Vertex M Continuous Gas Monitor

Honeywell

Technical Handbook

Vertex M Continuous Monitor Symbols

Symbol	Description
	Power on Power off
	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 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 instrument could result in increased emissions and higher vulnerability to other radiated fields.

Following the guidelines in this EMC Considerations section will ensure your instrument maintains the highest degree of EMC integrity. The guidelines listed apply only to I/O emissions and do not apply to A.C. and D.C. instrument 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 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. For discrete wire terminations, pigtails to the cabinet (connector) ground should be extremely short (absolutely no greater than three inches). For multiconductor connector terminations, only 360° shielded shells should be used.

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.

Table of Contents

1 Introduction

1.1 System Overview

The Honeywell Analytics Vertex M™ System continuously monitors up to 24 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 M System provides fast response to a wide range of gases. Each location may be up to 400 ft (122 m) from the Vertex M 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 M 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 M System is manufactured by:

Honeywell Analytics Inc.
405 Barclay Boulevard
Lincolnshire, IL 60069 USA
www.honeywellanalytics.com

1.1.2 General Safety

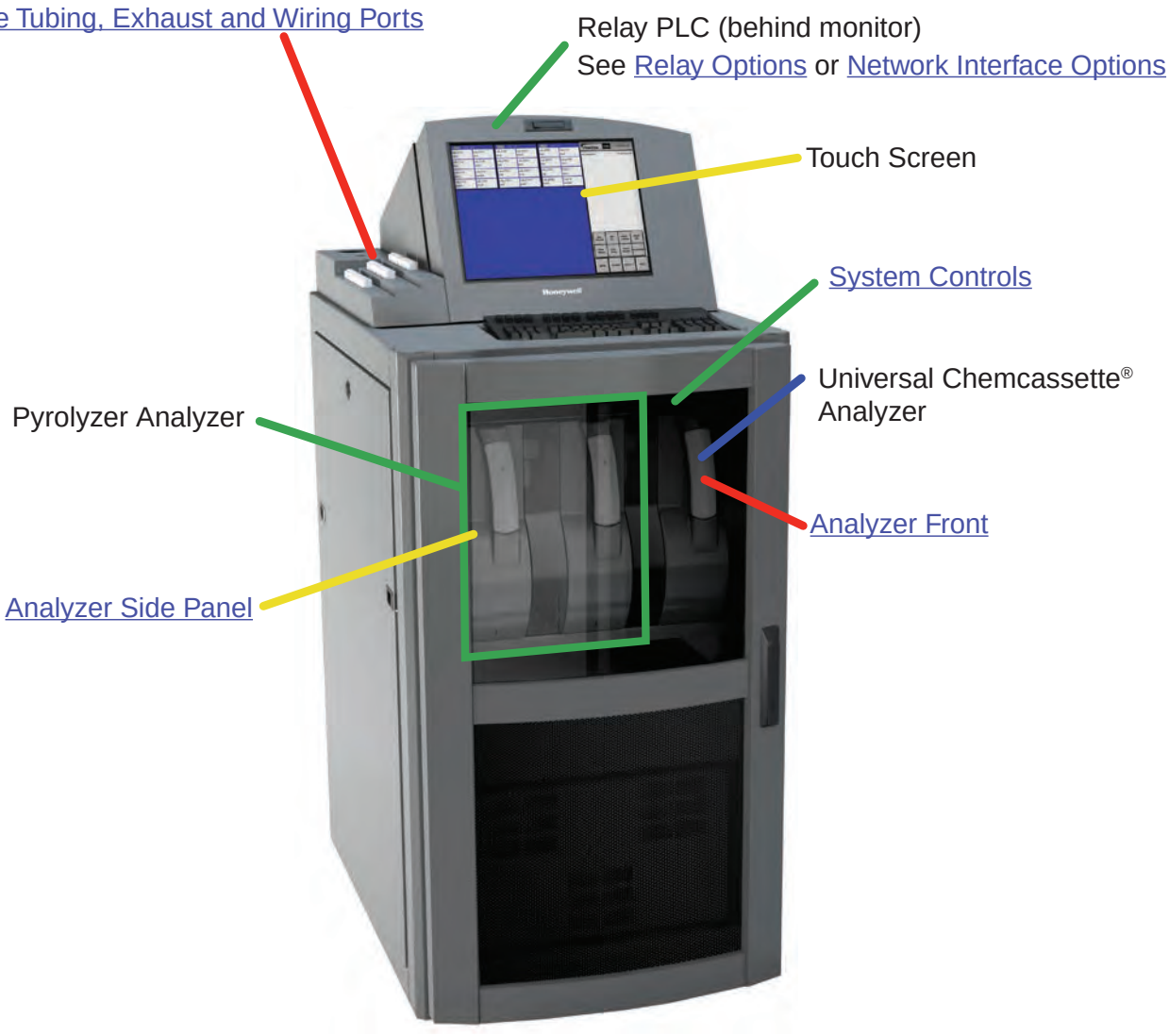
Follow all installation and operational instructions to ensure the safe and reliable operation of this unit.

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

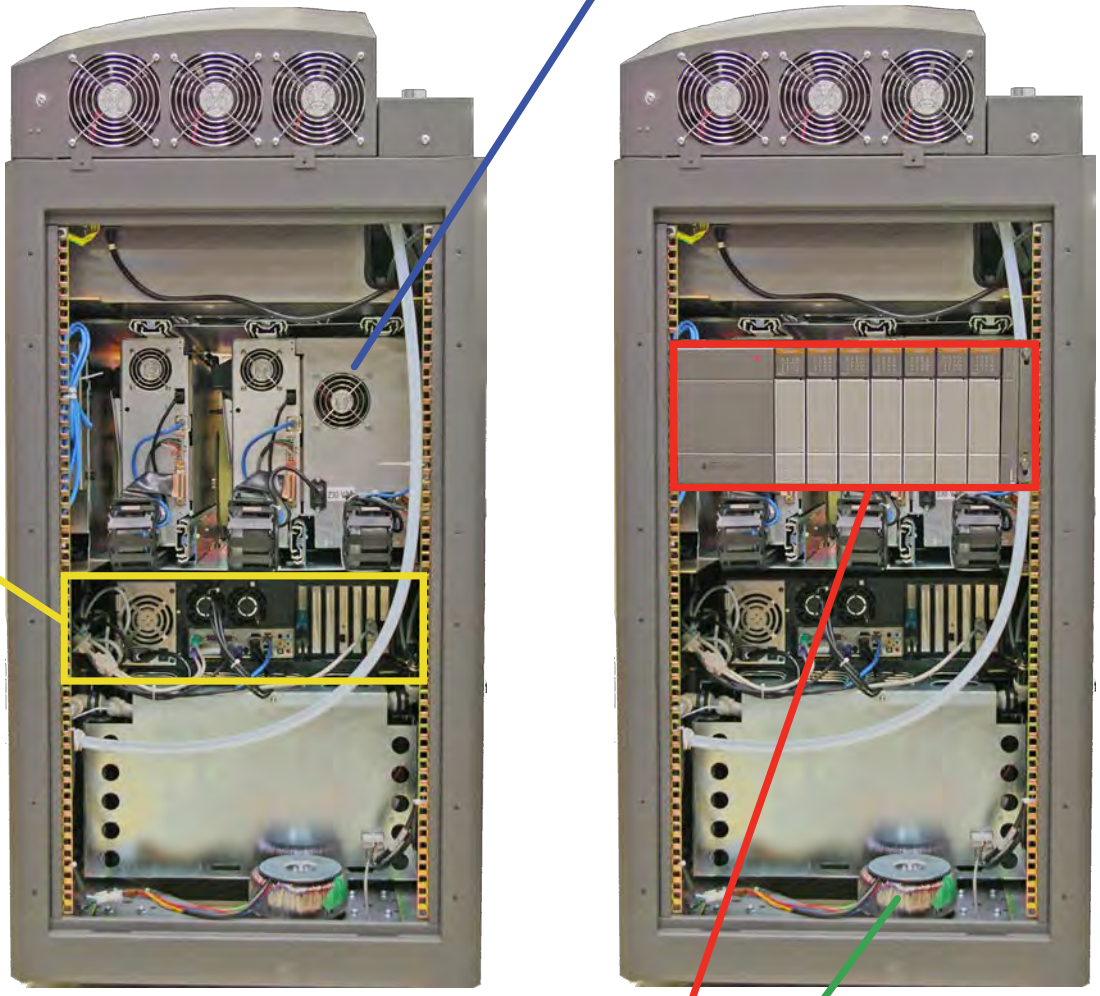
1.2 System Components

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

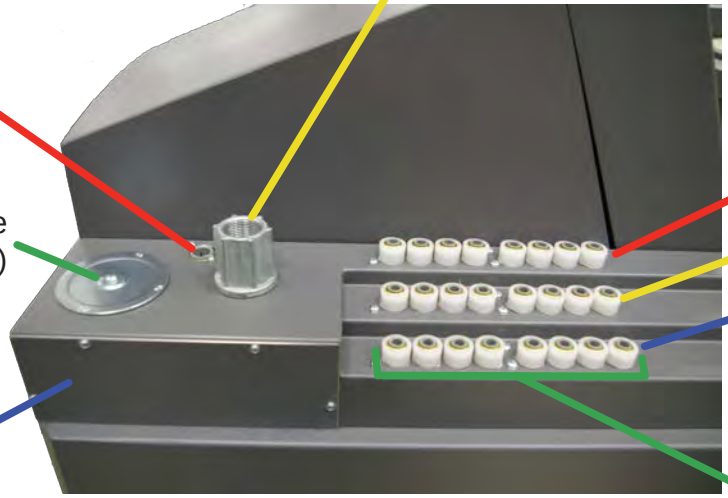
1.2.1 Vertex M Front



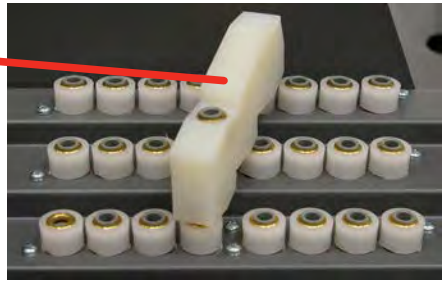
1.2.2 Vertex M Back



1.2.3 Sample Tubing, Exhaust and Wiring Ports



3-Port Manifold for multiple gas sampling
See Section A.4 Nominal Transport Times for tubing length limitations

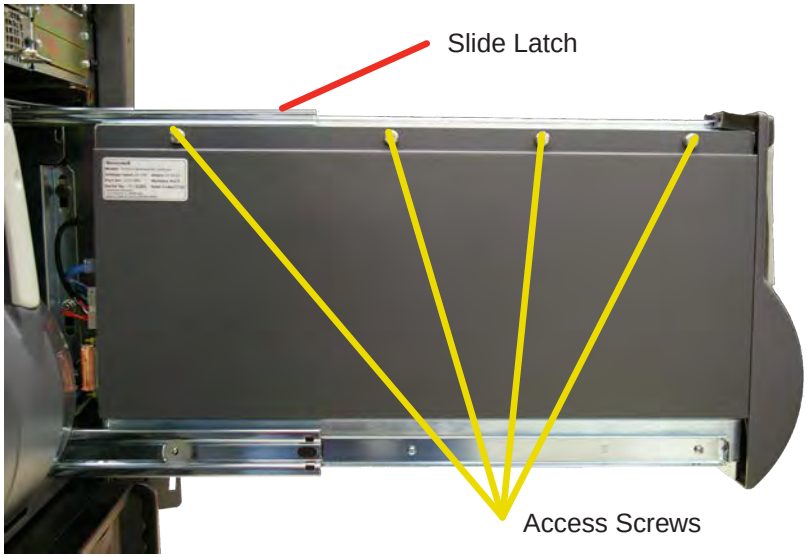


Note:

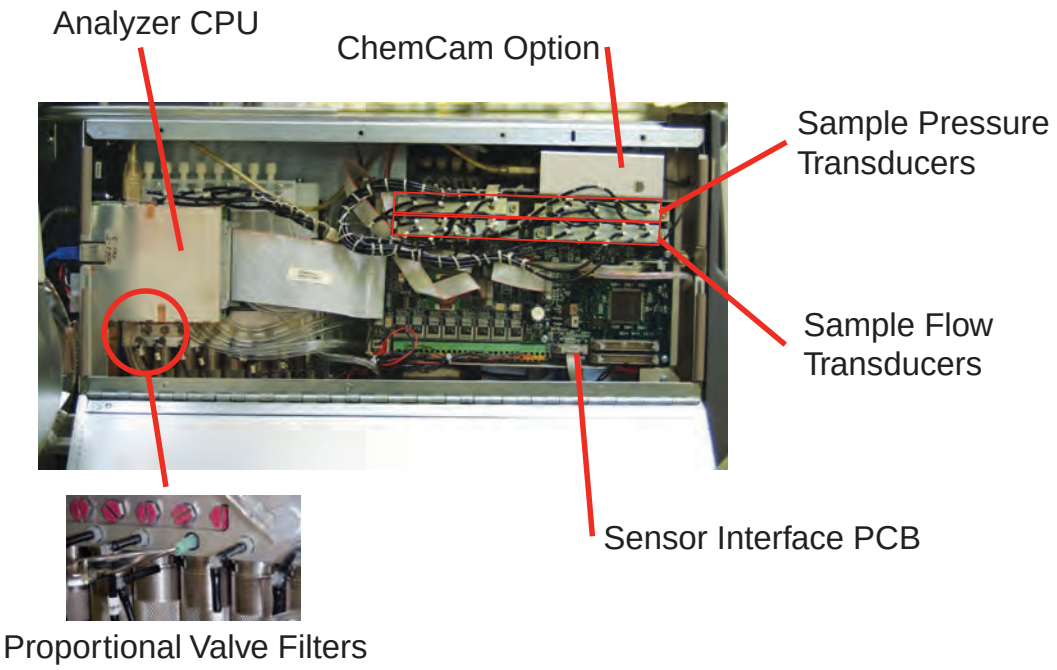
The Alarm wiring conduit plate must remain in place if not used.

