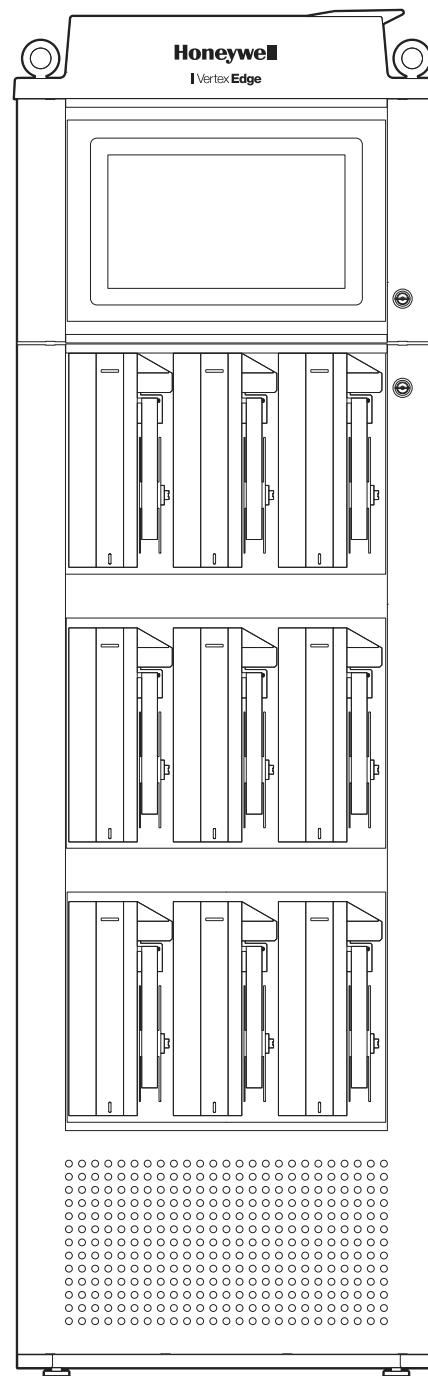


USER MANUAL

Vertex™ Edge 72-Point Continuous Monitor



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1 Safety

Read this information before you start using your device.

Trademarks





Brand or product names are trademarks of their respective owners. The following brand or product names are trademarks of Honeywell:



- Honeywell Vertex™ Edge
- Chemcassette®
- Teflon®
- Sola/Hevi-Duty

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 could be impaired.

Continuous Monitor Symbols

Symbol	Description
	Lifting instructions, low clearances, slipping/tripping hazards, minor corrosive dangers. Also used when defining personal protective equipment (gloves, dust masks, etc.)
	Personal injury risk: machinery hazards around guarded equipment, moving parts, crush/pinch hazards, flying debris, and arc flash hazards.
	The most dangerous or potentially lethal hazards: unguarded equipment, confined space entrances, and lockout labels.
	Caution: possibility of electric shock

Symbol	Description
	Caution: hot surface
	Protective conductor terminal (ground terminal)

EMC Considerations

Your Honeywell Analytics continuous gas monitor has been designed to comply with Electromagnetic Compatibility (EMC) standards applicable at the time of its manufacturing. The design includes filtering, shielding and bypassing techniques. At the time of certification, simulated customer Input/ Output (I/O) schemes were tested.

All methods used in your equipment for emission suppression and reduction of susceptibility are interactive. Modifications to the monitor could result in increased emissions and higher vulnerability to other radiated fields.

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

FCC Compliance Statement

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

This device complies with Part 15 of the FCC Rules. Operation is subject 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.

China RoHS

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印制电路板组件	X	0	0	0	0	0
线束及电镀连接组件	X	0	0	0	0	0
第三方电脑，显示器，开关，集成器，控制器	X	0	0	0	0	0
机械部件风扇，马达等	X	0	0	0	0	0
外壳	0	0	0	0	0	0
金属零件	0	0	0	0	0	0
紧固件	X	0	0	0	0	0
管路系统	0	0	0	0	0	0

本表格中未列出的所有部件和配件包含的有害物质均没有超过 GB/T 26572 所要求的限制。

本表格依据 SJ/T 11364 的规定编制

0 : 表示该有害物质在该部件所有均质材料中的含量均在 GB/T26752 规定的限量要求以下。

× : 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T26572 规定的限量要求。

Vertex Edge_RST_1, 25 August 2020

Cabling

At the 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 next 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, pigtailed to the cabinet (connector) ground should be extremely short (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.

2 Introduction

Learn what you need to know about the Honeywell Vertex™ Edge 72-Point Continuous Monitor System before operating.

System Overview

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

- Triggering alarms and opening event windows to warn operators of high concentrations;
- Displaying the location, gas type and gas concentration; and
- Storing the alarm information in a database.

The Vertex Edge System provides fast response to a wide range of gases. Each location may be up to 400 ft (122 m) from the Vertex Edge System. The system uses one or more of Honeywell Analytics' Chemcassette® analyzers to provide a monitoring system tailored to meet the requirements of the facility.

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

- Pumps are redundant;
- The system powers up in the same state as when powered down; and
- You can stop monitoring while replacing filters, Chemcassettes, and significant components in one of the analyzers while remaining analyzers continue to function.

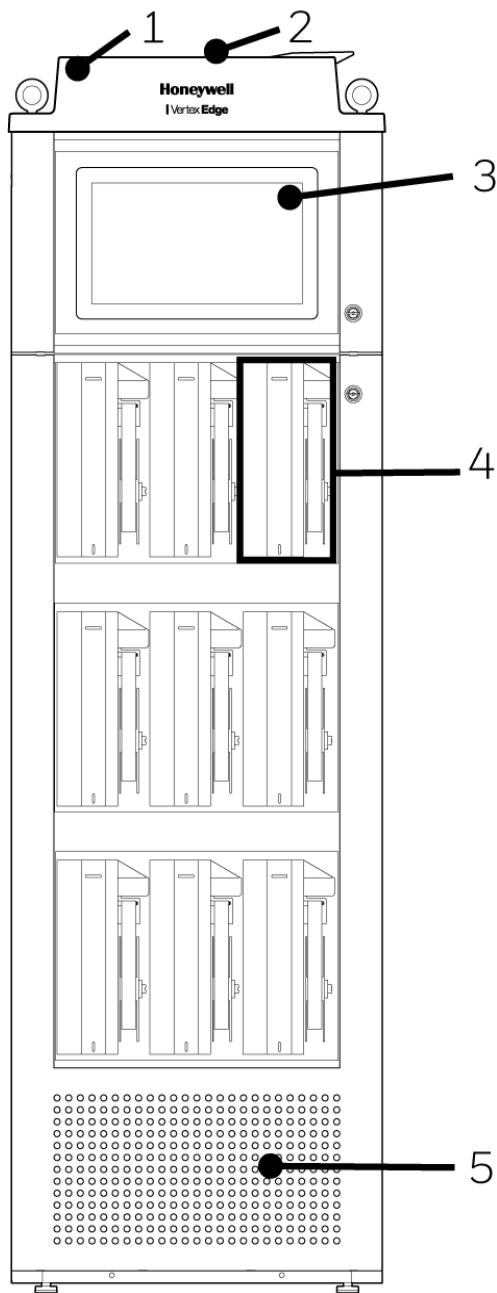
Operation can be through an LCD touch screen or through a local area network (LAN).

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

System Components

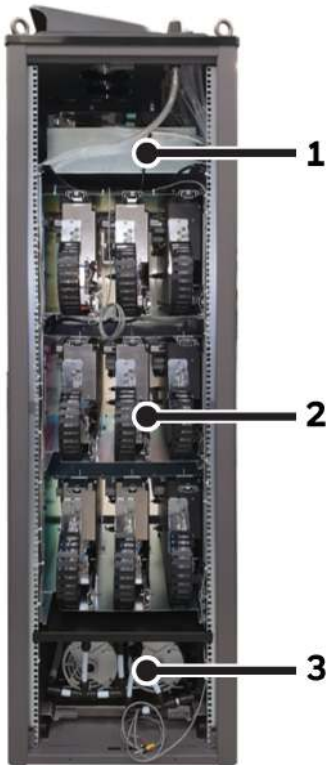
The following photos illustrate the Vertex Edge System views, ports, connections and controls.

Front view



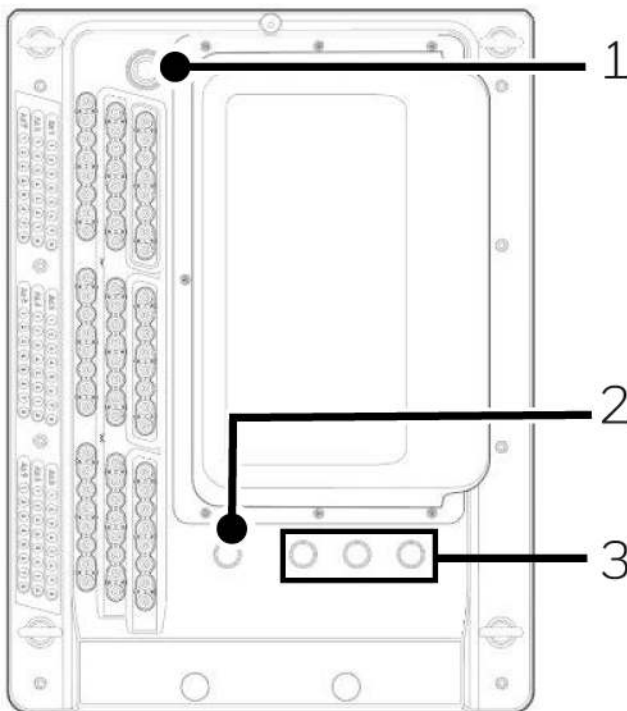
1. Sample tubing connections
2. Exhaust and wiring port
3. System controls (behind screen)
4. Analyzer
5. Pump

Back view



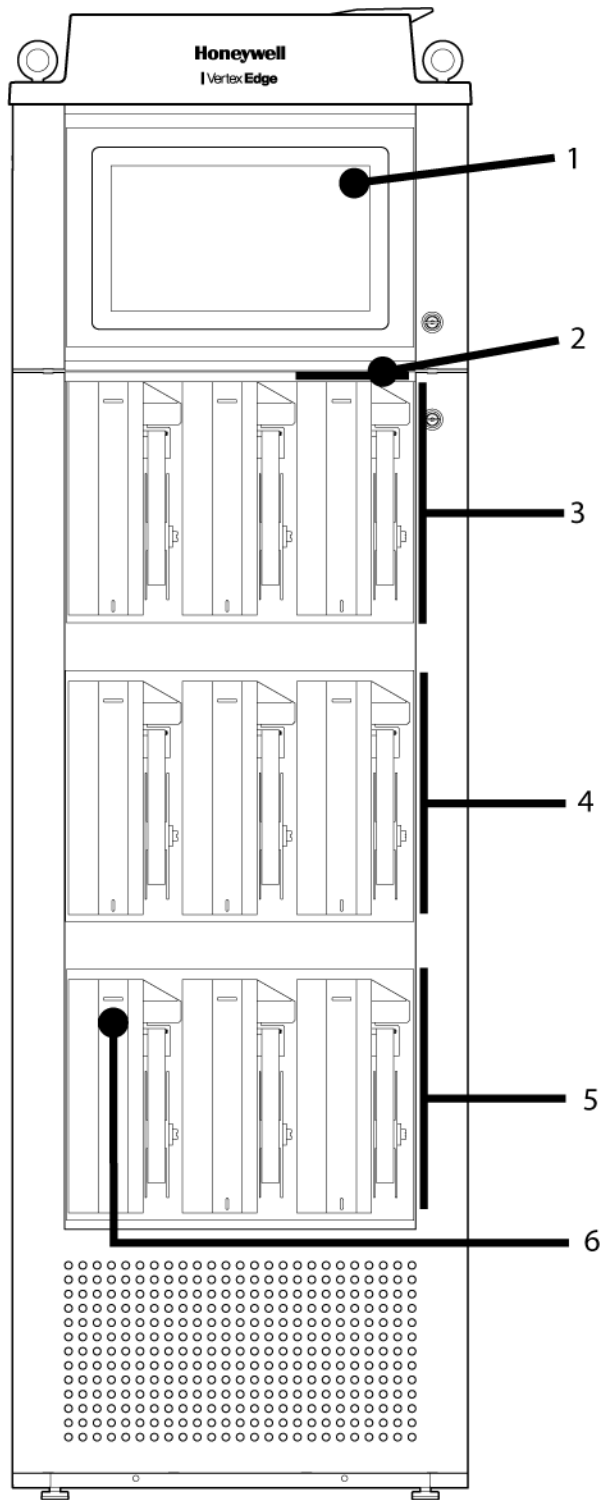
1. Smart power distribution unit
2. Analyzer
3. Pump

Exhaust and wiring ports



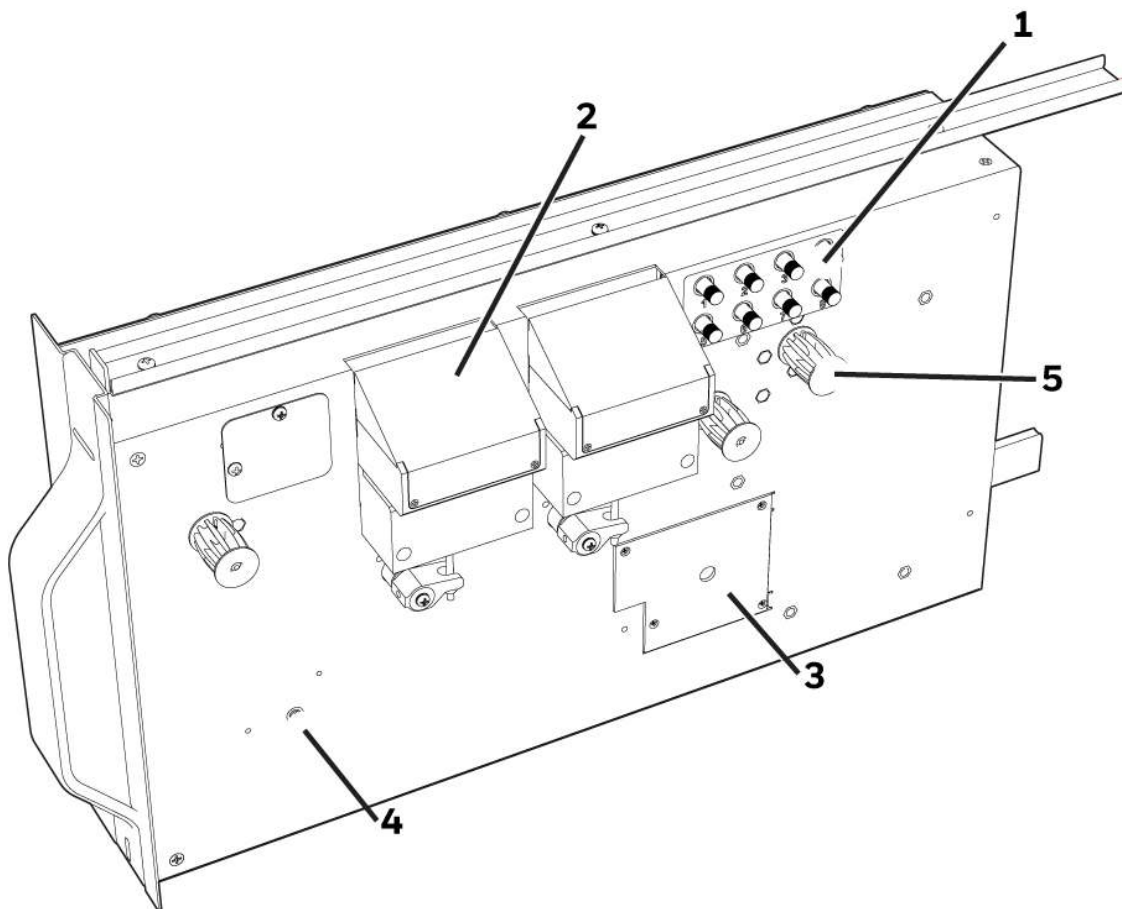
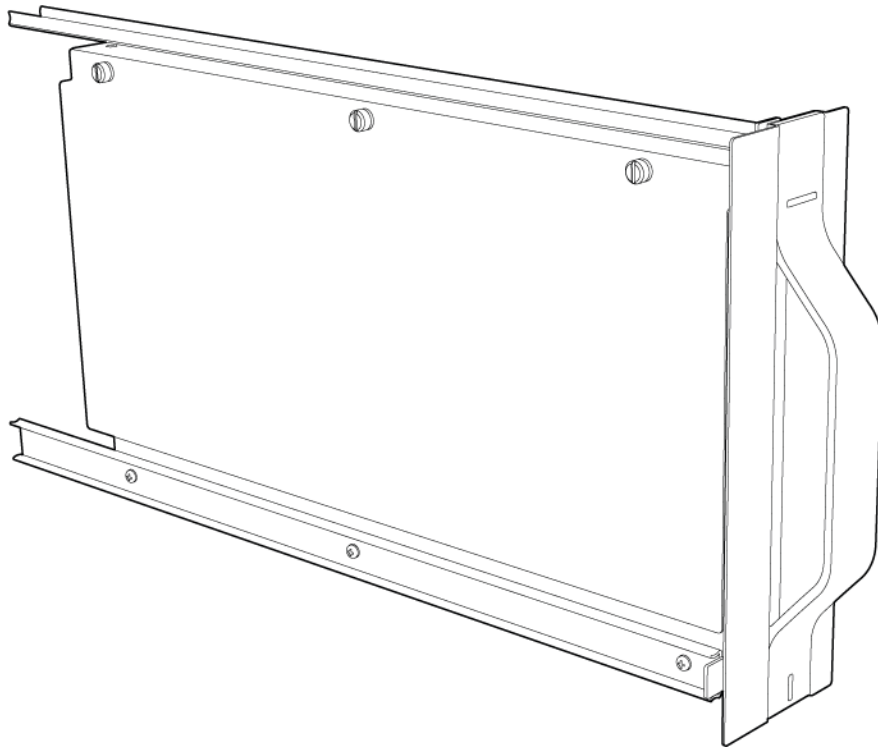
1. System Exhaust 0.5 in (12.7 mm) tubing
2. AC Input 0.75 in pipe thread
3. Alarm Wiring Conduit Plates - 4 in (101.6 mm) x 2 in

Module Front - Door Closed



1. Protective panel over touch screen
2. Analyzer Slot
3. Tier 1
4. Tier 2
5. Tier 3
6. Analyzer Status LED

Analyzer side panel – Exterior

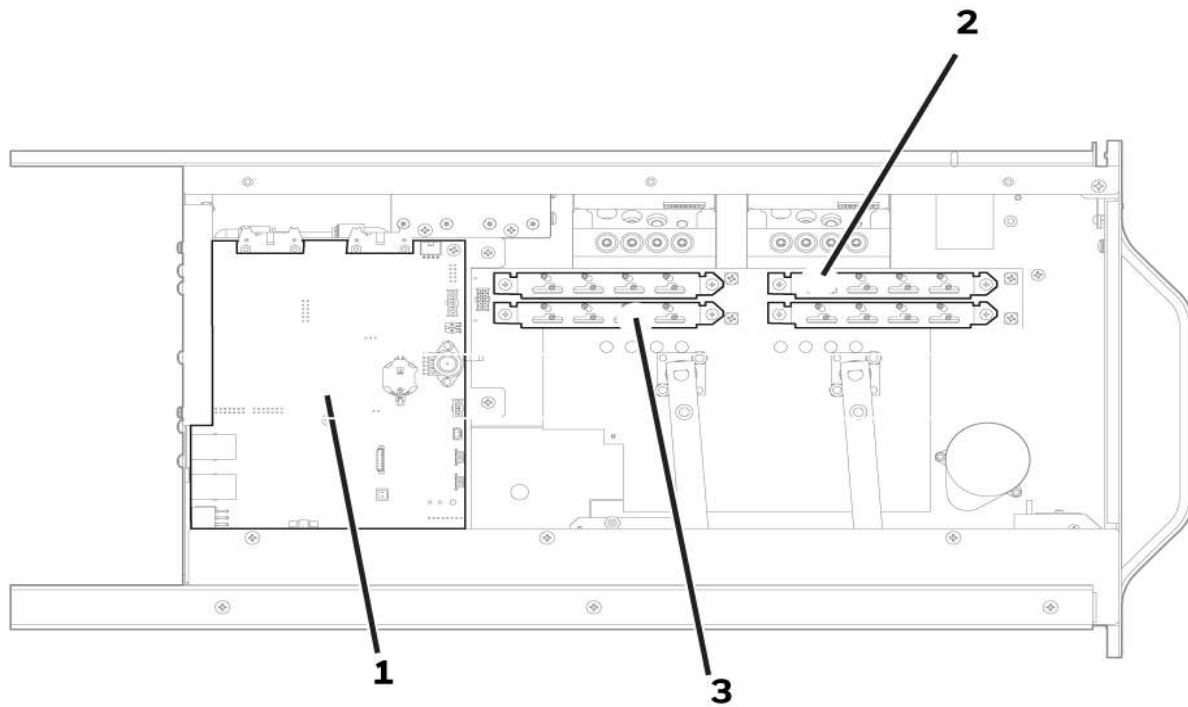


1. Needle Valve for flow adjustment
2. Optics Block
3. RFID reader
4. Take-up reel
5. Tape guide roller



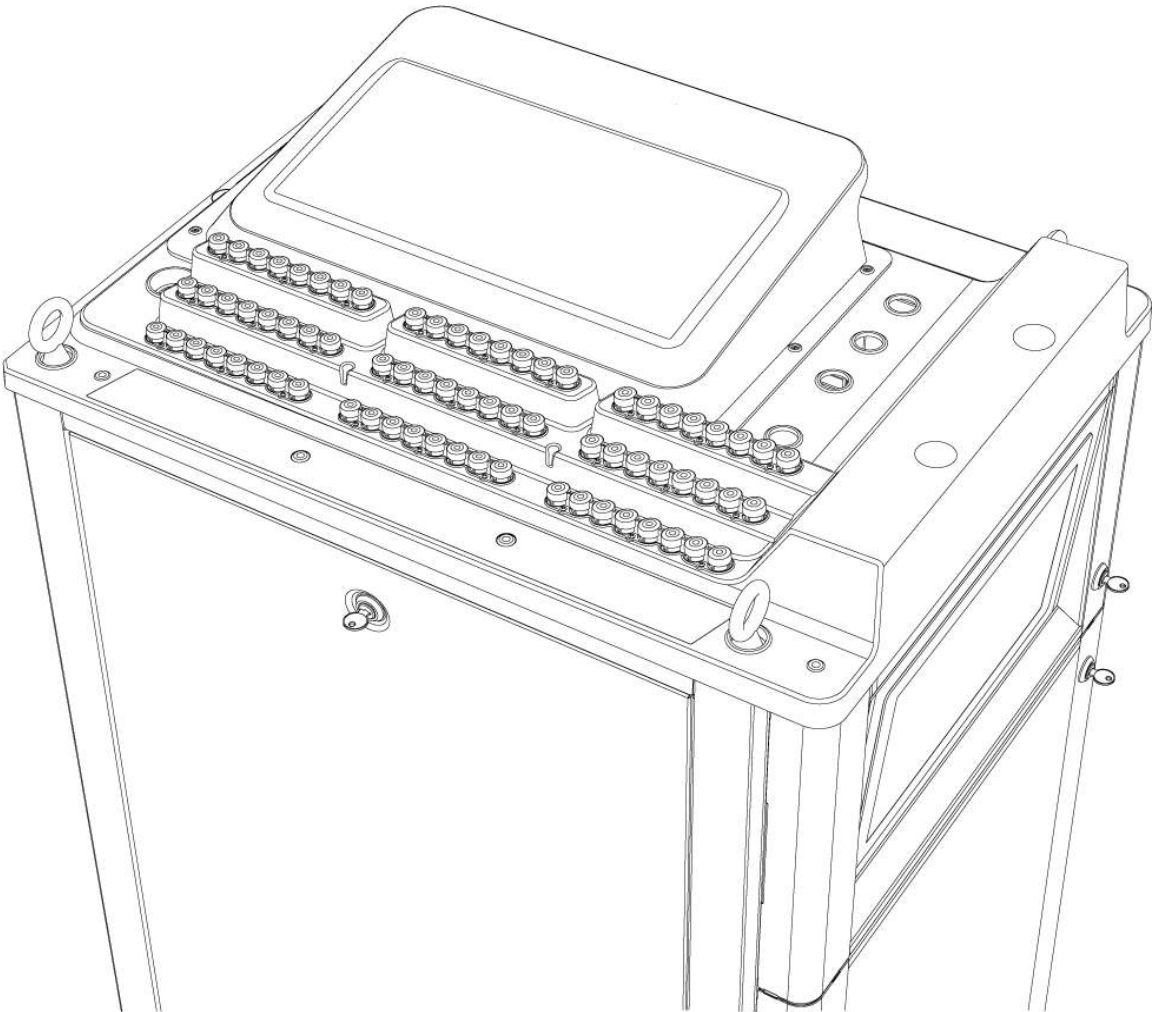
1. Analyzer Status LED.
2. Analyzer Release Slot

