Click the square representing the point or points to associate with the relay. The point changes color to indicate the change.
4. Choose Accept make the change the change to the configuration profile. Choosing cancel leaves the alarm definition unchanged.

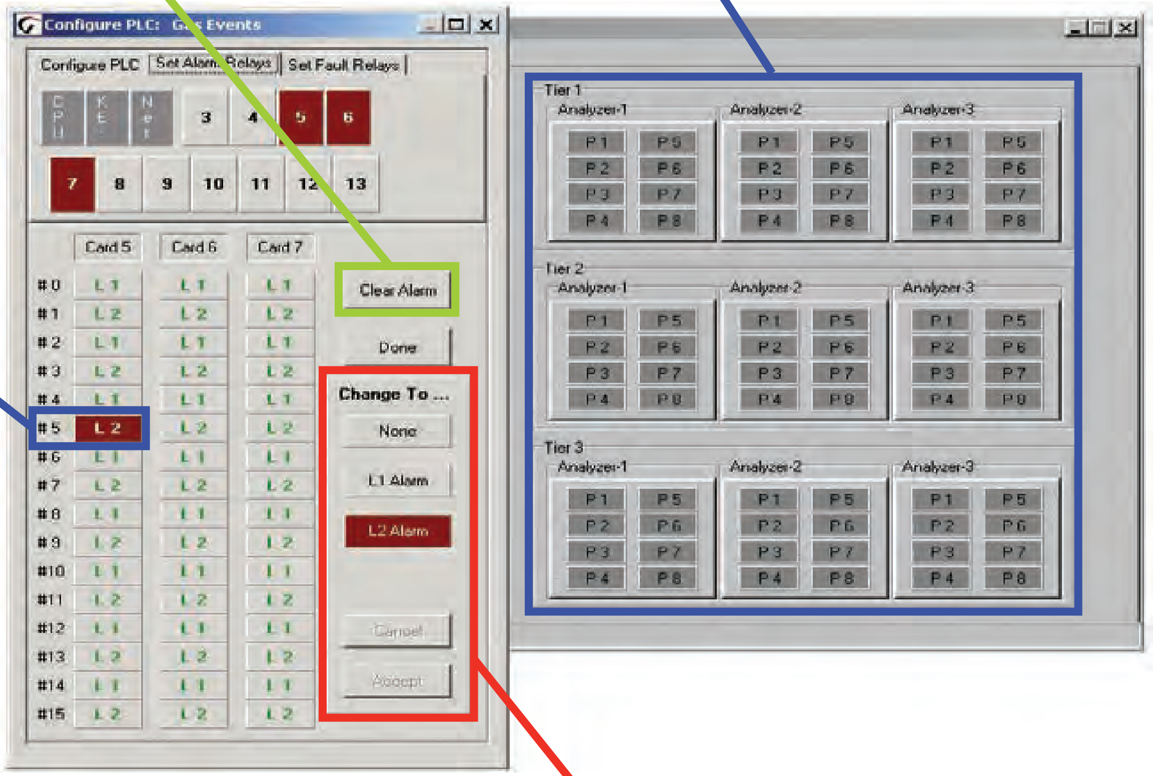
Repeat the steps for all contacts.

To verify a contacts association to analyzer points, choose the contact. The associated point display changes color.

**Clear all alarm definitions from relays**

**Squares that represent the point or points to associate with the relay**

**Selected relay in the relay block**


Configure PLC: Gas Events
Configure PLC
Set Alarm Relays
Set Fault Relays
CPU
KEt
Net
3
4
5
6
7
8
9
10
11
12
13
Card 5
Card 6
Card 7
#0
#1
#2
#3
#4
#5
#6
#7
#8
#9
#10
#11
#12
#13
#14
#15
L1
L2
Clear Alarm
Done
Change To ...
None
L1 Alarm
L2 Alarm
Cancel
Accept
Tier 1
Tier 2
Tier 3
Analyzer-1
Analyzer-2
Analyzer-3
P1
P2
P3
P4
P5
P6
P7
P8

Set type of alarm

### 3.7.8 Set Fault Relays

Fault relay contacts activate for instrument or maintenance faults. Faults are associated with an entire analyzer and not individual points.

- Instrument faults indicate a loss of monitoring on one or more points.
- Maintenance faults indicate the Vertex System requires attention but is continuing to monitor.

**Note:**

The number of relays used for fault indication is configurable. See Section 3.7.6, Configure PLC

Defining an analyzer for association with a relay is a four-step process:

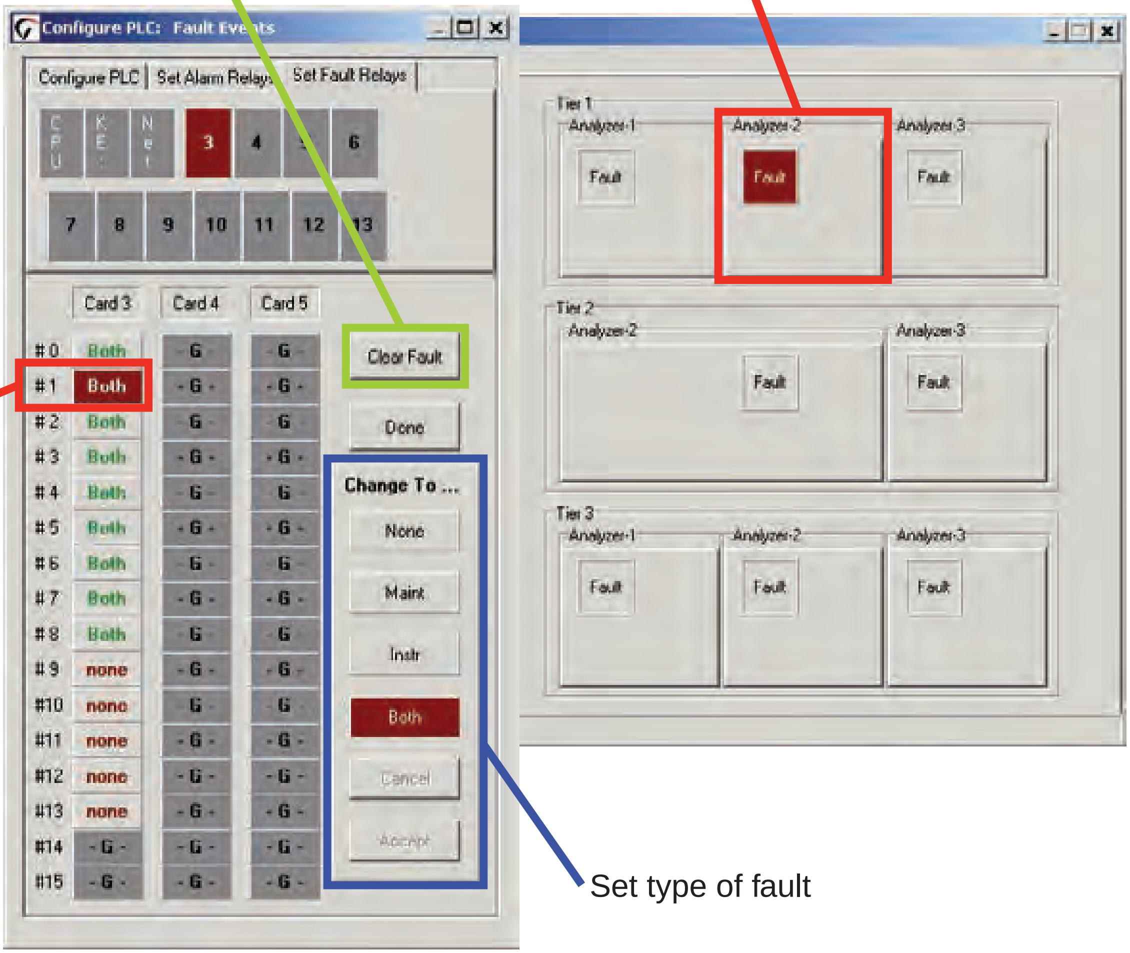
1. Choose the relays to which you want to associate with an analyzer.
2. Choose Instrument, Maintenance, Both or None in the Change To... area.
3. Click the square representing the analyzer or analyzers to associate with the relay. The square changes color to indicate the association.
4. Choose Accept to modify to the configuration profile. Choosing Cancel leaves the alarm definition unchanged.

Repeat for all relays.

To verify a relay's assignment to analyzers, choose the contact. The associated analyzer changes color.

Clears all fault definitions from all relays

Square that represents the analyzer or analyzers to associate with the relay


Configure PLC: Fault Events
Configure PLC
Set Alarm Relays
Set Fault Relays
CPU
KE.
Net
3
4
5
6
7
8
9
10
11
12
13
Clear Fault
Done
Change To ...
None
Maint
Instr
Both
Cancel
Accept
Tier 1
Analyzer-1
Analyzer-2
Analyzer-3
Fault
Tier 2
Tier 3

| | Card 3 | Card 4 | Card 5 |
|---|---|---|---|
| #0 | Both | G | G |
| #1 | Both | - G - | - G - |
| #2 | Both | G | G |
| #3 | Both | - G - | - G - |
| #4 | Both | G | G |
| #5 | Both | - G - | - G - |
| #6 | Both | G | G |
| #7 | Both | - G - | - G - |
| #8 | Both | G | G |
| #9 | none | - G - | - G - |
| #10 | none | G | G |
| #11 | none | - G - | - G - |
| #12 | none | - G - | - G - |
| #13 | none | - G - | - G - |
| #14 | - G - | - G - | - G - |
| #15 | - G - | - G - | - G - |

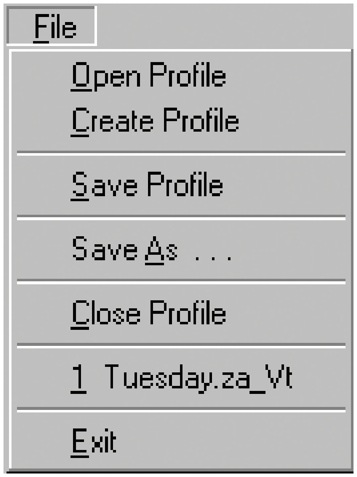
Selected relay in the relay block

Set type of fault

## 3.7.9 Profile Management-File Menu

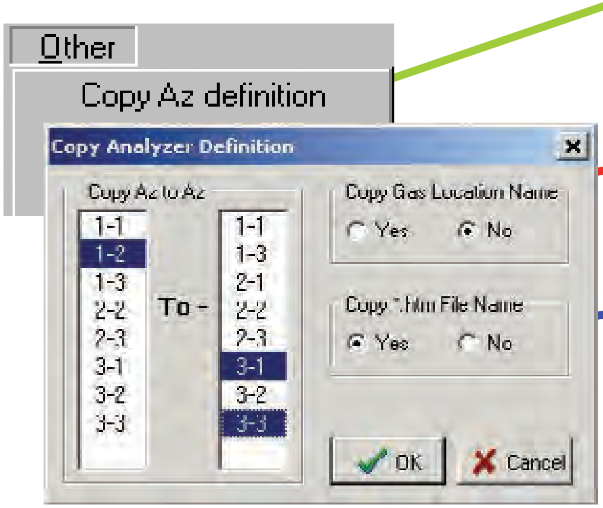
Use the file menu to open, create, save or close a configuration file. Configuration files may be stored in any directory on the Vertex System hard disk.

When you make any changes to the configuration profile, Vertex will always prompt you to save the change before closing the Configuration window.


File
Open Profile
Create Profile
Save Profile
Save As . . .
Close Profile
1 Tuesday.za_Vt
Exit

## 3.7.10 Other Menu

The Other Menu offers several shortcuts to speed configuring the Vertex System.


Other
Copy Az definition
Copy Analyzer Definition
Copy Az to Az
1-1
1-2
1-3
2-2
2-3
3-1
3-2
3-3
To -
1-1
1-3
2-1
2-2
2-3
3-1
3-2
3-3
OK
Cancel

Copy Gas Location Name ○ Yes ● No

Copy *.htm File Name ● Yes ○ No

**Copy Az definition**
Copies the configuration of one analyzer to any other analyzer in the system. You have two options when copying an analyzer configuration:

**Copy Gas Location Name**
Copies the location from the first analyzer to the second analyzer.

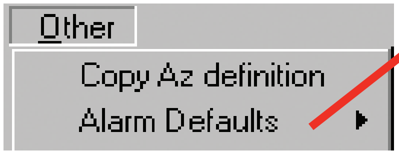
**Copy *.htm File Name**
Assigns the instruction file for the first analyzer to the second analyzer.