1.2.4 Analyzer Side Panel

Exterior View

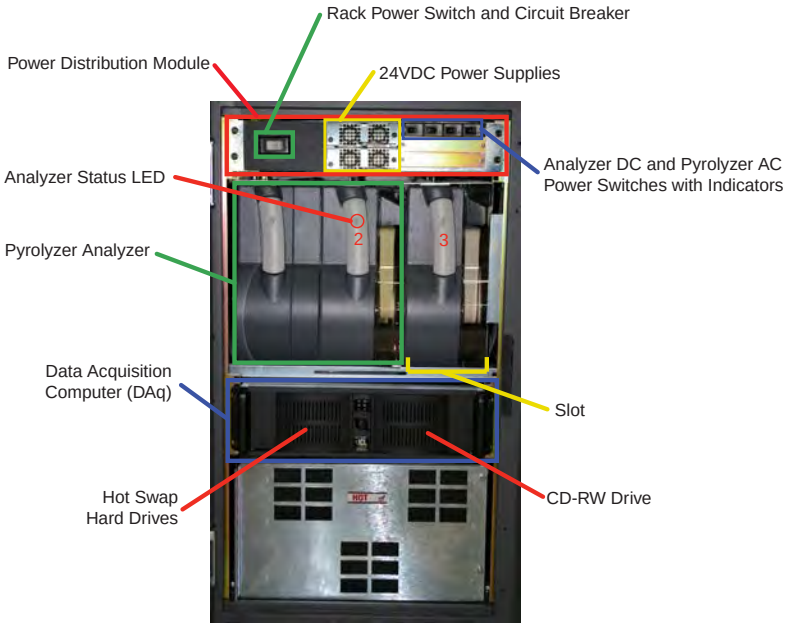


Internal View

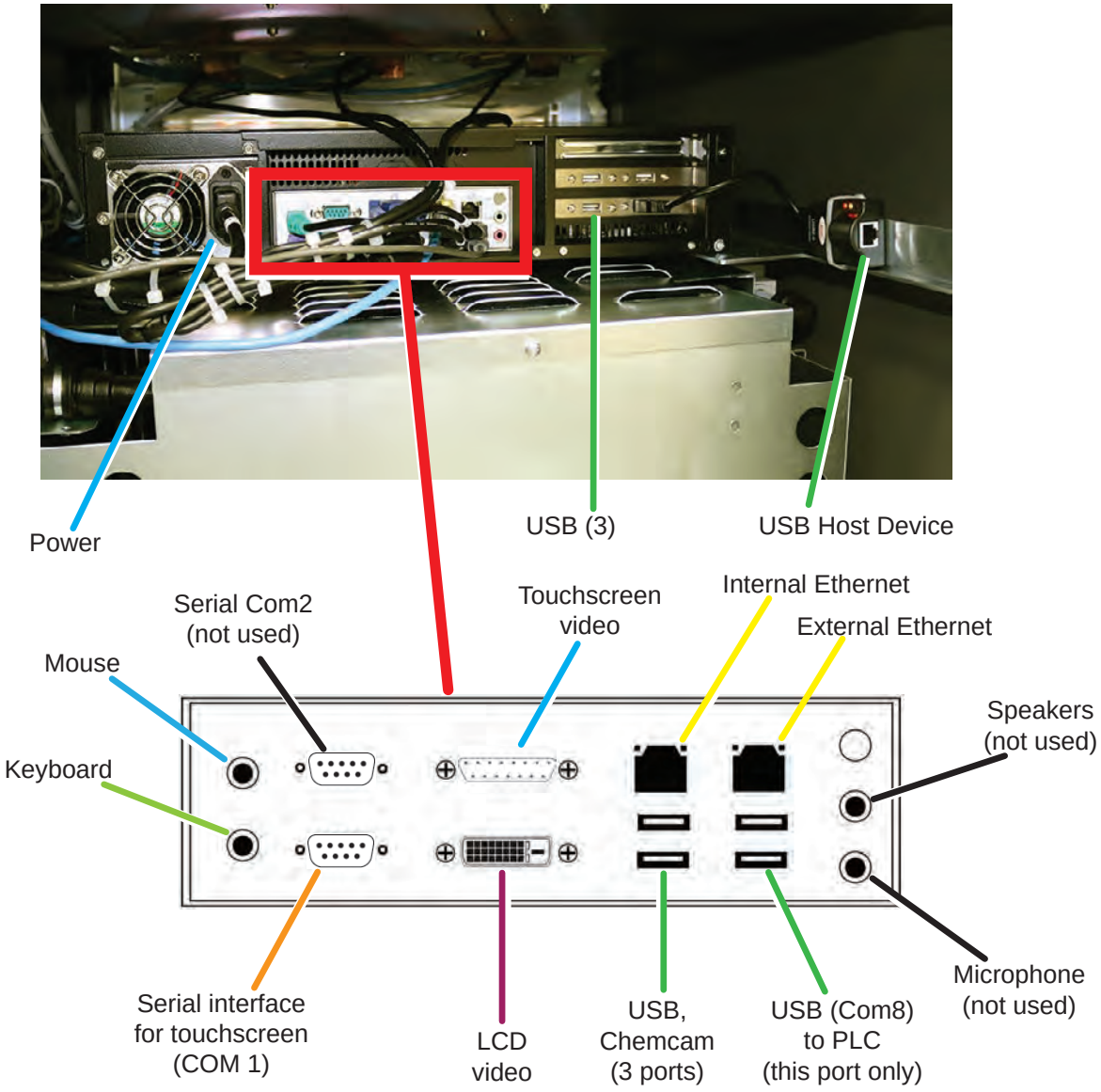


1.2.5 Analyzer Front

1.2.6 System Controls



1.2.7 Data Acquisition Computer (rear)



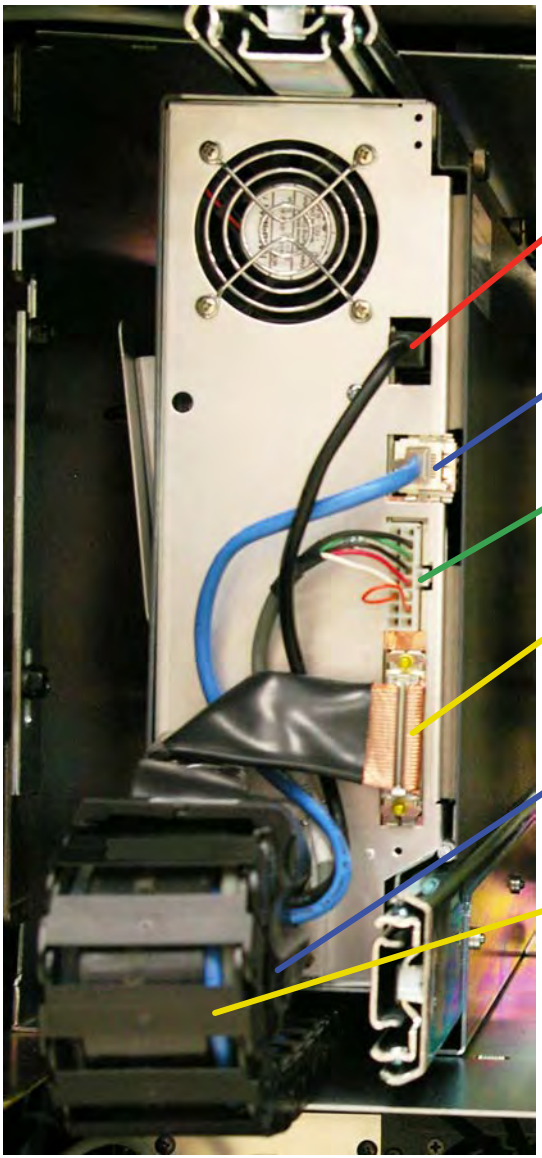
Caution:

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

Note:

This photograph shows a typical port configuration. Port and slot locations vary from model to model.

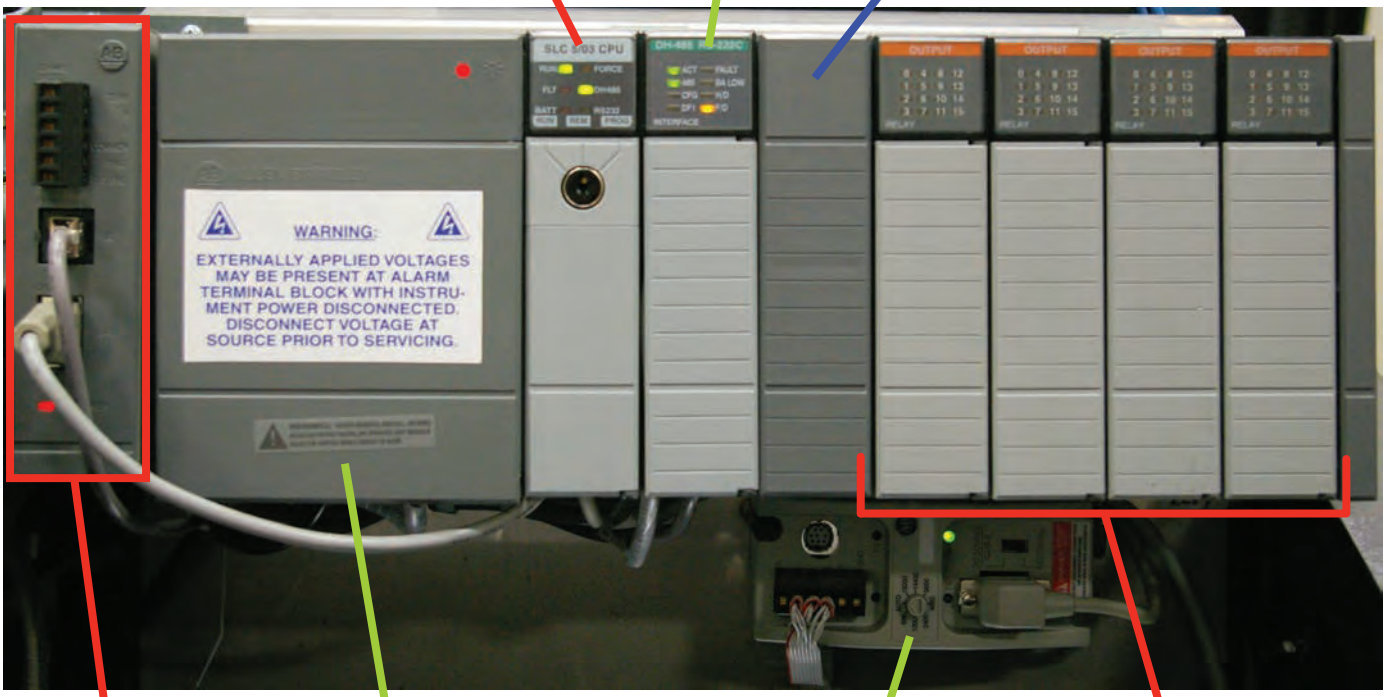
1.2.8 Back of Chemcassette® Module



Note:

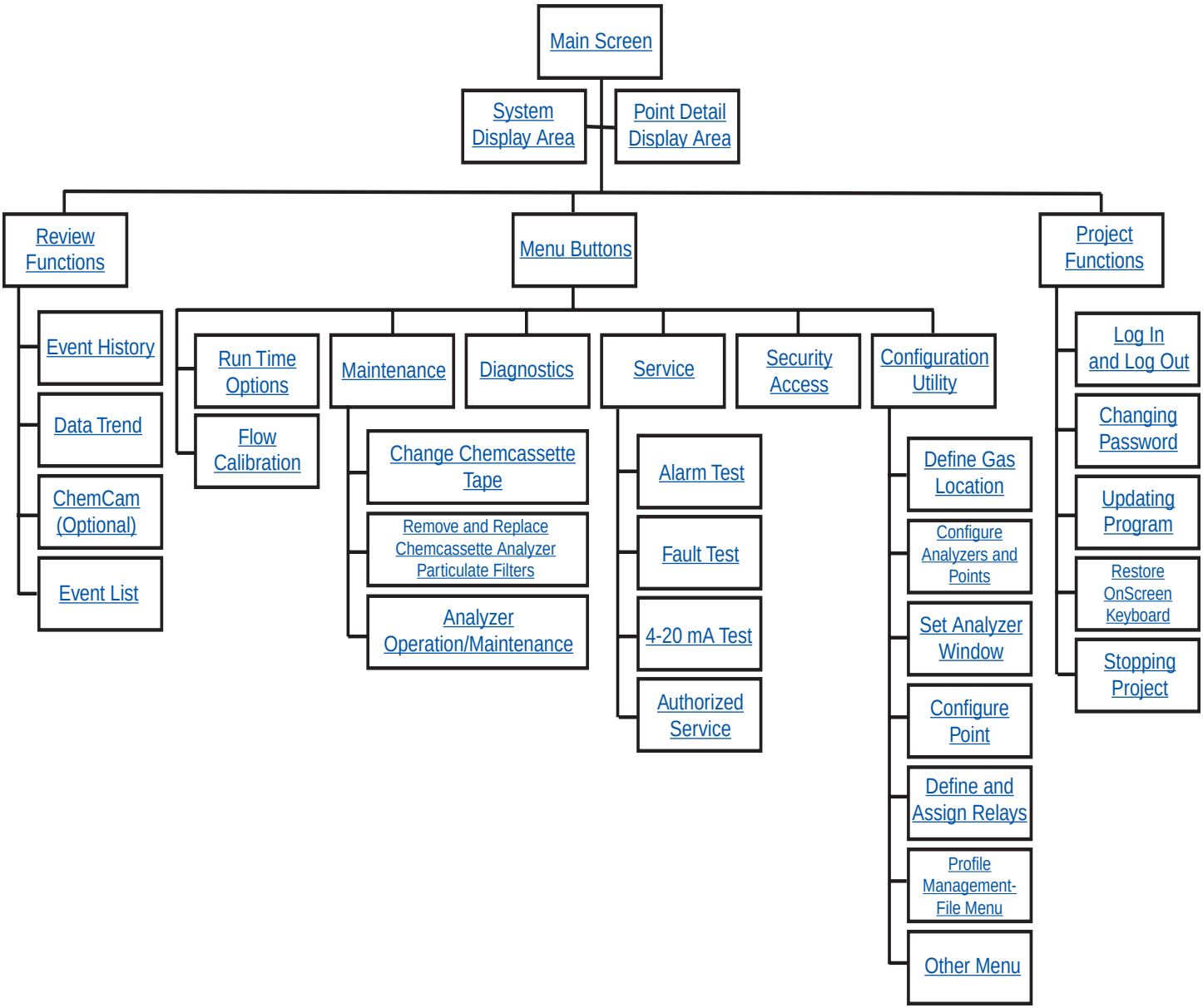
Connection secured by slide latch. Push up to open. Push down to close.

1.2.9 Main PLC


PLC Processor Module
DH485/RS232 Interface Module
Expansion slot for optional Communications Interface
WARNING:
EXTERNALLY APPLIED VOLTAGES MAY BE PRESENT AT ALARM TERMINAL BLOCK WITH INSTRUMENT POWER DISCONNECTED. DISCONNECT VOLTAGE AT SOURCE PRIOR TO SERVICING.
DH485 Link Coupler
PLC Power Supply
Advanced Interface Converter
Optional Relay Modules

1.2.10 4-20mA Analog Output Option PLC

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 M 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.

Tier 1	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 M System
Chemcassette®	8	1, 2 or 3	3
Pyrolyzer	8	1 and 2 Only	1

Table 1-2. Required Slots

Examples of possible combinations in a Vertex M System:

- One, Two or Three Chemcassette® modules
- One Pyrolyzer Chemcassette® module
- One pyrolyzer Chemcassette® module, one Chemcassette® module

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 M 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 M System via a line
- Each of the 24 sample tubing connections on the Vertex M 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 M 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 24 inlets, one for each monitored location. One exhaust port is also located on top of the Vertex M cabinet.

1.6 Chemcassette® Detection System

The Chemcassette® Analyzer module is a self-contained, microprocessor controlled analyzer that occupies one slot in a Vertex M. 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 M 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:

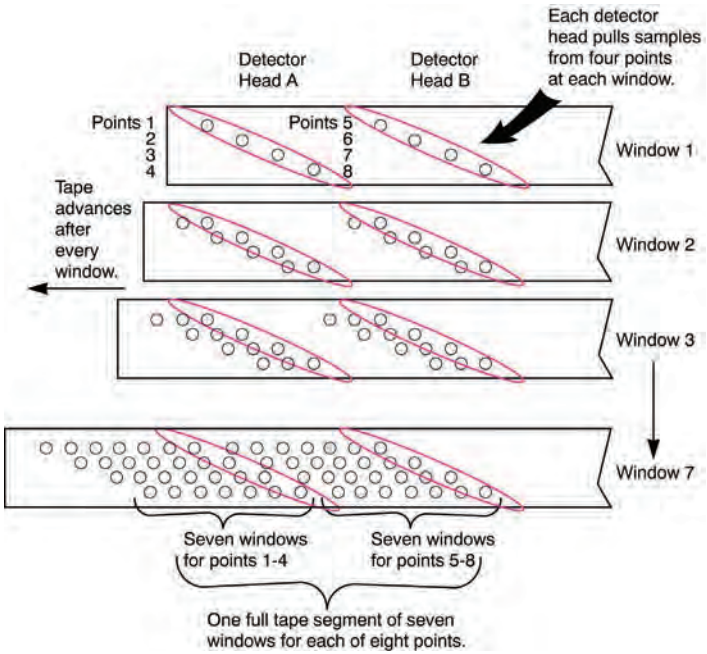
- Chemcassette® detection tape
- Optics and electronics for the detection system
- Chemcassette® tape transport mechanism
- Self adjusting proportional valves

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.

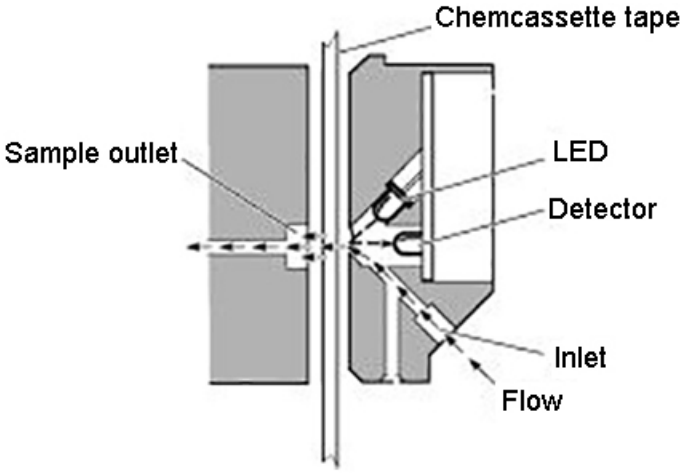
1.6.2 Stain Pattern

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

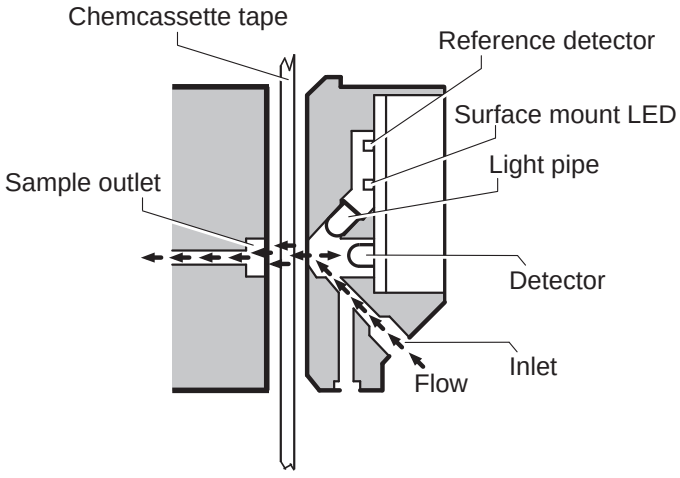


When monitoring a location, the system detects and measures a specific gas or a family of gases in the sample. The microprocessor in the analyzer module interprets the data and responds appropriately.

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.



Legacy Detection System



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.

1.7 Pyrolyzer Module Detection System

The pyrolyzer module is similar to the standard Chemcassette® module except that it detects nitrogen trifluoride (NF_3). 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 M 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 113	HF
Freon 13	Freon 114	HCl
Freon 21	Freon 116	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 M 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.

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 M should not exceed 50 feet.

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

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

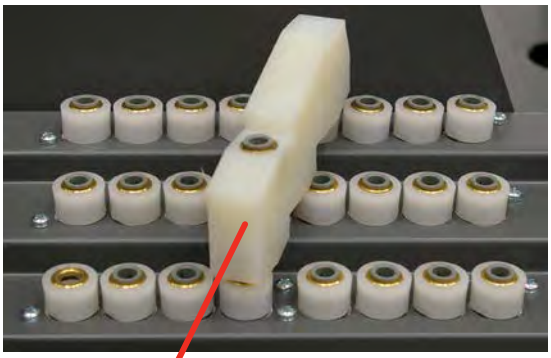
Pump Status Indicator

See Pump Status Indicator under Section 4.3.1 System Display Area.

1.9 Multiple Gas Monitoring

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



Optional manifold for multiple-gas monitoring.

1.10 Control System

The Vertex M 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.

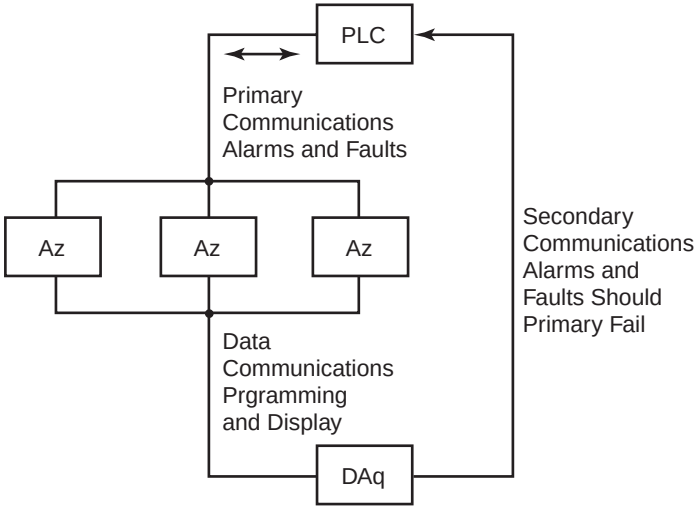


Figure 1-1. Communications Path

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 M 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 LCD touchscreen w/ on-screen keyboard or included 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 M 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 M System. Topics in this section assist you with appropriate placement of the Vertex M 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).

2.2.1 Placement of the Vertex M System

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

Note:
Refer to the installation drawing in Appendix A Installation Drawings for lifting/mounting information.

You can place the Vertex M 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 Vertex M's monitoring ability and could damage the monitor.

Allow room around the Vertex M System for ventilation and servicing.

2.2.3 Sample Transport Time

Install the Vertex M System central to all 24 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 M System is 24. in. (61 cm) wide, 36 in. (91.4 cm) deep and 57 in. (144.8 cm) in height. The system with 3 analyzers weighs about 550 pounds (249 kg). Allow for 24 in. (61 cm) door swing; 5 in. (12.3 cm) at rear and 5 in. (12.3 cm) on sides. Allow clearance above monitor for installing sample lines.