Analyzer side panel – Interior

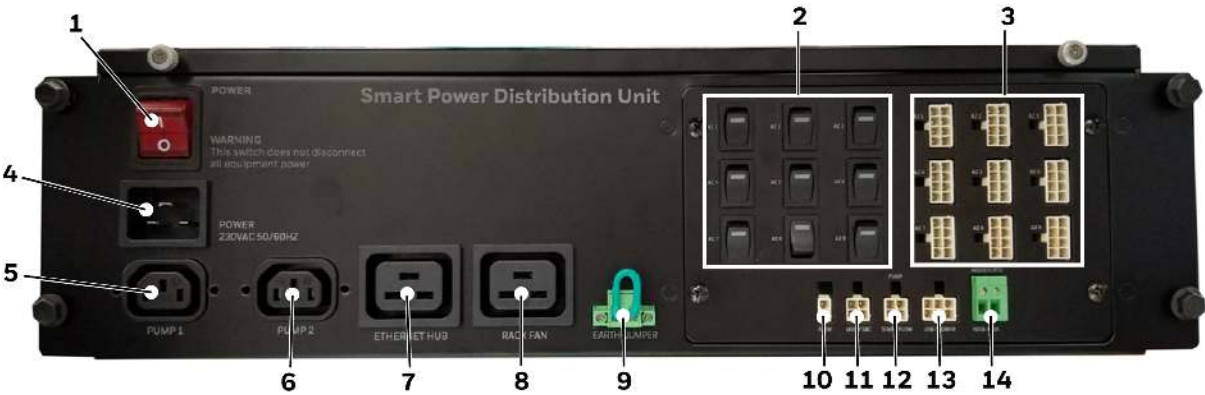


1. Analyzer Main Board
2. Sample pressure transducers
3. Sample flow transducers

Sample tubing connections



Smart Power Distribution Unit



Si No	Description	Si No	Description
1	Main Power ON/OFF Switch	8	Rack Fan Power Connector

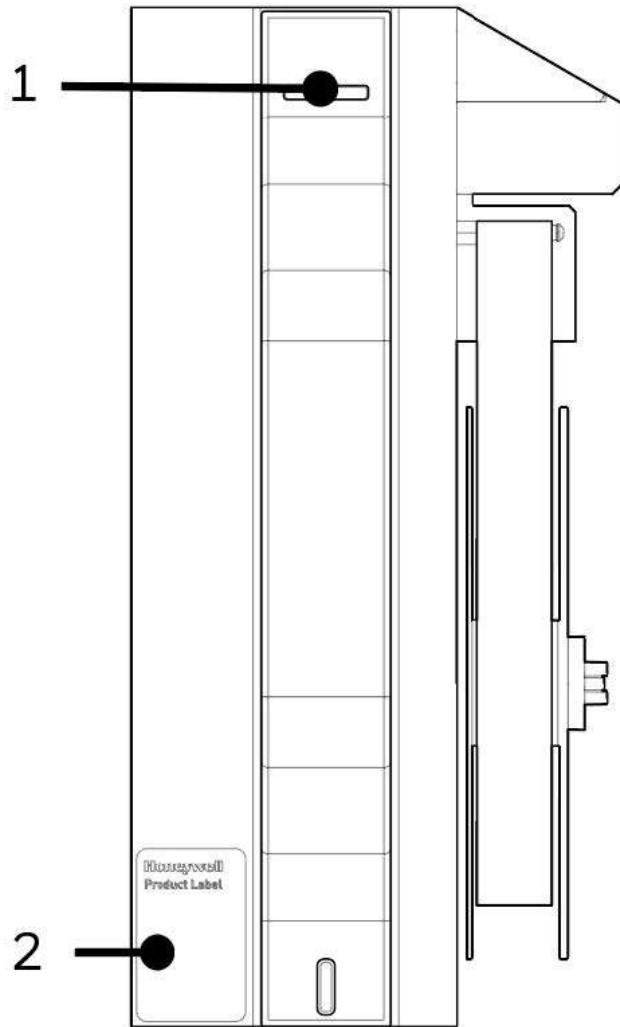
Si No	Description	Si No	Description
2	Analyzer Power Switches	9	Earth Jumper
3	Analyzer Connectors	10	Flow
4	Main Power Connector	11	MON/SBC
5	Pump 1 Power Connector	12	Temperature/flow
6	Pump 2 Power Connector	13	USB/Power
7	Ethernet Hub Power Connector	14	Modbus RTU

System Control Unit



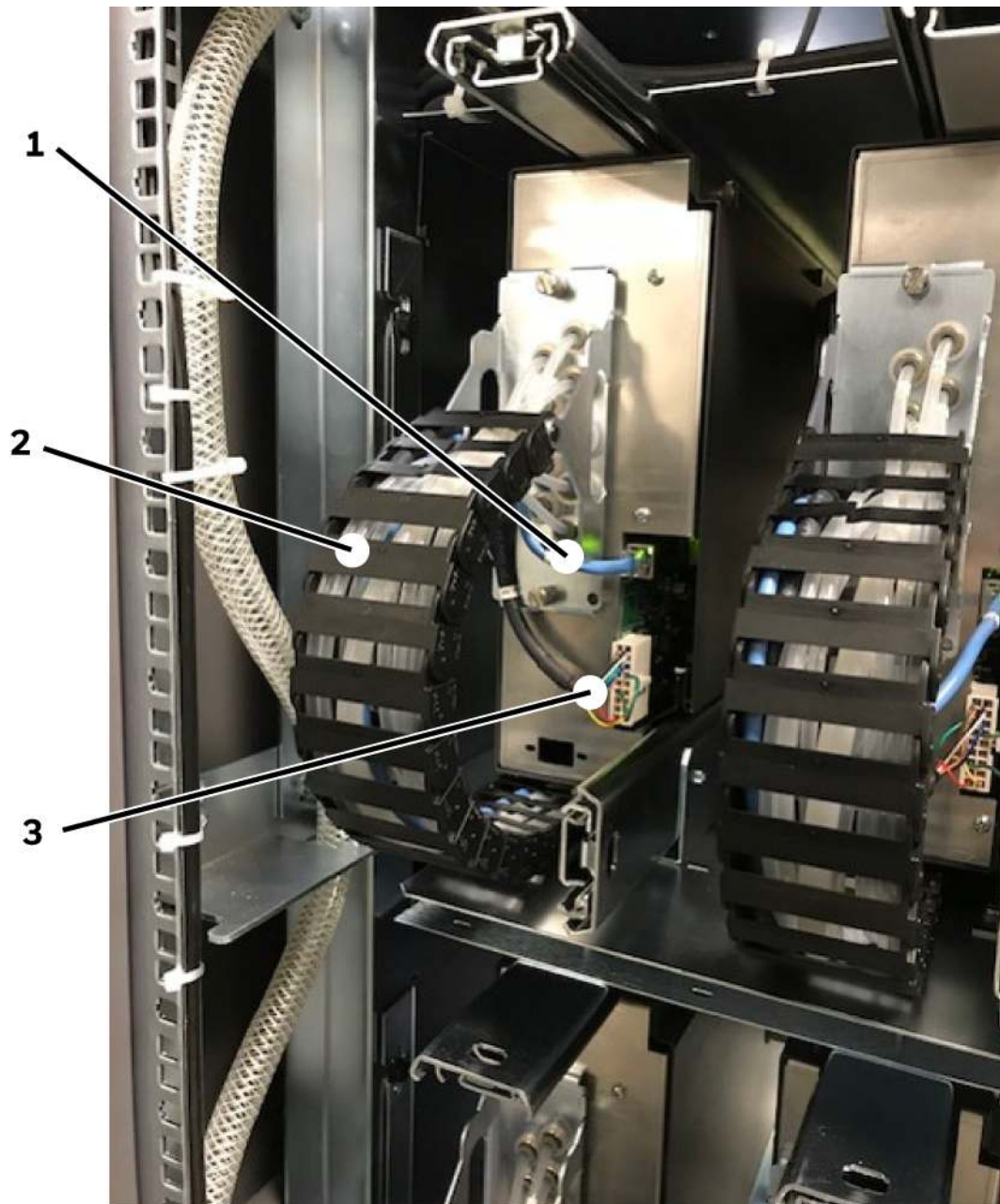
1. Single Board Computer
2. Power Distribution Unit

Analyzer – Front view



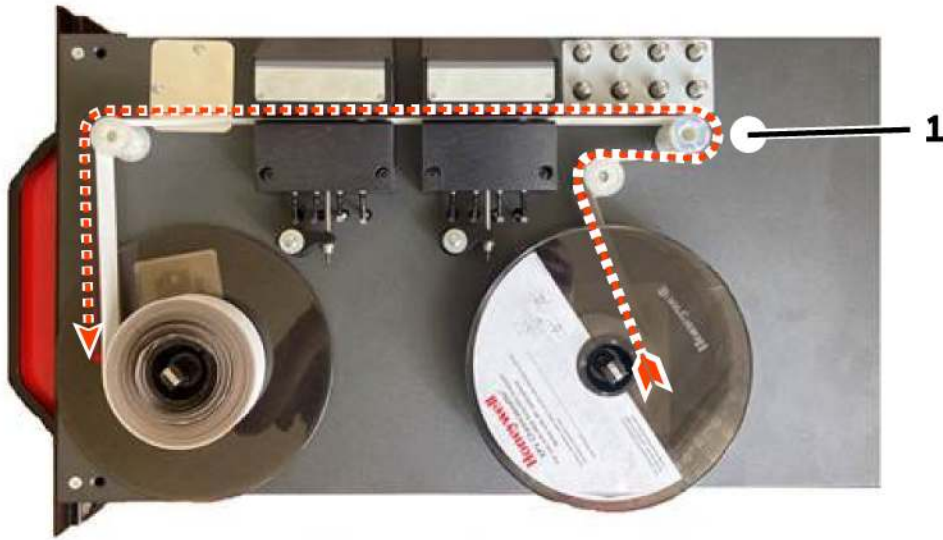
1. Analyzer status LED
2. Product label

Back of Analyzer



1. Internal Ethernet Communication Cable
2. Tubing Harness
3. Analyzer Power Connection

Chemcassette



1. Chemcassette directional flow

Analyzer Modules

The Vertex Edge System is populated with up to nine universal analyzer modules. Modules are installed in slots on one of three tiers. Each tier includes three slots for a total of nine slots in a Vertex Edge System. Analyzer modules occupy one slot each.

Tier 1	CC	CC	CC
Tier 2	CC	CC	CC
Tier 3	CC	CC	CC
	Slot 1	Slot 2	Slot 3

	Number of Points	Installed into Slots	Total Possible per Vertex Edge System
Analyzer	8	1, 2 or 3	9

Sampling System

Each Analyzer module is a monitoring center for sampling lines from sample locations. As they apply to the Vertex Edge 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 Edge System via a line
- Each of the 72 sample tubing connections on the Vertex Edge 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 Edge 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 no filters
- Flow controlling manual needle valve
- Top exhaust port

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

Chemcassette Detection System

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

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 Edge 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 to develop a better stain for better sensitivity and reliability; and
- Stores event data for retrieval by the data acquisition computer.

Components of the detection system include:

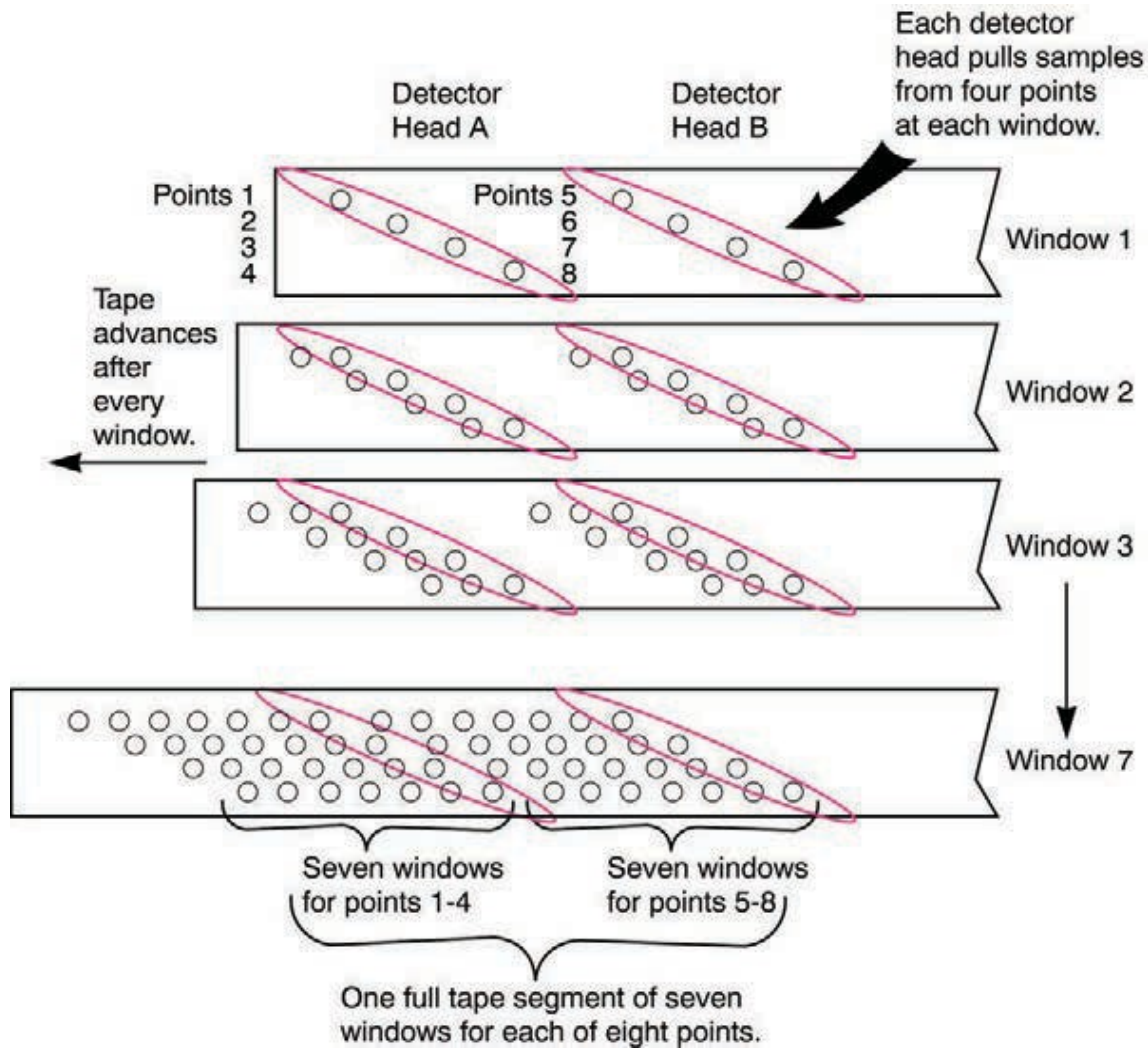
- Chemcassette detection tape
- Optics and electronics for the detection system
- Chemcassette tape transport mechanism
- Manual adjustment needle valve

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.

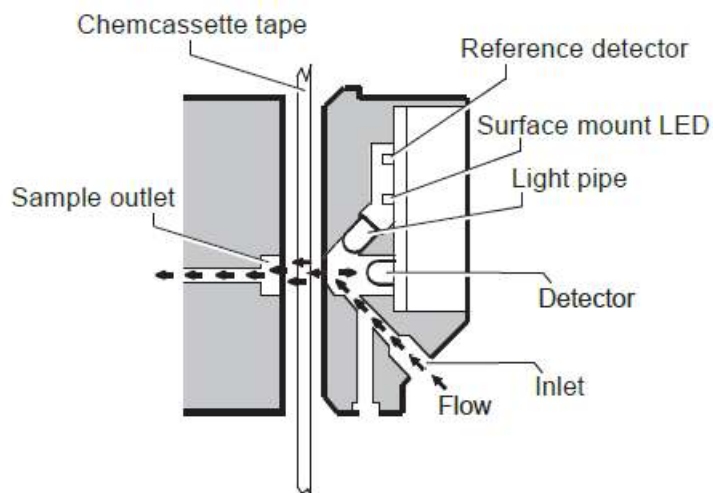
Stain Pattern

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 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 reports a precise concentration level to Daq PC or external system. Gas concentrations are reported in parts-per-million (ppm), parts-per-billion (ppb) or milligrams-per-cubic-meter (mg/m³).

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.

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 Edgeshould not exceed 50 feet.

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

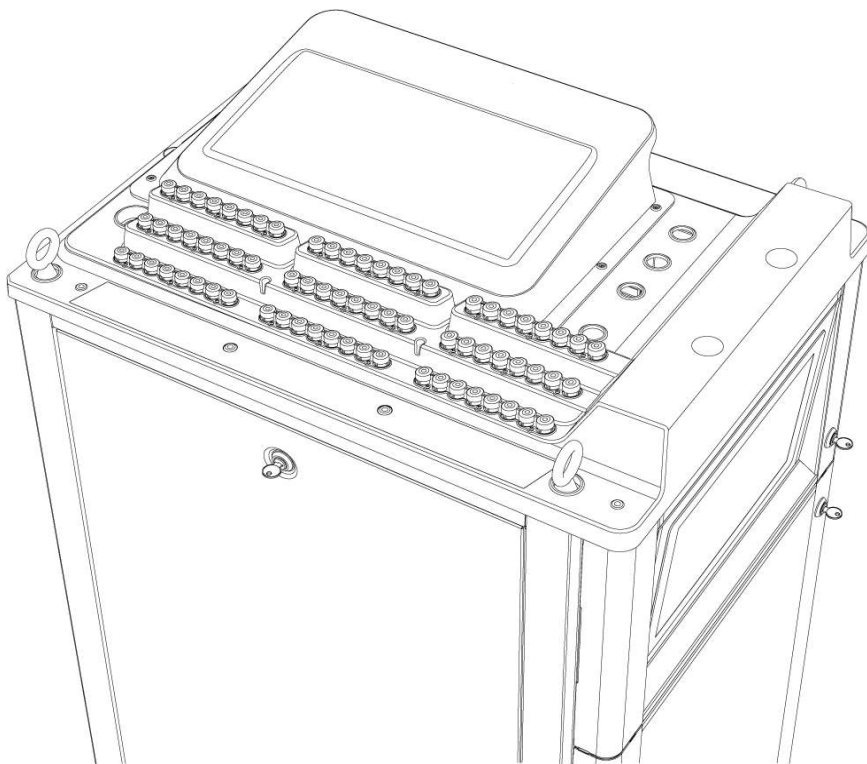
The Vertex Edge System draws cooling air in through a filter mounted on the pump module access door.



Multiple Gas Monitoring

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

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



Control Systems

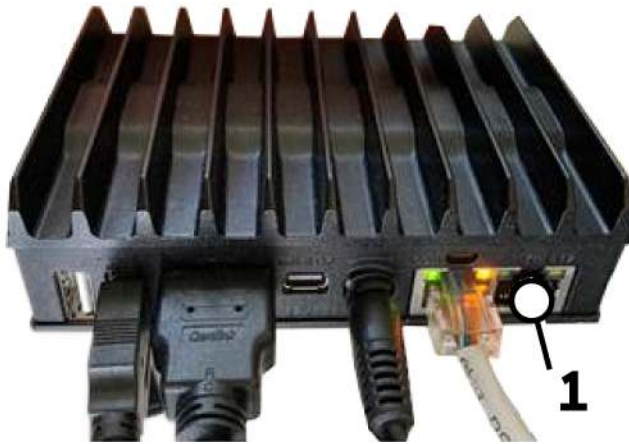
The Vertex Edge control system consists of a central data acquisition computer (DAq), and one or more analyzer modules.

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

Data Acquisition Computer

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

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



1. External Ethernet Network (Modbus TCP/IP, Web server, optional OPC)

3

Installation

The installation procedure for the Vertex Edge System consists of six steps:

1. Surveying the Installation Site;
2. Optional Floor Mounting;
3. Installing Sample Lines;
4. Installing Pump Exhaust Line;
5. Electrical Power;
6. Data Acquisition System.

Installation Step 1: Surveying the Installation Site

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

The site should:

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

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

Placement of the Vertex Edge System

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

You can place the Vertex Edge System away from sample locations with sample tubing up to 400ft. (122m) length.

Exposure to Dust and Humidity

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

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

Sample Transport Time

The shorter the sample line, the shorter the transport 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.

Monitor Dimensions

Monitor dimensions are an important factor in monitor placement. The Vertex Edge System is 24 in. (61 cm) wide, 34-1/2 in. (88 cm) deep and 76 in. (193 cm) in height. The system with 9 analyzers weighs about 900 pounds (408 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 the monitor for installing sample lines.

Sample Locations

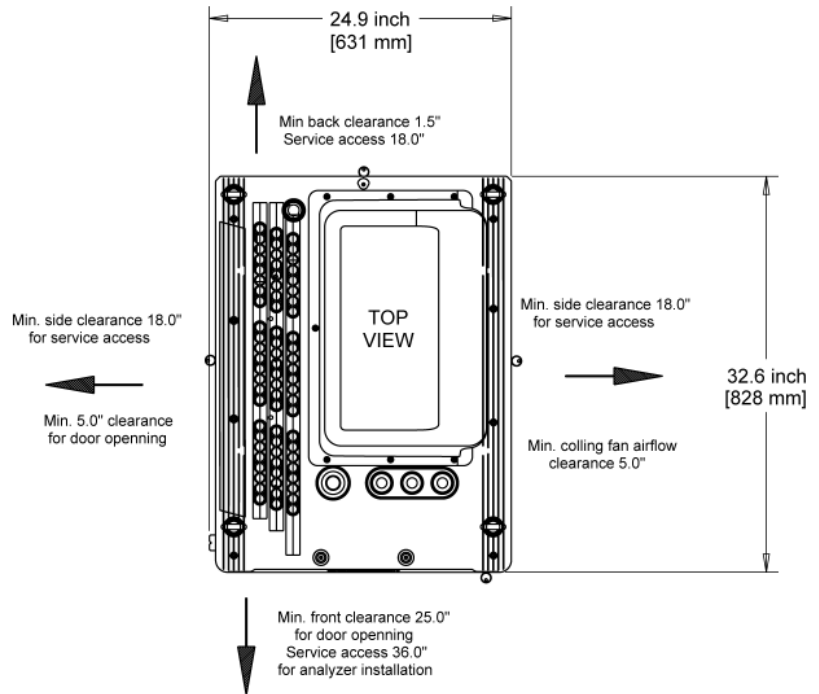
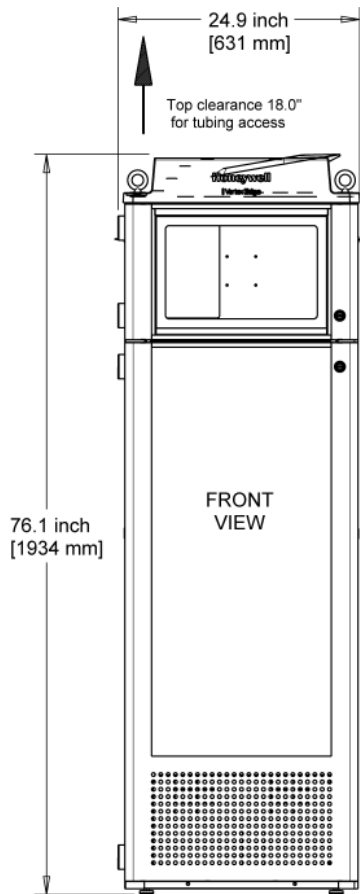
Before installing the Vertex Edge System, evaluate the sampling locations to determine the presence of excessive dust or moisture. An external filter must be used in all locations. Make sure you use the correct filter. Dust may be a result of construction as well as manufacturing activities. Moisture may result 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.