**Alarm Defaults**
Sets the level 1 and level 2 alarms of all analyzers not yet configured to the following values:

One-half TLV and TLV

TLV and two times TLV

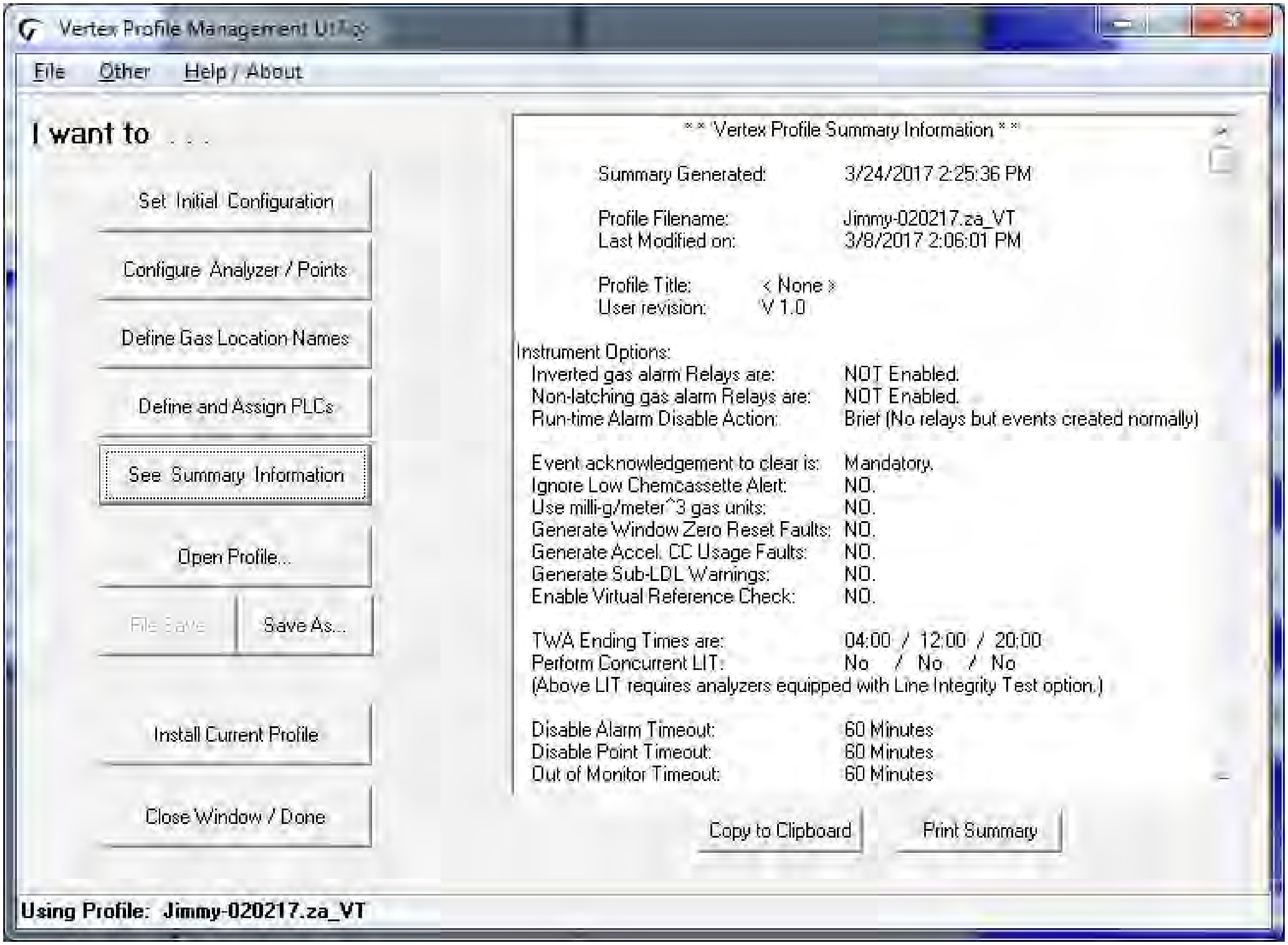
One-half TLV and two times TLV


Other
Copy Az definition
Alarm Defaults

### 3.7.11 Profile Management Utility

This text report is about 600 lines long and completely describes the configuration of the monitor.

Use this concise reporting capability and the “Last Modify Date” to confirm that the configuration is correct and has not been altered.


Vertex Profile Management Utility
File
Other
Help / About
I want to . . .
Set Initial Configuration
Configure Analyzer / Points
Define Gas Location Names
Define and Assign PLCs
See Summary Information
Open Profile...
File Save
Save As...
Install Current Profile
Close Window / Done
Copy to Clipboard
Print Summary

```
              * * Vertex Profile Summary Information * *

        Summary Generated:            3/24/2017 2:25:36 PM

        Profile Filename:             Jimmy-020217.za_VT
        Last Modified on:             3/8/2017 2:06:01 PM

        Profile Title:          < None >
        User revision:          V 1.0

Instrument Options:
  Inverted gas alarm Relays are:      NOT Enabled.
  Non-latching gas alarm Relays are:  NOT Enabled.
  Run-time Alarm Disable Action:      Brief (No relays but events created normally)

  Event acknowledgement to clear is:  Mandatory.
  Ignore Low Chemcassette Alert:      NO.
  Use milli-g/meter^3 gas units:      NO.
  Generate Window Zero Reset Faults:  NO.
  Generate Accel. CC Usage Faults:    NO.
  Generate Sub-LDL Warnings:          NO.
  Enable Virtual Reference Check:     NO.

  TWA Ending Times are:               04:00  /  12:00  /  20:00
  Perform Concurrent LIT:             No    /  No    /  No
  (Above LIT requires analyzers equipped with Line Integrity Test option.)

  Disable Alarm Timeout:              60 Minutes
  Disable Point Timeout:              60 Minutes
  Out of Monitor Timeout:             60 Minutes
```

Using Profile: Jimmy-020217.za_VT

## 3.8 Load Tape

After configuring the analyzers, load each analyzer with the proper Chemcassette® tape required for the target gas. See Section 5.3.5, Change Chemcassette® Tape, for loading procedure. See Detectable Gases, for a list of target gases and Chemcassette® tape part numbers.

After installing Chemcassettes® for initial configuration, keep the analyzer in IDLE mode. Do not move to monitor mode until you have:

Performed a leak check on sample lines (See Section 3.9, Leak Checking Sample Lines.)

Set supply vacuum See Section 3.10.1, Set Supply Vacuum

Verified flow rates See Section 3.10.2, Verify Flow Rates

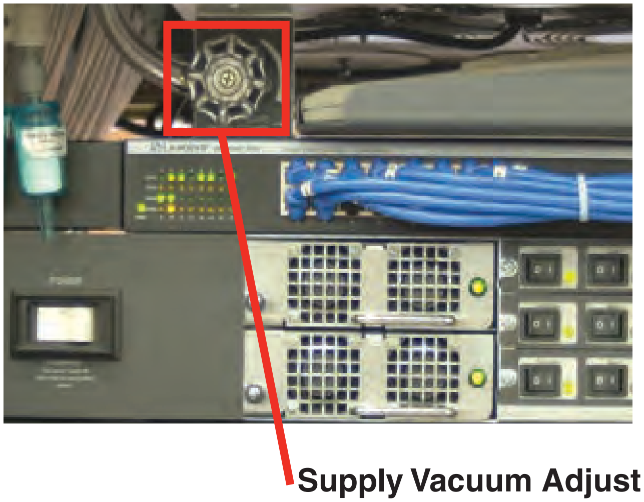
## 3.9 Verify Flow Rates and Supply Vacuum

After you have configured all analyzers, loaded Chemcassettes® and performed leak check, you will verify flow rates in the Flow Diagnostics Window. From Main Screen, touch Menu, Service, Authorized Service. The Authorized Service window opens.

### 3.9.1 Set Supply Vacuum (Series 2)

Select each Analyzer in the selection pad and press pump on.

Adjust the supply vacuum knob behind the monitor to obtain 10-15 inches Hg (13 inches Hg recommended).



**Note:**
At higher altitudes with many analyzers installed, the system (50 Hz. mains) may not be able to achieve 13” Hg. In this case, the maximum achievable sample point flow rate shown may be reduced by up to 20%.

### 3.9.2 Verify Flow Rates

The Authorized Service window displays the flow range in bar graph form for each point of the selected analyzer.

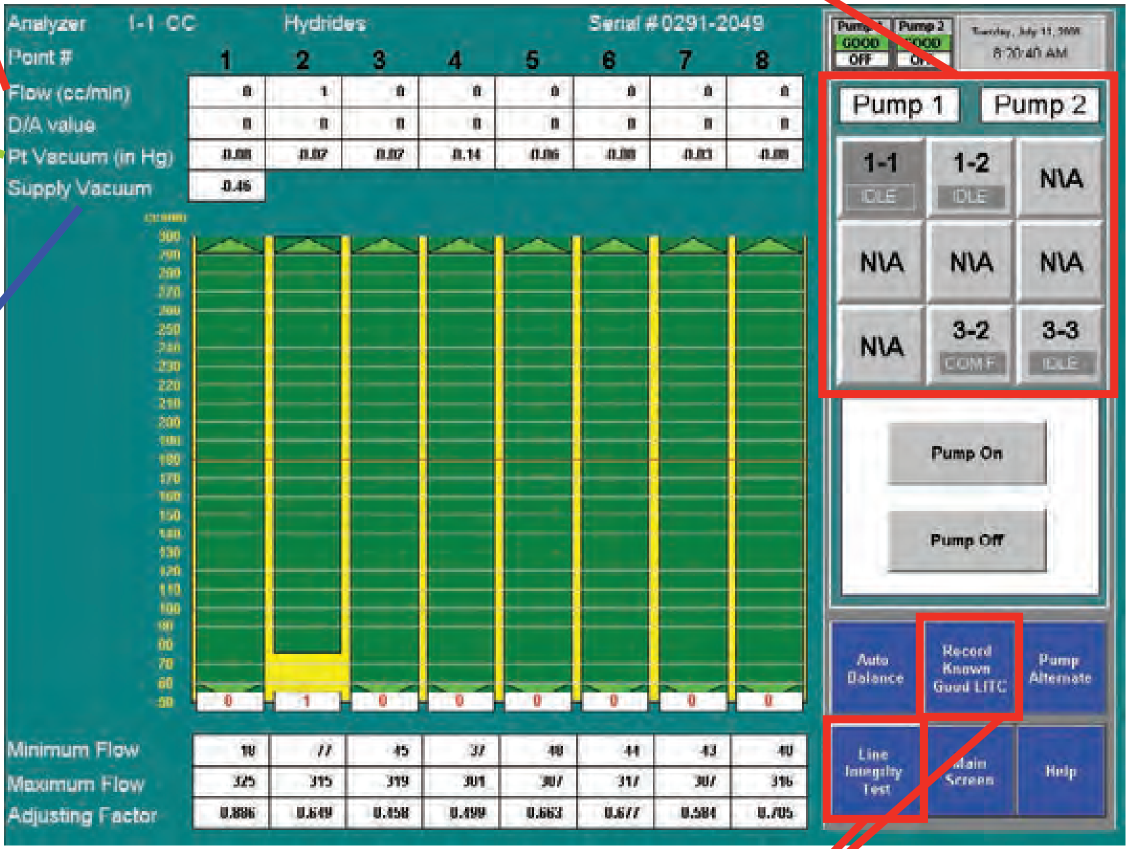
Choose the analyzer from the selection pad in the upper right-hand corner. Press the pump on button. The eight points display their flow.