2.2.5 Sample Locations

Before installing the Vertex M 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. This tubing is manufactured to our own strict specifications, and has been purged of all by-products of the manufacturing process. On occasion, 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 monitors configured for detecting mineral acids gases (HBr, HCl, HF, NF_3). Before enabling building alarm systems, make certain that 1) you have installed the correct Chemcassette® and 2) your monitor reads zero.

Install sample lines from each location to the top of the Vertex M 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).

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 M System. See Section 3.8 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 ports 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 the 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.

2.4.2 Sample Line Connections

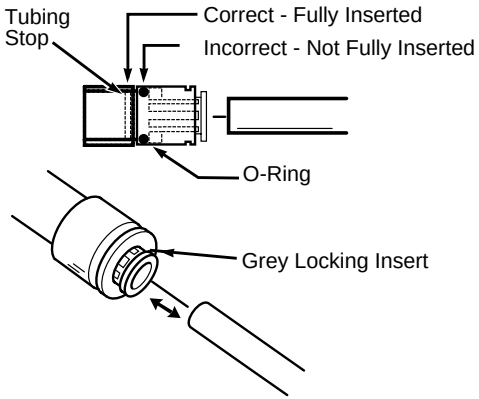


Figure 2-1. Sample Line Inlet Connections

To prepare for installation of sample lines, remove the FEP Teflon tubing from the installation kit. The top of the unit includes 25 connections:

- 24 Sample Inlets
- Exhaust Outlet (See Section 2.5 Installing Pump Exhaust Line for connection.)

Note:

Always perform a leak check after installing sample lines. See Section 3.8 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 A 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 M System is equipped with a vacuum pump that is located in the bottom of the Vertex M 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.

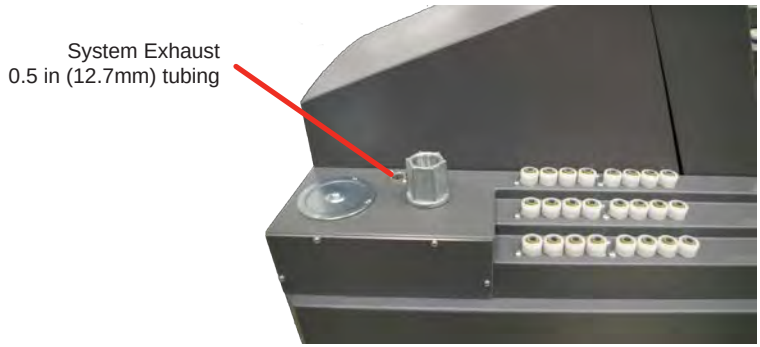
Do not crimp exhaust lines, or place them in an area where weight could collapse the tubing, or bend them to less than a 12 in. (30.5 cm) radius.

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 monitor includes 20 ft. (6m) 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 M 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 M 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. Ensure power is disconnected at the source prior to servicing alarm contacts.

2.6.1 Connecting AC Power

AC Source Requirements:

- Operating Voltage: 110 or 230 VAC ± 10% (under load) @ 50/60 Hz; 15 Amps maximum, single phase.

The Vertex M System requires a dedicated AC circuit rated at either 110 or 230 volts, 50/60 Hz, 15 Amp single phase. 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 three-position terminal block in the side panel of the rack.

See Figure 2-2.

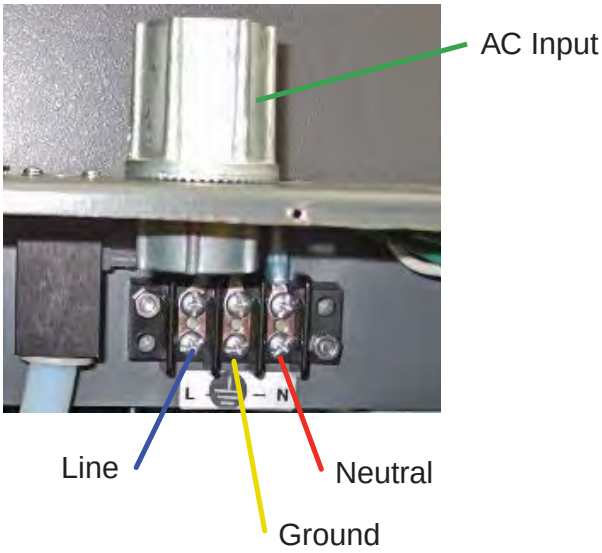


Figure 2-2. AC Power Connection

2.6.2 Power On/Off

An internal rack power switch is located behind the door.

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

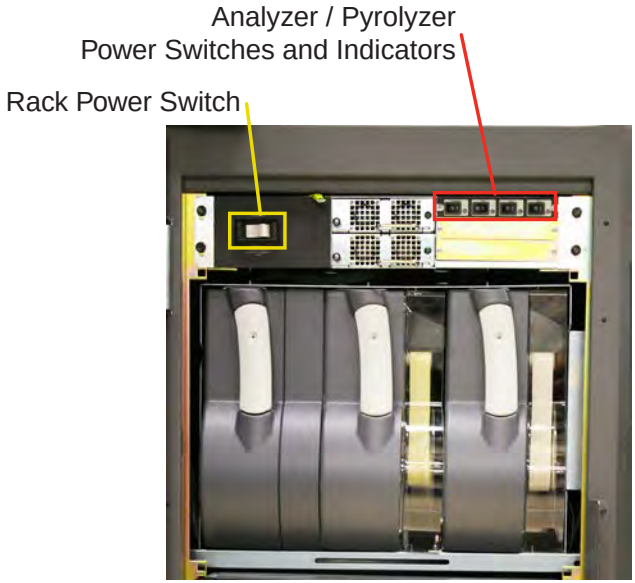


Figure 2-3. Rack Power Switch

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 M System. System display and operator control are through an LCD touch screen with on-screen keyboard or the external keyboard on top of the unit.

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.

Figure 2-4. On-screen Keyboard

2.7.1 Printer

The Vertex M 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.

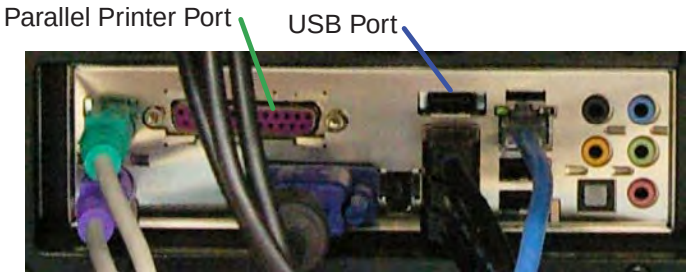


Figure 2-5. Printer Connection

2.7.2 External Network Connection

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

Figure 2-6.

⚠ CAUTION

Do not connect an external network to the Vertex M Ethernet hub. Use only the external Ethernet connection (as shown in Figure 2-6) on the back of the data acquisition computer. Connecting an external network to the hub will impair monitoring capability.

Figure 2-7. Ethernet cable

1. When using an Ethernet output, the conduit must be connected to Earth ground.
2. The Vertex M comes with a Ferrite. Four wraps of the Ethernet cable is needed as close to the Vertex M as possible.

2.7.3 Network Computer Security

The Vertex M relies on the HMI system of accounts and passwords to prevent unauthorized tampering as described in Section 4.6.6 Security Access 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 M RSView32 application in a Windows® account without administrator privileges will cause error messages to be displayed. The Vertex M should be treated and secured as any other networked PC by maintaining the appropriate virus protection. Contact your local Honeywell Analytics field service representative prior to installing Microsoft updates or Service Packs

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 A Optional Relay Specifications for alarm relay voltage and contact rating guidelines.

2.8.1 Relay Contacts

The Vertex M 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 behind the Vertex M LCD screen. See Appendix A Optional Relay Specifications for more 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 mains power supply and alarm wiring.

- Route relay wiring through raceway and out through the top of the cabinet.
- Use shielded cable or conduit.
- Conduit must be earth grounded.

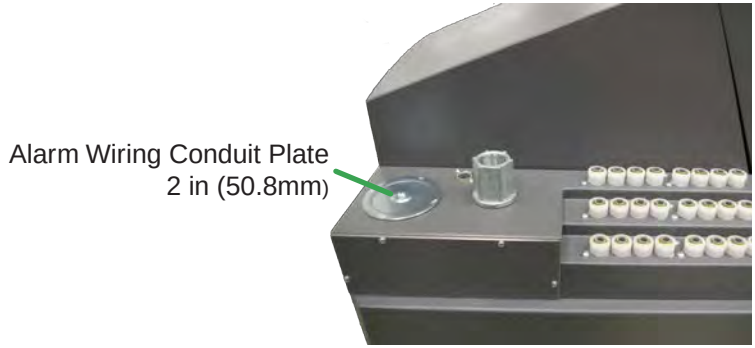
⚠ CAUTION

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 M System power supply for external alarm power.

Note:

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



Note:

The Alarm wiring conduit plate must remain in place if not used.

Validating the System

The Vertex M 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 M System startup sequence.

3.1.1 Initial Startup

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

- 3.3 Verify Installation
- 3.4 Power Up
- 3.5 Start Program
- 3.6 Configuration Utility
- 3.7 Load Tape
- 3.8 Leak Checking Sample Lines
- 3.9 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

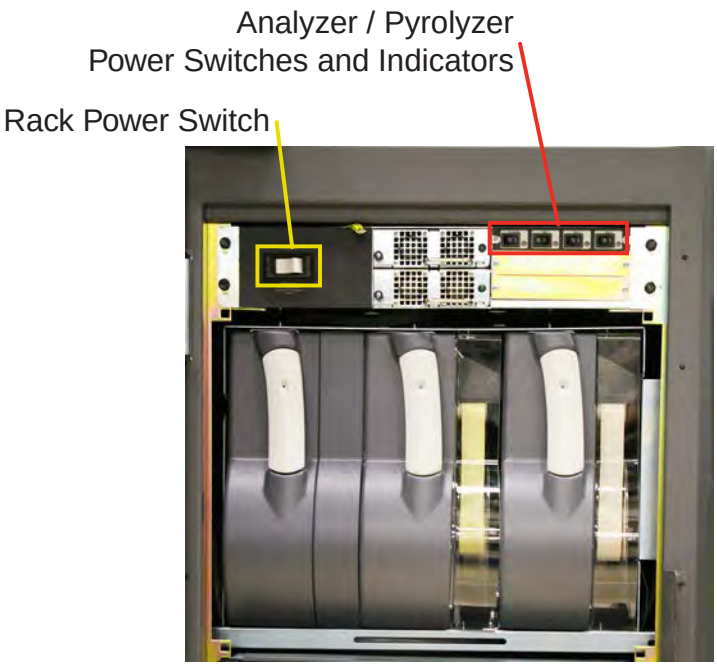
See Section 2 Installation for connection details.

3.4 Power Up

Use the rack power switch behind the front door to power up the Vertex M System.

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

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



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

3.5 Start Program

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

Note:

Any time the Vertex M 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 M System. Stop project if adjusting time and time zone. Once complete restart project. See **Section 4.4.5 Stopping Project** on how to stop the project.

CAUTION

Do not change language in Windows setup.

Figure 3-1. Vertex M Main Screen

3.6 Configuration Utility

Before the Vertex M 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.

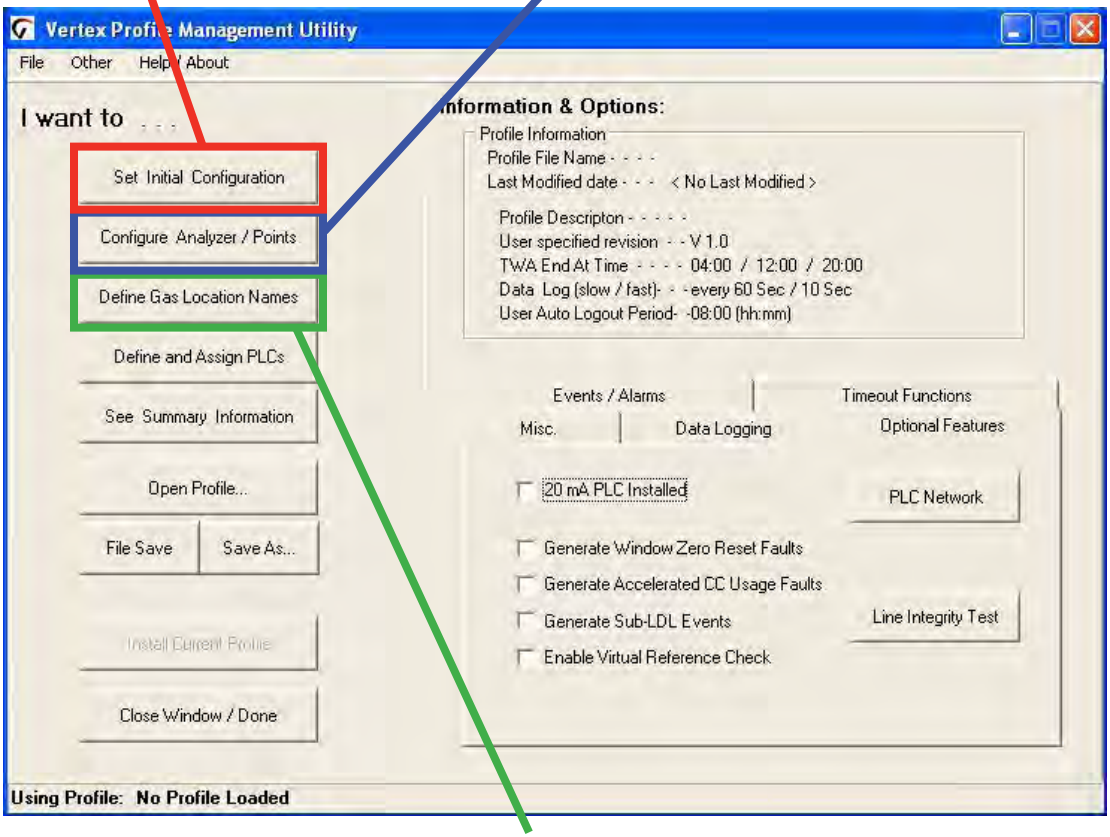
To open the Configuration Menu, touch Main Screen, Menu and then Configuration.

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.



Define Gas Location Names

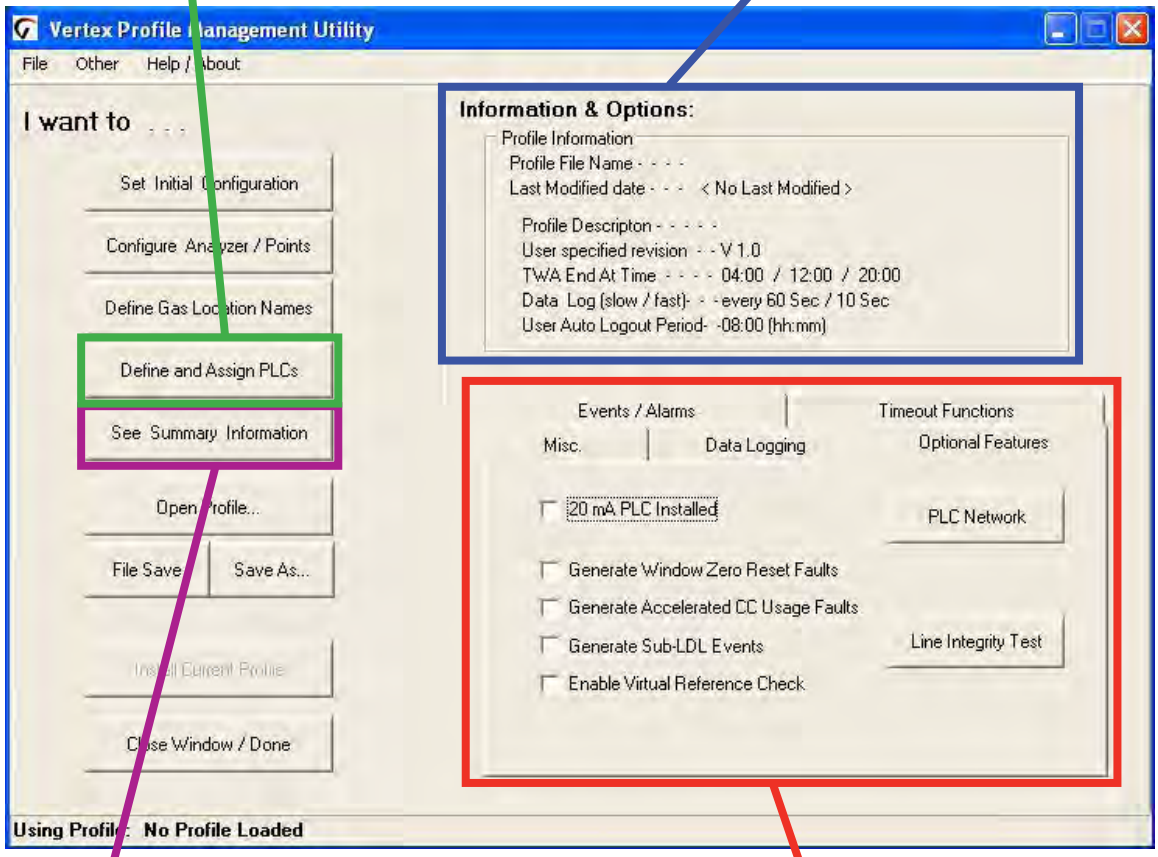
Enter the short and long names for each monitored location.

Define and Assign PLCs

Associate relays with software alarms and faults.

Information and Options

A display of key parameters about the Vertex M system.



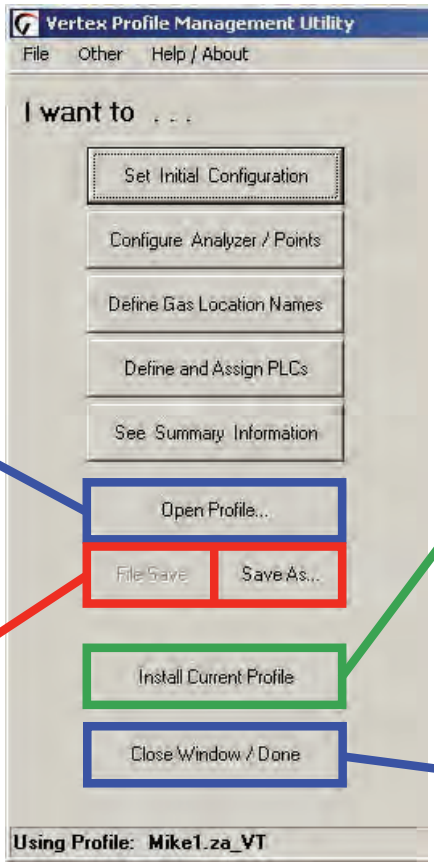
See Summary Information

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 indicating the status and final result of the installation.