Sample Line Particulate Filter Use

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

Installation Drawings

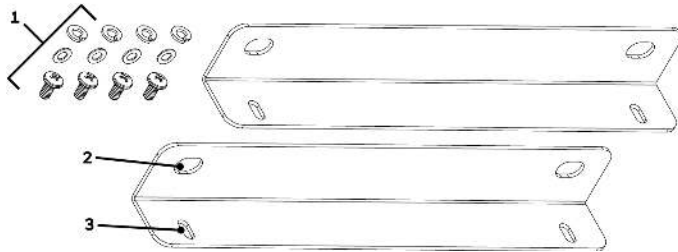


FLOOR SPACE REQUIREMENT

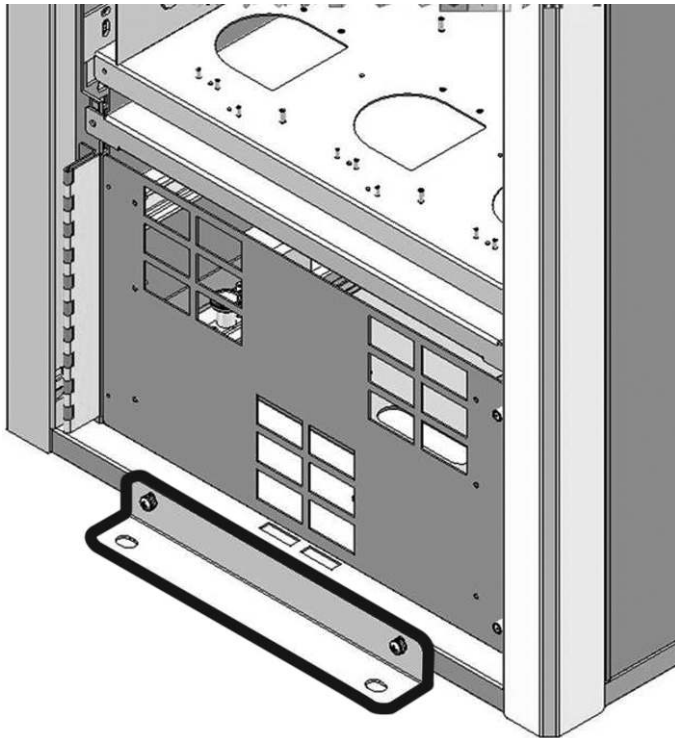
Some service procedures may require access from any side

Optional Installation Step 2: Floor Mounting

1. Attach the bracket to the front and rear of the Vertex Edge cabinet, including the supplied hardware.
2. Anchor the bracket to the floor with the appropriate mounting hardware base on installation (hardware not provided).



1. Cabinet hardware
2. Floor
3. Cabinet side



Installation Step 3: Installing Sample Lines

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

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

- Sample Line Installation Requirements
- Sample Line Connections
- Installing Sample Line Particulate Filters

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

1/4 in. (6.35 mm) O.D. x 0.190in. (4.83 mm) (Thin wall)

Sample Line Installation Requirements

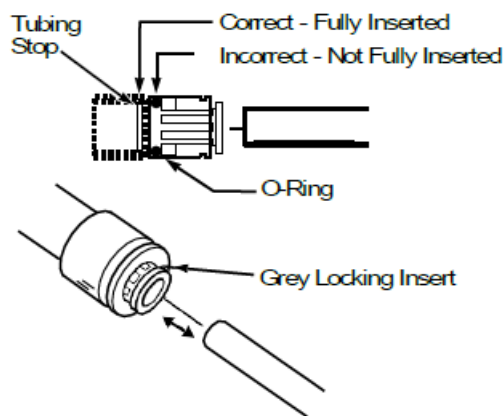
Follow the general requirements listed below when installing sample lines.

- Sample lines should not exceed 400 ft. (122m) in length.
- Route all lines as direct as possible to improve transport time.
- 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 Edge System. See 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 points require a filter. Filter kit 1295A0702 is recommended.
- If an analyzer is installed in the Vertex Edge with a Chemcassette tape, the optics may need cleaning before activating a previously unused point(s).

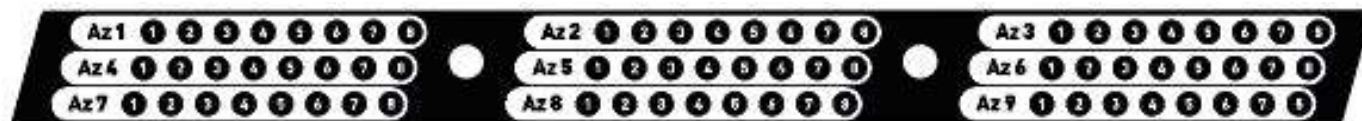
Sample Line Connections

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

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



Sample Line Inlet Connections



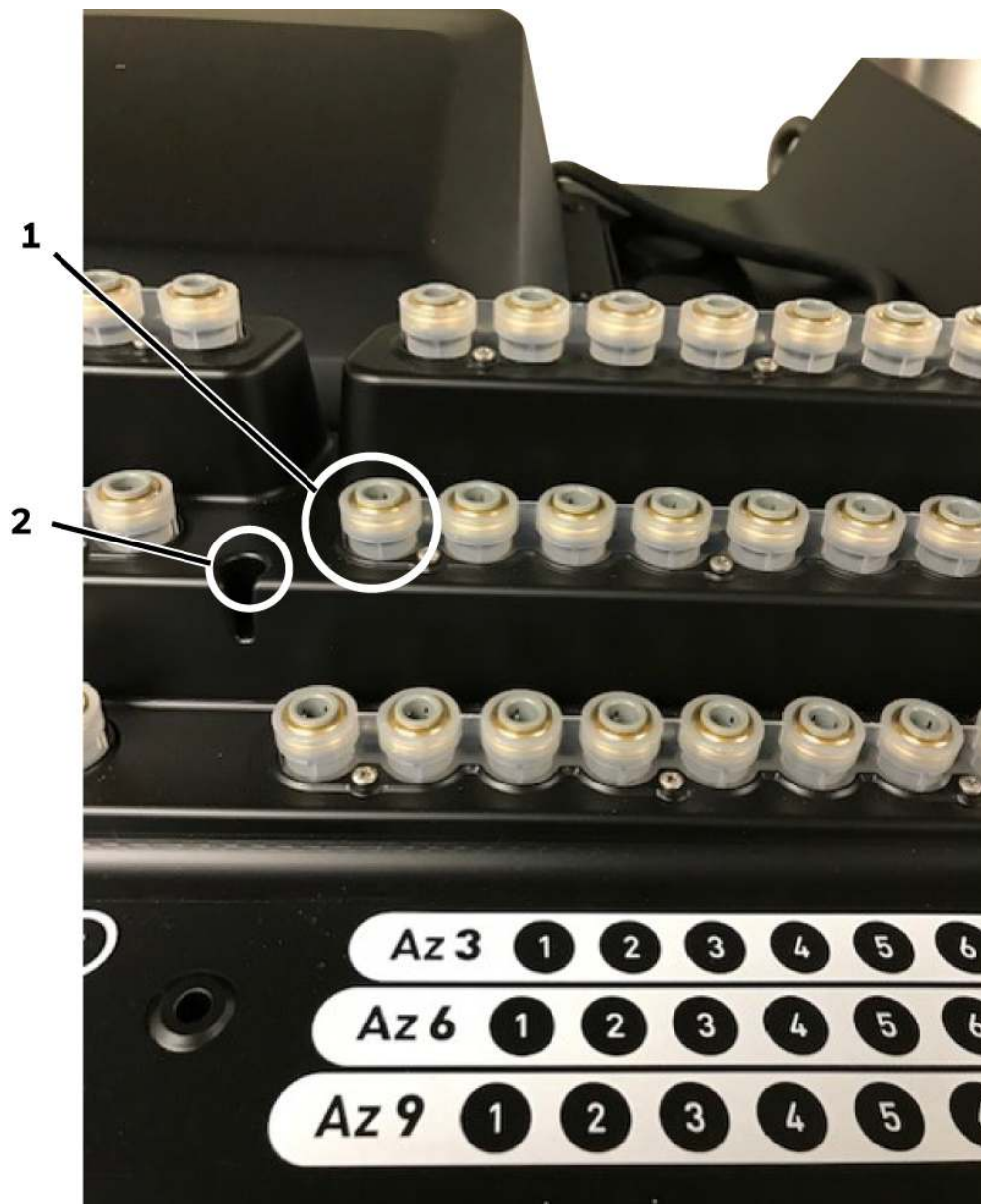
Note: Always perform a leak check after installing sample lines. See Leak Checking Sample Lines, for the leak check procedure.

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 1/2in. to 5/8in. (12 mm -16 mm). There is an insert depth guide hole near the inlet ports. To verify the insert depth, insert the tube into the guide hole far enough to touch the end and mark the length. Remove the pipe to measure the insertion depth.



CAUTION

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



1. Sample Point Feeding
2. Depth Gauge

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

Installation Step 4: Installing the Pump Exhaust Line

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

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.

Exhaust Line Connection

The instrument includes 50 ft. (15 m) of 0.375in. (10mm) I.D. x 0.5in. (13 mm) O.D. Teflon or Polypropylene tubing. Insert the tubing into the exhaust port on the top of the unit to the depth of 0.9in. (23mm).



CAUTION

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

To ensure a leak-free installation:

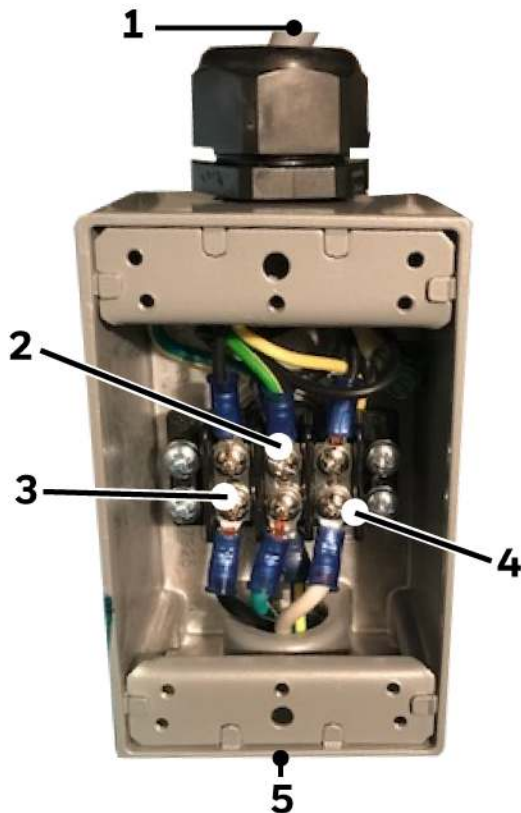
- Use a polypropylene tube with outside diameter 0.375in. (9.525mm) \pm 0.005in. (0.127mm).
- Verify that the external surface of the tube is free of score marks and scratches that could compromise the O-ring seal used in the fitting over the insertion depth.
- Cut the tube end perpendicular to its length 0.062in (1.5mm) from its end.
- Insert the tube in the fitting to a depth of 0.95 in.(24.13mm) \pm 0.05in. (1.27mm)

With the system running, verify the leak integrity by plugging a sample point and monitor sample point flow via HMI point flow screen.

Installation Step 5: Electrical Power

AC Source Requirements: Operating Voltage: 208~240VAC @ 50/60Hz; 15 Amps maximum, single phase.

The Vertex Edge System requires a dedicated AC source rated at 208~240VAC @ 50/60Hz, 15 Amp single phase providing hot, neutral, and ground lines. Line voltage should fluctuate no more than $\pm 10\%$. The external switch must be clearly labeled and installed in accordance with local electrical codes. Input power cable should be #14 AWG minimum. The safety ground wire must be the same or larger gauge as the line wires. Connect AC power connection to the two-position terminal block in the rear panel of the power module. Connect ground wire to the threaded stud on the side rail of the rack.



1. To power outlet. The customer connects it.
2. Green Ground.
3. Black Live line
4. White Neutral
5. Vertex Edge side, prewired.

Verifying Proper AC Power Connection

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

Verifying Line Connection

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

Verifying Neutral Connection

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

Verifying Operating Voltage

Touch the red multimeter lead to the line/hot connection and touch the black lead to the neutral. The meter should display a voltage value of 208~240VAC.

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

Vertex Edge Transformer Installation

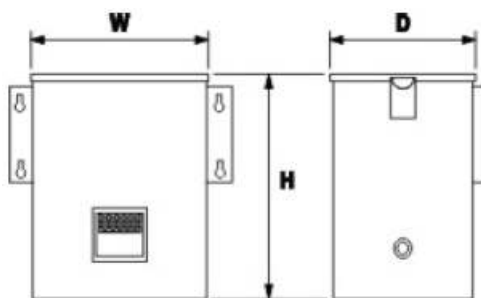
The directions and diagrams enclosed herein are intended to illustrate the proper installation and wiring of transformers designed to step-down or step-up site voltage to proper levels for Vertex Edge operation. The information provided has been gathered from Sola/Hevi-Duty for use with their products as specified in this document.

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

Design Characteristics

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

Design Style

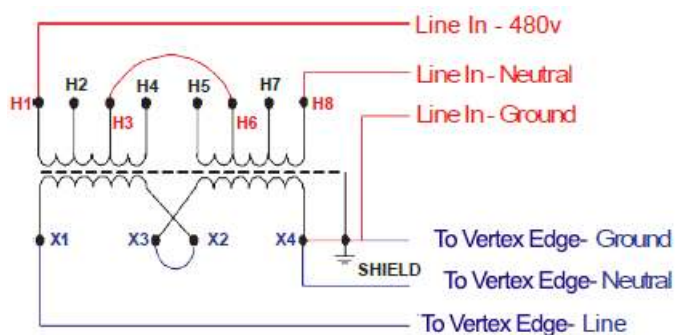


HA Part Number	Catalog Number	KVA	H	W	D	Ship Wt
0060-1020	HS5F5AS	5	17	14	9	104
0060-1021	HS12F5AS	5	17	14	9	104

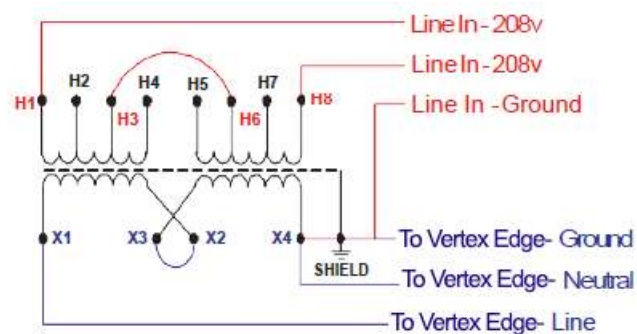
HA Part Number	Primary Amps	Secondary Amps
0060-1020	20.8/10.4	41.6/20.8
0060-1021	18.0	41.6/20.8

Step-Down Wiring

0060-1020 as Step-Down Transformer 480v to 240v 240 x 480 Volt Primary, 120/240 Volt Secondary, Taps: 2, 2½% FCAN & FCBN



Single 480VAC Line In



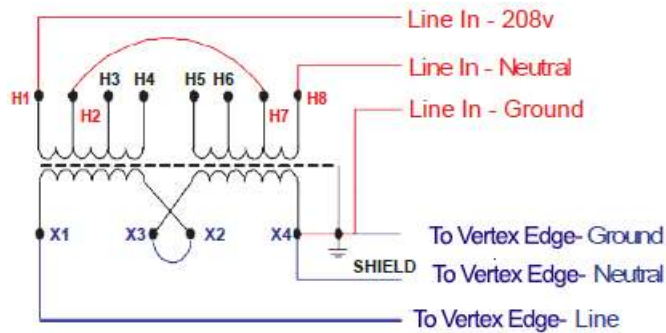
2 208VAC Lines In

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

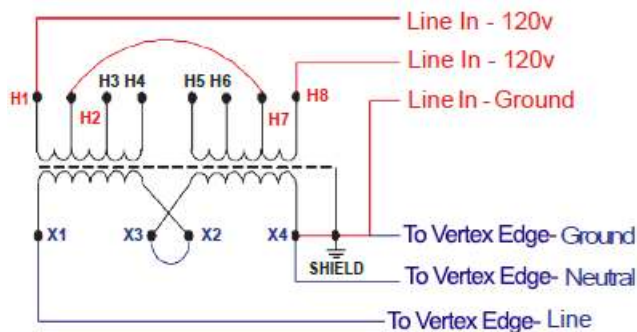
Set-Up wiring

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

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



Single 208VAC Line In

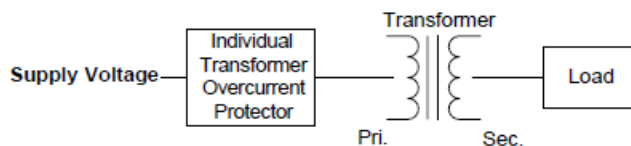


2 120VAC Lines In

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

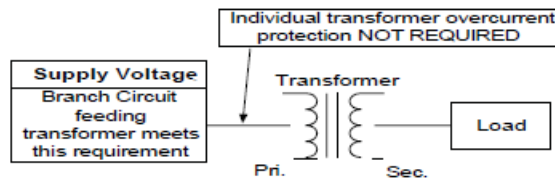
Overcurrent Protection

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



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

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

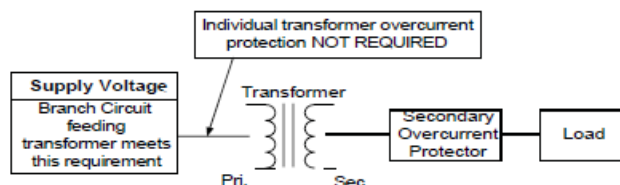


Primary Current	Overcurrent Protection Rating
Less than 2 amps	300% of maximum
2 to 9 amps	167% of maximum
9 amps or more	125% of rated primary current (or next highest standard rating)

Example 3. Primary and secondary protection is required if the transformer has more than two wires on the secondary circuit.

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

Example 4. If the branch circuit feeding the transformer has overcurrent protection to meet the individual primary overcurrent protection requirements in Example 3, then individual primary protection is not required. Secondary OCP is required as shown as follows.



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

Specification Guide for Transformers

General

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

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

Standards

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

Construction

Cores

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

Coils

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

Enclosures

- Transformer enclosures shall be constructed of heavy gauge sheet steel and coated with a grey powder paint finish (ANSI 61). Ventilated transformer enclosures shall be UL/NEMA Type 1 rated and UL/NEMA Type 3R rated for outdoor use with the addition of a weather shield. This information must be listed on the transformer nameplate.

- Maximum transformer enclosure temperature must not exceed 650°C rise above a 400°C ambient under full load.
- Transformers must have vibration isolators located between the core and coil assembly and the transformer enclosure to reduce audible sound levels caused from magnetostriction of the transformer core. No externally located vibration dampening pads shall be used as they tend to increase audible noise. Ventilated transformers are to be floor mounted to a concrete pad.
- The transformer enclosure must be grounded by the installer in accordance with the latest edition of the National Electric Code and any local codes or ordinances.

Performance

- Audible sound levels will not exceed limits established in NEMA ST 20:
 - 10 to 50 KVA 45 db
 - 51 to 150 KVA 50 db
 - 151 to 300 KVA 55 db
 - 301 to 500 KVA 60 db
- Transformers, 15 KVA to 500 KVA, shall incorporate a UL recognized 2200C insulation system and exhibit a maximum 1500C temperature rise above a maximum ambient of 400C under full load.

Installation Step 6: Data Acquisition System

The data acquisition computer or DAq is the main computer in the Vertex Edge System.

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



CAUTION

Do not connect an external network to the Vertex Edge Ethernet hub. Use only the external Ethernet connection on the back of the data acquisition computer. Connecting an external network to the hub will impair monitoring capability.

NOTE

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



4

Device Operations

Learn what you can do with your Honeywell Vertex™ Edge System Continuous Monitor.

Getting Ready for the Start-up

Learn the Honeywell Vertex™ Edge system start-up sequence and how to configure the analyzer modules for specific gas locations.

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

Before you begin the start-up and configuration, gather the following information:

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

Ahead of the start-up sequence, make sure that the following installation steps are completed:

- Sample lines
- Exhaust line
- AC power connection
- Sample Line Dust Filters
- I/O Connection

Power On

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

1. Open the touch screen door.
2. Turn on the rack power switch.
3. Turn on the power switch to appropriate analyzers.
4. Close and latch touch screen door. After 15 seconds, the analyzer status LEDs sequence four times through all colors.



1) Main Power ON/OFF Switch, 2) Analyzer Power Switches

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

Mon State	Alarm State	Fault State	time in millesconds								
			500				400		100		
idle	0	none	black								green
		maintenance	amber								black
		instrument	amber				black				
	1	any	red								black
	2	any	red				black				
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	
unpowered			black								

NOTE

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

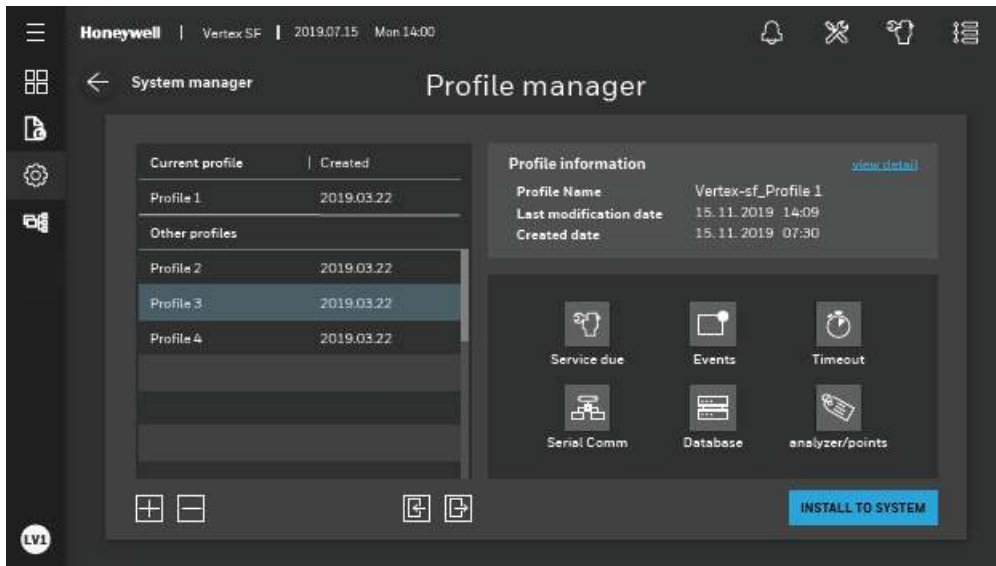
NOTE


Before the Vertex Edge System can begin monitoring, you must create a configuration profile.