**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 10-15 in. Hg

**Selection Pad**



Analyzer 1-1 CC Hydrides Serial #0291-2049

| Point # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Flow (cc/min) | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| D/A value | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pt Vacuum (in Hg) | -0.08 | 0.07 | 0.07 | 0.14 | -0.06 | -0.08 | -0.03 | -0.08 |
| Supply Vacuum | -0.46 | | | | | | | |

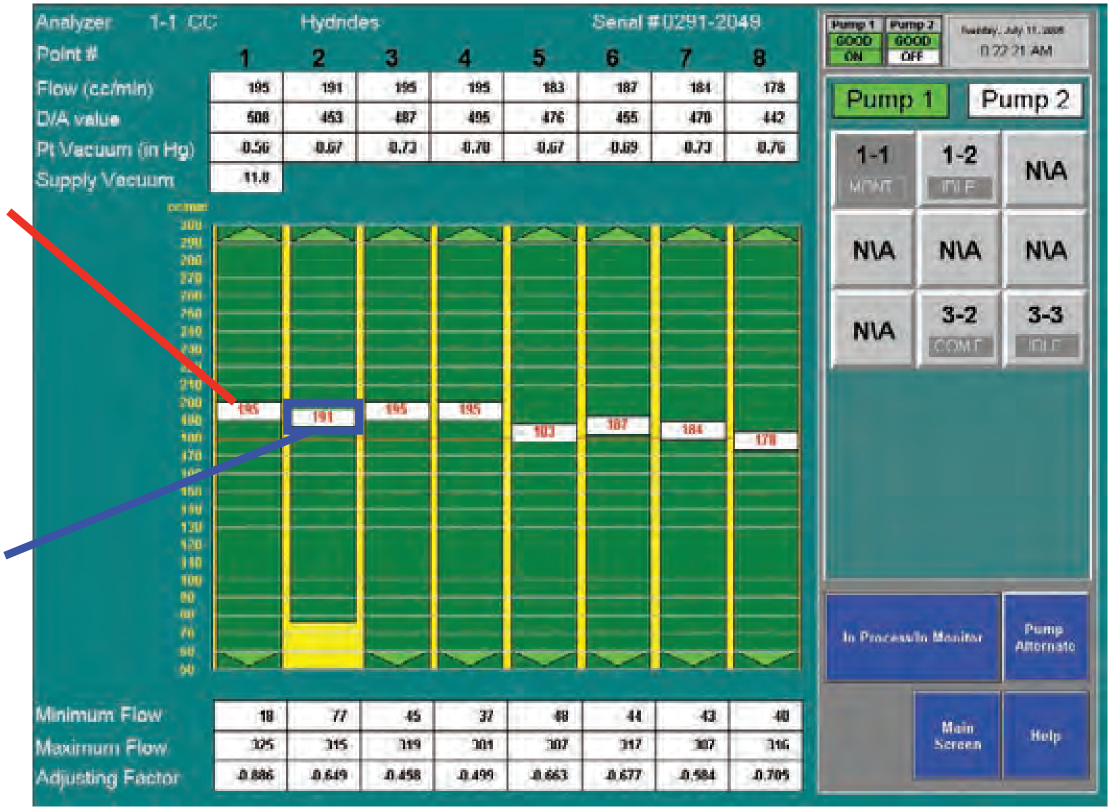
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Minimum Flow | 18 | 77 | 45 | 37 | 48 | 44 | 43 | 40 |
| Maximum Flow | 325 | 315 | 319 | 301 | 307 | 317 | 307 | 316 |
| Adjusting Factor | 0.886 | 0.649 | 0.358 | 0.499 | 0.663 | 0.677 | 0.584 | 0.705 |

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
Pump 1 GOOD OFF
Pump 2 GOOD ON
Tuesday, July 11, 2006
8:20:40 AM
Pump 1
Pump 2
1-1 IDLE
1-2 IDLE
N\A
N\A
N\A
N\A
N\A
3-2 COMF
3-3 IDLE
Pump On
Pump Off
Auto Balance
Record Known Good LITC
Pump Alternate
Line Integrity Test
Main Screen
Help

**Optional Line Integrity Test Option**
See Appendix - G Line Integrity Test Option

**Target Flow**
A horizontal red line indicates the target flow rate required by the Vertex 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.


Pump 1
GOOD
ON
Pump 2
GOOD
OFF
Pump 1
Pump 2
1-1
1-2
N\A
N\A
N\A
N\A
N\A
3-2
3-3
In Process/In Monitor
Pump Alternate
Main Screen
Help
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

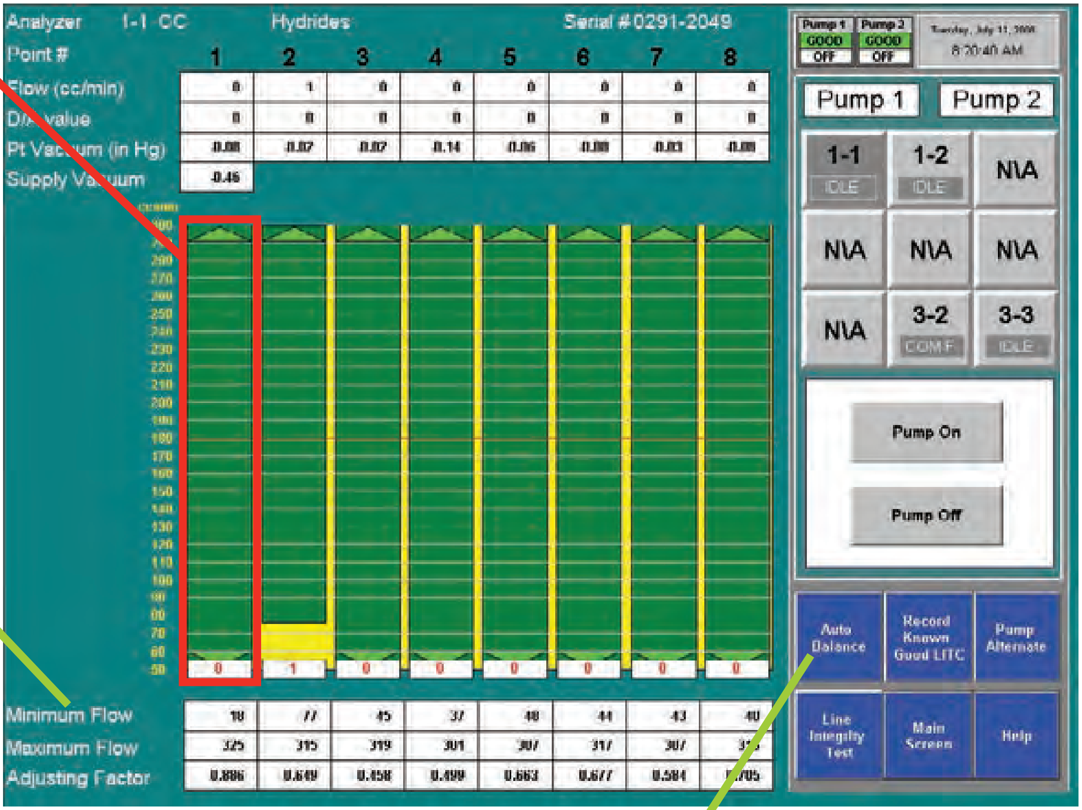
Analyzer 1-1 CC Hydrides Serial #0291-2049

| Point # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Flow (cc/min) | 195 | 191 | 195 | 195 | 183 | 187 | 184 | 178 |
| D/A value | 508 | 453 | 487 | 495 | 476 | 455 | 470 | 442 |
| Pt Vacuum (in Hg) | -0.56 | -0.67 | -0.73 | -0.70 | -0.67 | -0.69 | -0.73 | -0.76 |
| Supply Vacuum | 11.0 | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Minimum Flow | 18 | 77 | 45 | 37 | 48 | 44 | 43 | 40 |
| Maximum Flow | 325 | 315 | 319 | 301 | 307 | 317 | 307 | 316 |
| Adjusting Factor | -0.886 | -0.649 | -0.458 | -0.499 | -0.663 | -0.677 | -0.584 | -0.705 |

**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.


Pump 1
GOOD
OFF
Pump 2
GOOD
OFF
Tuesday, July 11, 2006
8:20:40 AM
Pump 1
Pump 2
1-1
IDLE
1-2
IDLE
N\A
N\A
N\A
N\A
N\A
3-2
COMF
3-3
IDLE
Pump On
Pump Off
Auto Balance
Record Known Good LITC
Pump Alternate
Line Integrity Test
Main Screen
Help
(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
0
1
0
0
0
0
0
0

Analyzer 1-1 CC Hydrides Serial #0291-2049

| Point # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Flow (cc/min) | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| D/A value | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pt Vacuum (in Hg) | -0.08 | -0.07 | -0.07 | -0.14 | -0.06 | -0.08 | -0.03 | -0.08 |
| Supply Vacuum | -0.46 | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Minimum Flow | 18 | 77 | 45 | 37 | 48 | 44 | 43 | 40 |
| Maximum Flow | 325 | 315 | 319 | 301 | 307 | 317 | 307 | [illegible] |
| Adjusting Factor | 0.886 | 0.649 | 0.458 | 0.499 | 0.663 | 0.677 | 0.584 | [illegible] |

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

**Auto Balance**
See Section 4.6.2, Flow Calibration, for instructions on adjusting flow rates.

## 3.10 Leak Checking Sample Lines

Perform a leak check of the sample lines following installation and also whenever a line is changed or moved. The leak check procedure involves plugging the end of the sample line and verifying that there is no flow through the line. To perform a leak check:

1. Put the affected Analyzer in Idle mode.
2. Choose Main Screen, Menu, Service, Authorized Service.
3. Select Analyzer.
4. Press pump on.
5. Securely plug the end of the sample line being tested.
6. Verify that the flow rate for the test line drops to zero. See Flow (cc/min) on page 3-45.
7. Verify that the sample Point Vacuum equals the Supply Vacuum within a tolerance of +/- 0.5 inches Hg (see **Point Vacuum (in Hg)) on page 3-45.**
8. Verify that the sample flow is less than 20cc.
9. After testing all points on the selected analyzer, press pump off.

**Note:**

> You must touch the Pumps On button even if the pumps are operating. Touching Pumps On turns on the solenoid valve to provide vacuum to the analyzer.

A sample point failing to meet both the flow and vacuum conditions of steps 6 and 7 indicates either a leak in the sample line or a faulty sample inlet connection.

To troubleshoot the condition, disconnect the sample line at the inlet port at the top of the Vertex cabinet. Securely plug the inlet port and repeat the above leak check procedure.

If the sample point passes the test with the top port plugged, the leak is somewhere in the sample line and the line must be replaced. If the sample point fails the leak check procedure with the top inlet port plugged, contact Honeywell Analytics for assistance.

## 3.11 Reconfigure

The modular design of the Vertex allows limited reconfiguration. All wiring and tubing is in place behind unpopulated slots. To add modules:

1. Remove filler panel.
2. Install new analyzer. (See Section 5.4, Replacing an Analyzer.)
3. Configure new analyzer. (See Section 3.7, Configuration Utility.)
4. Load tape. (See Section 3.8, Load Tape.)

5. Leak check sample lines. (See Section 3.9, Leak Checking Sample Lines.)
6. Verify flow rates. (See Section 3.10, Verify Flow Rates and Supply Vacuum.)

**Note:**

Any analyzers which are physically installed but not included in the configuration should be de-energized.

## 3.12 Moving to a New Site

Before moving the Vertex to a new site, use the following procedures to prevent loss of data or damage to the instrument.

1. Remove all Chemcassette® tapes and store as required by local policies.
2. Exit the Vertex program. Touch Project and then Stop Project.
3. Back up data and configuration files. See Section 5.10, File Maintenance.
4. Release latch on touch screen door to open and set all power switches to “Off”.
5. Disconnect electrical supply at the source and then disconnect from the power terminal in the back of the cabinet.
6. Disconnect sample lines and cap lines as required by local policies also cap Vertex inlet points.
7. Disconnect exhaust line and cap line as required by local policies.
8. Disconnect alarm relays.

**WARNING**

**Hazardous voltages may exist at the Alarm Contacts in this unit with the power switch turned off. Insure power is disconnected at the source prior to servicing alarm contacts.**

Crate and pad the Vertex to prevent damage during transport. If unsure of packing requirements, contact the Honeywell Analytics Service department.