Open Profile...
Opens a previously saved profile.

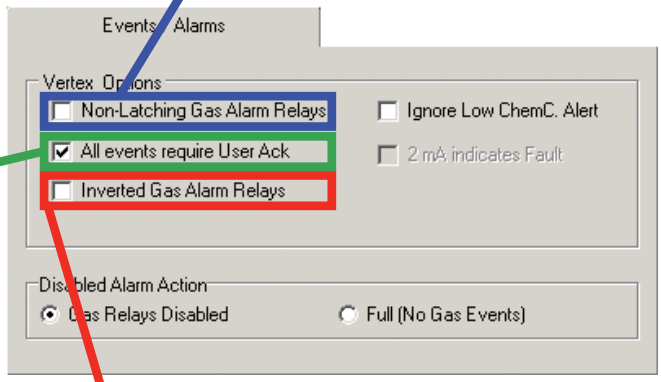
File Save/Save As...
Saves current profile on disk. Vertex M will prompt you to save changes when closing the Configuration window.

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

Close Window/Done
Exits Configuration setup

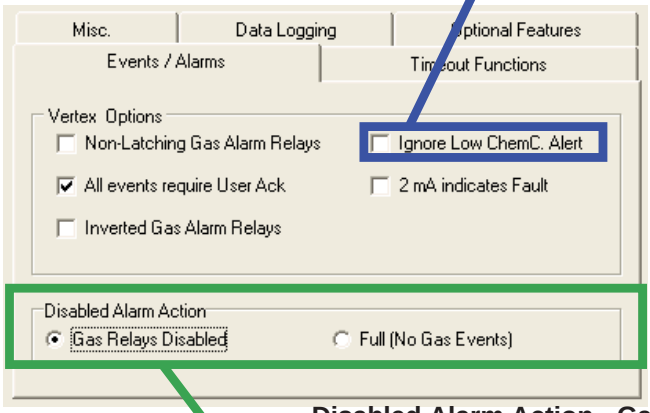
Non-Latching Gas Alarm Relays
A latching gas alarm relay activates when a gas concentration reaches a level 1 or level 2 alarm setting. The relay remains activated until an authorized operator resets the alarm. Non-latching gas alarm events clear themselves as soon as the gas concentration drops below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

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.



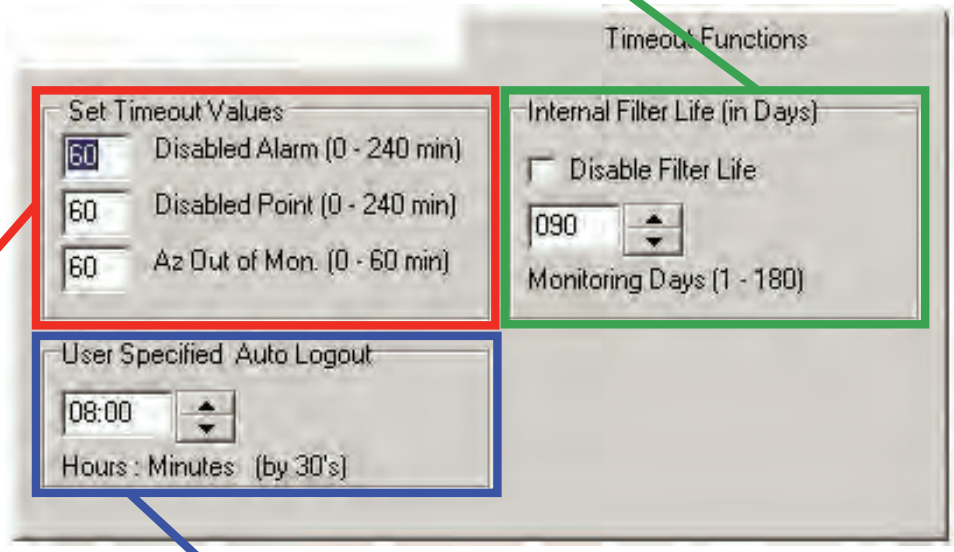
Inverted Gas Alarm Relays
Vertex M alarm relays, by default, are normally open (de-energized) when no alarm condition exists. If this option is checked, the alarm relays will be normally closed (energized) when there is no alarm. Fault relays are not affected by this option and are always normally closed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

Ignore Low ChemC. Alert
Vertex M 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.



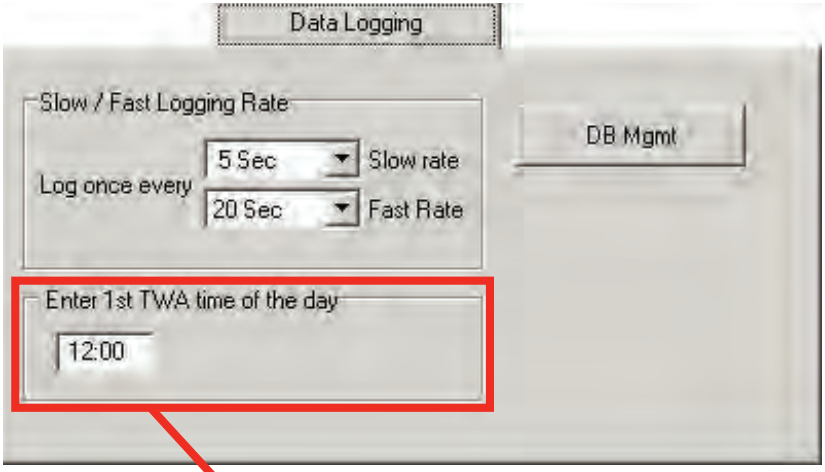
Disabled Alarm Action - Gas Relays Disabled or Full (No Gas Events)
This setting effects the operation when alarms are disabled using the Runtime Options screen. If “Full” is selected, Vertex M will not generate an alarm event for the affected point(s) and none of the associated actions such as relay 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

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
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.

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.

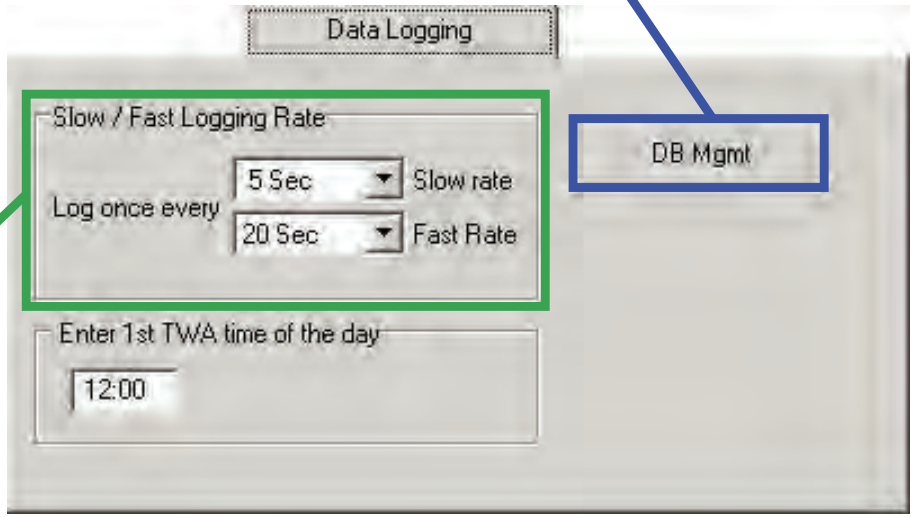


1st TWA Time
Use to set times for the beginning and end of each 8-hour, Time Weighted Average (TWA) period. Use this option to associate the TWA periods with shifts or any other regular event. The system calculates and displays the TWA after each 8-hour TWA cycle.

The default setting is 04:00 indicating that the Vertex M 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 M 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.

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.

Logging Rate
The Logging Rate option sets the frequency that Vertex M 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 M 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 3.5.4, Configure Point, for instructions to set logging frequency.)



Note:

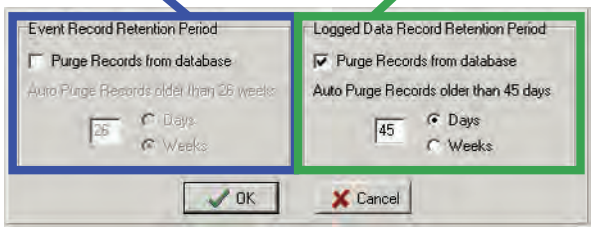
Setting the Vertex M System to continuously log concentration data on a 3-analyzer system requires approximately 15 megabytes of disk storage per day at the fastest logging rate of once every 5 seconds. Purge data often to avoid filling available disk space.

Database Management-Retention Periods

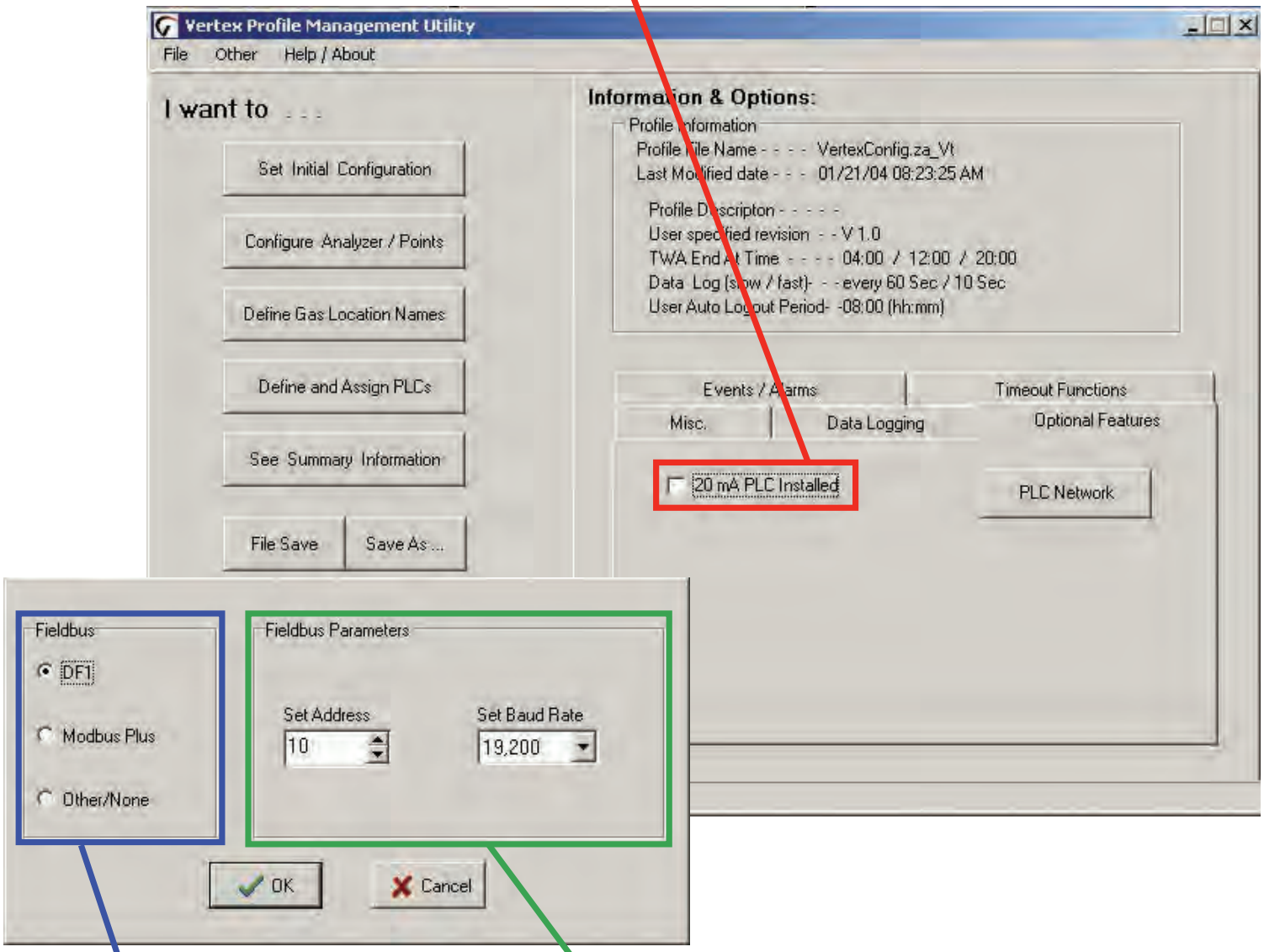
Retention periods are selected as either days or weeks. Valid entries for the period are positive numbers from 1-99. Vertex M will not recalculate the values when the unit is changed. For example, if the purge period is 14 days and you change “days” to “weeks”, Vertex M will set the period to 14 weeks.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

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

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



20 mA PLC Installed
Leave this box UN-checked regardless of whether a 4-20mA PLC is installed. See Appendix G for Analog Output option configuration.

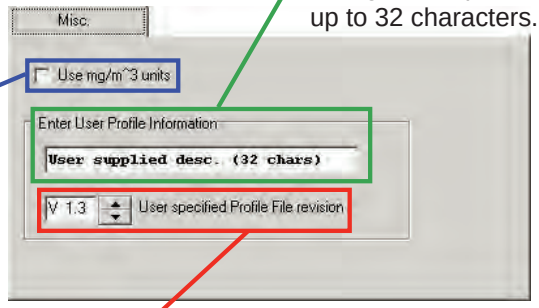


Fieldbus
Use this setting to select the PLC network interface that is installed.

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

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

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



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.

3.6.1 Define Gas Location

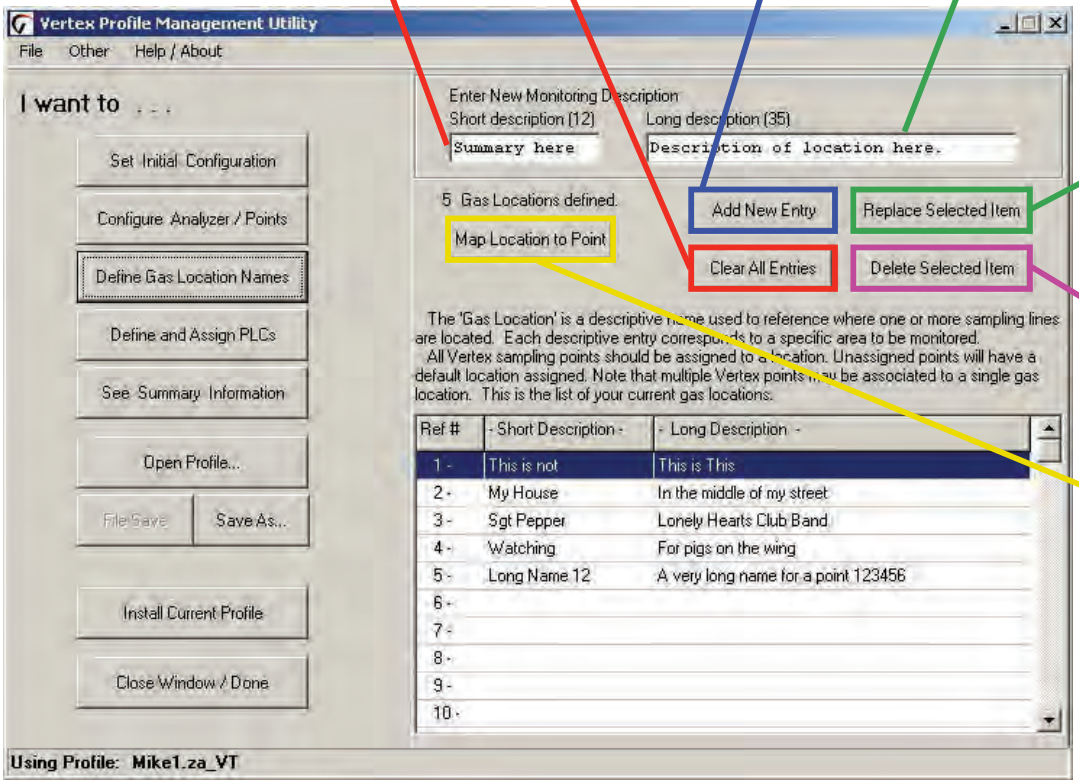
Use Define Gas Location to edit the list of locations. Assign a long and a short name for each location.

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.

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

Long names
Enter up to 35 characters.



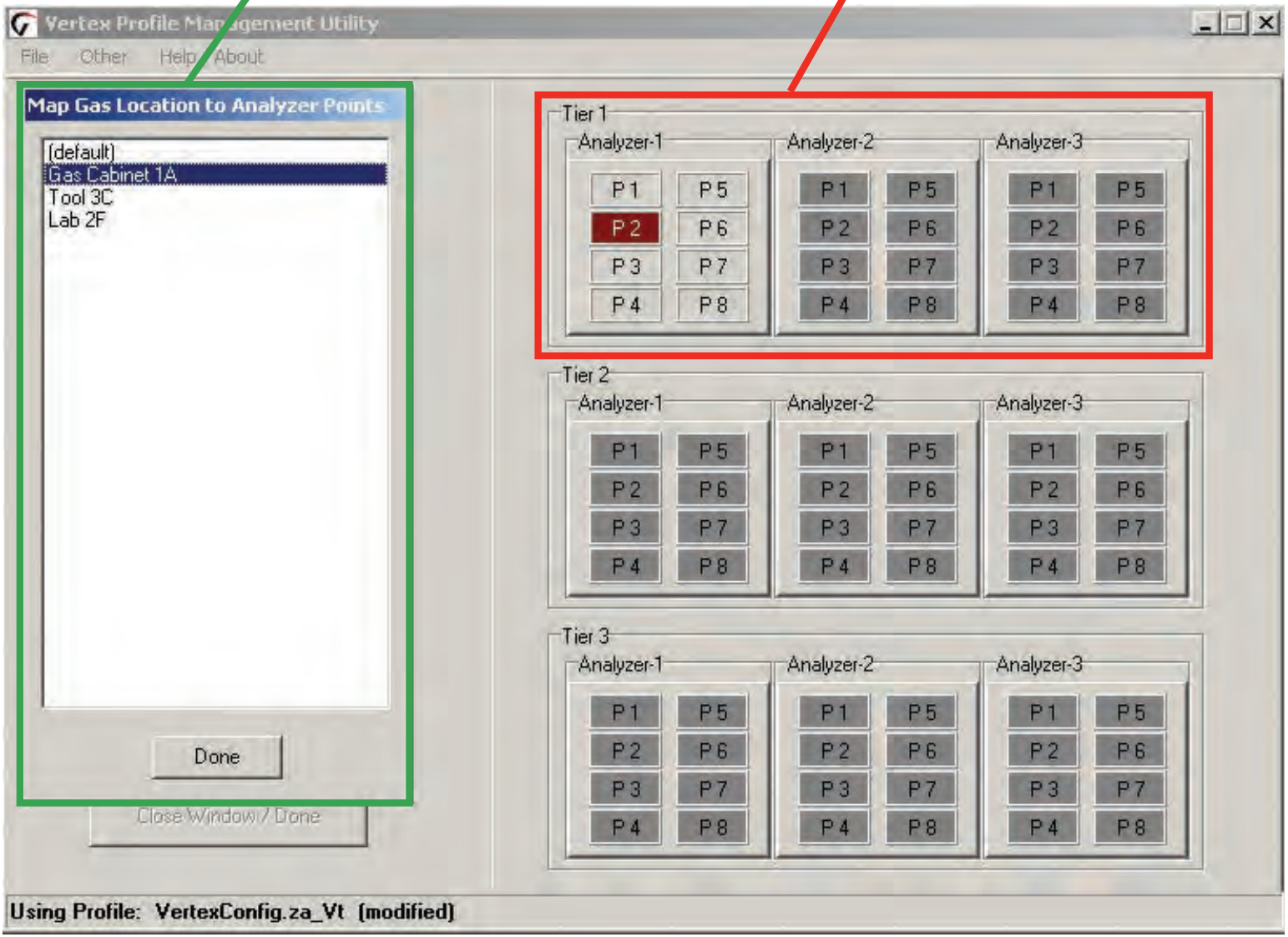
Replace Selected Item
Replaces the selected line in the gas location list with the information in the short and long name text boxes.