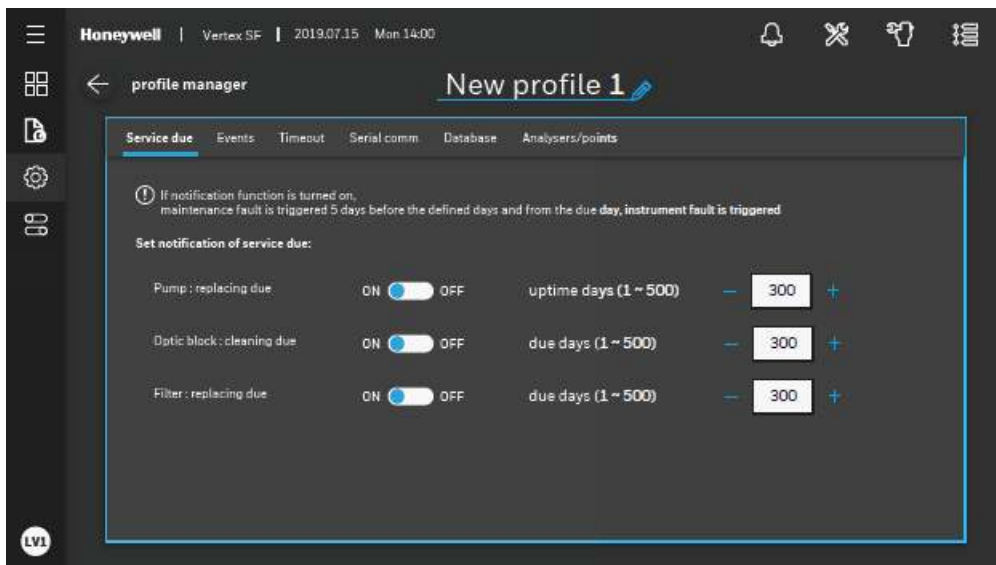
Create a Configuration Profile


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.

1. From the main menu, go to **System Manager > Profile Manager** .

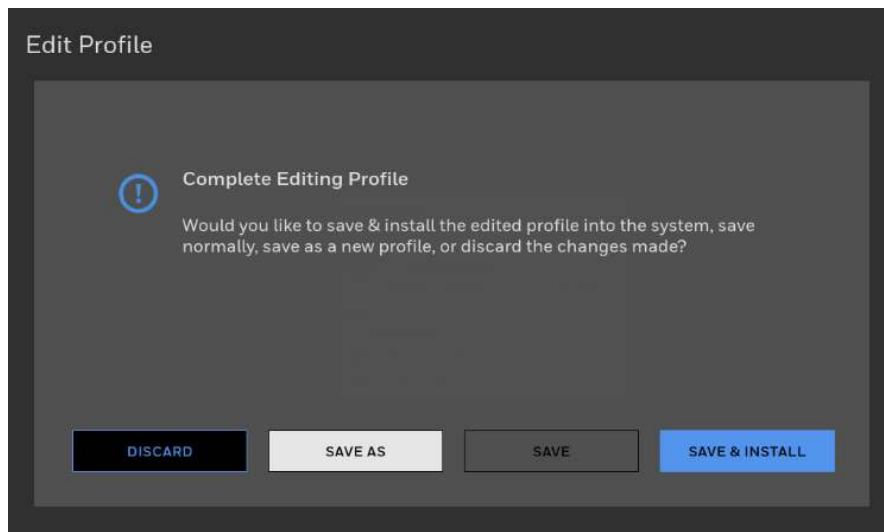


2. Tap the Add profile button .
3. In the Add new profile window, enter a profile name, and then tap **SAVE**.
4. After entering the profile name, you can set or modify values such as: Notification of service due, Events, Timeout, Serial comm, Database, and Analyzers and points.

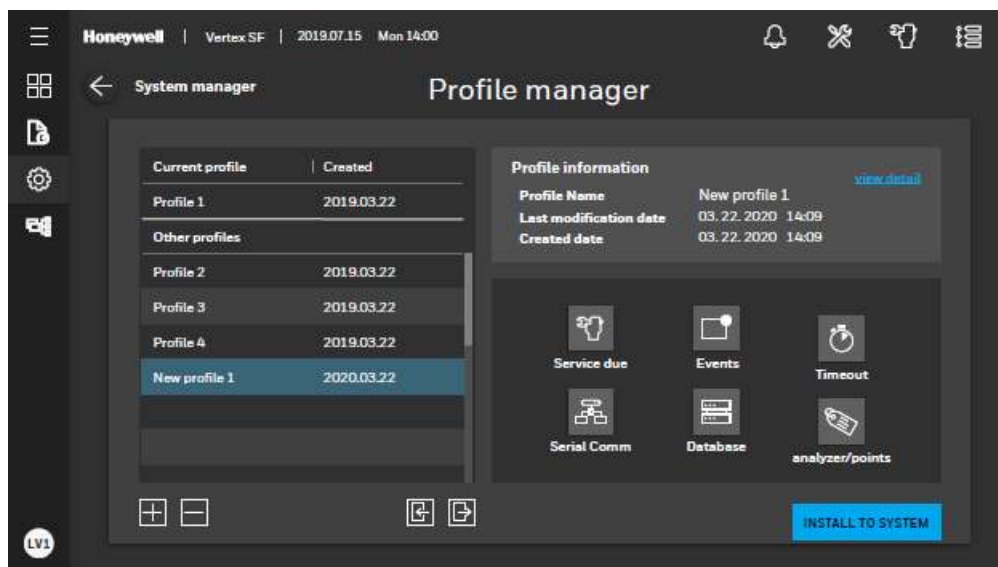


5. After finishing creating the profile, tap **Profile Manager**  **profile manager** to complete the Creating Profile process.
6. In the Add new profile window, tap **SAVE**.

7. Tap **INSTALL** whether you want to install this new profile in the system.



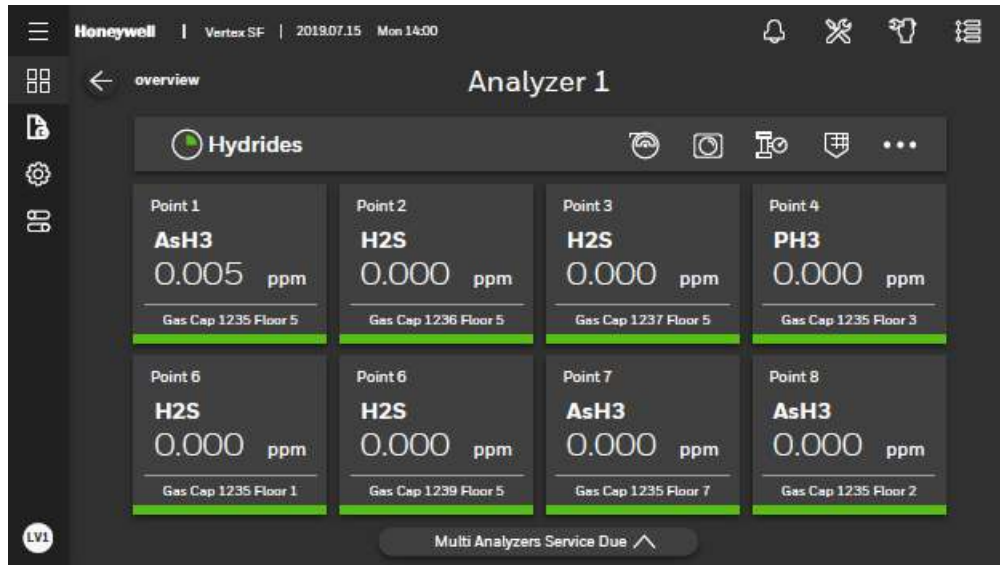
8. Tap **INSTALL TO SYSTEM** to complete installation.



View Analyzer Status


Review general point status of any analyzer.

1. From the main menu, tap **Overview**.
2. Tap on the selected Analyzer name. General information of each Analyzer's point is displayed.



3. Tap the back overview button  **overview** to return to the Overview screen.

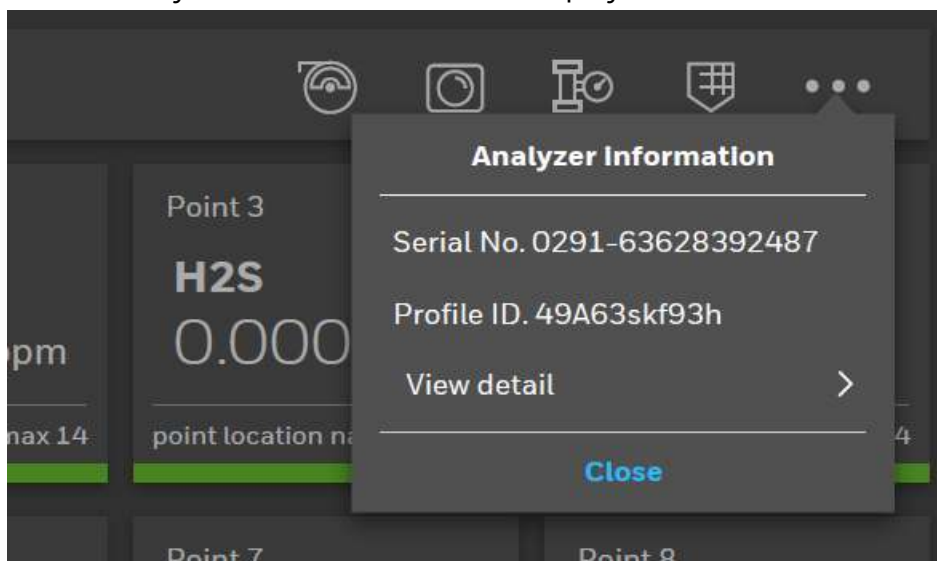
View Detailed Analyzer Information

1. In the left navigation panel, tap **OVERVIEW** 
2. Tap on the selected analyzer.
3. In the Components status bar,

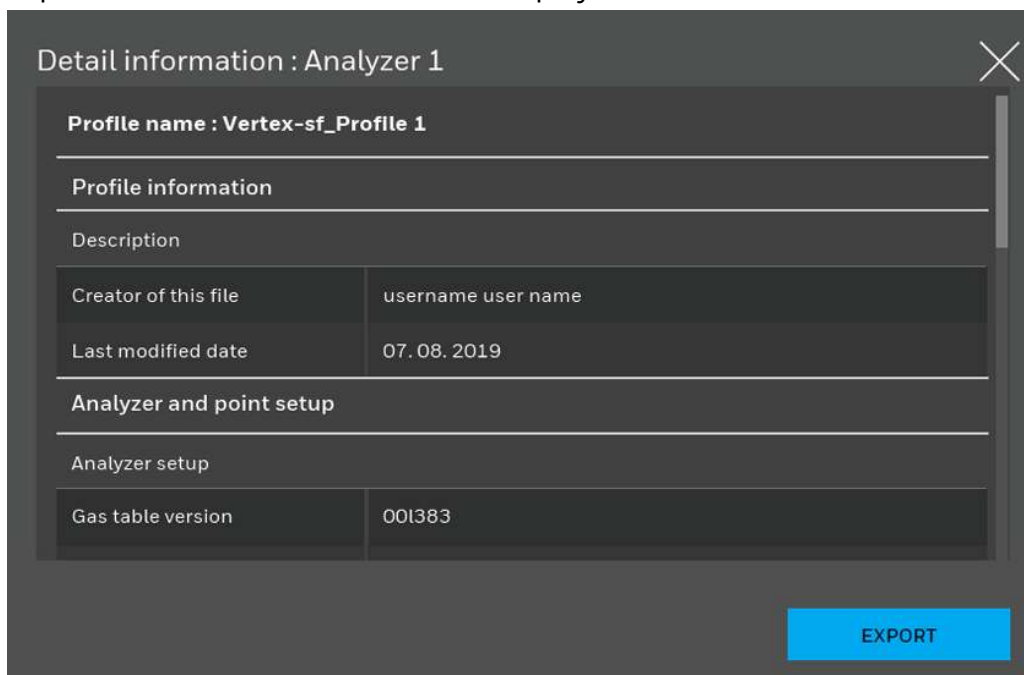


tap on the **More Info** button .

The Analyzer Information window displays the Serial No. and the Profile ID.



4. Tap **View detail**. The detailed info is displayed. Use the scroll bar to view the entire content.




5. Optional Step to export the detailed analyzer information. Tap **Export**.

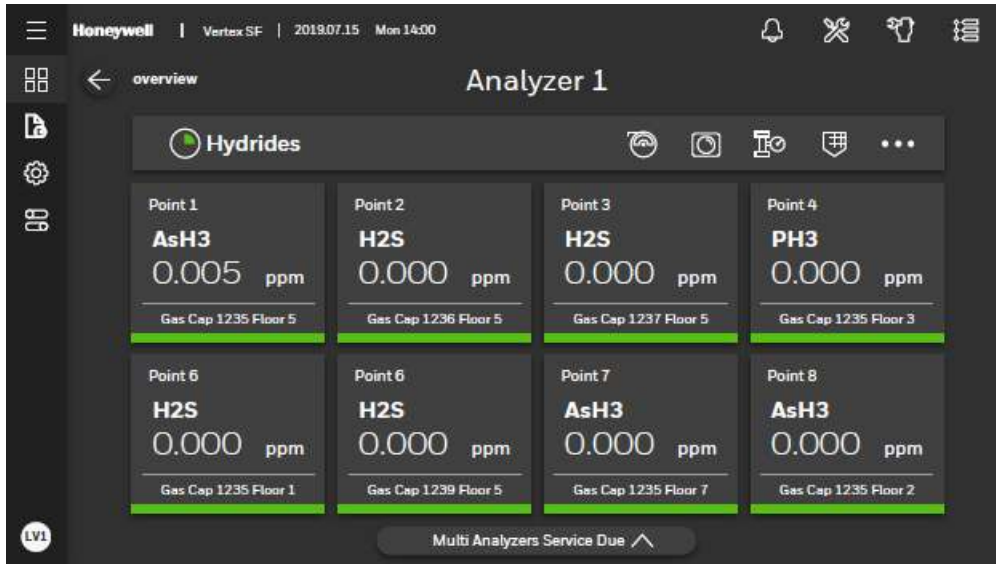
In the **File name** field, enter a file name for the export process, and then tap **NEXT**.

Select a USB port to export the information, and then tap **NEXT**.

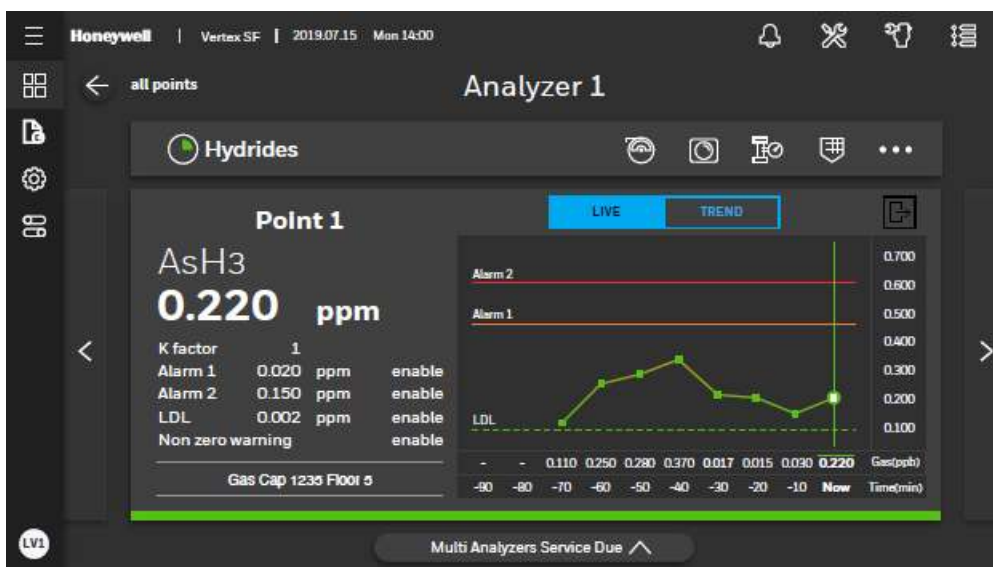
View Detailed Point Data

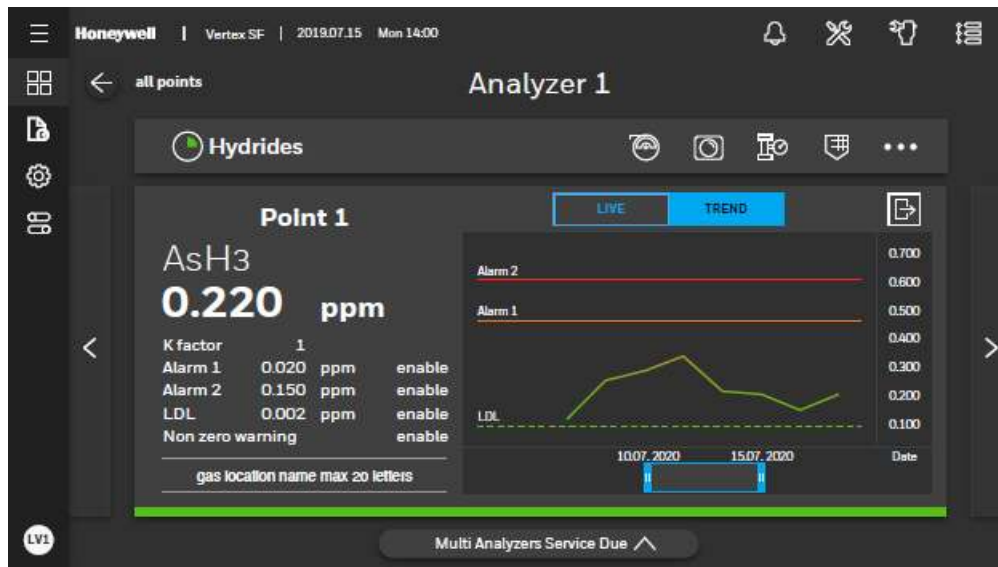
Analyze detailed info such as Live info, trend, and gas concentration of each analyzer's point.


1. From the main menu, tap **Overview** .
2. Tap the selected Analyzer.
3. Tap the selected Point.



4. From the detailed point information screen, you can perform several operations such as:
 - Live info.
 - Trend.
 - Scroll left and right on the gas chart.
 - Tap on the chart to view the gas concentration value.
 - customize the range using the slider.
 - Change the time-line.
 - Export as report.










5. Tap the All Points back button  **all points** to return to the selected Analyzer screen.

Acknowledge Notifications

Acknowledge and clear alarm, Instrument faults, and Maintenance faults notifications.

- From the upper right side of the main screen, tap on any of the notification icons to view

notification details.  The selected icon is highlighted in blue. The number within the circles indicate the sum of events for each notification.

	Alarm
	Instrument Fault
	Maintenance Fault
	All Events

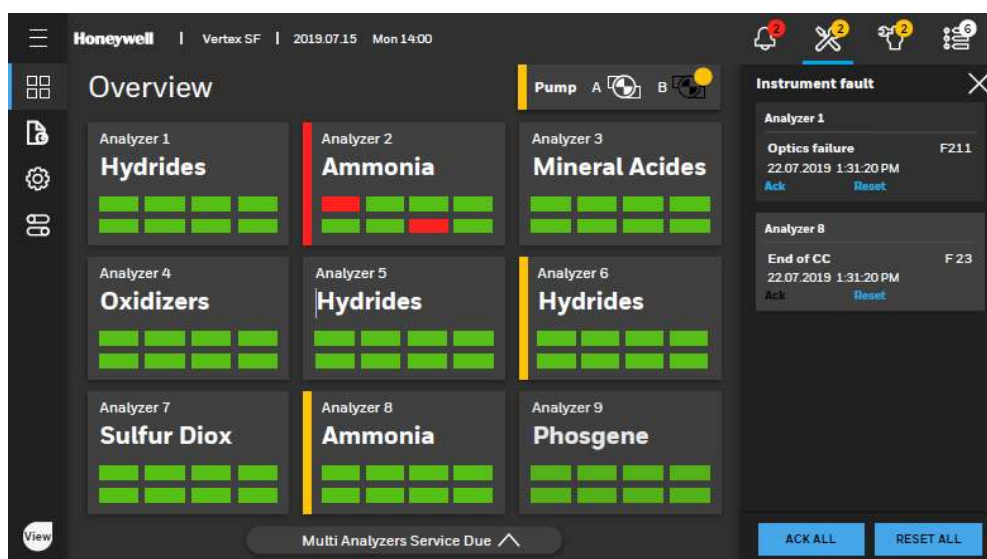
NOTE

If there is an alarm or fault, the notification panel will expand automatically.

NOTE

High Prioritized events are filtered first.

- You can acknowledge or reset individual notifications by tapping on individual **Ack** or **Reset** buttons on each notification, or acknowledge or reset all notifications from selected panel by tapping on **ACK ALL** or **RESET ALL** buttons.



The acknowledged event moves to the bottom of the list, and its color diminishes.

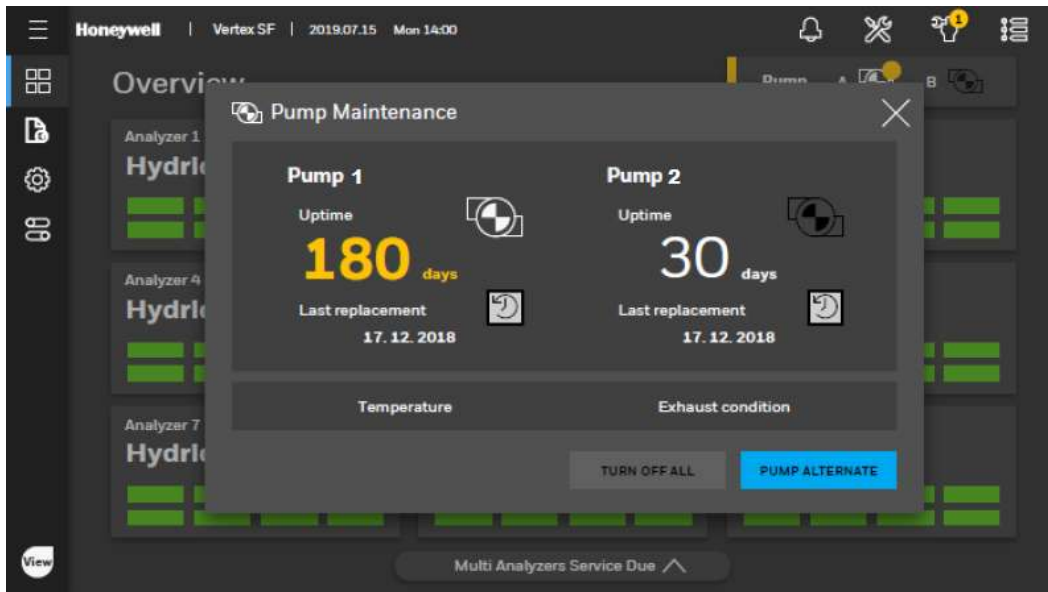
Alternate The Pump close to Due Date

Alternate the pump when pump uptime is reaching to the end and service is required.