**WARNING**

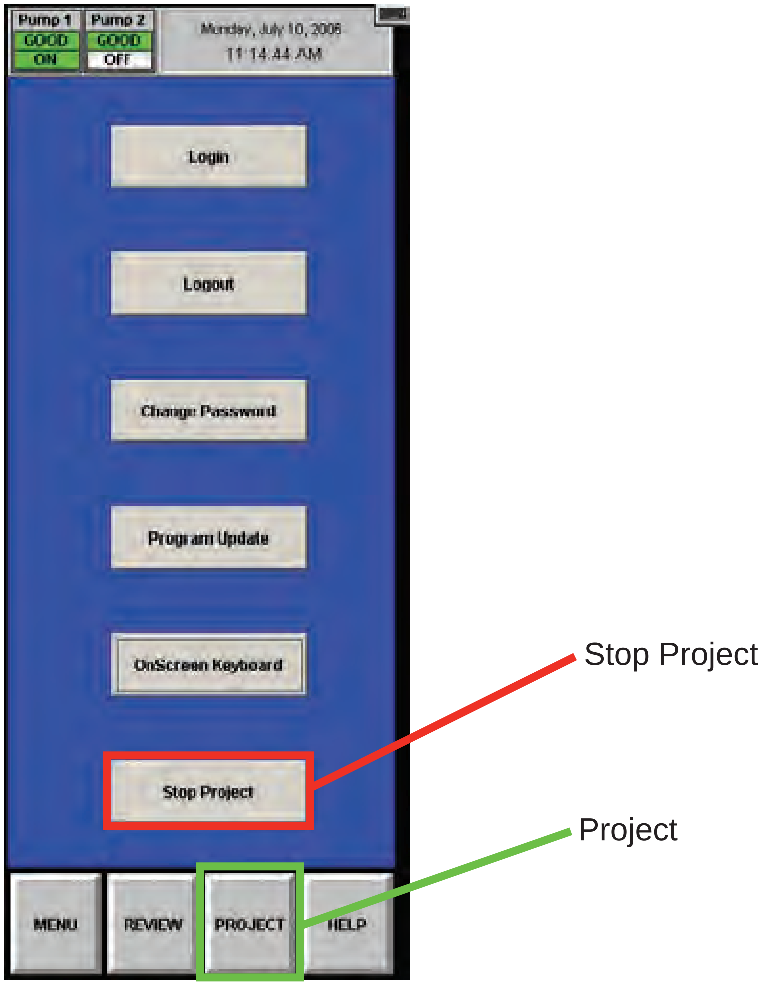
**Leaks in the exhaust tubing connection can cause exposure to toxic gases from remote sample areas. For leak-tight connections, follow the instructions in the Installing Pump Exhaust Line section and the Remove Pump section. With the system running, verify the leak integrity with a small amount of leak test fluid.**

## 3.13 System Shut Down

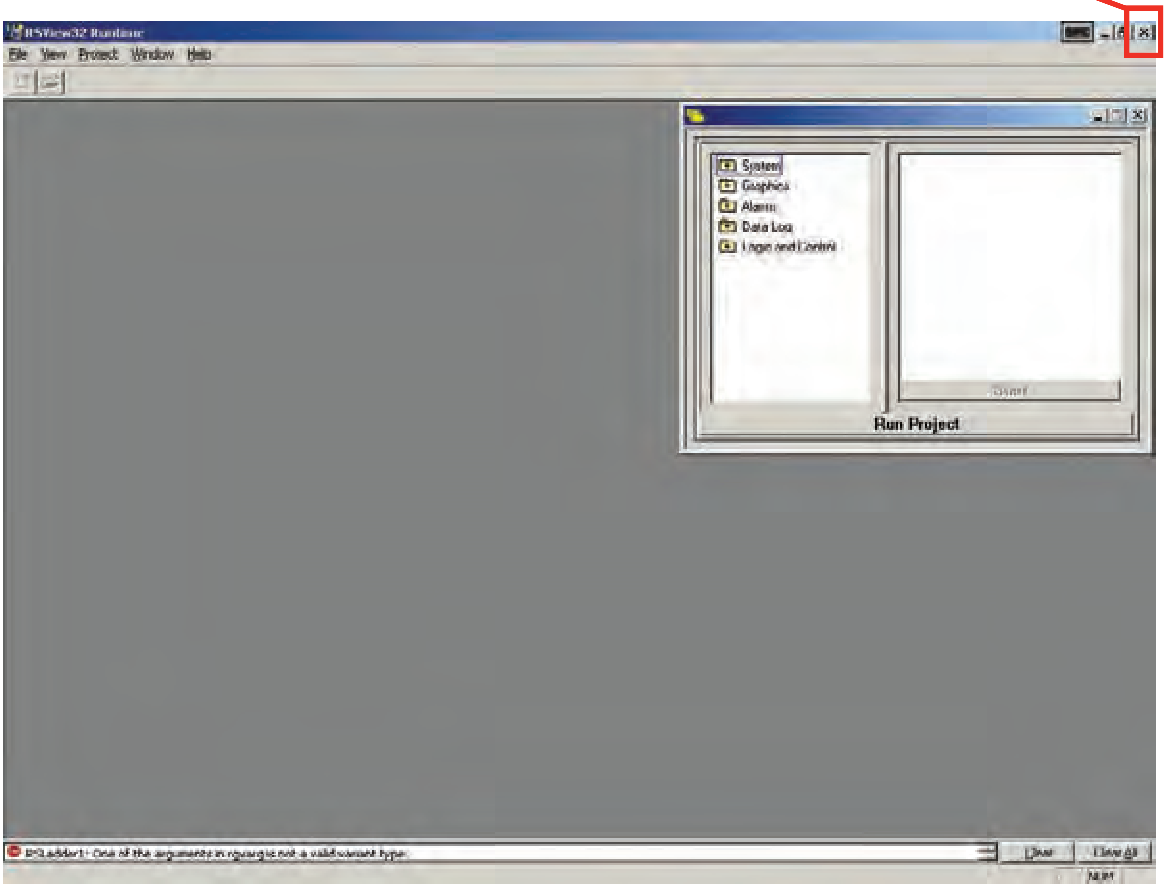
**CAUTION**

**Failure to properly shut down the Vertex could result in system file corruption.**

1. Exit the Vertex program. Touch Project and then Stop Project.


Pump 1
GOOD
ON
Pump 2
GOOD
OFF
Monday, July 10, 2006
11:14:44 AM
Login
Logout
Change Password
Program Update
OnScreen Keyboard
Stop Project
MENU
REVIEW
PROJECT
HELP
Stop Project
Project

2. When the Vertex HMI has closed, stop RSView32

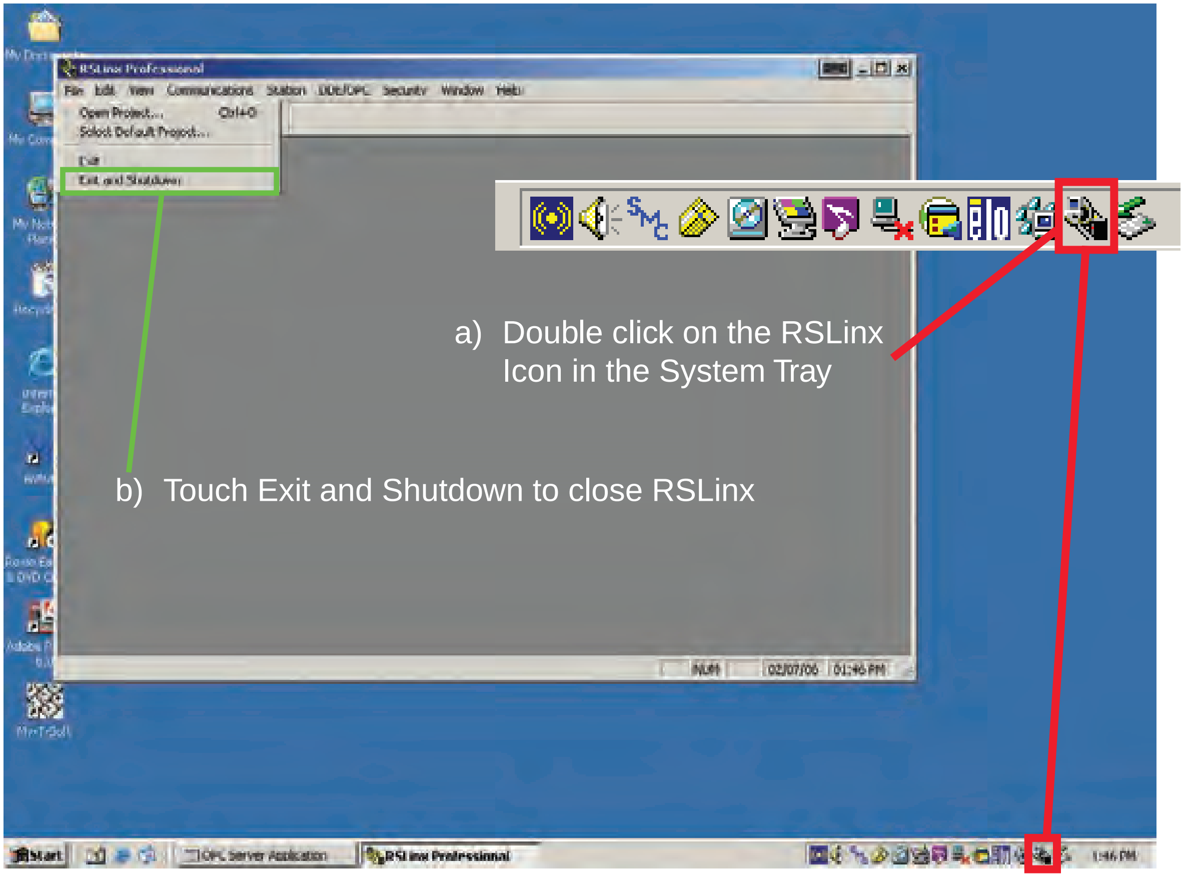


Click on the “X” to close RSView32

RSView32 Runtime
File View Project Window Help
System
Graphics
Alarms
Data Log
Logic and Control
Start
Run Project
Clear
Clear All
NUM

RSLadder1: One of the arguments in rgvarg is not a valid variant type.

3. Close RSLinx


RSLinx Professional
File Edit View Communications Station DDE/OPC Security Window Help
Open Project... Ctrl+O
Select Default Project...
Exit
Exit and Shutdown
NUM 02/07/06 01:46 PM
Start
OPC Server Application
RSLinx Professional
1:46 PM

a) Double click on the RSLinx Icon in the System Tray

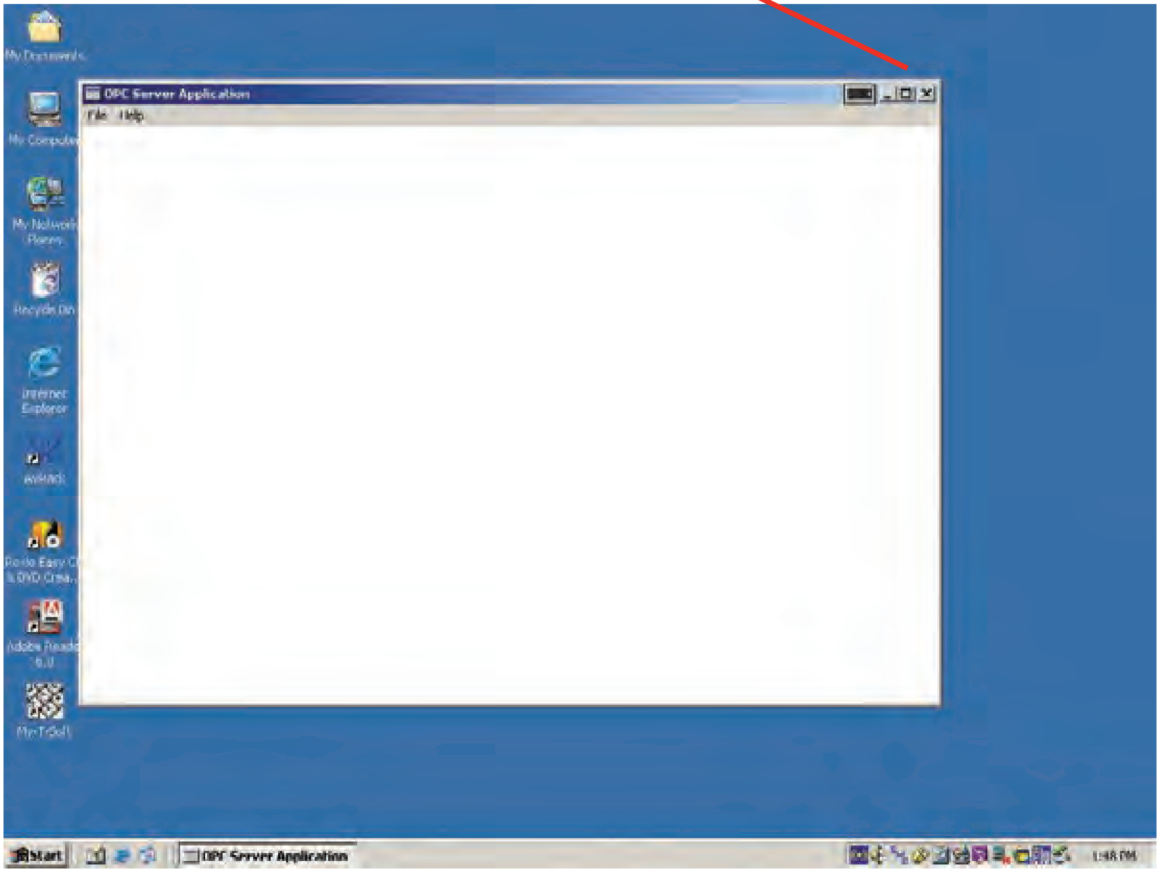
b) Touch Exit and Shutdown to close RSLinx

4. Close the OPC Server

**Note:**

RSLinx must be shut down before closing the OPC server. Failure to do this will result in the OPC server being automatically restarted.