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

Map Location To Point
Brings up Location Map window.

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 M.

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



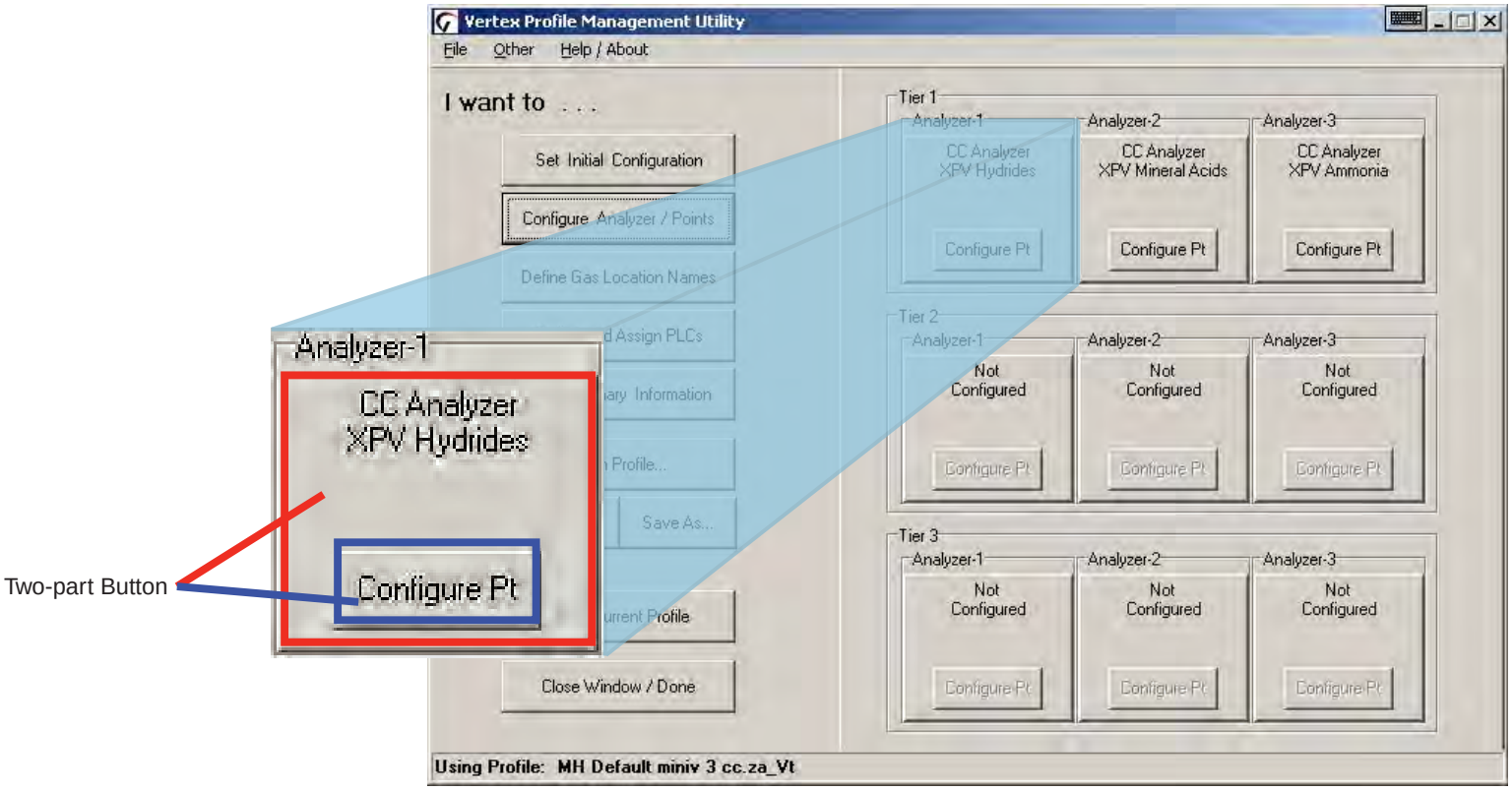
3.6.2 Configure Analyzers and Points

Press "Configure Analyzer/Points" to change the right side of the Configuration window to a display representing physical layout of the Vertex M 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.

Note:

Only analyzers on tier one should be configured. Configuring analyzers on tiers 2 or 3 will result in errors and faults.



3.6.3 Set Analyzer Window

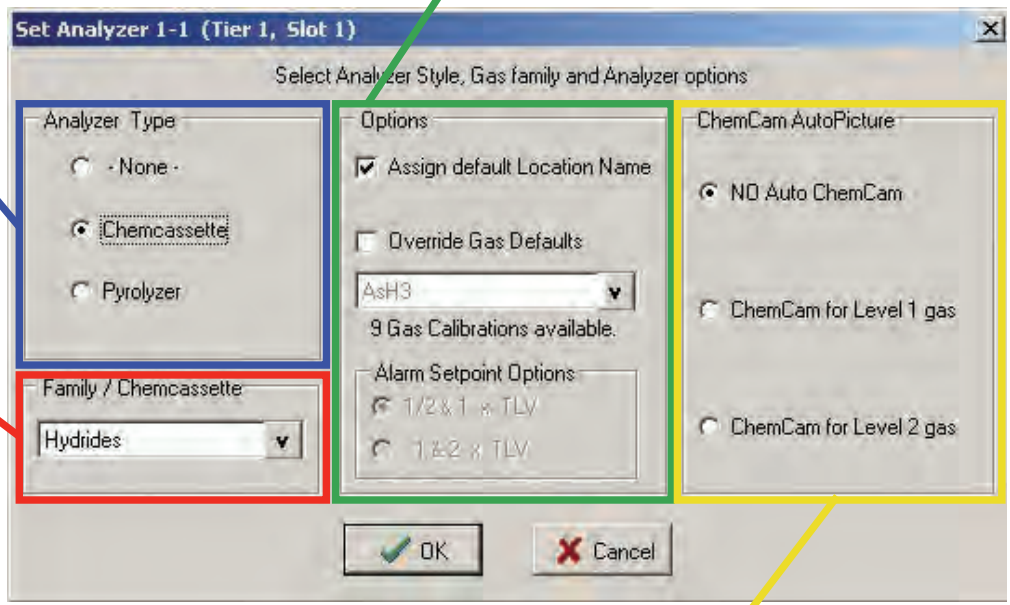
To configure the type of analyzer slot, press the top of the button representing the slot. The Set Analyzer Window opens.

Options
When you choose a family of gases, Vertex M enters default settings into the profile. Selecting "Override Defaults" allows you to change the target gas type, alarm levels and the location assignment.

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.

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.



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 M 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

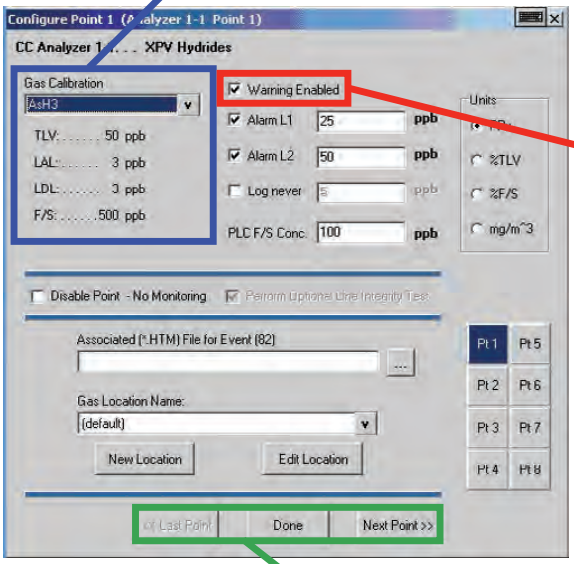
3.6.4 Configure Point

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.

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.



Warning
Select Warning to create an alarm when a gas concentration exceeds the Lower Detection Limit (LDL). See Appendix A 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

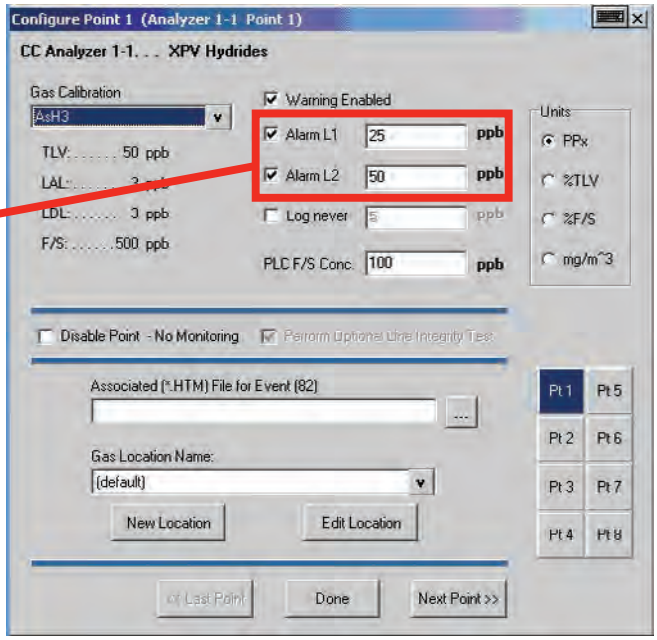
Vertex M loads default alarm levels when you choose a target gas. See Appendix A Detectable Gases for a list of default alarm levels. You may enter new levels only within the range of the Vertex M detection system.

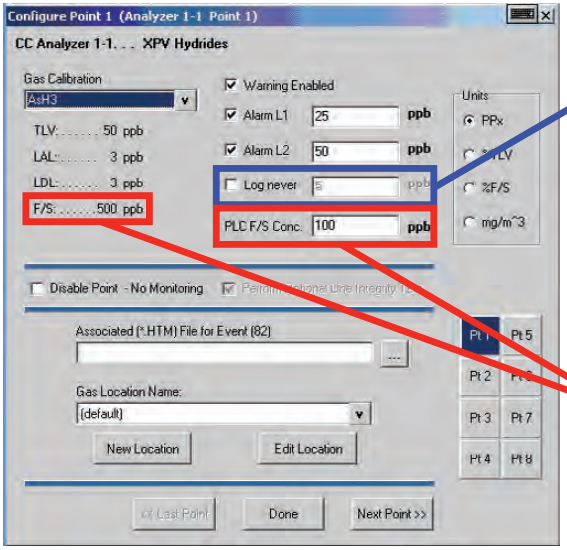
Make the gas assignments before changing alarm levels. Changing the gas automatically resets alarm level settings to the factory defaults.

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





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

PLC F/S Conc. (Data Output)
Calibrates the Vertex M 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). Factory default value sets the 20 mA point to two times the TLV which is typically lower than the full scale value of the gas calibration (i.e.; F/S)

	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

Note:

Setting the Vertex M System to continuously log concentration data on a 3-analyzer system requires approximately 15 megabytes of disk storage per day. Purge data often to avoid filling available disk space.

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.

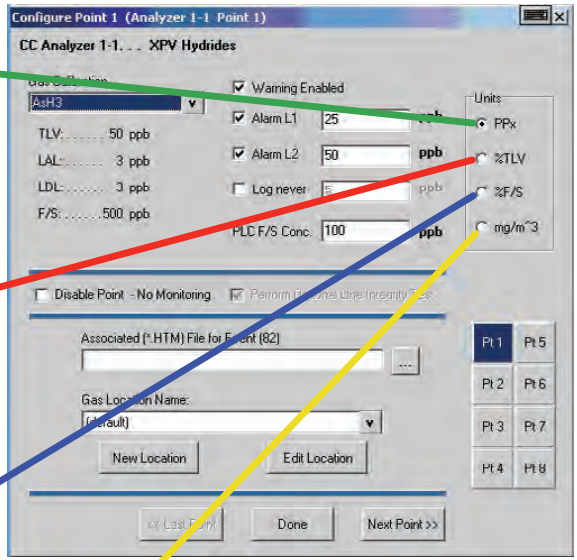
Unit choices are:

PPx
Parts-per-million or parts-ber-billion. See Appendix A Detectable Gases for definition.

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

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

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



Perform Optional Line Integrity Test
Check this box to perform a sample line integrity test. See Appendix A Line Integrity Test Option.

Disable Point No Monitoring
Select "Disable Point" for points not needed.

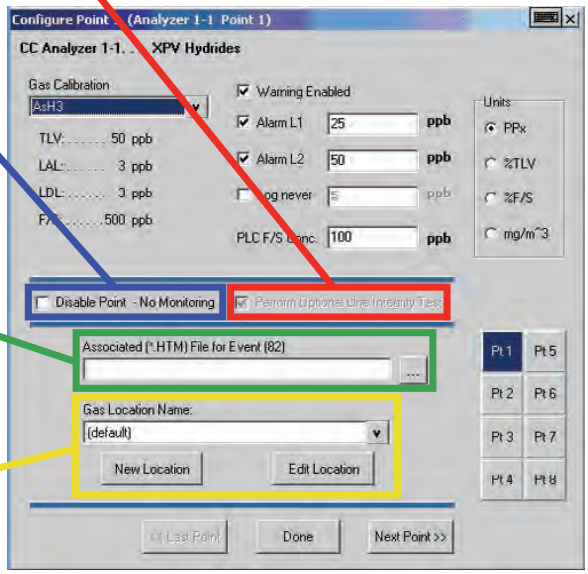
Associated (*.HTM) File
You may link a user-generated HTML file to this point. Either type in the file name or touch the browse (…) button to bring up a file selection window.

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.

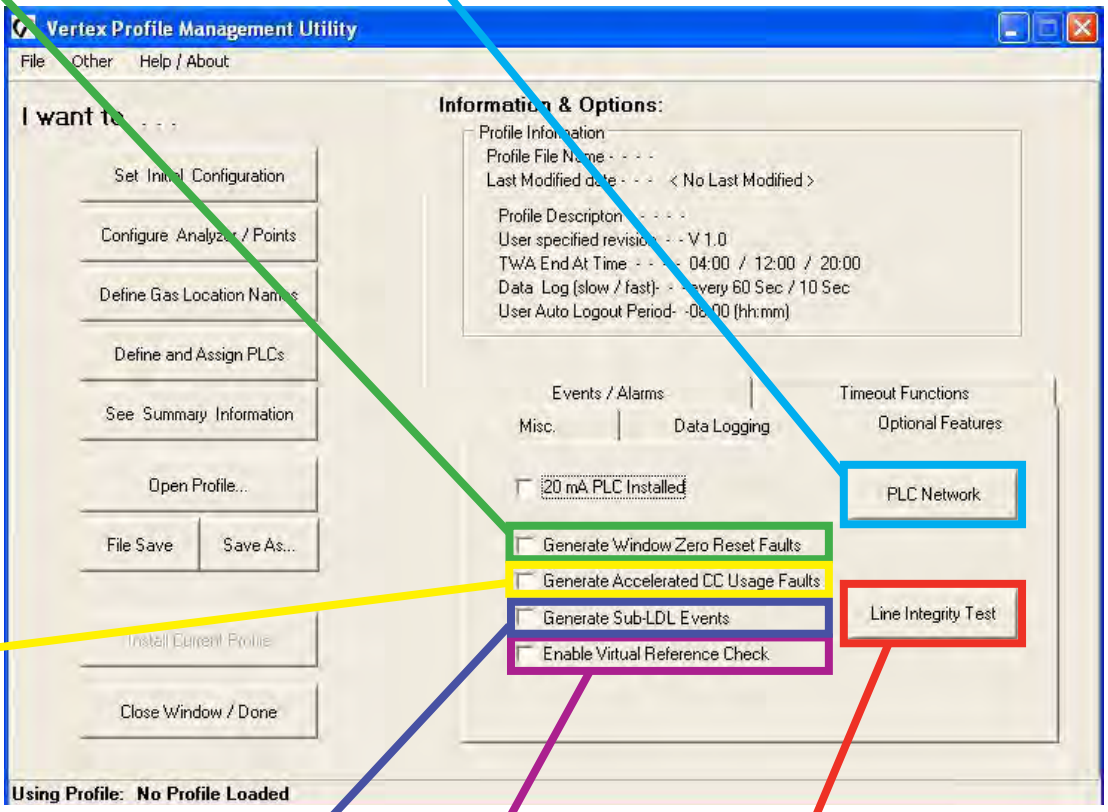
* Create a new location.



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



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 H - 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 monitor 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). See the following table for the number of windows used and the time to confirm an event. The function reduces the possibility that a non-gas event will result in a concentration or alarm.