1. From the main screen, tap on the Pump maintenance button . The pump icon is highlighted in yellow.



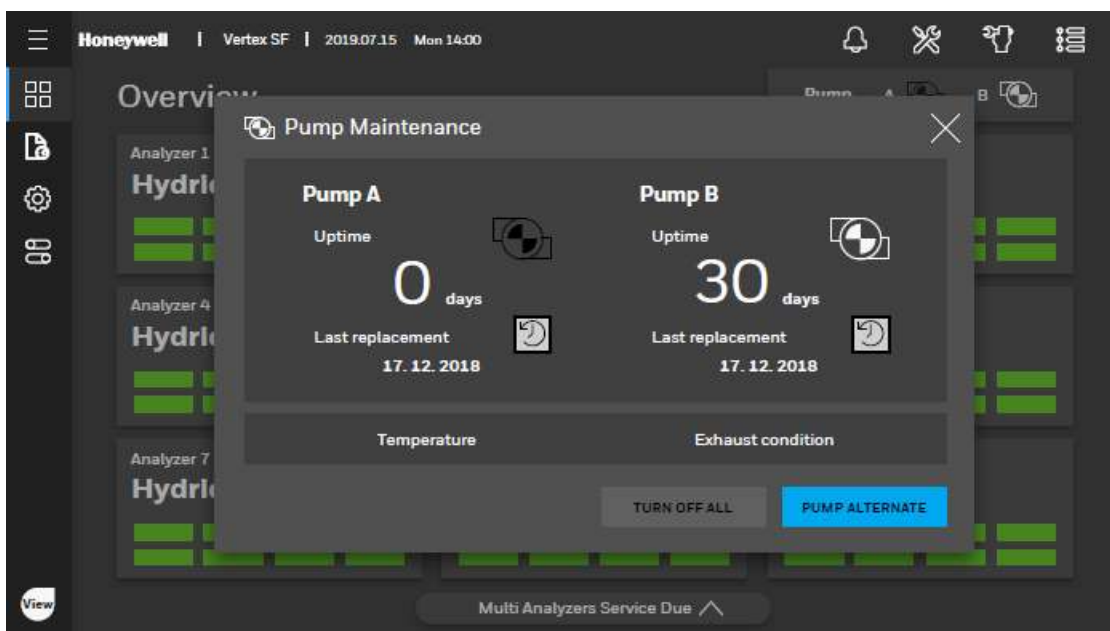
2. In the pump maintenance window, the uptime is highlighted in yellow. Tap **Pump Alternate**.



3. Tap **CONFIRM** to start the pump alternation process.


4. Optional step. Tap on the Reset button .

5. Tap **CONFIRM** to reset the counted uptime days. The highlighted uptime resets to zero.



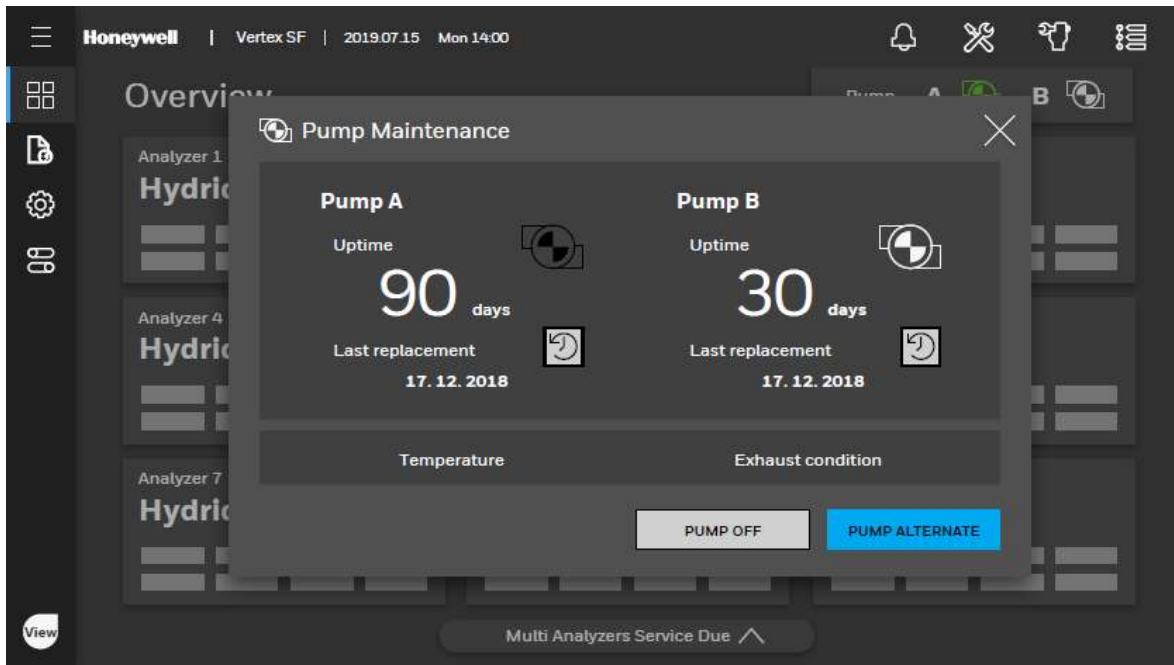
Turn a Pump On And OFF

You can turn ON or OFF a pump when all the analyzers are out of the monitor mode.


1. In the left navigation panel, tap **OVERVIEW** 
2. Tap the pump A/B button



3. In the Pump Maintenance window, tap **PUMP OFF** or **PUMP ON** as needed.



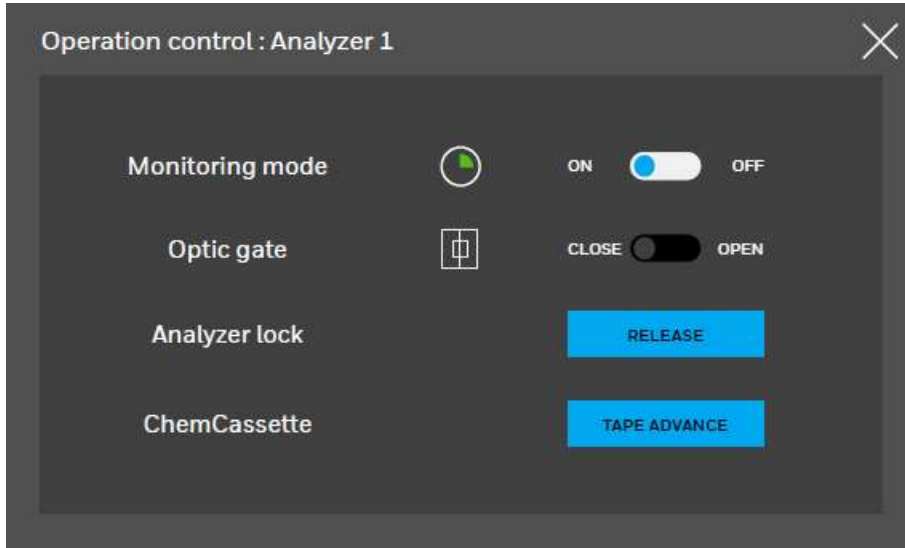
Turn the Monitoring Mode On and OFF

1. In the left navigation panel, tap **OVERVIEW** 
2. Tap on the selected analyzer.
3. In the Components status bar,



tap on the selected analyzer's name.


4. In the Operation Control window, select **Monitoring mode, ON or OFF**



NOTE

The Optic gate is closed when Monitoring mode is ON.

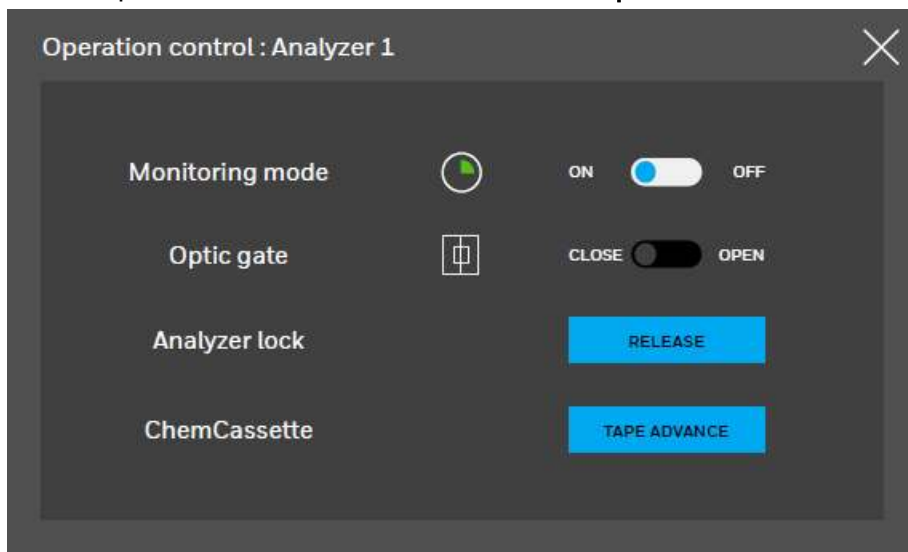
Open the Optic Gate

1. In the left navigation panel, tap **OVERVIEW** 
2. Tap on the selected analyzer.
3. In the Components status bar,



tap on the selected analyzer's name.


4. In the Operation Control window, shift the **Optic Gate** slider to **OPEN**.



NOTE

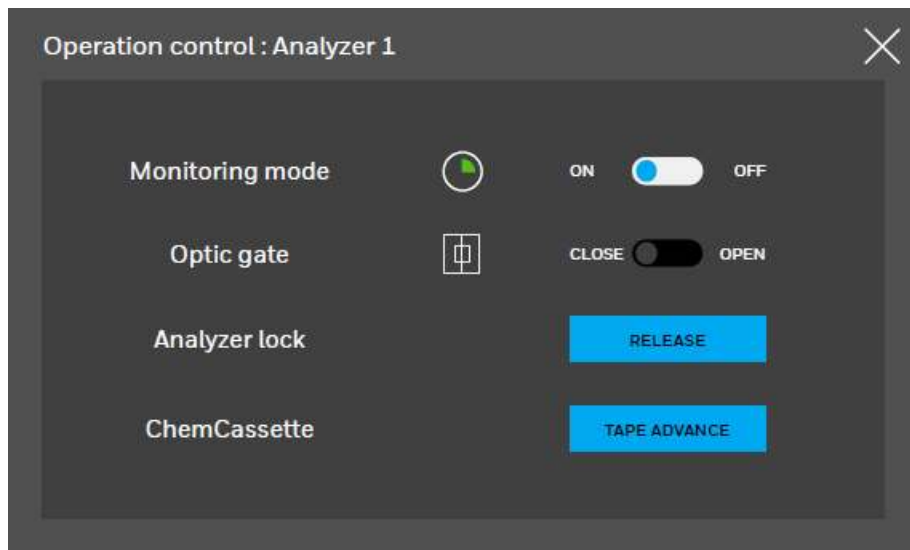
The Optic gate is closed when Monitoring mode is ON.

Release the Analyzer Lock


1. In the left navigation panel, tap **OVERVIEW** 
2. Tap on the selected analyzer.
3. In the Components status bar,



- tap on the selected analyzer's name.
4. In the Operation Control window, tap **RELEASE** next to **Analyzer lock**



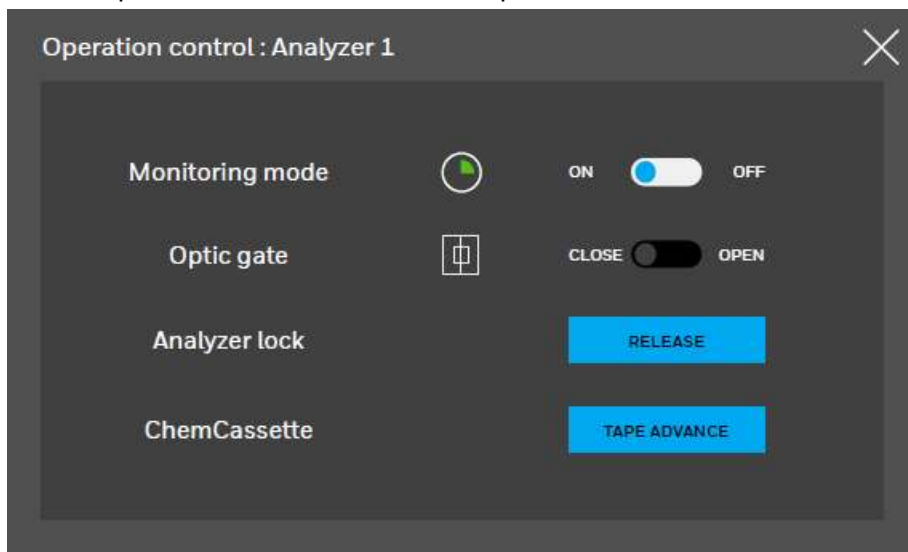
Advance the Chemcassette Tape

1. In the left navigation panel, tap **OVERVIEW** 
2. Tap on the selected analyzer.
3. In the Components status bar,




tap on the gas family name.

4. In the Operation Control window, tap **TAPE ADVANCE** next to **Chemcassette**



Adjust the Optic Block

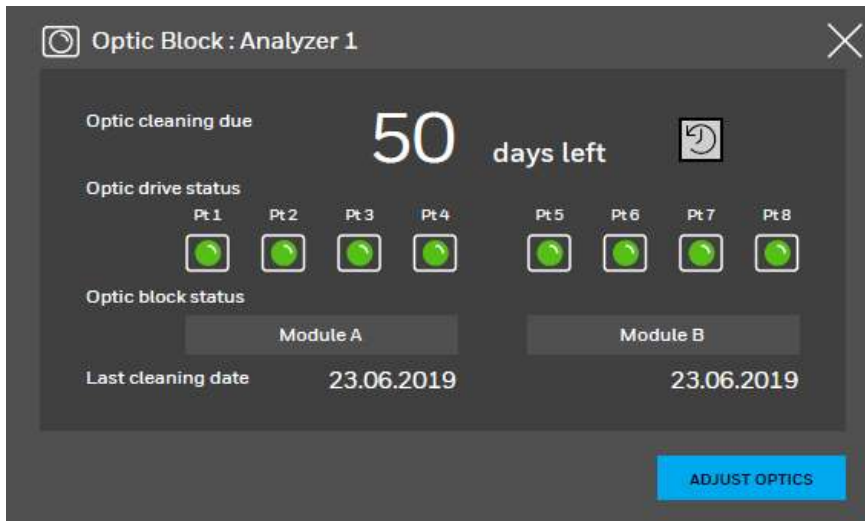
1. In the left navigation panel, tap **OVERVIEW** 
2. Tap on the selected analyzer.
3. In the Components status bar,




tap on the Optic

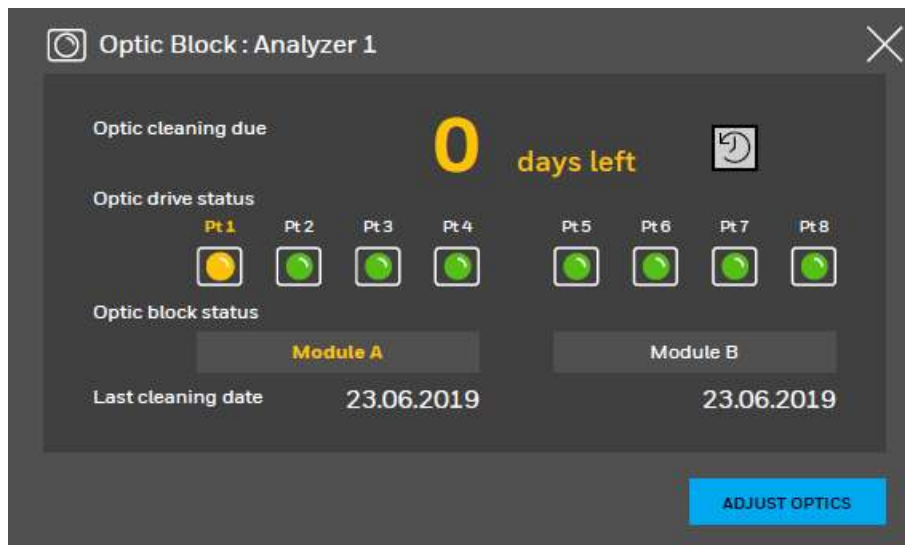
Block button .

4. In the Optic Block window, tap **ADJUST OPTICS**, and then tap **CONFIRM**. Follow onscreen instructions and finally tap **NEXT**.




5. Alternate Step. If the cleaning date has expired, the Optic Block button is highlighted in

yellow,  as well as the due date, the Optic Drive, and a Module status in the Optic Block window. Tap **ADJUST OPTICS** and clean the Optics block by referring to instructions and reset the count.



6. Optional Step. Tap the **Reset Count** button  to Reset the cleaning due days to 180.

Adjust the Flow Rate

1. In the left navigation panel, tap **OVERVIEW** 
2. Tap on the selected analyzer.
3. In the Components status bar,




tap on the Flow Rate button .

4. Check the flow rate, and if there is any point marked in yellow, you must adjust the rate.
5. Click **ADJUST FLOW** and adjust the needle valve on the side of the Analyzer while watching the flow rate on the graph.
6. When the flow reaches the target flow rate of 200cc/min, move to the next point. If the flow adjustment is made for all the points, click **STOP FLOW**.



7. After completing the flow adjustment, pump can be turned off by referring to section, Turn a pump On and Off.

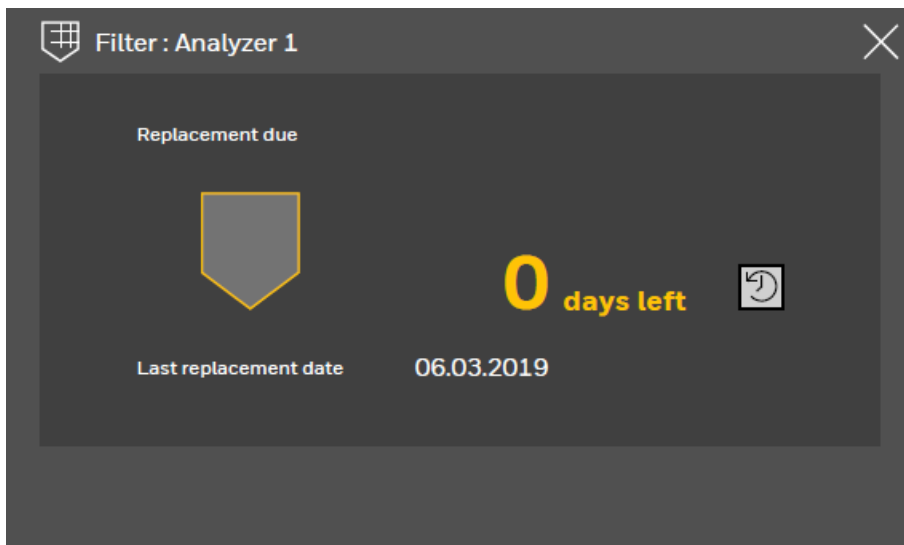
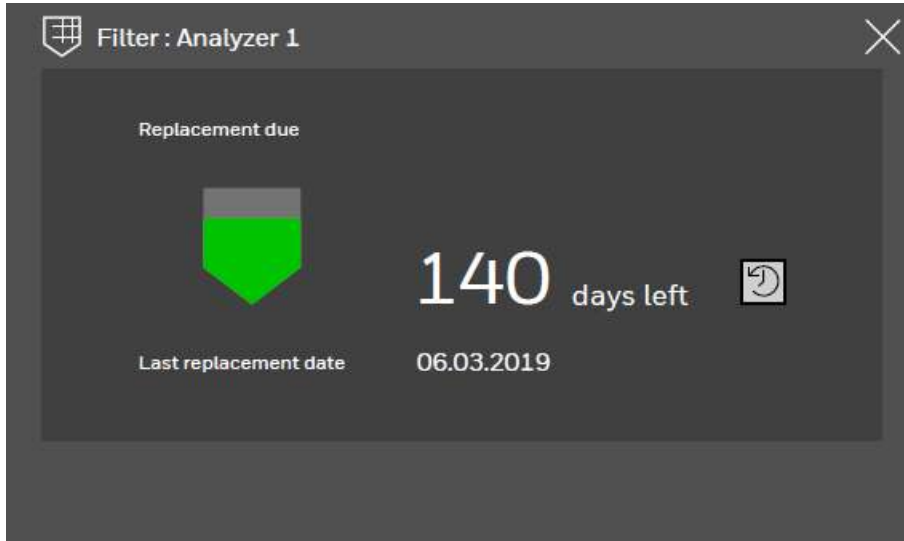
Replace the Filter

1. In the left navigation panel, tap **OVERVIEW** 
2. Tap on the selected analyzer.
3. In the Components status bar,




tap on the **Filter** button .

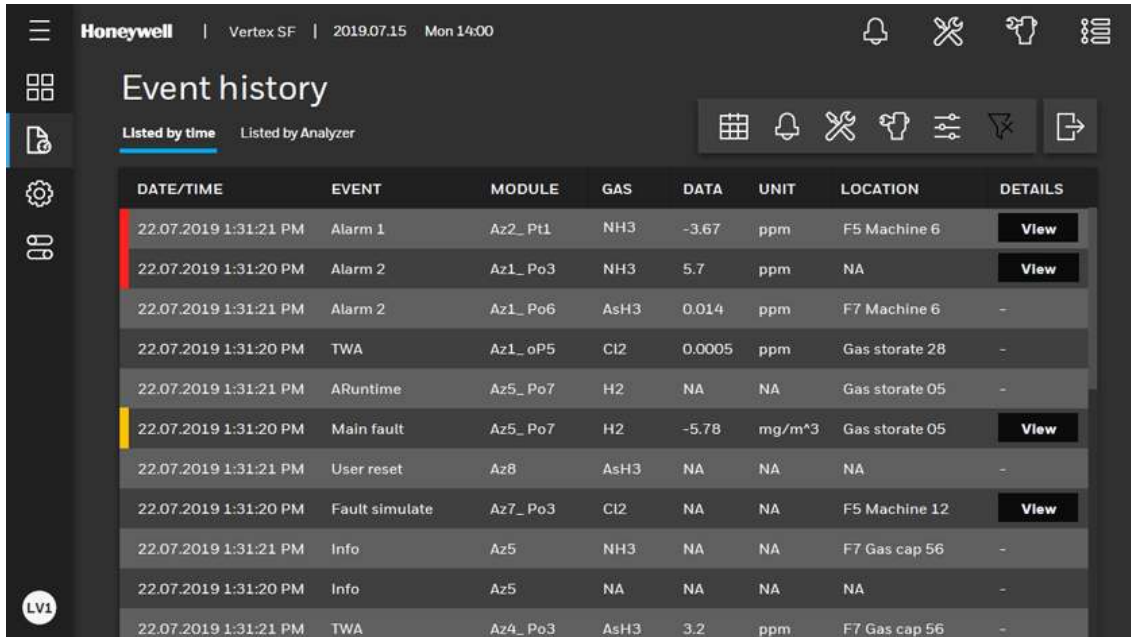
Either the regular replacement window highlighted in green or the expired time window highlighted in yellow is displayed.



4. Replace the filter manually.
5. Tap the **Reset Count** button  to reset the replacement due days.

View and Export the Events History Listed By Time


1. In the left navigation panel, tap **Event History** 
2. Tap in the **Listed by time** tab. A list of all events is displayed.