Click on the “X” to close the OPC Server


My Documents
My Computer
My Network Places
Recycle Bin
Internet Explorer
Roxio Easy CD & DVD Crea...
Adobe Reader 6.0
OPC Server Application
File Help
Start
OPC Server Application

5. In the Windows taskbar touch Start and then Shut Down.

6. Open touch screen and set all switches and the rack power switch to “Off”.

# 4 Operation

## 4.1 Introduction

This chapter describes Vertex operation including monitoring, system control and data viewing.

This chapter includes the following sections:

- 4.2 Monitoring Mode Overview
- 4.3 Main Screen
- 4.4 Project Functions
- 4.5 Review Functions
- 4.6 Menu Buttons
- 4.7 OnScreen Keyboard

See Chapter 3, Startup, if the analyzers in the Vertex System have not yet been configured.

## 4.2 Monitoring Mode Overview

Monitor mode is the Vertex System's standard operating state. Upon power up, the instrument performs initialization routines and returns to the same state as when powered down. During monitoring, the Vertex System will calculate concentrations every second for each of the enabled points. Concentrations are used for:

- Triggering alarm relays
- Viewing in the main screen
- Entries in the event list
- Viewing in point detail screen

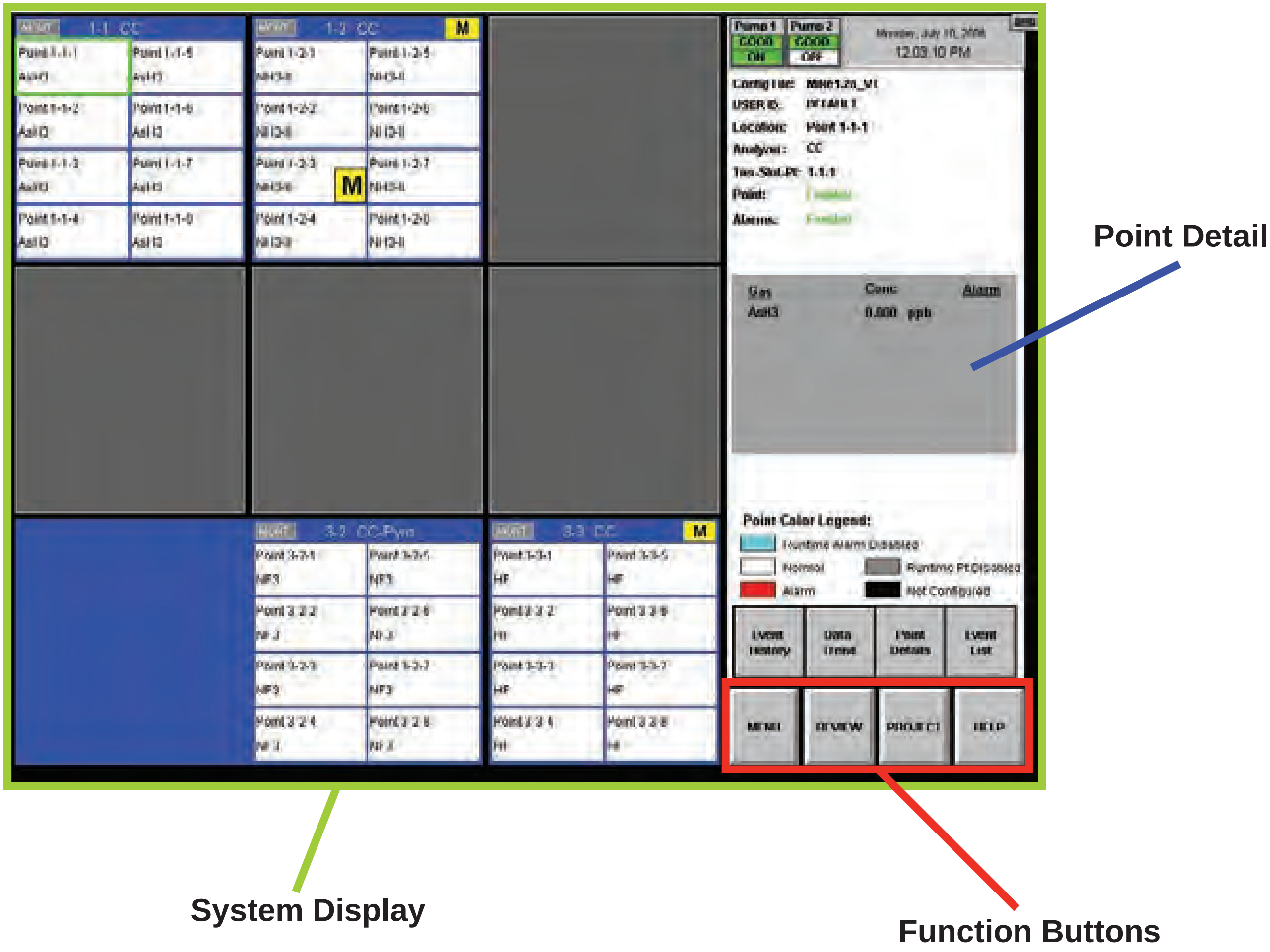
Concentration information is available through the:

- Point detail screen
- OPC
- Optional fieldbuses
- Optional 4-20 mA output
- Data logger

## 4.3 Main Screen

The Vertex System opens the main screen after power up. Vertex divides the main screen into three areas:

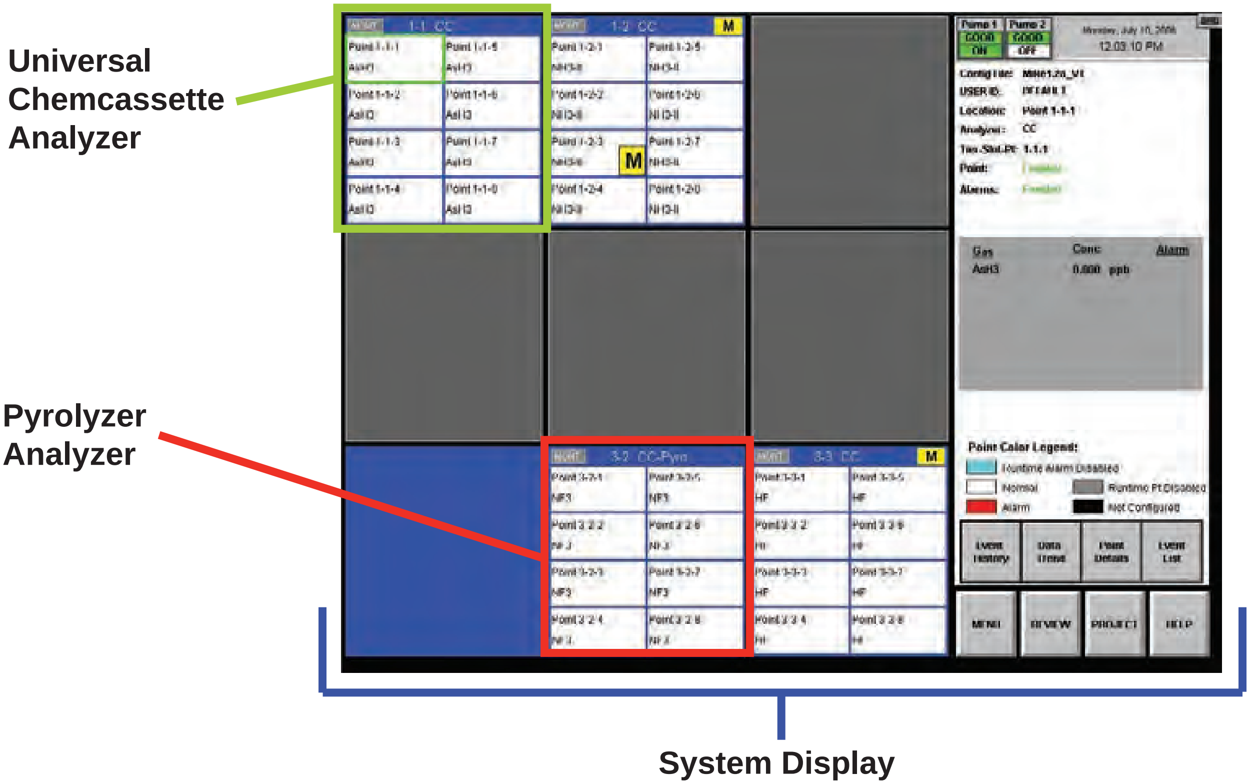
- System display
- Point detail
- Function buttons


1-1 CC
1-2 CC
M
3-2 CC-Pyro
3-3 CC
Pump 1
Pump 2
GOOD
ON
OFF
12:03:10 PM
Location: Point 1-1-1
Analyzer: CC
Gas
Conc
Alarm
AsH3
0.000 ppb
Point Color Legend:
Runtime Alarm Disabled
Normal
Runtime Pt Disabled
Alarm
Not Configured
Event History
Data Trend
Point Details
Event List
MENU
REVIEW
PROJECT
HELP
Point Detail
System Display
Function Buttons

## 4.3.1 System Display Area

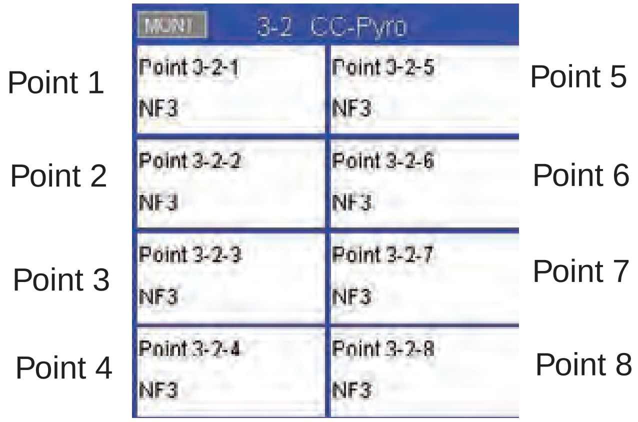
The System Display Area displays information about all of the points in the Vertex System. Each of the 72 blocks in the System Display Area represents one point. A group of eight blocks represents an analyzer block. The analyzer block has the status bar indicator at the top of the block. A pyrolyzer displays as a blue block in slot 1 and points detail in slot 2.

The System Display Area positions the modules in the same order in which they are physically located in instrument. The currently selected point displays a green border. If more than one point has the same gas location as the selected point, all points in same location display with green border.


Universal Chemcassette Analyzer
Pyrolyzer Analyzer
System Display
1-1 CC
1-2 CC
M
3-2 CC-Pyro
3-3 CC
Pump 1
Pump 2
12:03:10 PM
Gas
Conc
Alarm
AsH3
0.000 ppb
Point Color Legend:
Runtime Alarm Disabled
Normal
Runtime Pt Disabled
Alarm
Not Configured
Event History
Data Trend
Point Details
Event List
MENU
REVIEW
PROJECT
HELP

## Status Indicators

The indicator displays brief information about analyzer status such as faults, warnings or maintenance functions in process.