Note:

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

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

3.6.5 Define and Assign Relays

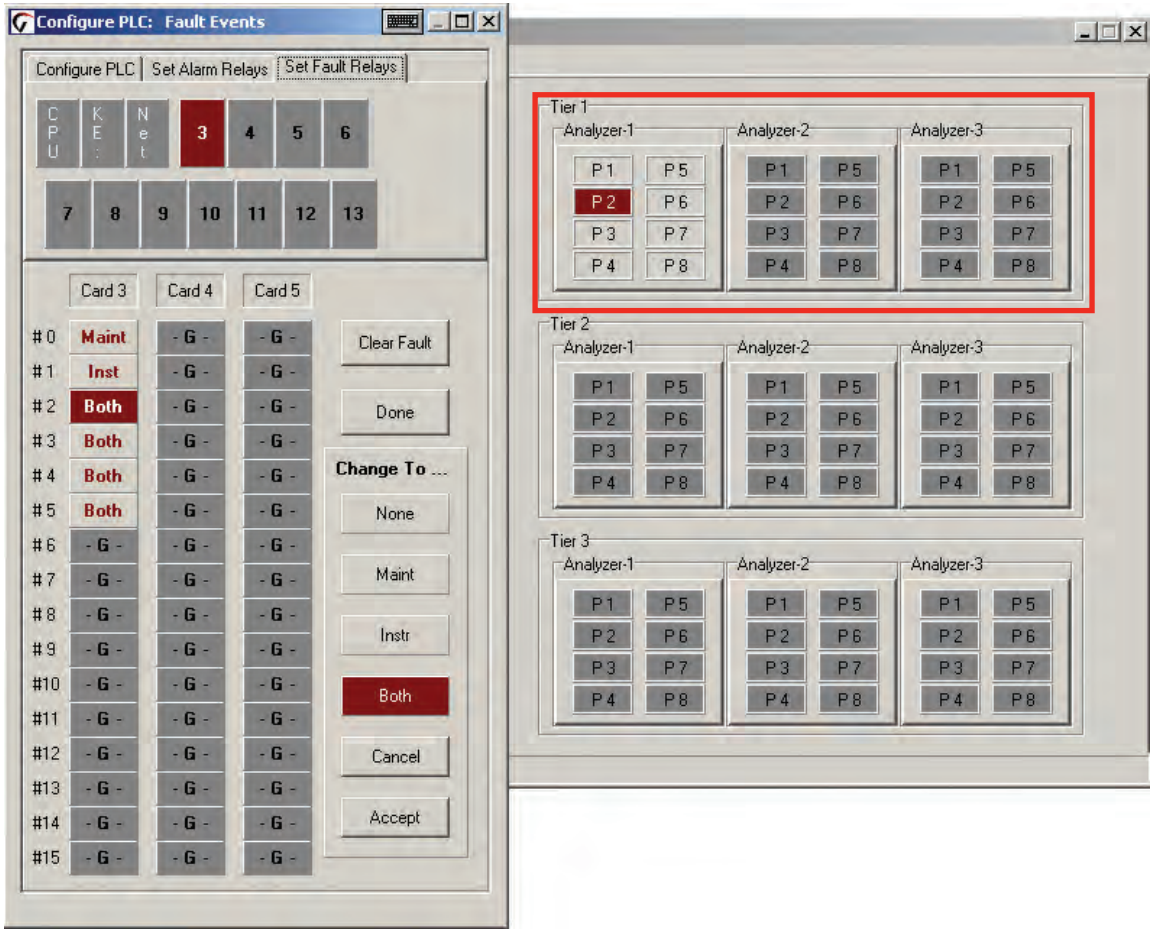
The Vertex M System includes multiple programmable relays. You may associate relays with one or more alarms or faults to trigger external alarm devices or emergency equipment. Relays are located on relay cards; either 8 or 16 relays populate each card.

Note:

Relays are NOT factory configured.

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

See Appendix A Optional Relay Specifications for a complete listing of alarm relay specifications.



3.6.6 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.

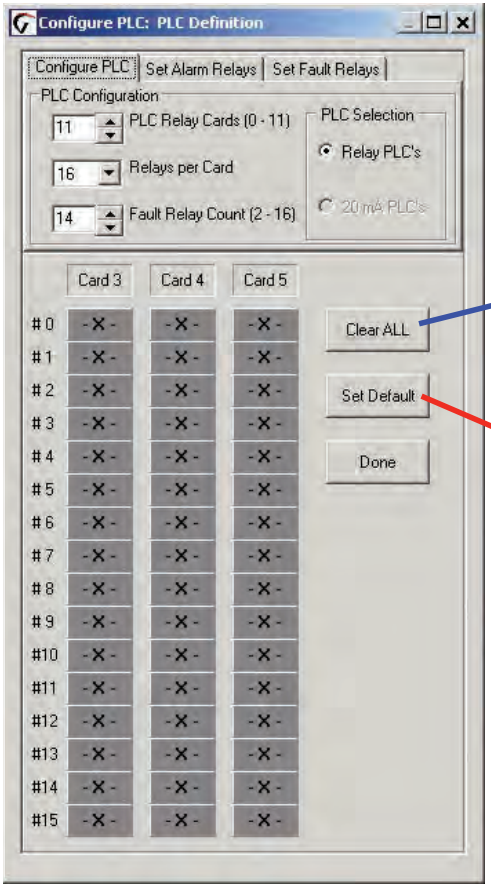
PLC Relay Cards

Up to 4 relay cards populate the Vertex M System. The cards are numbered 3-6.

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 pairs of contacts.



Clear All
Erases the alarm and fault relay definitions

Set Default
Sets all relays to the initial default mappings

Fault Relay Count

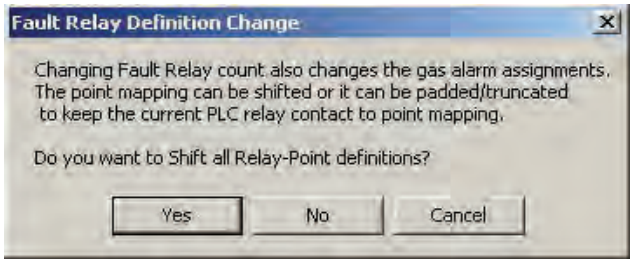
You may allocate from 2 to 16 relays for fault indicators.

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 M 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.



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 15 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.

3.6.7 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:

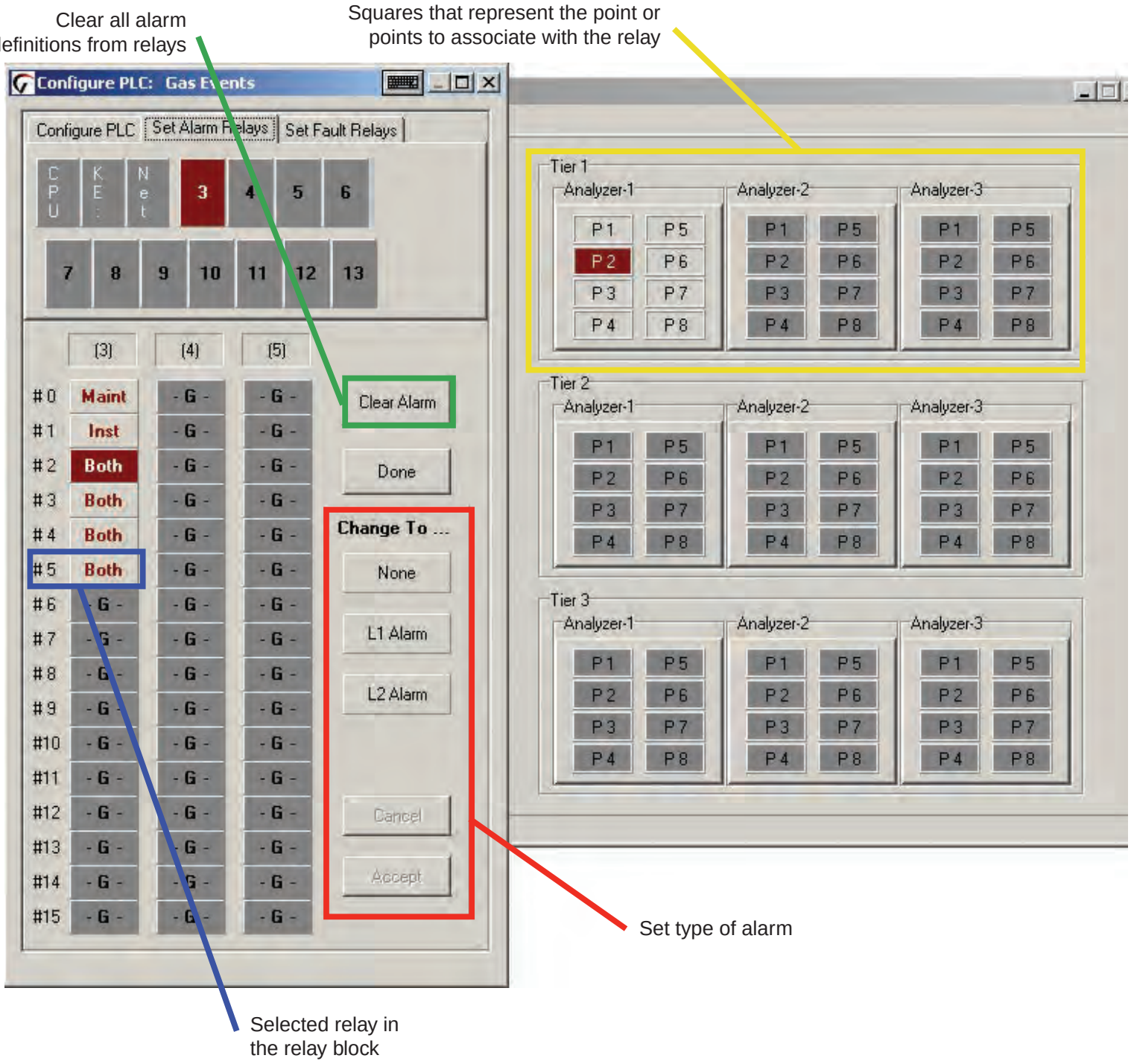
Set the number of fault relays before setting alarm relay definitions. If you change the number of fault relays, the current alarm relay definitions may change and must be redefined. See Section 3.6.6 Configure PLC.

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
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
[3]
[4]
[5]
#0 Maint - G - - G -
#1 Inst - G - - G -
#2 Both - G - - G -
#3 Both - G - - G -
#4 Both - G - - G -
#5 Both - G - - G -
#6 - G - - G - - G -
#7 - G - - G - - G -
#8 - G - - G - - G -
#9 - G - - G - - G -
#10 - G - - G - - G -
#11 - G - - G - - G -
#12 - G - - G - - G -
#13 - G - - G - - G -
#14 - G - - G - - G -
#15 - G - - G - - G -
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
Selected relay in the relay block

3.6.8 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 M System requires attention but is continuing to monitor.

Note:

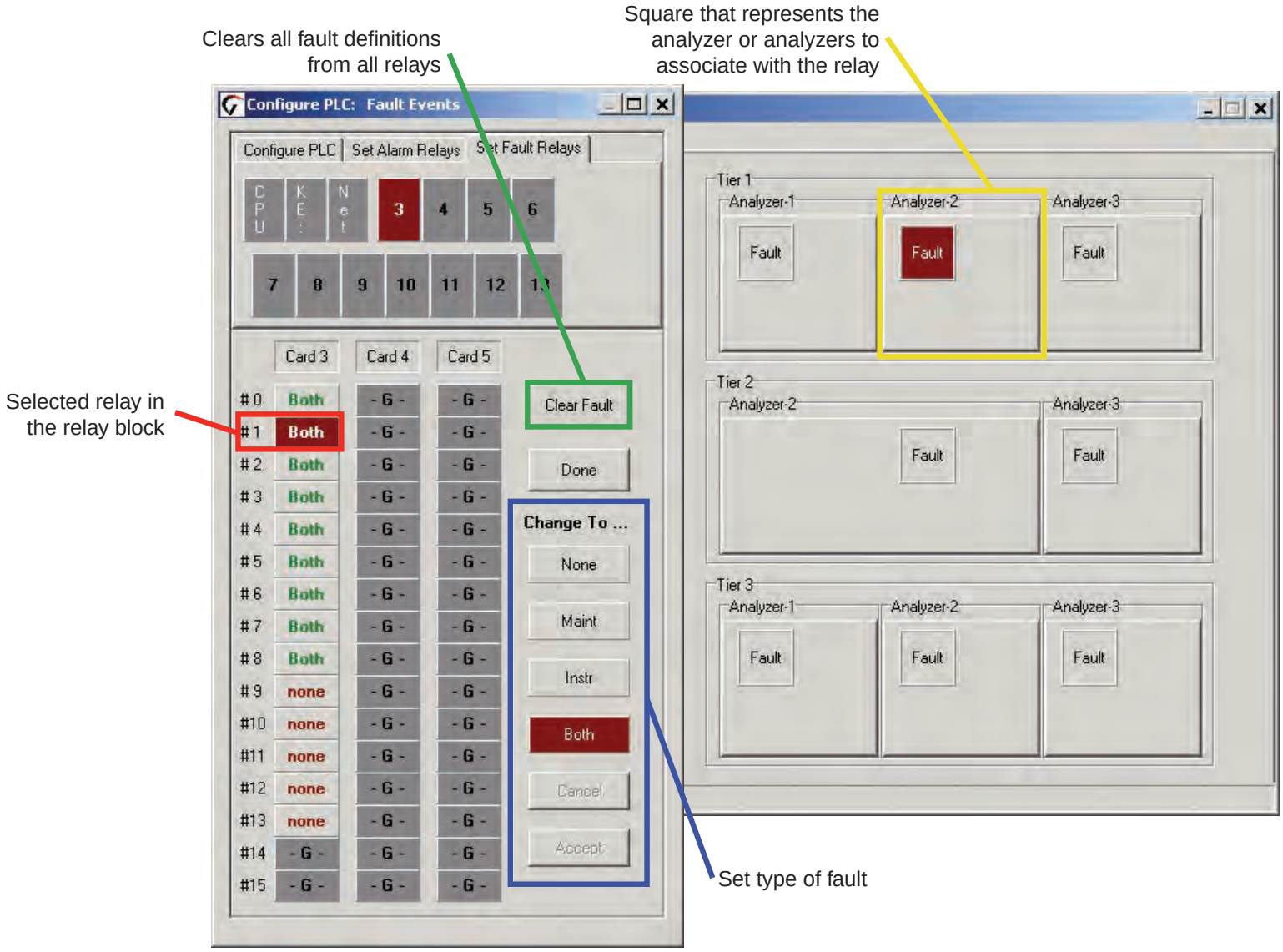
The number of relays used for fault indication is configurable. See Section 3.6.6 Configure PLC.

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.

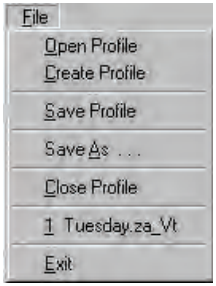
To verify a relay's assignment to analyzers, choose the contact. The associated analyzer changes color.


Clears all fault definitions from all relays
Square that represents the analyzer or analyzers to associate with the relay
Selected relay in the relay block
Set type of fault
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
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 -
Clear Fault
Done
Change To ...
None
Maint
Instr
Both
Cancel
Accept
Tier 1
Analyzer-1
Analyzer-2
Analyzer-3
Fault
Tier 2
Analyzer-2
Analyzer-3
Fault
Tier 3
Analyzer-1
Analyzer-2
Analyzer-3
Fault

3.6.9 Profile Management-File Menu

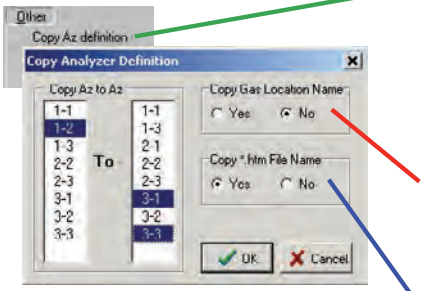
Use the file menu to open, create, save or close a configuration file. Configuration files may be stored in any directory on the Vertex M System hard disk.

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



3.6.10 Other Menu

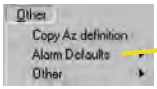
The Other Menu offers several shortcuts to speed configuring the Vertex M System.



Copy Az definition
Copies the configuration of one analyzer to any other analyzer in the system. There are 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

3.7 Load Tape

After configuring the analyzers, load each analyzer with the proper Chemcassette® tape required for the target gas. See Section 5.3.4 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 3.8 Leak Checking Sample Lines.

Verified flow rates See Section 3.9.1 Verify Flow Rates.

3.8 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.

Note:
At higher altitudes with many analyzers installed, the system (50 Hz. mains) may not be able to achieve 13" Hg.

3.8.1 Verify Flow Rates

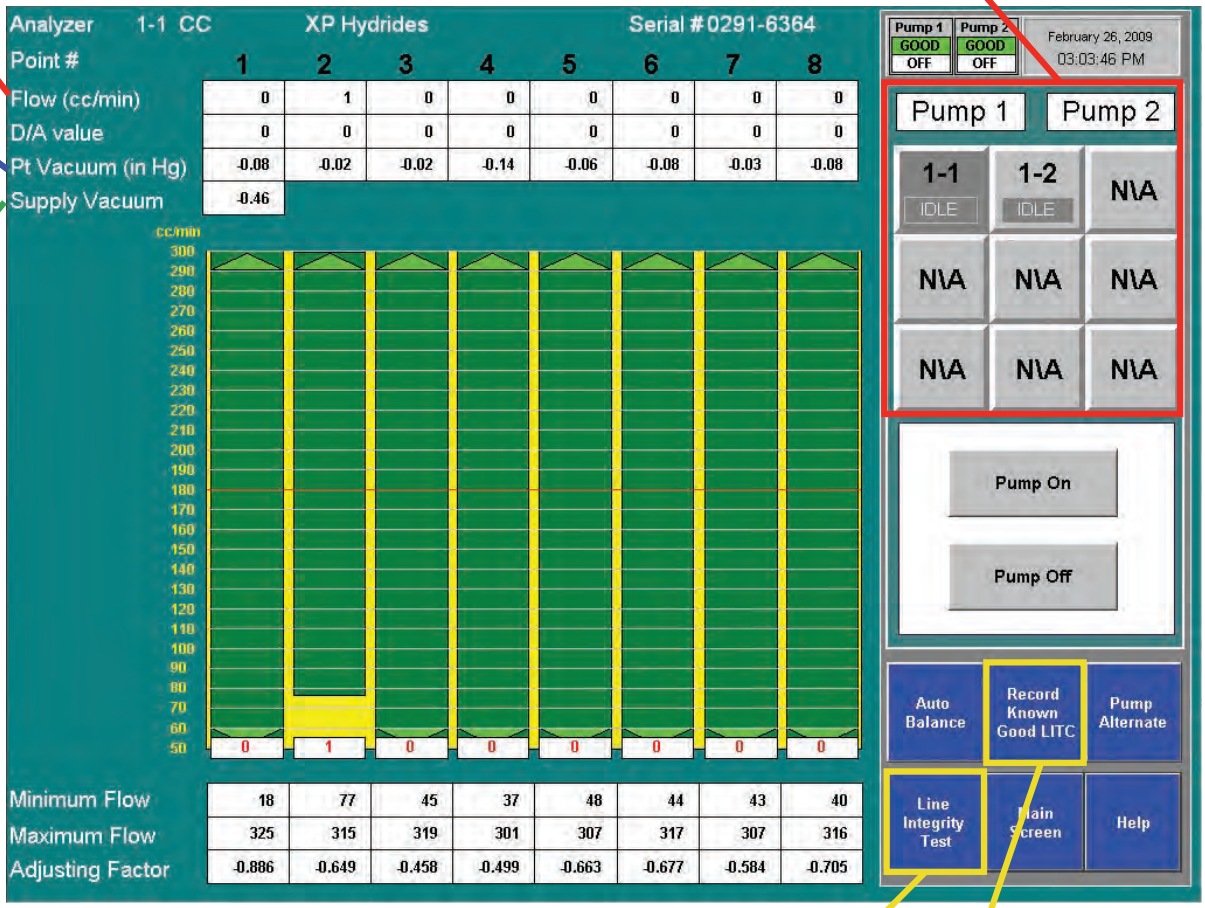
The Authorized Service window displays the flow range in bar graph form for each point of the selected analyzer.