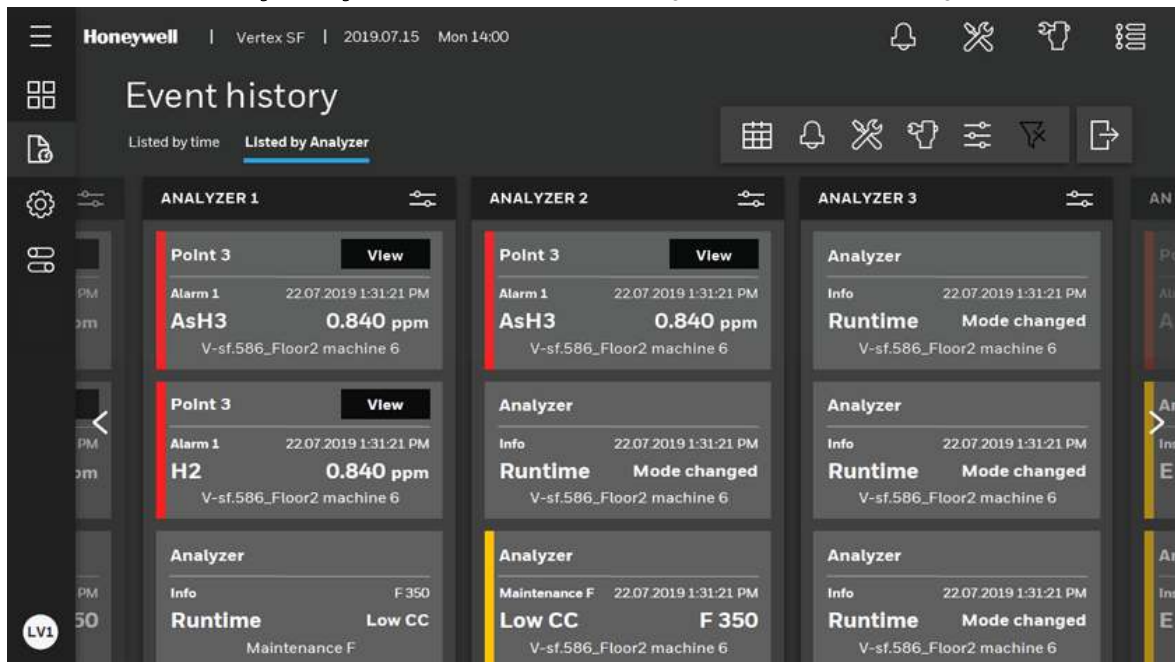


DATE/TIME	EVENT	MODULE	GAS	DATA	UNIT	LOCATION	DETAILS
22.07.2019 1:31:21 PM	Alarm 1	Az2_Pt1	NH3	-3.67	ppm	F5 Machine 6	View
22.07.2019 1:31:20 PM	Alarm 2	Az1_Po3	NH3	5.7	ppm	NA	View
22.07.2019 1:31:21 PM	Alarm 2	Az1_Po6	AsH3	0.014	ppm	F7 Machine 6	-
22.07.2019 1:31:20 PM	TWA	Az1_oP5	Cl2	0.0005	ppm	Gas storate 28	-
22.07.2019 1:31:21 PM	ARuntime	Az5_Po7	H2	NA	NA	Gas storate 05	-
22.07.2019 1:31:20 PM	Main fault	Az5_Po7	H2	-5.78	mg/m³	Gas storate 05	View
22.07.2019 1:31:21 PM	User reset	Az8	AsH3	NA	NA	NA	-
22.07.2019 1:31:20 PM	Fault simulate	Az7_Po3	Cl2	NA	NA	F5 Machine 12	View
22.07.2019 1:31:21 PM	Info	Az5	NH3	NA	NA	F7 Gas cap 56	-
22.07.2019 1:31:20 PM	Info	Az5	NA	NA	NA	NA	-
22.07.2019 1:31:21 PM	TWA	Az4_Po3	AsH3	3.2	ppm	F7 Gas cap 56	-

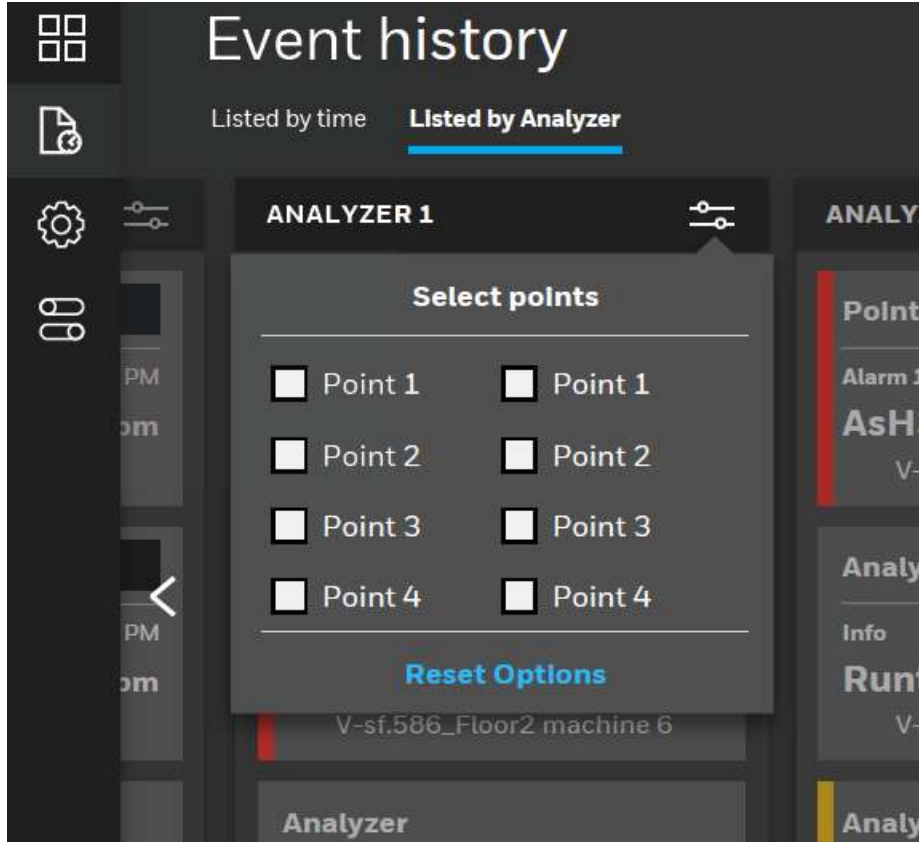
3. In the Listed by Time screen, you can filter the information and perform the following activities:

View and Export The Events History by Analyzer

1. In the left navigation panel, tap **Event History** 
2. Tap in the **Listed by Analyzer** tab. A list of all analyzer events is displayed.



3. Tap on the More Filters button  to view the events of specific Points.




5 Maintenance

This section describes routine maintenance procedures.

Maintenance Schedule

Component	Frequency
Sample line filters (end of line)	3-months
Teflon Corrosive Filter Membrane (end of line)	1 month
Teflon Corrosive Filter	3 months
Cabinet filter (located in front of pump module)	3 months or as needed
Air filters (located on the analyzer face) Applies only to early Series 1 (1291-1000 and 1291-2000)	3 months
Pump vane replacement	9-24 months operation per pump
Pump stem and o-ring	6 months
Valve filter	1 year
Supply Vacuum Filters	3-6 months
Alternate Pumps	6 months
Optics Cleaning	1 year or as needed
System File Maintenance	1 year or as needed

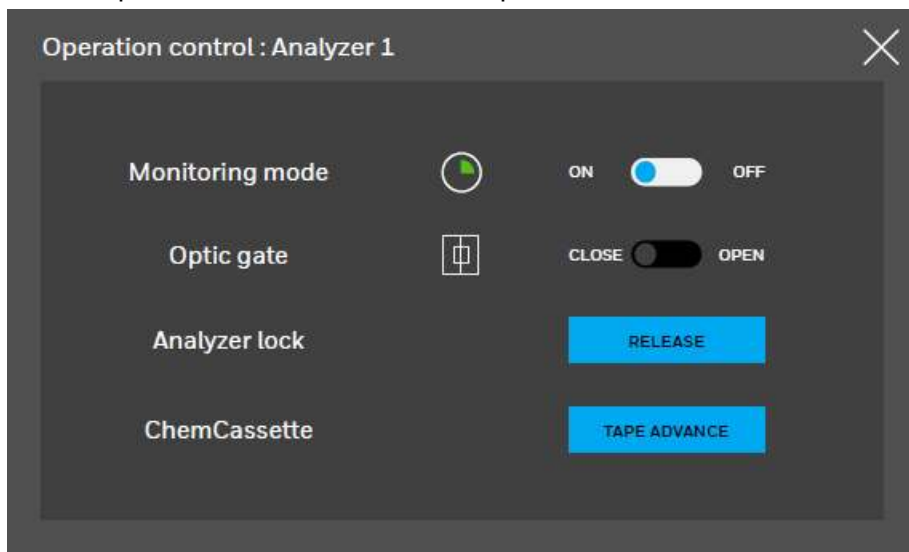
Advance the Chemcassette Tape

1. In the left navigation panel, tap **OVERVIEW** 
2. Tap on the selected analyzer.
3. In the Components status bar,



tap on the gas family name.


4. In the Operation Control window, tap **TAPE ADVANCE** next to **Chemcassette**



Replace the Chemcassette

Change the Vertex Edge Chemcassette tape for any of the following reasons:

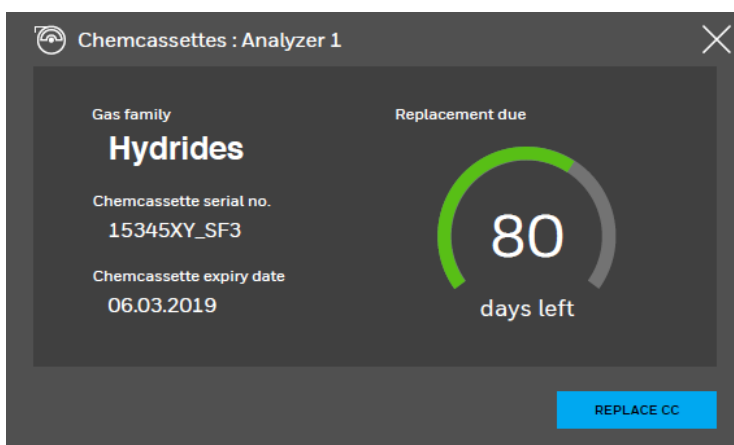
- Scheduled end-of-tape service
- Low Chemcassette warning
- Chemcassette has expired
- End of Chemcassette

1. In the left navigation panel, tap **OVERVIEW** 
2. Tap on the selected Analyzer.
3. In the Components status bar,

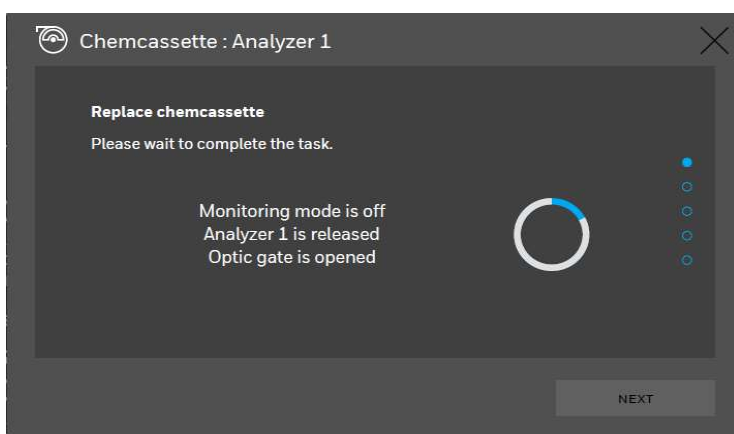


tap on the Chemcassette button .

4. In the Chemcassette window, tap **REPLACE CC**.

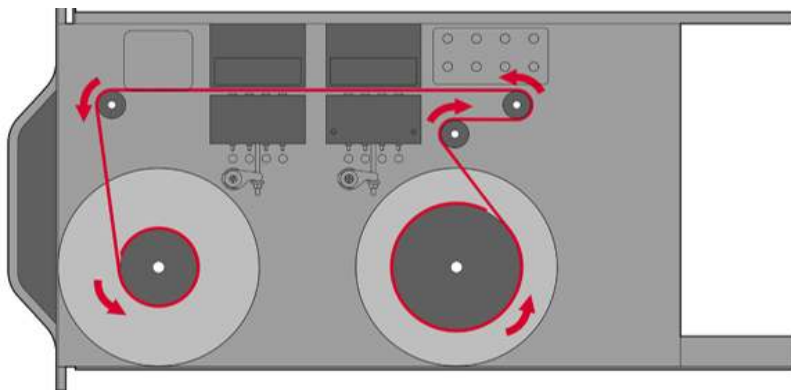


5. “**Stopping monitoring mode**” confirmation screen pops up. Tap **CONFIRM**.
6. The tape replacement procedure gets started. The Analyzer is released, and the Optics gate opens.



7. Pull out the Analyzer and remove old Chemcassette tape.

8. Route the Chemcassettetape through Optics blocks and guide rollers.



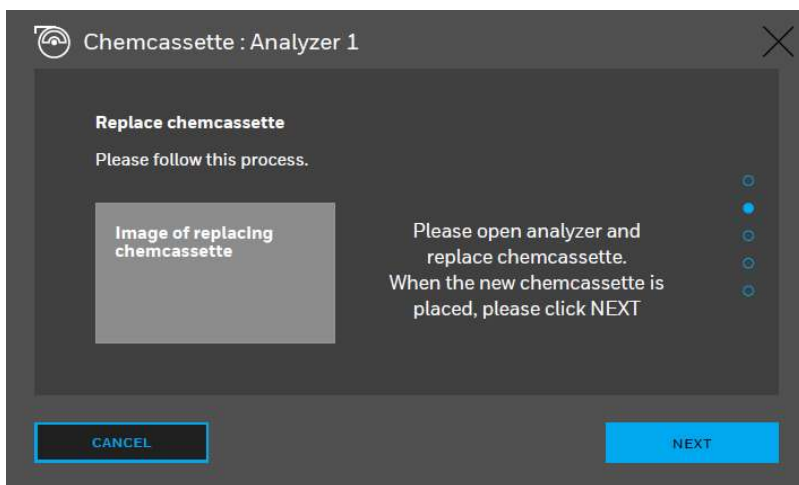
9. Snap the tape leader into the take-up reel.



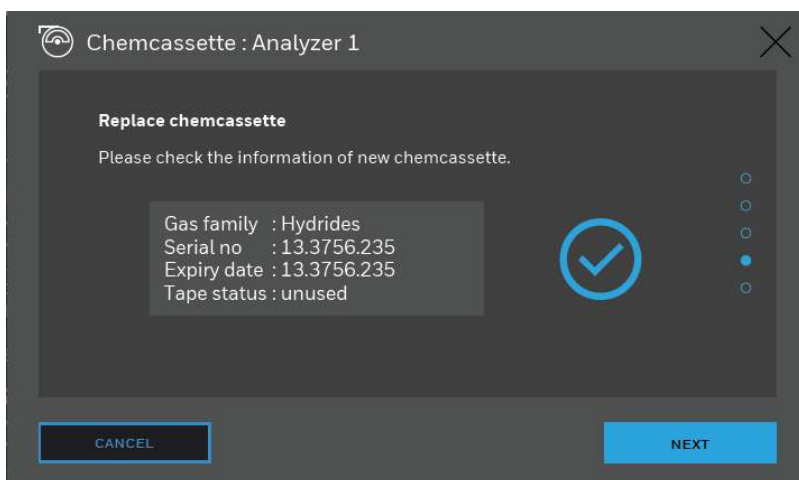
10. When the Chemcassette leader is napped in, the Optics block should be placed between the two “ALIGN” marks on the tape leader. The alignment is essential to adjust and verify the Optics module before gas monitoring.



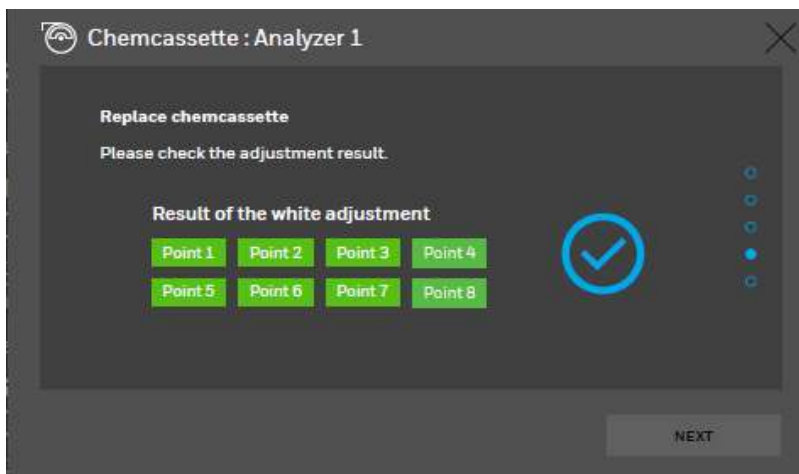
11. When new Chemcassette is installed correctly, tap **NEXT**.



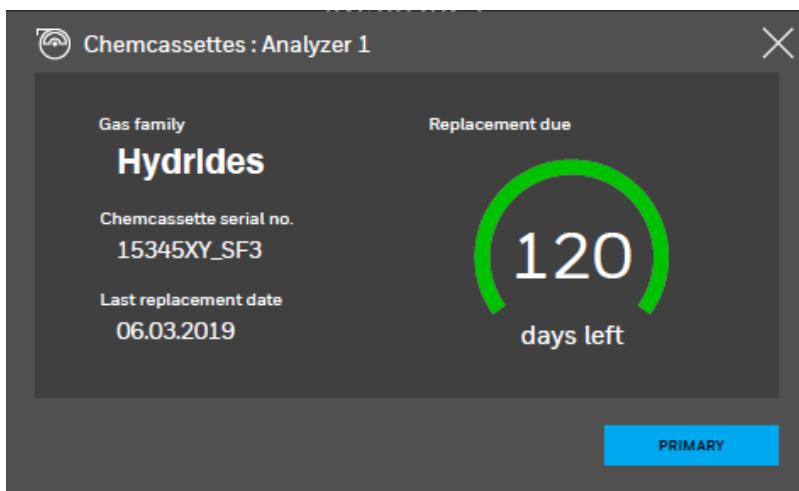
12. The Analyzer reads the RFID tag on the Chemcassette tape and shows the tape information. Check the Chemcassette information and Tap **NEXT**.



13. If the Chemcassette is a brand-new tape, the Optics module is adjusted and verified while advancing the Chemcassette tape automatically. The results of optics adjustment and verification are shown on the screen. If the tape is not brand new, Optics adjustment and verification steps will be skipped.



14. After completing the Optics adjustment/Verification, Tap **NEXT**
15. In the **Start Monitoring Mode** window, tap **START** if you want to start the monitoring mode. If not, Tap **IDLE**. The new ChemCassette information is displayed.



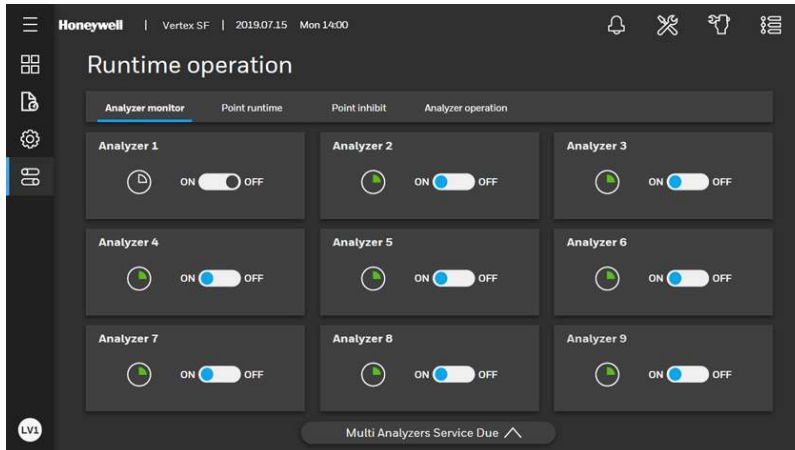
Replace an Analyzer

The Vertex Edge rack is designed for quick replacement of major components. You may replace the Chemcassette analyzer while other analyzers continue to monitor.

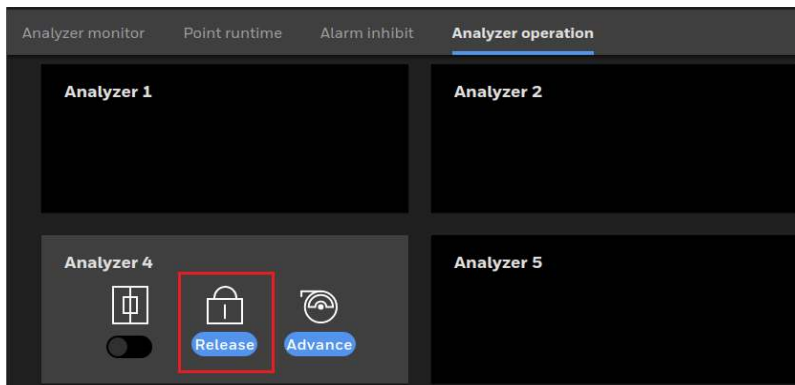
1. Turn off monitoring mode for the Analyzer to be replaced. In the left navigation panel, tap **Runtime Control**



2. Tap on the **Analyzer Monitor** tab, and then **Turn OFF** the analyzer.

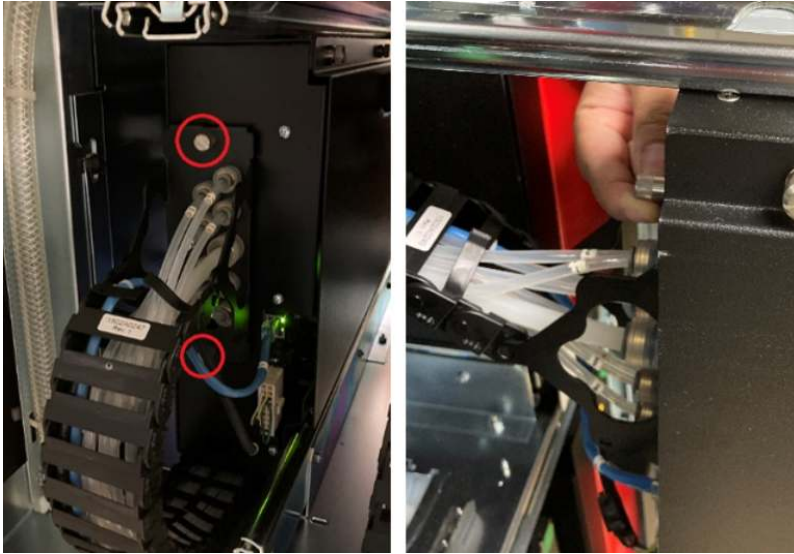


3. In Runtime Operation, tap on the **Analyzer operation** tab.
4. Tap **Release**.

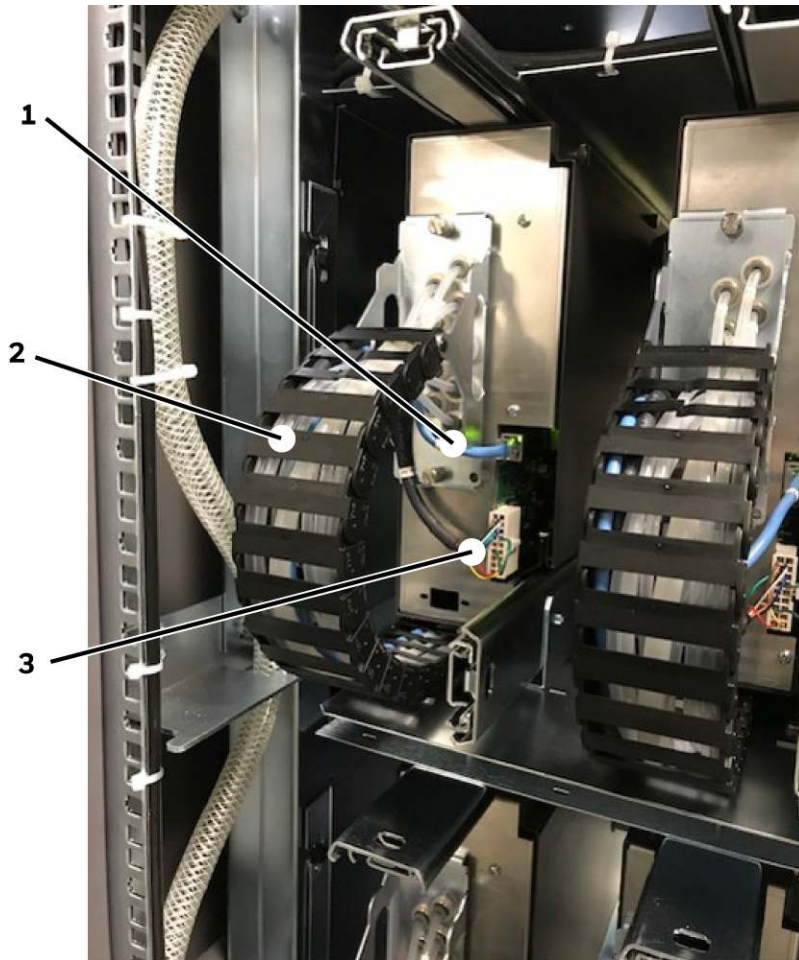


5. Open the gate and remove the Chemcassette tape from the Analyzer to be replaced, and then close the gate.
6. Turn Off the power of the Analyzer by switching OFF the Analyzer power button on the PDU.
7. Remove the analyzer from the rack.
8. Pull out the analyzer to the front as much as possible.