MONT
3-2 CC-Pyro
Point 1
Point 3-2-1
NF3
Point 3-2-5
NF3
Point 5
Point 2
Point 3-2-2
NF3
Point 3-2-6
NF3
Point 6
Point 3
Point 3-2-3
NF3
Point 3-2-7
NF3
Point 7
Point 4
Point 3-2-4
NF3
Point 3-2-8
NF3
Point 8

Status indicators include:

- IDLE - the analyzer is not monitoring or performing maintenance
- MONT - the analyzer is monitoring
- LD CC - Load Chemcassette® routine is in progress
- PROG - a new application program is being loaded into the analyzer
- CONF - a new configuration is being loaded into the analyzer
- COMF - a communications failure between the DAq and the analyzer

PYRO-W - a pyrolyzer analyzer is warming up. When pyrolyzer has reached stable temperature, it will automatically go into monitor

FLOW - a flow Auto Balance procedure is in process on the analyzer

The Vertex System displays only the short names of the location and target gases within each point block. During normal monitoring, the background color of each block is white. Vertex will change the background color of a point as conditions change.

| | |
|---|---|
| Blue | Alarms for the point are disabled in the runtime options menu. |
| White | Normal operation. |
| Red | Gas concentration exceeded an alarm level. |
| Grey | Point is disabled in the runtime menu or is disabled due to a fault. |
| Black | Point is not configured for monitoring. |

**Table 4-1**

### Alarm Indicators

When the target gas concentration for a point reaches a preset alarm level, Vertex will display a W, 1 or 2 in the point block to indicate the severity of the alarm.

| Alarm Indicator | Concentration Threshold |
|---|---|
| W | Lower Detectable Limit (LDL) |
| (if enabled) | |
| 1 | Alarm Level 1 |
| 2 | Alarm Level 2 |

See Section 3.7.4 Configure Point for information on setting Alarm Level 1 and Alarm Level 2.

See Section 3.7.10 Other Menu for information on alarm default values.

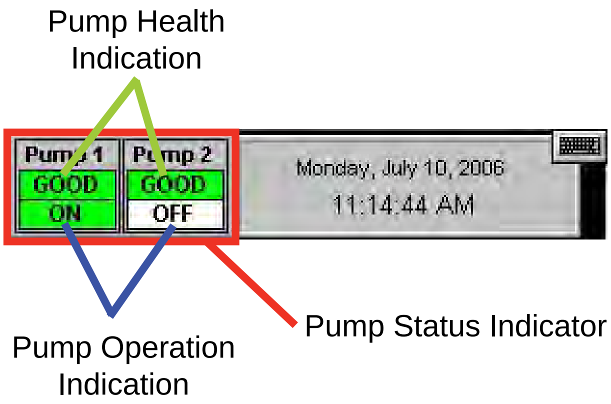
### Pump Status Indicator

The Vertex Display includes pump status indicators in the top right corner. The bottom row indicates which of the pumps is currently operating. The indicator will display “ON” with a green background if the pump is operating and “OFF” on a white background if the pump is not running.

The top row indicates what is known about pump health. The indicator will display “GOOD” with a green background if the pump has successfully provided proper levels of system vacuum. If the Indicator displays “BAD” on a red background, this indicates that pump related faults 112 or 219 have been generated. The indicator may display “UNKNOWN” on a white background after software is installed or after analyzers are added or moved into a different location.

Pumps in the “UNKNOWN” or “BAD” state change to the “GOOD” state only when successfully used during gas monitoring. After a failed pump has been repaired or replaced, it can be exercised by pressing “PUMP ALTERNATE” button while monitoring (See Section 4.6.2 Flow Calibration). If successful, the pump state will change to “GOOD”.

Honeywell Analytics recommends that pumps be alternated periodically to insure availability according to your facility’s schedule.



## Fault Indicators

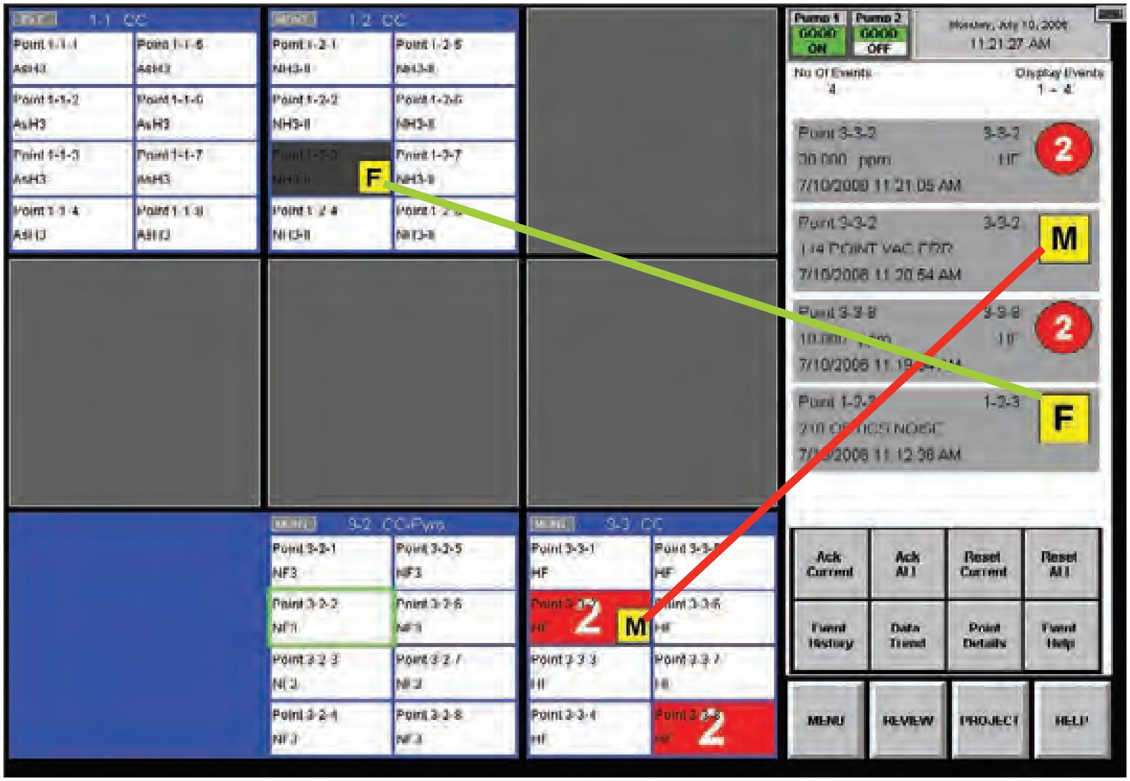
In addition to changing color, an event window opens indicating a new event.

A yellow square inside the status bar in the analyzer block indicates an analyzer-specific fault.

A yellow square inside of the point block indicates a point-specific fault

See Section 6.3 Maintenance Faults

See Section 6.5 Information Events


1-1 CC
1-2 CC
3-2 CC-Pyro
3-3 CC
Pump 1
GOOD
ON
Pump 2
GOOD
OFF
11:21:27 AM
No Of Events
4
Display Events
1 - 4
F
M
2
Ack Current
Ack All
Reset Current
Reset All
Event History
Data Trend
Point Details
Event Help
MENU
REVIEW
PROJECT
HELP

**M - Indicates a maintenance fault**

**F - Indicates an instrument fault**

## 4.3.2 Point Detail Display Area

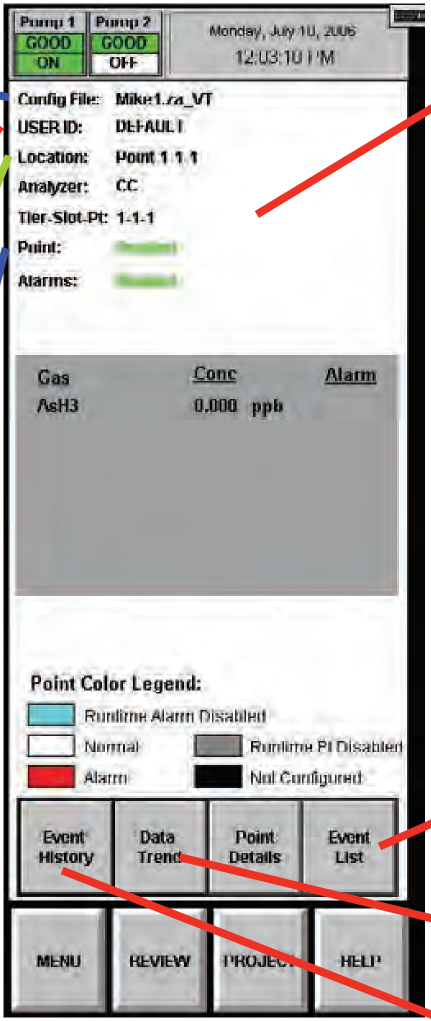
The Point Detail Area displays comprehensive information about each location. Touching a block in the System Display Area displays the current information about a location.

**Config File**
The configuration profile file name

**User ID**
The name of the current, logged in user

**Location**
The short name of the sampled location

**Point**
Points not needed for monitoring may be disabled. A disabled point does not trigger alarms.



Monday, July 10, 2006
12:03:10 PM

Config File: Mike1.za_VT
USER ID: DEFAULT
Location: Point 1 1 1
Analyzer: CC
Tier-Slot-Pt: 1-1-1
Point:
Alarms:

| Gas | Conc | Alarm |
|---|---|---|
| AsH3 | 0.000 ppb | |

Point Color Legend:

| | | | |
|---|---|---|---|
| 🟦 | Runtime Alarm Disabled | | |
| ⬜ | Normal | ▨ | Runtime Pt Disabled |
| 🟥 | Alarm | ⬛ | Not Configured |

**Tier-Slot-Point**
Points are identified by the tier, slot and their point number in which the analyzer is installed

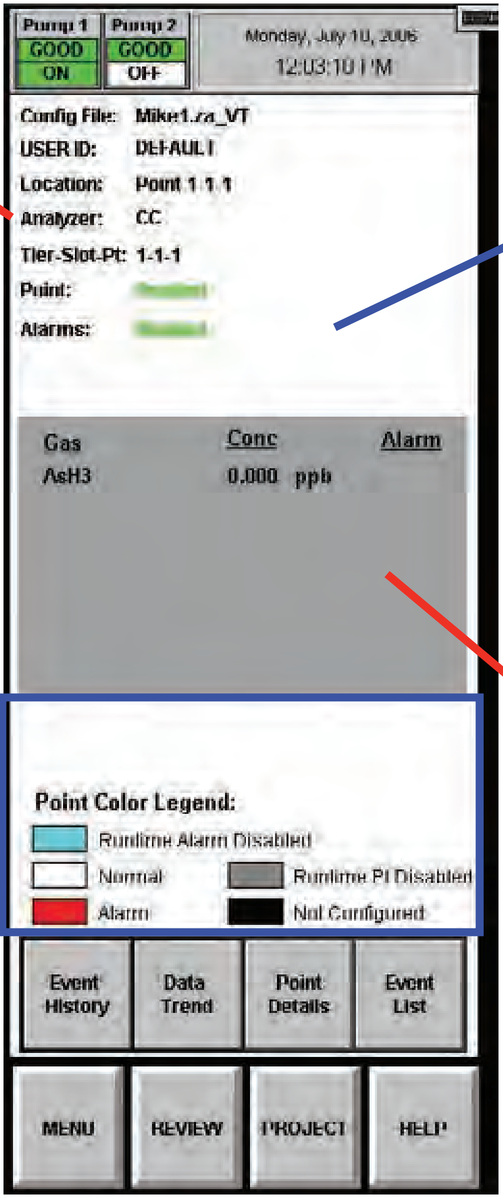
See Section 4.5.4 Event List

See Section 4.5.2 Data Trend

See Section 4.5.1 Event History

**Analyzer**
The analyzer type

**Alarms**
A point may be enabled but the alarm may be disabled



Pump 1
GOOD
ON
Pump 2
GOOD
OFF

Monday, July 10, 2006
12:03:10 PM

Config File: Mike1.za_VT
USER ID: DEFAULT
Location: Point 1 1 1
Analyzer: CC
Tier-Slot-Pt: 1-1-1
Point: [illegible]
Alarms: [illegible]

| Gas | Conc | Alarm |
|---|---|---|
| AsH3 | 0.000 ppb | |

Point Color Legend:
🟦 Runtime Alarm Disabled
⬜ Normal
▨ Runtime Pt Disabled
🟥 Alarm
⬛ Not Configured

Event History
Data Trend
Point Details
Event List
MENU
REVIEW
PROJECT
HELP

**Point Color Legend**
This legend defines the background colors in the system display area

**Gas Data**
Name of the gas or gases, up to three gases per location

Current concentration for each gas

Alarms, if any, for that point and gas. This field shows “on” or blank.