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.

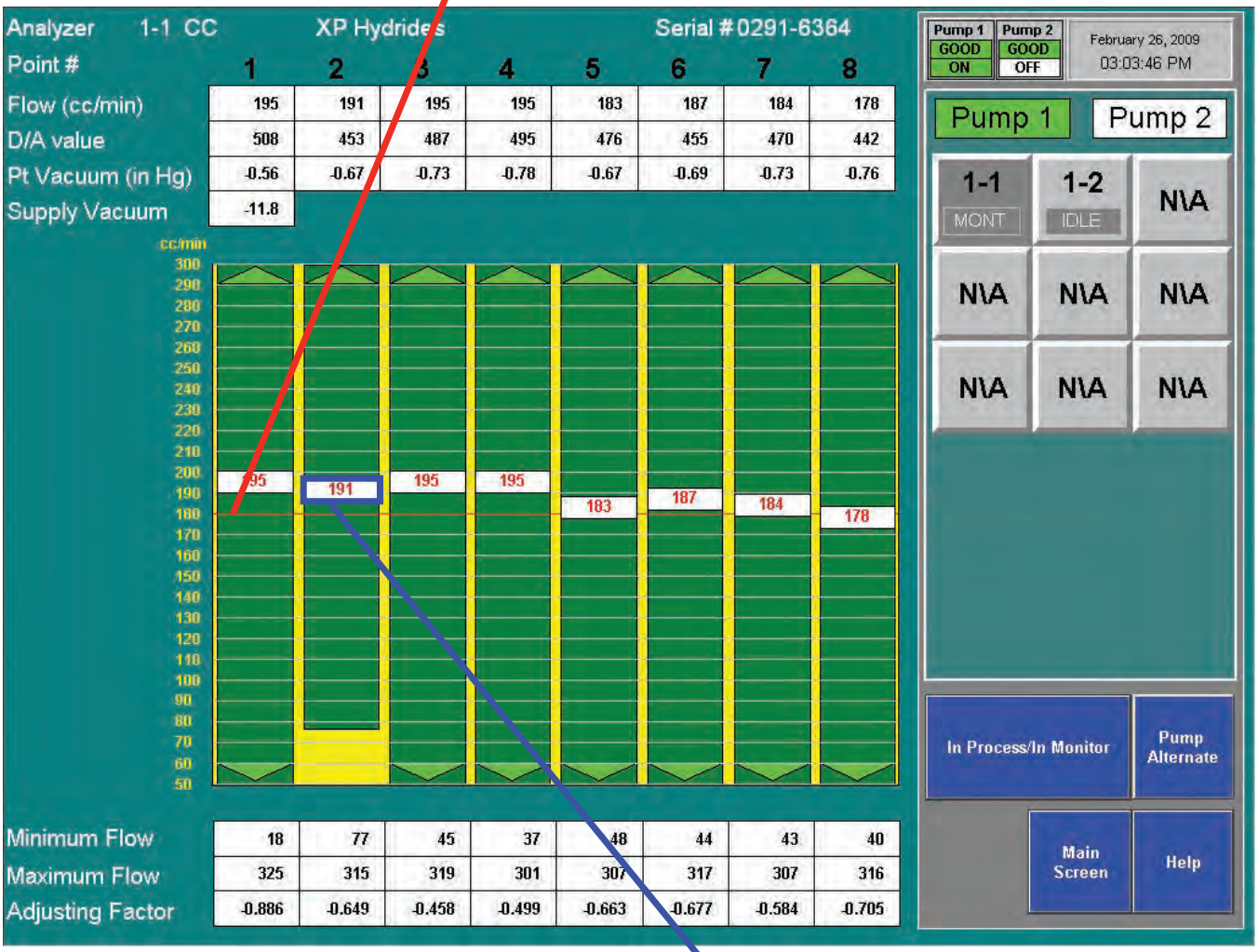
Point Vacuum (in Hg)
Point Vacuum indicates the restriction from sample line length and the pressure developed by shared lines.

Supply Vacuum
Typical supply vacuum is 9-12 in. Hg



Optional Line Integrity Test Option
See Appendix A Line Integrity Test Option

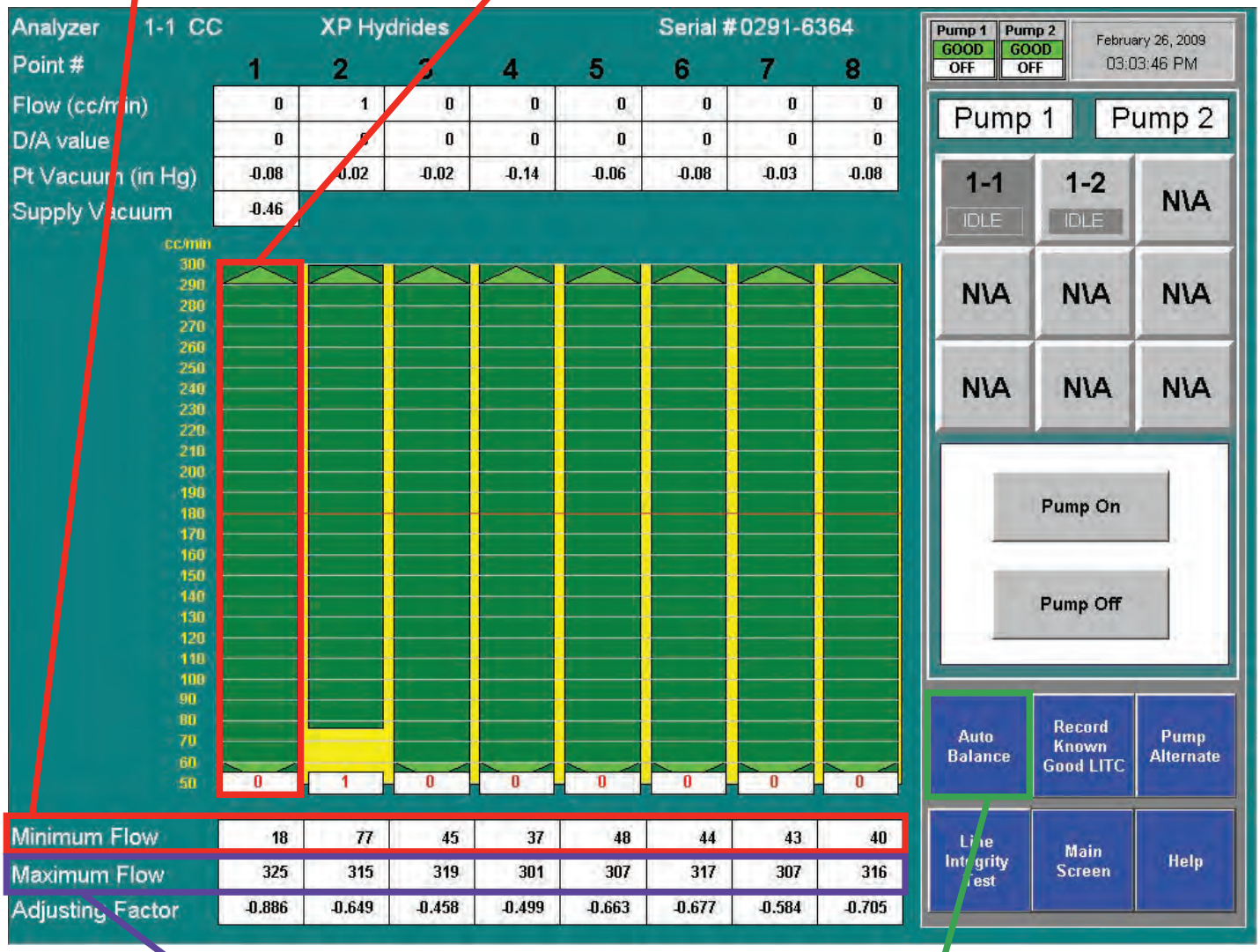
Target Flow
A horizontal red line indicates the target flow rate required by the Vertex M System for correct analysis. The target flow rate is 180 cc/min. +/-5% (171-189 cc/min.)



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

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

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.



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.

3.9 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 3-36.
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 3-36.
8. “Verify that the sample flow is less than 20cc.” “See Flow (cc/min)” and “(see Point Vacuum (in Hg)) are links.
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 step 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 M 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.

3.10 Reconfigure

The modular design of the Vertex M 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 3.6 Configuration Utility.
4. Load tape. See Section 3.7 Load Tape.
5. Leak check sample lines. See Section 3.9 Leak Checking Sample Lines.
6. Verify flow rates. See Section 3.8 Verify Flow Rates and Supply Vacuum.

Note:

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

3.11 Moving to a New Site

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

1. Remove all Chemcassette® tapes and store as required by local policies.
2. Exit the Vertex M program. Touch Project and then Stop Project.
3. Back up data and configuration files. See Section 5.10 File Maintenance.
4. Open the front door and set all power switches to "Off".
5. Disconnect electrical supply at the source and then disconnect from the power terminal in the side of the cabinet.
6. Disconnect sample lines and cap lines as required by local policies also cap Vertex M 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 M to prevent damage during transport. If unsure of packing requirements, contact the Honeywell Analytics Service department.

CAUTION

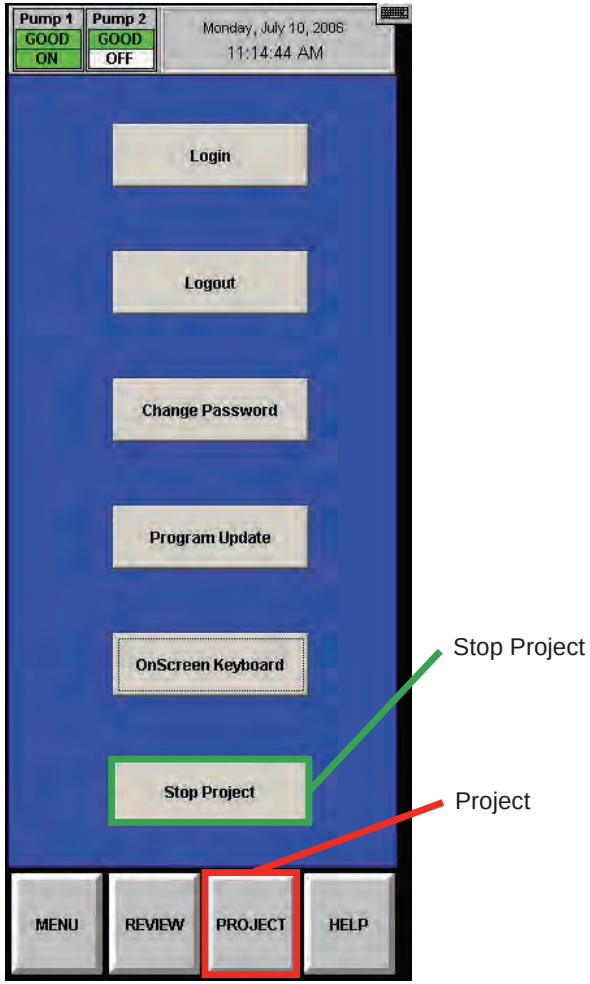
Leaks in the exhaust tubing connection can cause exposure to toxic gases from remote sample areas. For leak-tight connections, follow the instructions in the *Installing Pump Exhaust Line* section and the *Remove Pump* section. With the system running, verify the leak integrity with a small amount of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

System Shutdown

⚠ CAUTION

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

1. Exit the Vertex program. Touch Project and then Stop Project.
2. In the Windows taskbar touch Start and then Shut Down.
3. Open touch screen and set all switches and the rack power switch to “Off”.



4 Operation

4.1 Introduction

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

This chapter includes the following sections:

See Section 3 Startup if the analyzers in the Vertex M System have not yet been configured.

4.2 Monitoring Mode Overview

Monitor mode is the Vertex M System's standard operating state. Upon power up, the monitor performs initialization routines and returns to the same state as when powered down. During monitoring, the Vertex M 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

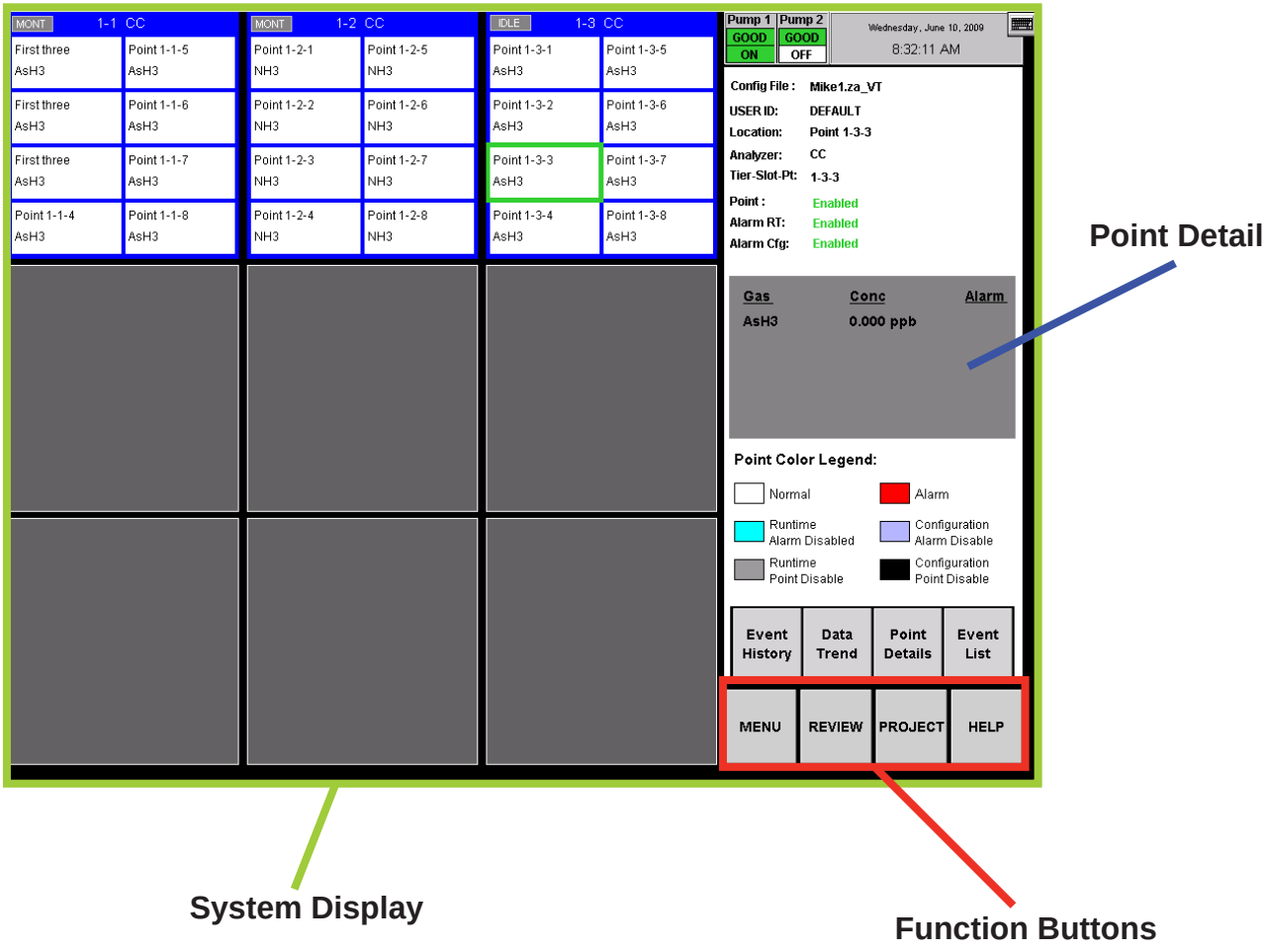
Concentration information is available through the:

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

4.3 Main Screen

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

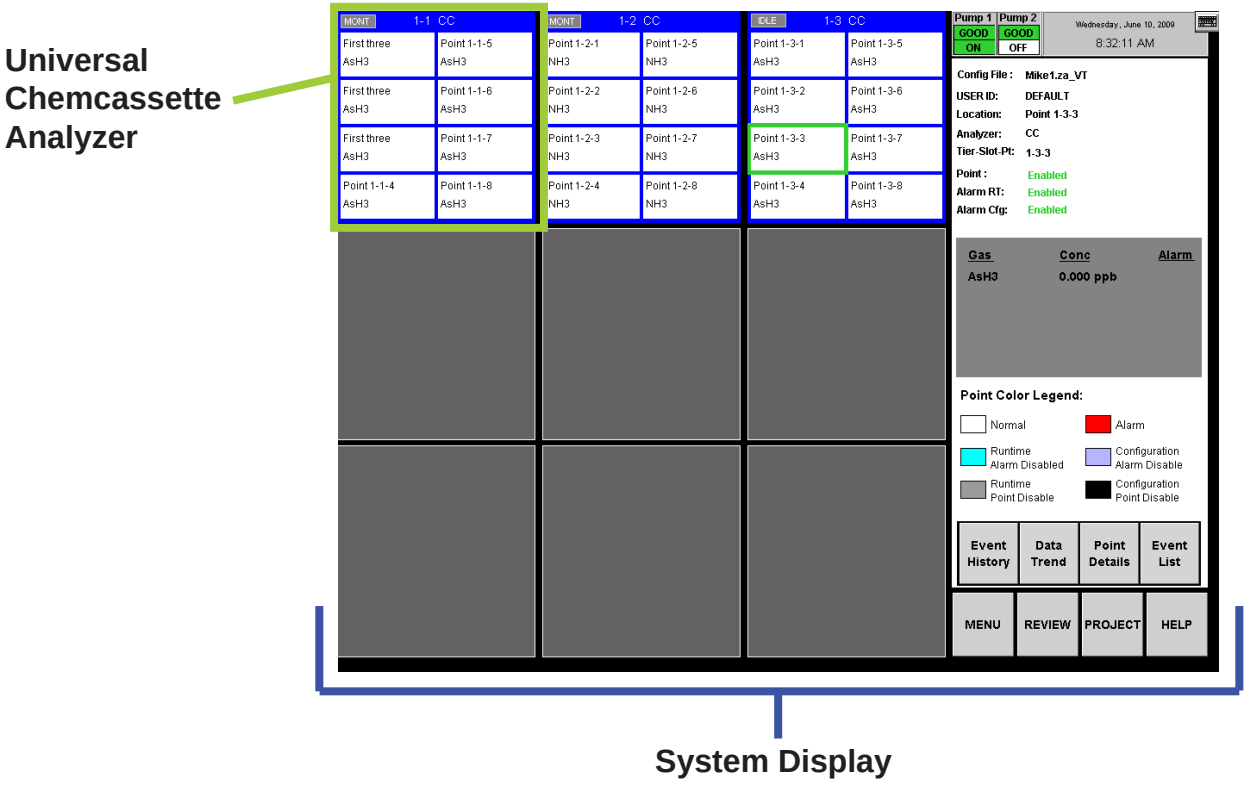
- System display
- Point detail
- Function buttons



4.3.1 System Display Area

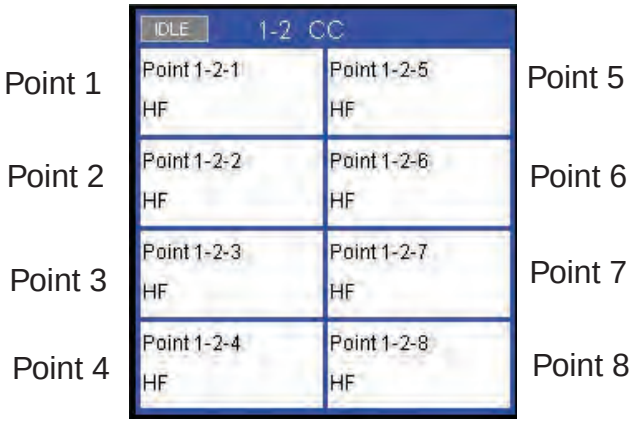
The System Display Area displays information about all of the points in the Vertex System. Each of the 72 blocks in the System Display Area represents one point. A group of eight blocks represents an analyzer block. The analyzer block has the status bar indicator at the top of the block. A pyrolyzer 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 monitor. 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.



Status Indicators

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



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.

White	Normal operation.
Blue	Alarms for the point are disabled in the runtime options menu.
Grey	Point is disabled in the runtime menu or is disabled due to a fault.
Red	Gas concentration exceeded an alarm level.
Purple	Disable configuration alarm
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 (if enabled)	Lower Detectable Limit (LDL)
1	Alarm Level 1
2	Alarm Level 2

See Section 3.6.4 Configure Point for information on setting Alarm Level 1 and Alarm Level 2.

See Section 3.6.10 Other Menu for information on alarm default values.

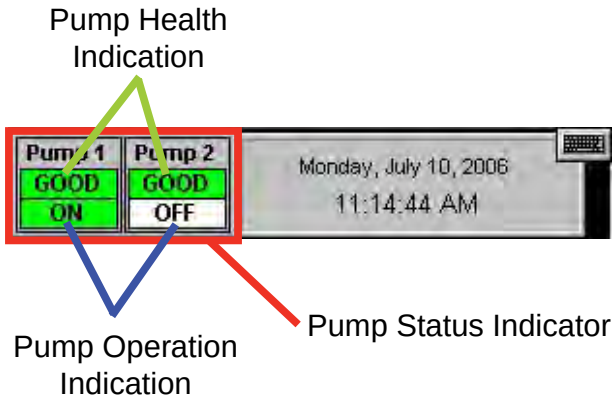
Pump Status Indicator

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.



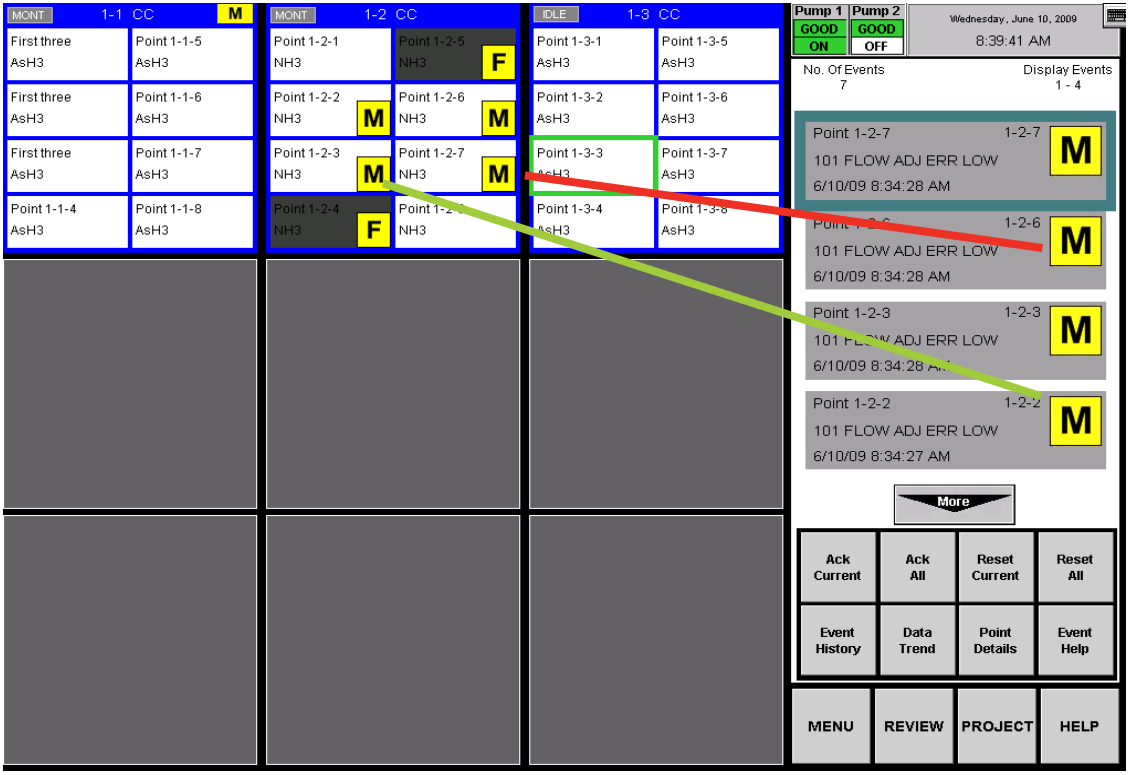
Fault Indicators

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



M - Indicates a maintenance fault

F - Indicates an instrument fault

4.3.2 Point Detail Display Area

The Point Detail Area (see Figure 4-1) 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
Tier-Slot-Point	Points are identified by the tier, slot and their point number in which the analyzer is installed
Point.	Points not needed for monitoring may be disabled. A disabled point does not trigger alarms

- See Section 4.5.4 Event List
- See Section 4.5.2 Data Trend
- See Section 4.5.1 Event History

Figure 4-1.

Figure 4-2 is an image of the Point Detail section of the main Vertex display screen snapshot

Analyzer	The analyzer type
Points / Alarms	A point may be enabled but the alarm may be disabled
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.
Point Color Legend	This legend defines the background colors in the system display area

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.

Figure 4-2.

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.

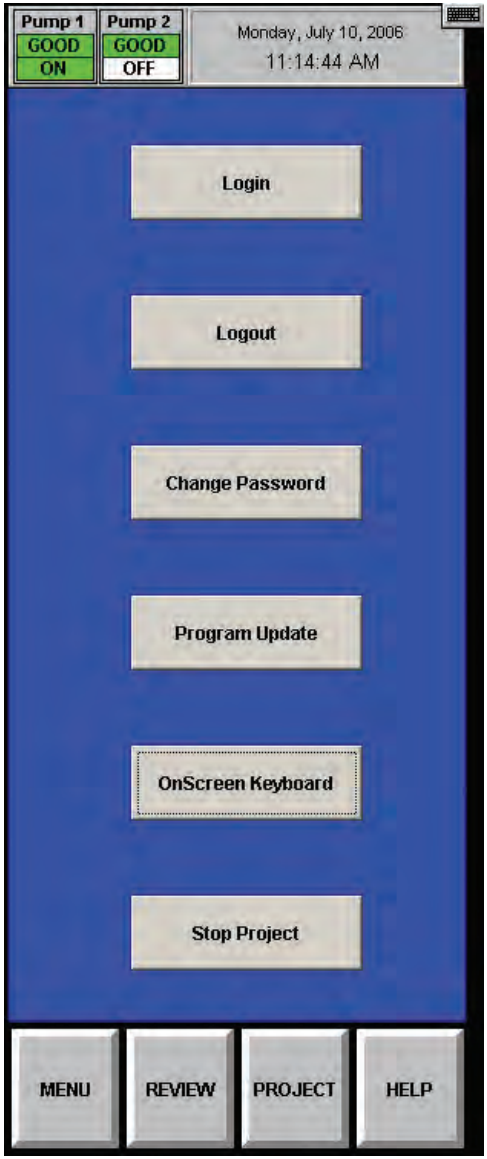
Review - View stored historical gas concentration data or events and access ChemCam.

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

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 M).



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

Figure 4-3. Login

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. A Log Out confirmation window appears. Simply click OK to close the window.

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.

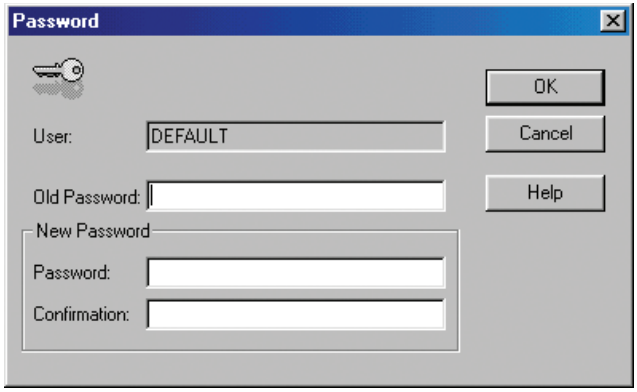


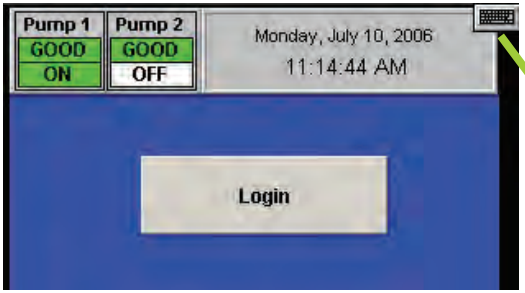
Figure 4-4. Password Change

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.



4.4.5 Stopping Project

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

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

4.5 Review Functions

Use Review functions to view information stored in the Vertex M 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.

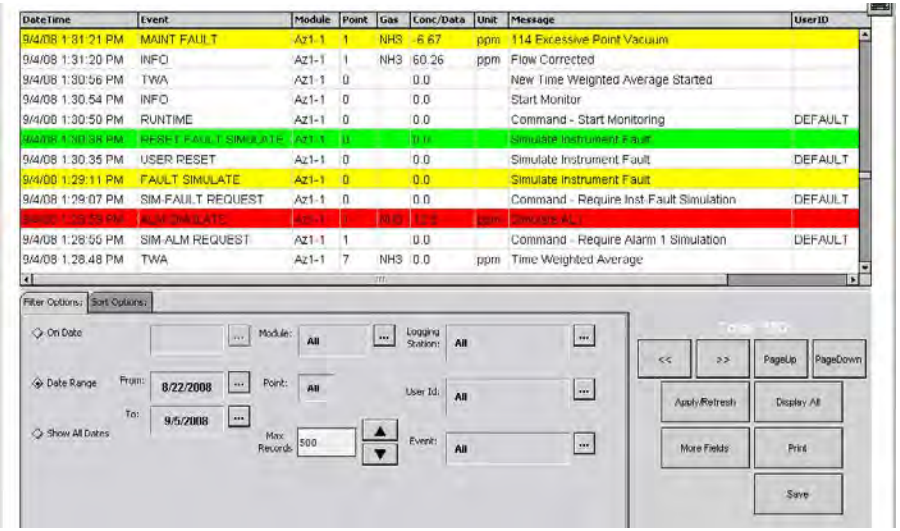


Figure 4-5. Event History

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:

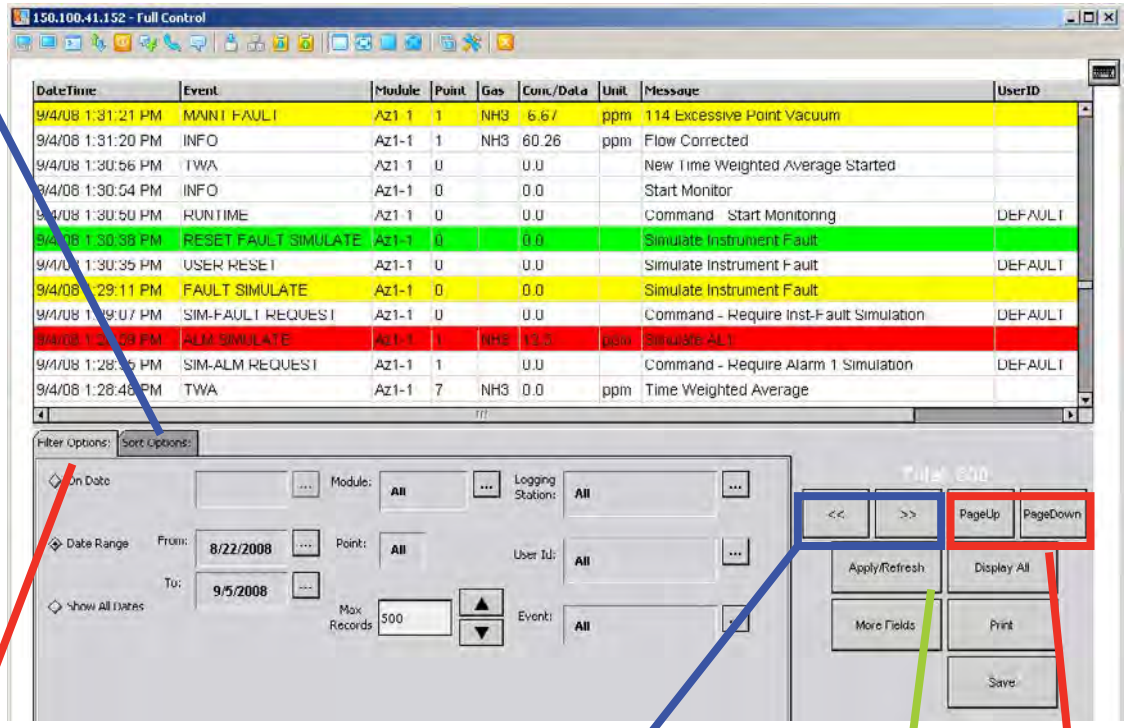
- Date and time of the event
- Module name
- An event message which may include alarm status, user login state or a comment.
- Logging station computer name

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.



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:

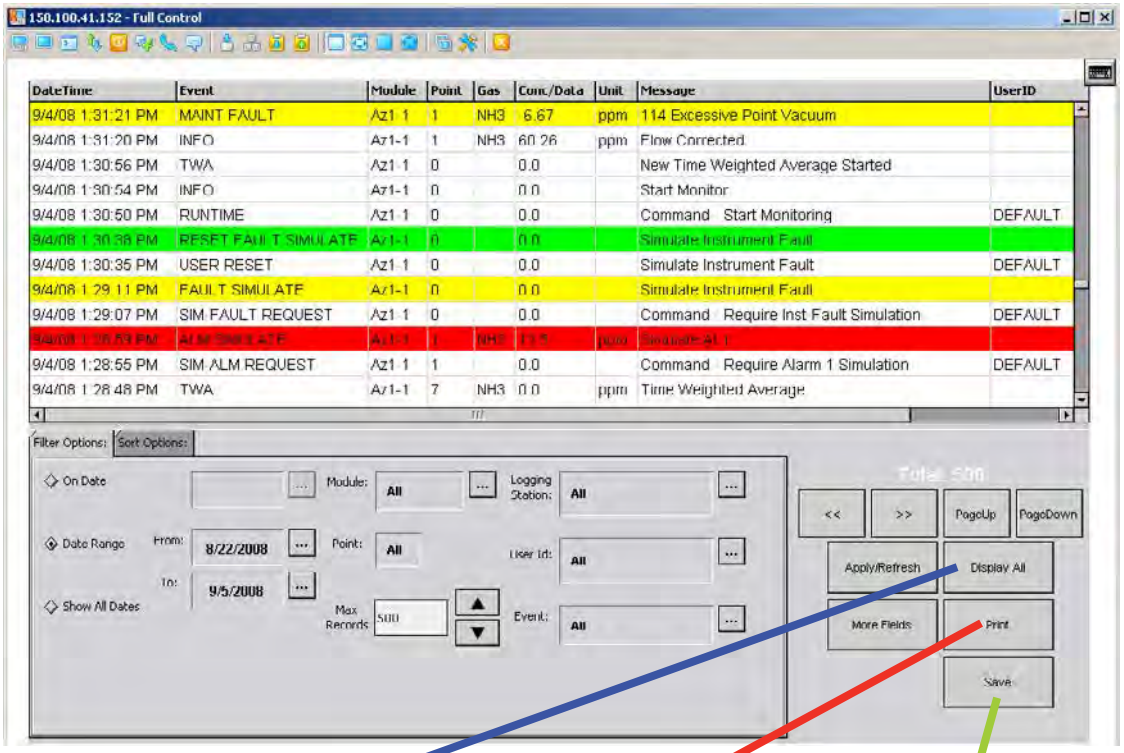
Changes to sort and filter options will not take effect until you press Apply/Refresh.

<< >>
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.

Figure 4-6. Event History



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.

Figure 4-7. Event History