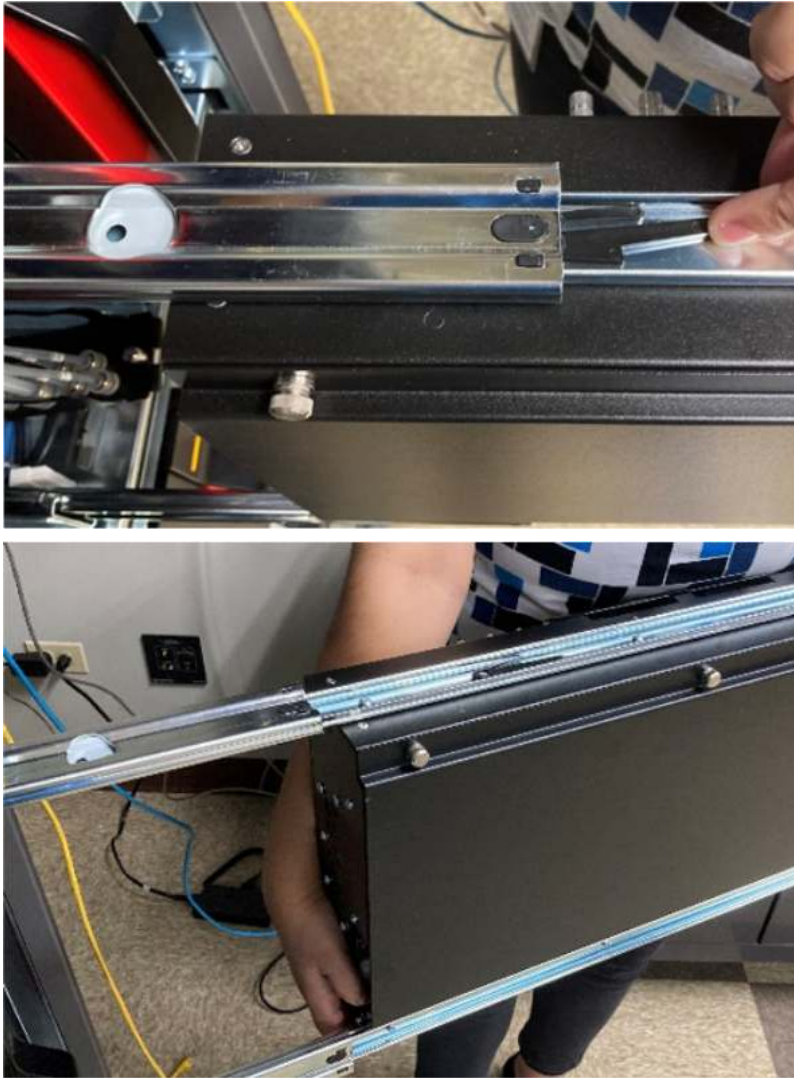
9. Unscrew the two screws located at the top and bottom of the manifold bracket.



10. Remove the tubing harness (2) carefully and remove internal Ethernet cable (1) and power connector (3) from the Analyzer.



11. Unlock the latch on the top of the Analyzer and pull out.



Install an Analyzer

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

NOTE

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

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

IMPORTANT: The 2 screws need to be highlighted to fully secure. If these are not tightened, the unit will leak.

Return to Service

1. Turn analyzer power switch on.
2. Re-install the Configuration Profile.
3. Install the Chemcassette.
4. Return analyzer to monitor mode in Runtime Options Menu.

Replace a Pump

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

NOTE

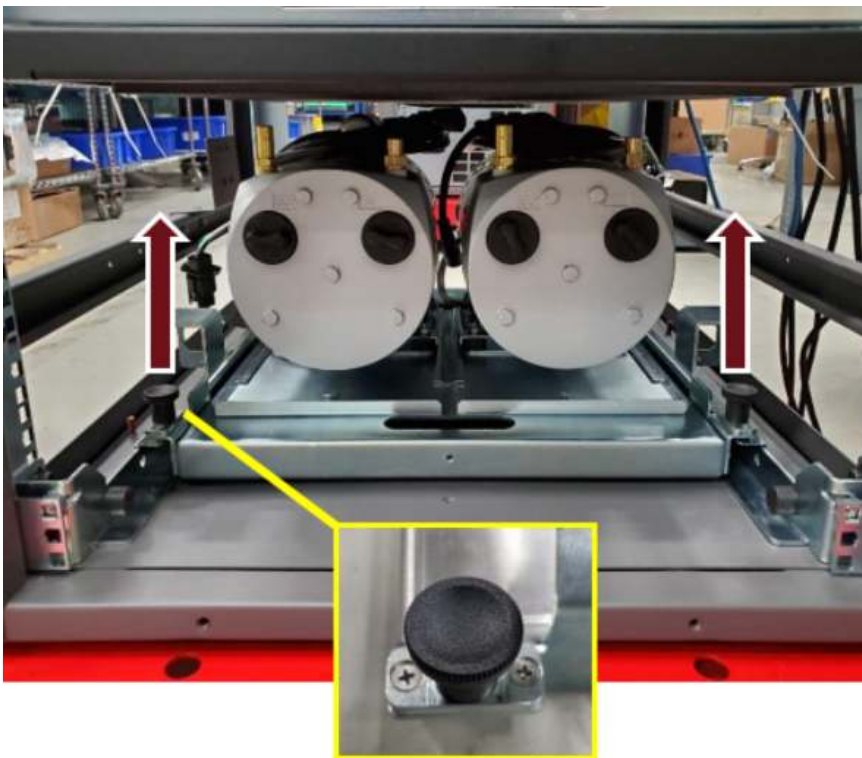
You may replace a pump only when the system places it in standby. Do not replace an operating pump.



WARNING

The pump to be disconnected must be off

1. Pull up and twist on the two knobs to unlock them.



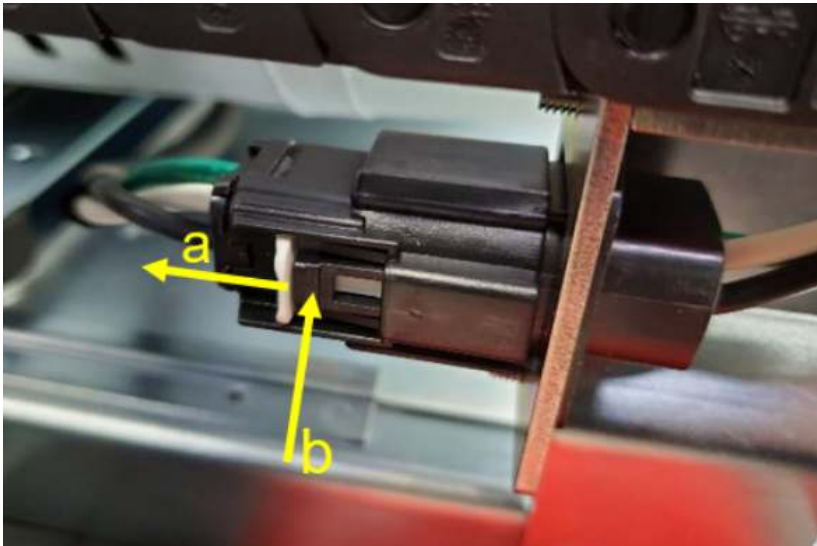
2. Grab the handle and pull the drawer out.



3. Remove the two fittings from the top of the pump that is to be replaced by pulling them up, and place them to the side.



4. Uninstall the electrical connector on the side of the pump.
 - a. Pull the white tab out.
 - b. Push down on the black tab and pull back on the connector.



5. Pull up on the pin and at the same time pull the pump off of the drawer.



6. Place a new pump in its place and slide it in.
7. Repeat steps in reverse order to finish the pump replacement.

Clean the Touchscreen

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

Reference your touch monitor manual for any additional information.

Clean the Optics

Clean Chemcassette optics annually or whenever optics verification error occurs.

Compressed air is required

1. Open the Optics Block Gate.
2. Remove the Chemcassette.
3. Open the Vertex Edge side panel.
4. Remove tubing (shown in photo) one at the time and blow out with compressed air.



5. Re-secure side panel and reload the Chemcassette.

NOTE

Remove and clean one port at a time to insure proper orientation of tubing. Do not remove the capillary tubing (microtubes). After cleaning the Optics, the cleaning counter should be reset to avoid unnecessary maintenance warning due to Optics cleaning due.

CAUTION

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

Learn from about strategic information related to the Honeywell Vertex™ Edge Detector.

Specifications

OVERALL SYSTEM DIMENSION	
Size	76" x 24" x 35"
Weight - Full loaded condition	Full ~900lbs (~408kg) Empty ~655lbs (~297kg)
Weight - Empty rack	≤ 730lbs (331kg)
ANALYZER	
Size	22" x 13" x 6"
Weight	≤ 27lbs (12kg)
POWER REQUIREMENTS	
Operating voltage	208V~240VAC, 15A
POWER CONSUMPTION	
Normal condition	1.1k Watt
Maximum condition	≤ 1.4k Watt
DISPLAY AND OUTPUTS	
Visual	15.6" wide screen monitor with capacitive touch interface Display gas reading, alarm & instrument status real-time base Provide real-time trend chart and gas event snapshot trend chart Event logging including maintenance/instrument fault and gas alarm Multiple searching option for

	the event LED indicator: Normal (Green), Alarm 1 (Red), Alarm 2 (Red), Fault (Yellow)
Digital communications	TCP/IP and RTU Modbus, OPC (Option)
SECURITY	
	Role-based access control Support HTTPS
CERTIFICATION AND SPECIFICATION	
	EN 50270 and EN61010-1 UL/IEC 61010-1 RED, FCC for RFID
PERFORMANCE	
	Refer to product manual for complete gas list
Flow rate	2.1 LPM
Transport time	Less than 50 seconds up to 325ft with thin wall tube (0.190"ID)
Sample line tubing	1/4 in. (6.35 mm) O.D. x 0.190in. (4.83 mm) (Thin wall)
Tubing length	Up to 400ft (120m) with thin wall
Exhaust line tubing	1/2 in. (12.7 mm) O.D. x 3/8 in. (9.5 mm) I.D. Teflon tubing
Exhaust length	Up to 50 ft. (15 m) maximum
OPERATING CONDITIONS	
Temperature	59°F to 95°F (15°C to 35°C)
Humidity	20-80% RH
Altitude	-1000 ft. (-305 m) to 6000 ft. (1829 m) above sea level
Pollution degree	2
WIRING REQUIREMENT	
Power	Single phase power, Minimum 14 AWG
Digital	Modbus TCP/IP: CAT5 shielded cable or equivalent (RJ45 connector); Modbus RTU: 2-wire stranded, shielded cable or equivalent (24-14 AWG)

Detectable Gases

Vertex Edge System Chemcassette analyzers are continuous monitoring instruments. The initial analysis period listed in the following table varies based on the programmed alarm levels. This period is valid only after the system pulls a new Chemcassette window. Increasing the programmed alarm levels will decrease the initial sample period.

For accurate detection, gas must be present at sufficient levels and durations. Typical response times are shown in this table at 2 TLV, which will vary in duration depending on the target gas and alarm level settings. For high concentrations (greater than full scale) a minimum of 4 seconds is required.

Family	CC Name (P/N)	Table	Gas Name	TLV	LAL	LDL	Default Alarm Level 1	Default Alarm Level 2	Range	Alarm Setting	Initial Analysis Period (second)	Time to 1TLV alarm @ 2TLV concentration, 10ft sample line
1	XPV Hydrides (1295-0226)	1	Arsine XP (AsH3)	5 ppb	3 ppb	2.5 ppb	50 ppb	100 ppb	0-500 ppb	3-500 ppb	30	<20 sec (Alarm @ 50 ppb with 100 ppb AsH3 gas)
		2	Arsine XP (AsH3) Low Level	5 ppb	0.5 ppb	0.3 ppb	2.5 ppb	5 ppb	0-50 ppb	0.5-1.9 ppb 2-4.9 ppb 5-9.9 ppb 10-50 ppb	300 150 60 30	<45 sec
		3	Diborane XP (B2H6)	100 ppb	15 ppb	10 ppb	100 ppb	200 ppb	0-1000 ppb	15-49 ppb 50-99 ppb 100-1000 ppb	60 45 30	<45 sec
		4	Germane XP (GeH4)	200 ppb	100 ppb	100 ppb	200 ppb	400 ppb	0-2000 ppb	100-149 ppb 150-199 ppb 200-2000 ppb	480 360 240	<252 sec
		5	Phosphine XP (PH3)	50 ppb	5 ppb	5 ppb	300 ppb	600 ppb	0-3000 ppb	5-3000 ppb	15	<20 sec (Alarm @ 300ppb with 600ppbPH3 gas)
		6	Silane XP (SiH4)	5 ppm	0.5 ppm	0.3 ppm	5 ppm	10 ppm	0-50 ppm	0.5-4.9 ppm 5-9.9 ppm 10-19.9 ppm 20-50 ppm	60 45 30 15	<30 sec
		7	Silane-M XP (SiH4-M)	5 ppm	0.06ppm	0.05 ppm	2.5 ppm	5.0 ppm	0.05-15 ppm	0.05-2.49 ppm 2.5-4.99 ppm 5-9.99 ppm 10-15 ppm	180 60 45 30	<20 sec
		8	Hydrogen Sulfide XP (H2S)	1 ppm	0.2 ppm	0.1 ppm	1 ppm	2 ppm	0-10 ppm	0.2-0.4 ppm 0.5 - 0.9 ppm 1-1.9 ppm 2-10 ppm	45 30 15 10	TBD
		9	Hydrogen Sulfide XP (H2S) Low Level	1 ppm	20 ppb	15 ppb	500 ppb	1000 ppb	0-2000 ppb	20-99 ppb 100-199 ppb 200-399 ppb 400-2000 ppb	120 60 30 15	<25sec (Alarm @ 500 ppb with 1000 ppb H2S gas)
		10	Hydrogen Selenide XP (H2Se)	50 ppb	8 ppb	6 ppb	50 ppb	100 ppb	0-500 ppb	8-49 ppb 50-99 ppb 100-500 ppb	180 120 60	<45 sec
2	XPV4 Hydrides (1257-9300)	1	Arsine XP4 (AsH3)	5 ppb	3 ppb	2.5 ppb	50 ppb	100 ppb	0-500 ppb	3-500 ppb	30	<20 sec (Alarm @ 50 ppb with 100 ppb AsH3 gas)

Family	CC Name (P/N)	Table	Gas Name	TLV	LAL	LDL	Default Alarm Level 1	Default Alarm Level 2	Range	Alarm Setting	Initial Analysis Period (second)	Time to 1TLV alarm @ 2TLV concentration, 10ft sample line
		2	Arsine XP4 (AsH3) Low Level	5 ppb	0.5 ppb	0.3 ppb	2.5 ppb	5 ppb	0-50 ppb	0.5-1.9 ppb 2-4.9 ppb 5-9.9 ppb 10-50 ppb	300 150 60 30	<45 sec
		3	Diborane XP4 (B2H6)	100 ppb	15 ppb	10 ppb	100 ppb	200 ppb	0-1000 ppb	15-49 ppb 50-99 ppb 100-1000 ppb	60 45 30	<40 sec
		4	Germane XP4 (GeH4)	200 ppb	100 ppb	100 ppb	200 ppb	400 ppb	0-2000 ppb	100-149 ppb 150-199 ppb 200-2000 ppb	480 360 240	<252 sec
		5	Phosphine XP4 (PH3)	50 ppb	5 ppb	5 ppb	300 ppb	600 ppb	0-3000 ppb	5-3000 ppb	15	<20 sec (Alarm @ 300ppb with 600ppbPH3 gas)
		6	Silane XP4 (SiH4)	5 ppm	0.5 ppm	0.3 ppm	5 ppm	10 ppm	0-50 ppm	0.5-4.9 ppm 5-9.9 ppm 10-19.9 ppm 20-50 ppm	60 45 30 15	<30 sec
		7	Silane-M XP4 (SiH4-M)	5 ppm	0.06 ppm	0.05 ppm	2.5 ppm	5.0 ppm	0.05-15 ppm	0.05-2.49 ppm 2.5-4.99 ppm 5-9.99 ppm 10-15 ppm	180 60 45 30	<20 sec
		8	Hydrogen Sulfide XP4 (H2S)	1 ppm	0.2 ppm	0.1 ppm	1 ppm	2 ppm	0-10 ppm	0.2-0.4 ppm 0.5 - 0.9 ppm 1-1.9 ppm 2-10 ppm	45 30 15 10	TBD
		9	Hydrogen Sulfide XP4 (H2S) Low Level	1 ppm	20 ppb	15 ppb	500 ppb	1000 ppb	0-2000 ppb	20-99 ppb 100-199 ppb 200-399 ppb 400-2000 ppb	120 60 30 15	<25sec (Alarm @ 500 ppb with 1000 ppb H2S gas)
		10	Hydrogen Selenide XP4 (H2Se)	50 ppb	8 ppb	6 ppb	50 ppb	100 ppb	0-500 ppb	8-49 ppb 50-99 ppb 100-500 ppb	180 120 60	<45 sec
3	XP6 Hydrides (1507-9300)	1	Arsine XP6 (AsH3)	5 ppb	3 ppb	2.5 ppb	50 ppb	100 ppb	0-500 ppb	3-500 ppb	30	<20 sec (Alarm @ 50 ppb with 100 ppb AsH3 gas)
		2	Arsine XP6 (AsH3) Low Level	5 ppb	0.5 ppb	0.3 ppb	2.5 ppb	5 ppb	0-50 ppb	0.5-1.9 ppb 2-4.9 ppb 5-9.9 ppb 10-50 ppb	300 150 60 30	<45 sec
		3	Diborane XP6 (B2H6)	100 ppb	15 ppb	10 ppb	100 ppb	200 ppb	0-1000 ppb	15-49 ppb 50-99 ppb 100-1000 ppb	60 45 30	<40 sec
		4	Germane XP6 (GeH4)	200 ppb	100 ppb	100 ppb	200 ppb	400 ppb	0-2000 ppb	100-149 ppb 150-199 ppb 200-2000 ppb	480 360 240	<252 sec

Family	CC Name (P/N)	Table	Gas Name	TLV	LAL	LDL	Default Alarm Level 1	Default Alarm Level 2	Range	Alarm Setting	Initial Analysis Period (second)	Time to 1TLV alarm @ 2TLV concentration, 10ft sample line
5	XP 4 Mineral Acids (1257-9310)	1	Boron Trifluoride XP4 (BF3)	0.1 ppm	0.05 ppm	0.04 ppm	0.1 ppm	0.2 ppm	0-10 ppm	0.05-0.99 ppm 1.0-10.0 ppm	45 30	<45 sec (Alarm @1ppm with 2ppm BF3 gas)
		2	Hydrogen Bromide XP4 (HBr)	2 ppm	0.3 ppm	0.2 ppm	2 ppm	4 ppm	0-20 ppm	0.3-1.9 ppm 2-20 ppm	45 30	<35 sec
		3	Hydrogen Bromide XP4 (HBr) Low Level	2 ppm	30 ppb	20 ppb	200 ppb	400 ppb	0-2000 ppb	30-99 ppb 100-399 ppb 400-2000 ppb	180 120 60	<75 sec (Alarm @ 500 ppb with 1000 ppb HBr gas)
		4	Hydrogen Chloride XP4 (HCl)	2 ppm	0.2 ppm	0.2 ppm	2 ppm	4 ppm	0-20 ppm	0.2-0.9 ppm 1-3.9 ppm 4-20 ppm	60 30 20	<25 sec
		5	Hydrogen Chloride XP4 (HCl) Low Level	2 ppm	30 ppb	20 ppb	200 ppb	400 ppb	0-2000 ppb	30-199 ppb 200-399 ppb 400-2000 ppb	240 150 90	<95 sec (Alarm @ 200 ppb with 400 ppb HCl gas)
		6	Hydrogen Fluoride XP4 (HF)	0.5 ppm	0.4 ppm	0.4 ppm	2 ppm	4 ppm	0-20 ppm	0.4-0.9 ppm 1-3.9 ppm 4-20 ppm	240 90 60	<50 (Alarm @ 2ppm with 4ppmHF gas)
		7	Hydrogen Fluoride XP4 (HF) Low Level	500 ppb	30 ppb	20 ppb	500 ppb	1000 ppb	0-2000 ppb	30-99 ppb 100-199 ppb 200-399 ppb 400-2000 ppb	360 240 120 90	<95 sec (Alarm @500ppb with 1ppmHF gas)
		*Due to U.S. Government regulations, this range may be subject to restrictions requiring special licensing for certain countries outside North America.										
6	XP6 Mineral Acids (1507-9310)	1	Boron Trifluoride XP6 (BF3)	0.1 ppm	0.05 ppm	0.04 ppm	0.1 ppm	0.2 ppm	0-10 ppm	0.05-0.99 ppm 1.0-10.0 ppm	45 30	<45 sec (Alarm @1ppm with 2ppm BF3 gas)
		2	Hydrogen Bromide XP6 (HBr)	2 ppm	0.3 ppm	0.2 ppm	2 ppm	4 ppm	0-20 ppm	0.3-1.9 ppm 2-20 ppm	45 30	<35 sec
		3	Hydrogen Bromide XP6 (HBr) Low Level	2 ppm	30 ppb	20 ppb	200 ppb	400 ppb	0-2000 ppb	30-99 ppb 100-399 ppb 400-2000 ppb	180 120 60	<75 sec (Alarm @ 500 ppb with 1000 ppb HBr gas)
		4	Hydrogen Chloride XP6 (HCl)	2 ppm	0.2 ppm	0.2 ppm	2 ppm	4 ppm	0-20 ppm	0.2-0.9 ppm 1-3.9 ppm 4-20 ppm	60 30 20	<25 sec
		5	Hydrogen Chloride XP6 (HCl) Low Level	2 ppm	30 ppb	20 ppb	200 ppb	400 ppb	0-2000 ppb	30-199 ppb 200-399 ppb 400-2000 ppb	240 150 90	<95 sec (Alarm @ 200 ppb with 400 ppb HCl gas)
		6	Hydrogen Fluoride XP6 (HF)	0.5 ppm	0.4 ppm	0.4 ppm	2 ppm	4 ppm	0-20 ppm	0.4-0.9 ppm 1-3.9 ppm 4-20 ppm	240 90 60	<50 (Alarm @ 2ppm with 4ppmHF gas)
		7	Hydrogen Fluoride XP6 (HF) Low Level	500 ppb	30 ppb	20 ppb	500 ppb	1000 ppb	0-2000 ppb	30-99 ppb 100-199 ppb 200-399 ppb 400-2000 ppb	360 240 120 90	<95 sec (Alarm @500ppb with 1ppmHF gas)