**Note:**

> A Vertex System equipped with two or more analyzer modules can monitor up to three different gases per location. However, you may not program an analyzer for more than one gas family at a time. When you configure the Vertex System for multiple gases per location, touching a point on the system display area will also change the border on other points monitoring the same location. The information for a location displayed in the point detail area will be identical regardless of which point is selected in the system display area.

## 4.3.3 Function Buttons

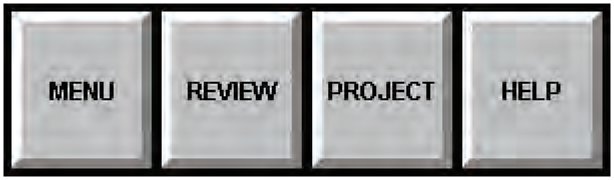
Use the function buttons located under the point detail area to access the following areas.

**Menu** - Perform runtime changes, flow calibration, maintenance, diagnostics and service functions, edit security settings and configure the system.

**Review** - View stored historical gas concentration data or events and access ChemCam.

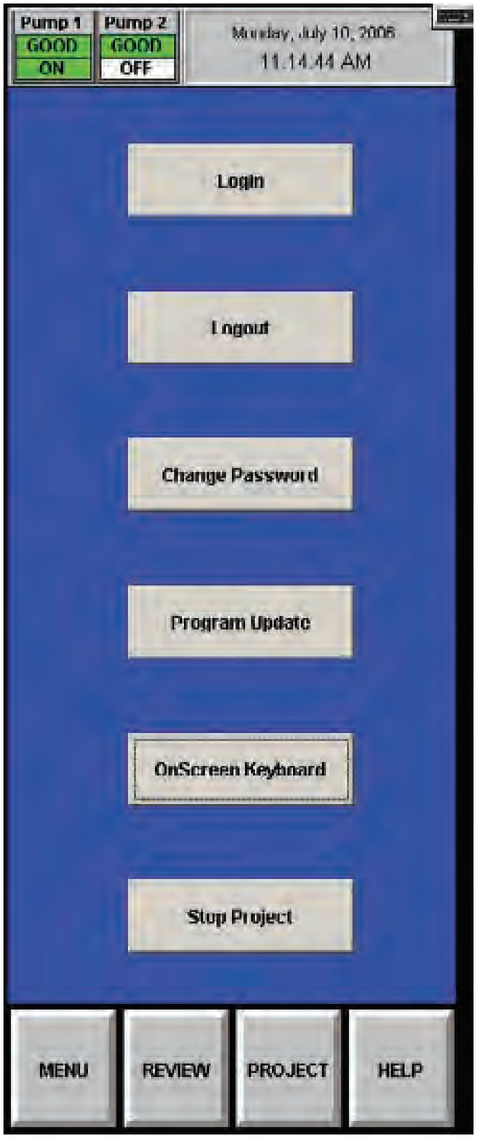
**Project** - Log in, log out, change passwords, update programs and stop the project (exit Vertex).

**Help** - Opens a window to explain the functions of the main screen.



## 4.4 Project Functions

Use Project functions to log in, log out, change passwords, update programs, restore the keyboard and stop the project (exit Vertex).

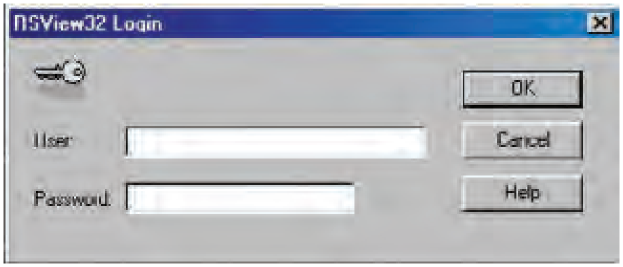

Pump 1
GOOD
ON
Pump 2
GOOD
OFF
Monday, July 10, 2006
11:14:44 AM
Login
Logout
Change Password
Program Update
OnScreen Keyboard
Stop Project
MENU
REVIEW
PROJECT
HELP

## 4.4.1 Log In and Log Out

To protect the integrity of the system, the Vertex System classifies menus as either open or protected functions. If you require access to a protected menu, you must log in under a user account with permission to use that menu. The Vertex System administrator assigns access to protected functions by setting up user accounts.

See Section 4.6.6 Security Access, for more information.

### Logging In



To log in, choose Main Screen, Project and then Log In. The Login window opens. Enter your user account name and password followed by Enter.

After you log in, the system checks your access privileges. As you use Vertex menus, only the buttons to which you have access will be active. The buttons associated with functions to which you are denied access are dimmed.

A user can choose Logout to select the default user account.

### Logging Out

To log out, choose Main screen, Project and then Logout.

The Vertex System will automatically log out any user after a period of inactivity. The default timeout period is 8 hours. Authorized users may change the timeout setting in the Configuration Menu.

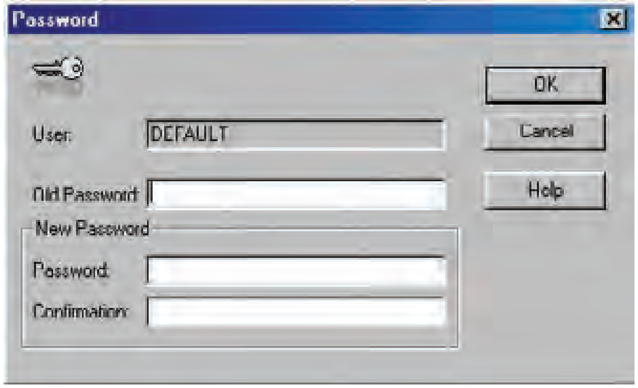
Thirty seconds prior to the end of the timeout period, Vertex will warn before logging out a user.

## 4.4.2 Changing Password

You may change your password at anytime. To change your password:

1. Login with old password.
2. Touch Project and then Change Password.
3. Enter old password.
4. Enter new password in both text boxes.
5. Touch Enter.

If both new passwords are identical, Vertex will accept your new password.


Password
OK
Cancel
Help
Old Password:
New Password
Password:
Confirmation:

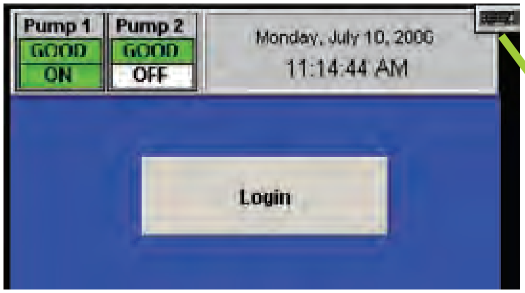
User: DEFAULT

## 4.4.3 Updating Program

Contact Honeywell Analytics for details.

## 4.4.4 Restore OnScreen Keyboard

Use the OnScreen Keyboard button to restore the keyboard if it becomes hidden.

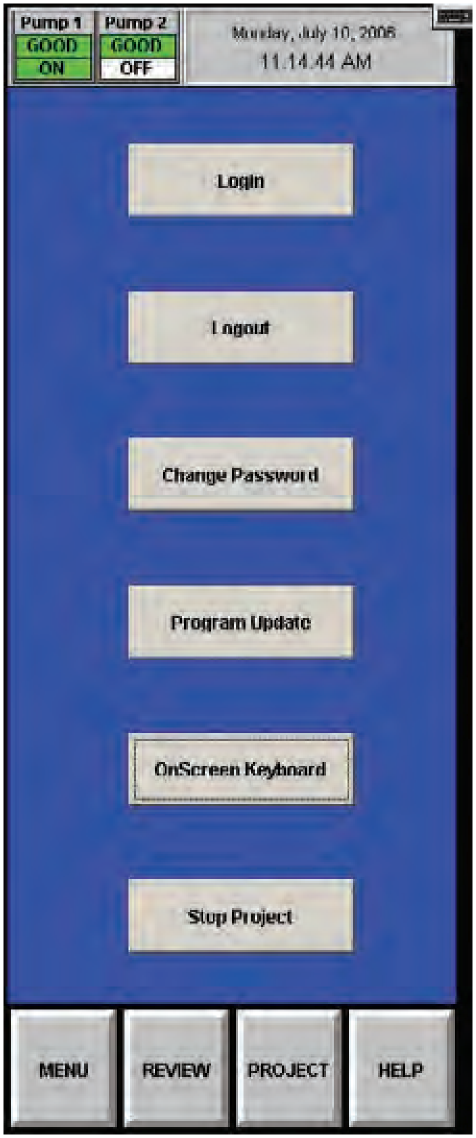

Pump 1
GOOD
ON
Pump 2
GOOD
OFF
Monday, July 10, 2006
11:14:44 AM
Login
OnScreen Keyboard Button

## 4.4.5 Stopping Project

Use Stop Project to exit the Vertex program. Touch Project and then Stop Project.

Even though the Vertex program is not running, individual analyzers continue to monitor and store data in their internal memory.

## 4.5 Review Functions


Pump 1
GOOD
ON
Pump 2
GOOD
OFF
Monday, July 10, 2006
11:14:44 AM
Login
Logout
Change Password
Program Update
OnScreen Keyboard
Stop Project
MENU
REVIEW
PROJECT
HELP

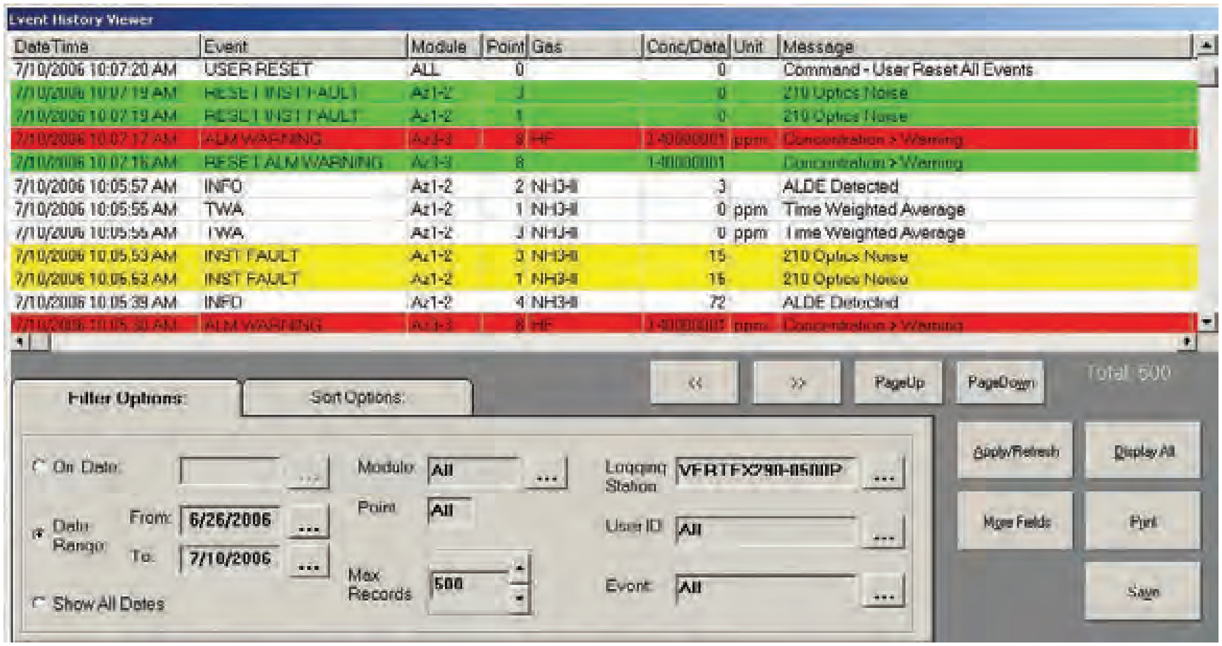
Use Review functions to view information stored in the Vertex System database. Available for viewing through the Review menu are:

- View currently active events using Event List.
- View historical events using Event History.
- View historical or real time concentration data through the Data Trend window.
- Access ChemCam functionality.

### 4.5.1 Event History

An event is any action that the Vertex System is required to enter into the database. As events occur, the Vertex System stores the events in a database on the DAq PC. The default database format is Microsoft Access.

Use the Event History Window to sort and filter data in the event log.



Event History Viewer

| DateTime | Event | Module | Point | Gas | Conc/Data | Unit | Message |
|---|---|---|---|---|---|---|---|
| 7/10/2006 10:07:20 AM | USER RESET | ALL | 0 | | 0 | | Command - User Reset All Events |
| 7/10/2006 10:07:19 AM | RESET INST FAULT | Az1-2 | 3 | | 0 | | 210 Optics Noise |
| 7/10/2006 10:07:19 AM | RESET INST FAULT | Az1-2 | 1 | | 0 | | 210 Optics Noise |
| 7/10/2006 10:07:17 AM | ALM WARNING | Az3-3 | 8 | HF | 1.40000001 | ppm | Concentration > Warning |
| 7/10/2006 10:07:16 AM | RESET ALM WARNING | Az3-3 | 8 | | 1.40000001 | | Concentration > Warning |
| 7/10/2006 10:05:57 AM | INFO | Az1-2 | 2 | NH3-II | 3 | | ALDE Detected |
| 7/10/2006 10:05:55 AM | TWA | Az1-2 | 1 | NH3-II | 0 | ppm | Time Weighted Average |
| 7/10/2006 10:05:55 AM | TWA | Az1-2 | 3 | NH3-II | 0 | ppm | Time Weighted Average |
| 7/10/2006 10:05:53 AM | INST FAULT | Az1-2 | 3 | NH3-II | 15 | | 210 Optics Noise |
| 7/10/2006 10:05:53 AM | INST FAULT | Az1-2 | 1 | NH3-II | 15 | | 210 Optics Noise |
| 7/10/2006 10:05:39 AM | INFO | Az1-2 | 4 | NH3-II | 72 | | ALDE Detected |
| 7/10/2006 10:05:30 AM | ALM WARNING | Az3-3 | 8 | HF | 1.40000001 | ppm | Concentration > Warning |

Total: 500

○ On Date:
● Date Range: From: 6/26/2006 To: 7/10/2006
○ Show All Dates
Module: All
Point: All
Max Records: 500
Logging Station: VERTEX290-0500P
User ID: All
Event: All

Events include but are not limited to:

- Alarms and faults
- User log in and log outs
- Configuration changes
- System maintenance
- Security changes
- Time and date of power up
- User comments

The peak concentration during an alarm is reported in the Conc/Data field of the reset event. This supplements the concentration reported in the Alarm event, which is the first concentration reported by the Vertex after an alarm threshold is first exceeded.

Each event record contains the following minimum information:

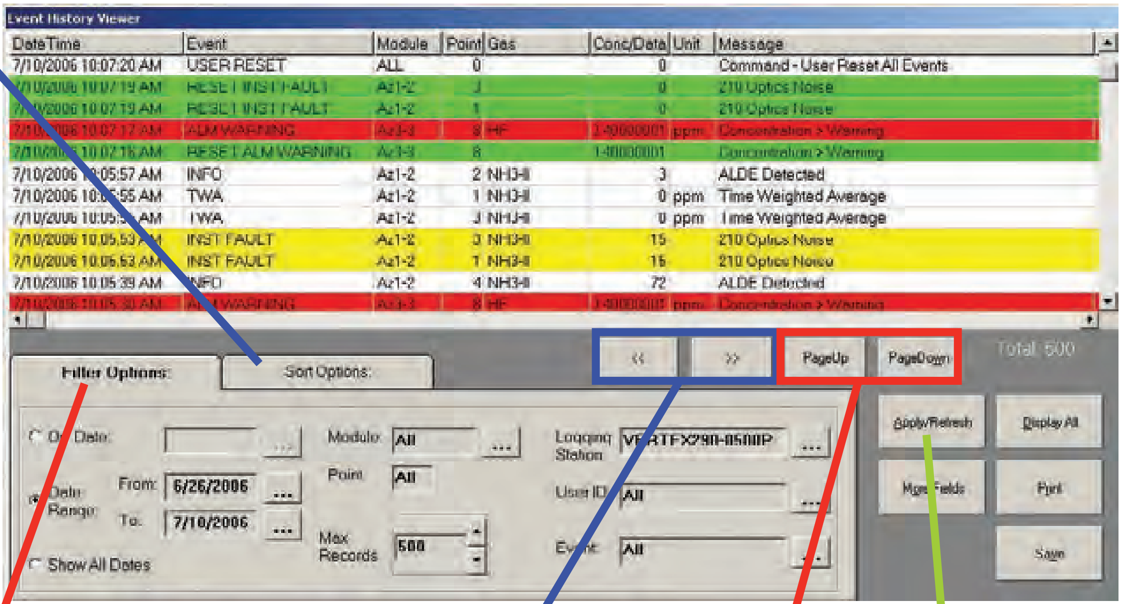
- Date and time of the event
- Module name
- An event message which may include alarm status, user login state or a comment.
- Logging station computer name

To view the event log, choose Main Screen, Review and then Event History.

Unless sorted, Vertex displays events in descending order with the most recent event at the top of the display.

**Sort Options**
Sorting arranges data according to the values in one of the sort lists. The default sorting of events is chronologically with the most recent events first.

If the data base is large, the sort may take a while.



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| 7/10/2006 10:05:57 AM | INFO | Az1-2 | 2 | NH3-II | 3 |  | ALDE Detected |
| 7/10/2006 10:05:55 AM | TWA | Az1-2 | 1 | NH3-II | 0 | ppm | Time Weighted Average |
| 7/10/2006 10:05:5[illegible] AM | TWA | Az1-2 | 3 | NH3-II | 0 | ppm | Time Weighted Average |
| 7/10/2006 10:05:53 AM | INST FAULT | Az1-2 | 3 | NH3-II | 15 |  | 210 Optics Noise |
| 7/10/2006 10:05:53 AM | INST FAULT | Az1-2 | 1 | NH3-II | 15 |  | 210 Optics Noise |
| 7/10/2006 10:05:39 AM | INFO | Az1-2 | 4 | NH3-II | 72 |  | ALDE Detected |
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○ On Date:
● Date Range: From: 6/26/2006 To: 7/10/2006
○ Show All Dates
Module: All
Point: All
Max Records: 500
Logging Station: V[illegible]RTEX290-0500IP
User ID: All
Event: All

**Filter Options**
Apply filters to find a subset of events in the log. A filtered list displays only the rows that meet the criteria you specify.

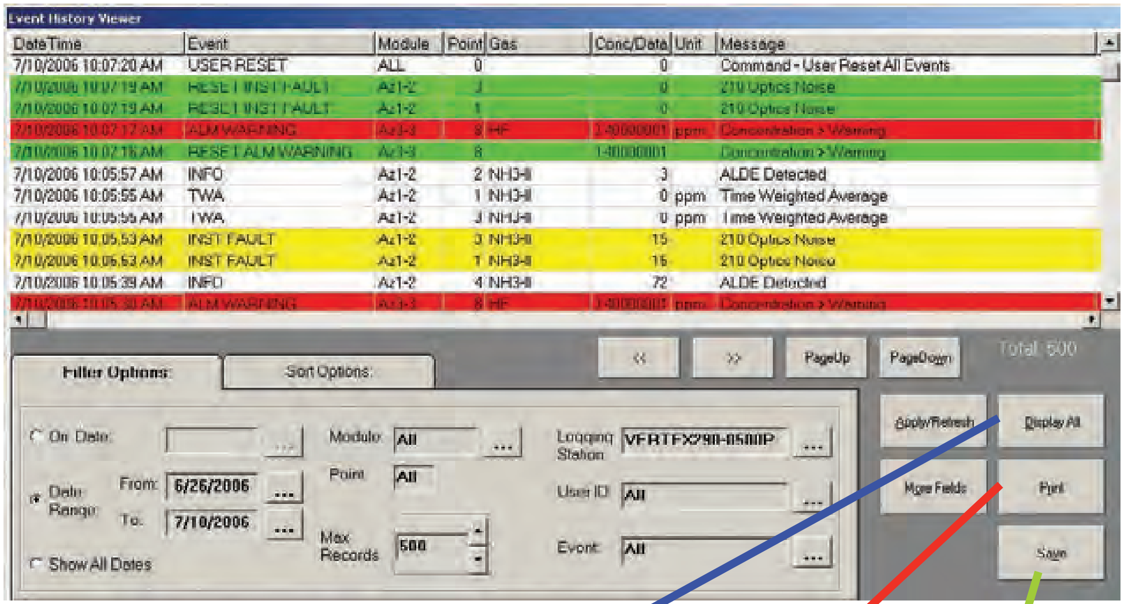
**Note:**

> Changes to sort and filter options will not take effect until you press Apply/Refresh.

**<< >>**
Horizontal scroll to show additional fields.

**Apply/Refresh**
Touch to apply the selected sort or filter or filter options.

**Page Up/Page Down**
Vertical scroll to show additional records.



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| 7/10/2006 10:05:39 AM | INFO | Az1-2 | 4 | NH3-II | 72 |  | ALDE Detected |
| 7/10/2006 10:05:30 AM | ALM WARNING | Az3-3 | 8 | HF | 1.40000001 | ppm | Concentration > Warning |

Total: 500

○ On Date:

● Date Range: From: 6/26/2006 To: 7/10/2006

○ Show All Dates

Module: All

Point: All

Max Records: 500

Logging Station: VERTEX290-0500P

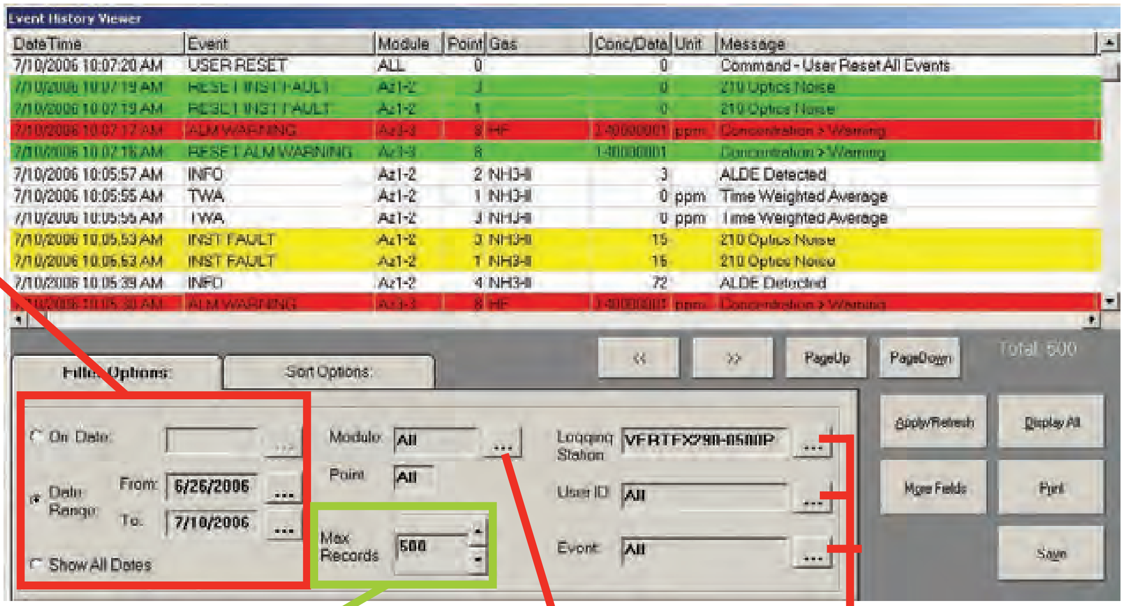
User ID: All

Event: All

**Display All**
Removes filtering.

**Print**
Prints current query. Before printing, note that Event History can be quite long. The “total” figure shows the number of events.

**Save**
Saves current query to an Access database.



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Total: 500

Filter Options: | Sort Options:

○ On Date:

● Date Range: From: 6/26/2006 To: 7/10/2006

○ Show All Dates

Module: All

Point: All

Max Records: 500

Logging Station: VERTEX290-0500P

User ID: All

Event: All

**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. ...