Family	CC Name (P/N)	Table	Gas Name	TLV	LAL	LDL	Default Alarm Level 1	Default Alarm Level 2	Range	Alarm Setting	Initial Analysis Period (second)	Time to 1TLV alarm @ 2TLV concentration, 10ft sample line
			*Due to U.S. Government regulations, this range may be subject to restrictions requiring special licensing for certain countries outside North America.									
7	XP Ammonia (1295-0405)	1	Ammonia XP (NH3)	25 ppm	1.5 ppm	1.5 ppm	25 ppm	50 ppm	0-150 ppm	1.5 - 49.9 ppm 50 - 150 ppm	10 10	<20 sec
		2	Dimethylamine XP (DMA)	5.0 ppm	0.5 ppm	0.5 ppm	5 ppm	10 ppm	0-50 ppm	0.5-2.4 ppm 2.5-50.0 ppm	15 10	<20 sec
		3	Tetrakis Dimethylamino Titanium XP (TDMAT)	None Estimated	0.1 ppm	0.1 ppm	1.0 ppm	2.0 ppm	0-10 ppm	0.1-0.4 ppm 0.5-10.0 ppm	15 10	<20 sec
8	XP4 Ammonia (1257-9309)	1	Ammonia XP4 (NH3)	25 ppm	1.5 ppm	1.5 ppm	25 ppm	50 ppm	0-150 ppm	1.5 - 49.9 ppm 50 - 150 ppm	10 10	<20 sec
		2	Dimethylamine XP4 (DMA)	5.0 ppm	0.5 ppm	0.5 ppm	5.0 ppm	10.0 ppm	0-50.0 ppm	0.5-2.4 ppm 2.5-50.0 ppm	15 10	<20 sec
		3	Tetrakis Dimethylamino Titanium XP4 (TDMAT)	None Estimated	0.1 ppm	0.1 ppm	1.0 ppm	2.0 ppm	0-10 ppm	0.1-0.4 ppm 0.5-10.0 ppm	15 10	<20 sec
9	XP6 Ammonia (1507-9309)	1	Ammonia XP6 (NH3)	25 ppm	1.5 ppm	1.5 ppm	25 ppm	50 ppm	0-150 ppm	1.5 - 49.9 ppm 50 - 150 ppm	10 10	<20 sec
		2	Dimethylamine XP6 (DMA)	5.0 ppm	0.5 ppm	0.5 ppm	5.0 ppm	10.0 ppm	0-50.0 ppm	0.5-2.4 ppm 2.5-50.0 ppm	15 10	<20 sec
		3	Tetrakis Dimethylamino Titanium XP6 (TDMAT)	None Estimated	0.1 ppm	0.1 ppm	1.0 ppm	2.0 ppm	0-10 ppm	0.1-0.4 ppm 0.5-10.0 ppm	15 10	<20 sec
10	Phosgene (1295-0228)	1	Phosgene XP (COCl2)	100 ppb	10 ppb	7 ppb	100 ppb	200 ppb	0-4000 ppb	10-49 ppb 50-99 ppb 100-199 ppb 200-4000 ppb	60 45 30 15	<25 sec
		2	Phosgene XP (COCl2) High Range	100 ppb	10 ppb	7 ppb	100 ppb	200 ppb	0-4000 ppb	10-49 ppb 50-99 ppb 100-199 ppb 200-4000 ppb	60 45 30 15	<25 sec
11	Phosgene (1257-9309)	1	Phosgene XP4 (COCl2)	100 ppb	10 ppb	7 ppb	100 ppb	200 ppb	0-4000 ppb	10-49 ppb 50-99 ppb 100-199 ppb 200-4000 ppb	60 45 30 15	<25 sec
		2	Phosgene XP4 (COCl2) High Range	100 ppb	10 ppb	7 ppb	100 ppb	200 ppb	0-4000 ppb	10-49 ppb 50-99 ppb 100-199 ppb 200-4000 ppb	60 45 30 15	<25 sec
12	XPV Chlorine-II (1295-0560)	1	Fluorine XP-Cl2-II (F2)	0.1 ppm	0.06 ppm	0.06 ppm	1 ppm	2 ppm	0-10 ppm	0.06-1.99 ppm 2.0-3.90 ppm 4.0-10.0 ppm	90 60 30	<110 sec (Alarm @ 0.1ppm with 0.2 ppmF2 gas) <25 sec (Alarm @ 1.0ppm with 2.0 ppmF2 gas)
		2	Fluorine XP-Cl2-II (F2)	0.1 ppm	0.05 ppm	0.03	0.1 ppm	0.2 ppm	0-1.0 ppm	0.05-0.199 ppm	120	<135 sec (Alarm @ 0.1ppm with

Family	CC Name (P/N)	Table	Gas Name	TLV	LAL	LDL	Default Alarm Level 1	Default Alarm Level 2	Range	Alarm Setting	Initial Analysis Period (second)	Time to 1TLV alarm @ 2TLV concentration, 10ft sample line
			(Low Level)			ppm				0.2-1.0 ppm	60	0.2ppmF2 gas)
		3	Chlorine XP-Cl2-II (Cl2)	0.1 ppm	0.06 ppm	0.05 ppm	0.5 ppm	1 ppm	0-5 ppm	0.06-0.24 ppm 0.25-5.0 ppm	45 30	<45sec (Alarm @ 0.1ppm with 0.2ppmCl2 gas) <20sec (Alarm @ 0.5ppm with 1.0ppmCl2 gas)
		4	Chlorine XP-Cl2-II (Cl2) (Low Level)	0.1 ppm	0.03 ppm	0.007 ppm	0.1 ppm	0.2 ppm	0-1.0 ppm	0.03 - 0.099 ppm 0.1 - 0.199 ppm 0.2 -1.0 ppm	120 90 60	<85 sec (Alarm @ 0.1ppm with 0.2ppmCl2 gas)
13	Fluorine/Oxidizer (1295-0220)	1	Chlorine (Cl2)	0.1 ppm	0.05 ppm	0.04 ppm	0.5 ppm	1 ppm	0-5 ppm	0.05-0.24 ppm 0.25-0.49 ppm 0.5-5 ppm	45 30 15	<25 sec (Alarm @ 0.5ppm with 1ppm Cl2 gas)
		2	Fluorine (F2)	0.1 ppm	0.1 ppm	0.06 ppm	1 ppm	2 ppm	0-10 ppm	0.1-0.9 ppm 1.0-10 ppm	60 30	<40 sec (Alarm @ 1ppm with 2 ppmF2 gas)
		3	Nitrogen Dioxide (NO2)	0.2 ppm	0.07 ppm	0.05 ppm	0.2 ppm	0.4 ppm	0-30 ppm	0.07-8.9 ppm 9-30 ppm	240 120	TBD
14	Sulfur Dioxide (1295-0552)	1	Sulfur Dioxide (SO2)	250 ppb	30 ppb	25 ppb	250 ppb	500 ppb	0-2500 ppb	30-249 ppb 250-2500 ppb	60 30	<30 sec
15	Hydrogen Cyanide (1295-0222)	1	Hydrogen Cyanide (HCN)	4.7 ppm	1 ppm	0.5 ppm	4.7 ppm	9.4 ppm	0-30 ppm	1-9.9 ppm 10-19.9 ppm 20-30 ppm	30 20 15	<25 sec
TLV - Threshold Limit Value — LAL - Lowest Alarm Level — LDL - Low Detection Limit												

Maintenance Faults

A maintenance fault indicates the Vertex Edge System requires attention but is continuing to monitor.

Event ID	Description	Set Condition	Possible Cause	Resolution
101	Flow is 50 cc/min less than nominal	Point flow is below 150cc/min in monitoring mode	Excessive point vacuum due to clog or kniked sample line	Check sample line and line filter. Clean the sample line and replace filter. Correct sample line issue.
			Sample line too long or ID too small	Ensure sample line requirements are with specifications
			Poor gate seal	Check nut on the optic block Contact Honeywell Analytics Service
			Supply vacuum insufficient (less than 7"Hg)	Plug pneumatic connector in unused slots Exhaust tubing restricted Service or switch pumps
			Condensation	Check internal lines for moisture
			Chemcassette thickness variation	Advance the Chemcassette. Adjust the needle valve to achieve 200cc/min. Contact Honeywell Analytics Service.
102	Remaining Chemcassette is low	Estimated remaining CC days is shorter than preset reminder	Less than preset reminder on the Chemcassette	Replace the Chemcassette
103	Analyzer out of monitor too long	When Analyzer stays at idle mode for more than out of monitor timeout	Analyzer out of monitor	Reset all alarms and faults, and then return analyzer to Monitor Mode
			Out of Monitor time limit too short	Change time limit in Configuration Profile
104	Run time point disable timeout	When the analyzer is in monitoring mode and the point stays at disabled state for more than point disabled timeout. If analyzer is out of monitoring mode, the counter will be set to zero.	Alarms were manually bypassed	Restore point to alarm active mode
			Run Time Point Disable time limit too short	Change time limit in Configuration Profile
105	Sample pressures greater than ambient	Sample pressure is greater than 0.25 inchesHg for more than 5 seconds in monitoring mode	Point pressure above atmospheric pressure while in idle	Review sample line location. Confirm atmospheric conditions.
			Pressure sensor Calibration error, Defective sensor	Contact Honeywell Analytics Service
106	Flow is 50 cc/min more than nominal	Point flow is above 250cc/min in monitoring mode.	Chemcassette thickness variation	Advance the Chemcassette. Adjust the needle valve to achieve 200cc/min. Contact Honeywell Analytics Service.
			Defective needle valve	Replace needle valve
107	Chemcassette expired	When it passes expiration date on RFID tag	Chemcassette expiration date reached	Replace Chemcassette
			Chemcassette installed past its expiration date	Replace Chemcassette
108	No polls from HMI for 10 seconds	No communication between PC and analyzer	Communications to HMI PC interrupted longer than 10 seconds	Check Ethernet cable at rear of analyzer. Check Ethernet hub connection and

Event ID	Description	Set Condition	Possible Cause	Resolution
				operation. Check Ethernet connection to HMI PC. Contact Honeywell Analytics Service.
109	Single pump failure	Pump swap has occurred because vacuum levels fell below operating range	Pump failure	Rebuild/Replace non-operating pump
			Unused slots not plugged	Install connector plug on unused slot
			Check valve on inactive pump leaking	Replace check valve Contact Honeywell Analytics Service
110	Optics Block Dirty - Cleaning Required	Optics LED drive value is higher than tolerance	Optic block dirty	Clean optics. Contact Honeywell Analytics Service.
			Optic block is aged	Replace optics block
			Tape leader installed improperly	Reload Chemcassette and recalibrate using leader
111	Sample Pressure High	Sample pressure is greater than 5.0inchHg vacuum for more than 5 seconds in monitoring mode	End of line filter clogged	Replace end of line filter
			Sample line kinked	Isolate by disconnecting possible crimped sample line
			Too small ID and/or Maximum line length exceeded	Check sample tube ID and length
			Crimped tube in cable carrier	Identify crimps in tubing harness by checking pressure with analyzer closed vs. open
112	Analyzer restart failed after pump swap	Analyzer failed to enter monitor after pump swap	Control related fault is issued because of an improper control response from another analyzer	Verify the pump connects are connected. Verify all analyzers enter monitor mode successfully.
113	Pump Over Temperature	Pump over temperature for more than 5 seconds	Fan failure	Check fans in pump module
			Line voltage less than 208 VAC or higher than 240VAC	Verify main line voltage
114	High Exhaust Pressure	High exhaust pressure for more than 5 seconds	Kinked exhaust	Check exhaust tubing for kinks or restrictions
			Exhaust tubing length exceeds 50ft. (15m.)	Reroute to reduce length
			Exhaust line restricted	Clean Exhaust line. Replace Exhaust line.
115	Power Supply failure	Analyzer power supply fail	Power line disconnected	Check power line from PDU to Analyzer
116	Optics Temperature Out Of Range	Optics temperature exceed the range, 0~45C	Hot or Cold environment	Relocate Vertex Edge
			Electronic problem	Replace optics block
			Cooling air failure	Replace fans
117	PDU Temperature Out Of Range	PDU temperature exceed the range, 50C	Hot or Cold environment	Relocate Vertex Edge
			Electronic problem	Replace PDU
118	Filter Timer	Filter time in configuration profile elapsed	Maintenance reminder, no malfunction	Change filter and reset timer

Event ID	Description	Set Condition	Possible Cause	Resolution
	Expired			
119	Optics Cleaning Timer Expired	Optics cleaning time in configuration profile elapsed	Maintenance reminder, no malfunction	Clean the Optics and reset timer
120	Pump Maintenance Timer Expired	Pump rebuild time in configuration profile elapsed	Maintenance reminder, no malfunction	Rebuild pump and reset timer
121	*Reserved for LIT option			
122	*Reserved for LIT option			
123	*Reserved for LIT option			
124	*Reserved for LIT option			
125	Possible debris in optics block	Optics signal has been erratic on at least 3 windows	Debris in optics block	Clean optics block
126	Abnormal Optics reading detected	Compensated abnormal optics reading and keep recode for information when the option of "Generate window zero reset" is enabled	Compensated optic reading automatically. So no further action required. But too frequently happens, debris in the optic block.	Clean optics block
127	Accelerated Chemcassette Usage	Daily tape usage is higher than 2 times estimated tape usage per day	Low level background gas below lower detectable limit	Locate source of background gas
128	Ethernet initialization failed	Analyzer ethernet initialization failed during boot up	Failed load the driver, Electronic problem	Reboot the analyzers. Contact Honeywell Analytics Service.
129	File system of Analyzer is corrupted	NorFlash - File system error	File system corrupted	Contact Honeywell Analytics Service
130	Optics blocks have different software versions	The two optics blocks are not running the same software version.	Program update done incorrectly	Reload program to both optics blocks.
131	Unable To Log event data	Analyzer event log function failed	Electronic problem	Contact Honeywell Analytics Service
132	Software version mismatched among Analyzers	In a rack, there is at least one analyzer with different SW version	New analyzer was installed into the Vertex Edge rack that contains a different software revision than the other analyzers	Upgrade analyzer Software

Instrument Faults

An instrument fault indicates a loss of monitoring on one or more points.

Event ID	Description	Set Condition	Possible Cause	Resolution
201	Chemcassette tape decolored	Tape color is discolored	Improper Chemcassette storage	Confirm Chemcassette storage meeting temperature meets or exceeds the Chemcassette storage requirements
				Replace Chemcassette
			Tape is too old	Confirm Expiration date will reach the tape length time line
				Replace Chemcassette
202	End Of Chemcassette	Tape shortage or breakage detected by control module, Insufficient Chemcassette motion detected	End of Chemcassette	Replace Chemcassette
			Chemcassette broken	Rethread Chemcassette
			Faulty tape encoder	Service analyzer
			Advance motor failure	Service analyzer
			Gate opening insufficient	Service analyzer
203	Failed writing hardware configuration	Failure writing hardware configuration	Non-volatile memory failure in analyzer CPU	Retry and reboot the Analyzer. Service or replace analyzer.
204	Failed reading hardware configuration	Failure reading hardware configuration	Non-volatile memory failure in analyzer CPU	Retry and reboot the Analyzer. Service or replace analyzer.
205	Gate motor times out	Gate timeouts detected three times	Gate position sensor not activated before timeout	Check motor operation using Maintenance, Analyzer Operations, Open Gate, or Close Gate
			Motor does not operate	Check motor connections to sensor interface PCB in analyzer
			Bad sensor or cable	Check sensor connection on PCB. Contact Honeywell service.
206	Gate motor driving failure	Gate motor sensor reported failure	Gate position sensor not activated before timeout	Check motor operation using Maintenance, Analyzer Operations, Open Gate, or Close Gate
			Motor does not operate	Check motor connections to sensor interface PCB in analyzer
			Bad sensor or cable	Check sensor connection on PCB Contact Honeywell service
207	Optics signals are noisy	Diagnostics from Optics module detected insufficient jumping values	Poor grounding	Replace Analyzer, Contact Honeywell service
			Optics block cover loose	Retighten or reinstall as required
208	Optics counts very low <200	Optics Primary Counts < 200	Optics LED not properly calibrated	Perform Load CC Operation to recalibrate
			Cable disconnected	Check cable. Contact Honeywell service.
			Optics board defective	Replace Analyzer, Contact Honeywell service
			Analyzer CPU defective	Replace Analyzer, Contact Honeywell service

Event ID	Description	Set Condition	Possible Cause	Resolution
209	Gas table file is bad or missing	Gas table not programmed or CRC error	No configuration loaded	Reinstall Configuration Profile
210	Optics drive unusually low	Optics LED drive < 1000	Optics LED not properly calibrated	Perform Load CC Operation to recalibrate
			Optics board defective	Replace Analyzer, Contact Honeywell service
			Analyzer CPU defective	Replace Analyzer, Contact Honeywell service
211	Optics drive unusually high	Optics LED drive > 4000	Optics LED not properly calibrated	Perform Load CC Operation to recalibrate
			LED degraded	Replace the optics block
			Optics board defective	Replace Analyzer, Contact Honeywell service
			Analyzer CPU defective	Replace Analyzer, Contact Honeywell service
212	Excess optics signal	Optics Primary Counts > 3700	Optics LED not properly calibrated	Perform Load CC Operation to recalibrate
			Optics board defective	Replace Analyzer, Contact Honeywell service
			Analyzer CPU defective	Replace Analyzer, Contact Honeywell service
213	Double Pump failure	Double Pump Failure	See causes for Fault 109	See recoveries for Fault 109
			Circuit breaker tripped	Contact Honeywell
214	Loss of Flow	Point flow is below 20cc/min (loss of flow) in monitoring mode.	Improper flow setup	Adjust flow to 200cc
			Tape tracking problem	Reload Chemcassette
			Condensation in system	Purge internal lines
			Clogged micro tube	Replace tube. Note: Calibration required, contact Service.
			Gate not fully closing	Gate adjustment loose, pivot binding
			Optics block loose	Tighten optics block fasteners
			Flow adjustment is unstable during adjusting	Replace needle valves
215	Failed to stop Analyzers monitoring mode	Analyzers won't stop monitoring mode	Queen Analyzer (first in the rack) failed to communicate with other Analyzers	Replace first Analyzer in the rack
			Analyzer hardware failure	Replace Analyzer, Contact Honeywell service
216	Point Pressure Out Of Range	Point pressure exceed 30" Hg for more than 5 seconds during monitoring mode	Miscalibrated sensor board or defective transducer	Replace Analyzer
217	System Pressure Out Of Range	System pressure exceed 30"Hg for more than 5 seconds during monitoring mode	Miscalibrated sensor board or defective transducer	Replace Analyzer
218	Inadequate Analyzer Vacuum	System pressure is lower than 6.0"Hg for more than 60 seconds when there is no pump failure. Individual analyzer observes inadequate vacuum, stops monitoring.	Improper system pressure adjustment	Adjust system pressure to 10"Hg
219	Optics SW corrupted	Optics block software not communicating	Hardware failure	Replace Analyzer
220	Optics Internal SW errors	Optics block reports incorrect information	Cable issue	Confirm cable connections
			Hardware failure	Replace Analyzer, Contact Honeywell service
221	LED adjustment failed due	LED adjustment failed (reported by Optics)	Optic block dirty	Clean optics.

Event ID	Description	Set Condition	Possible Cause	Resolution
	to insufficient optical signal			Contact Honeywell Analytics Service.
			Optics LED not properly calibrated	Perform Load CC Operation to recalibrate
			LED degraded	Replace the optics block
			Optics board defective	Replace Analyzer, Contact Honeywell service
222	Q-Factor out of range	Q factor < 0.5 or Q factor > 1.50	Chemcassette leader not tight or improperly positioned during white to light gray calibration	Reload Chemcassette
			Bad RFID tag	Load new Chemcassette
			Dirty optics block	Clean and recalibrate
			Bad optics PCB set	Service or replace analyzer
223	Failed reading dark gray leader	Optics Verification Failed	Chemcassette leader not tight or improperly positioned during white to light gray calibration	Reload Chemcassette
			Bad RFID tag	Load new Chemcassette
			Dirty optics block	Clean and recalibrate
			Bad optics PCB	Service or replace analyzer
224	Failed reading light gray leader	Optics Verification Failed	Chemcassette leader not tight or improperly positioned during light gray to dark gray calibration	Reload Chemcassette
			Bad RFID tag	Load new Chemcassette
			Dirty optics block	Clean and recalibrate
			Bad optics PCB	Service or replace analyzer
225	Optics blocks fail at SPI communication	No communication with Optics for more than 5 seconds	Bad optics PCB	Replace Optics Block
				Service or replace analyzer
226	Optics reference photodiode out of range	Reference photodiode output exceed operating range during Optics adjustment	Dirty Optics block	Clean optics. Contact Honeywell Analytics Service.
			Hardware failure	Contact Honeywell Analytics Service
227	LED Drive not stable in Optics	Optics block reports unstable reading 10 times. Close-loop control for LED drive not stable	Hardware failure	Contact Honeywell Analytics Service
228	Control module not responding to Analyzer	Analyzer unable to communicate with the Single Board Computer for 10 seconds	Hardware failure	Contact Honeywell Analytics Service
229	PDU not responding to Analyzer	Analyzer unable to communicate with the Power Distribution Unit (PDU) for 10 seconds	Hardware failure	Contact Honeywell Analytics Service
230	No valid Chemcassette detected	No valid RFID tag detected when the Analyzers starts monitoring	Chemcassette changed without using Change Tape utility	Reload Chemcassette
			Non-Honeywell tape installed	Unauthorized Tape installed
				Contact Honeywell Analytics Service
231	Chemcassette write failure	Failed to write data on the tag 5times consecutively	RFID Reader	Replace RIFD Board
				Replace Analyzer, Contact Honeywell service

Event ID	Description	Set Condition	Possible Cause	Resolution
232	Internal voltage error	Voltage failure for more than 5 seconds 5V, 3.3V or 24V	Internal voltage hardware issue	Contact Honeywell Analytics Service
233	Tape advance failure	Tape advance times out, Encoder fault or Stepper Motor fault	Encoder failure	Replace Encoder
			Cable issue	Check Encoder cabling
				Contact Honeywell Analytics Service
			Stepper Motor Failure	Replace Stepper Motor
			Cable issue	Check Stepper Motor cabling
				Contact Honeywell Analytics Service
234	Internal Comm failure	Internal communication failed for more than 5 seconds	Hardware failure	Contact Honeywell Analytics Service
235	Abnormal Az current consumption is detected	Az current > 5.0A	Hardware failure	Contact Honeywell Analytics Service
236	Internal fault at control module	Single Board Computer is providing internal fault code	Hardware failure	Contact Honeywell Analytics Service
237	Internal fault at PDU module	Power Distribution Module is providing internal fault code	Hardware failure	Contact Honeywell Analytics Service
238	Analyzer SW corrupted	Analyzer software failure	Software installation failure	Re-install analyzer software
				Replace Analyzer, Contact Honeywell service

Information Events

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

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

Event ID	Description
2001	Analyzer Powered Up
2002	Detected sub LDL event
2003	First non-zero reading is detected for the window
2004	Windows Zero Reset
2005	Optics Auto Adjust Requested
2006	Optics Auto Adjust Success (LED Drive Adjusted)
2007	Accept new gas family
2008	Optics verification Started
2009	Optics verified Successfully
2010	Q-factors set
2011	Test Optics requested
2012	Started gas monitoring
2013	Stopped gas monitoring
2014	Inhibited point - run time
2015	Released the inhibited point
2016	Disabled a point - run time
2017	Enabled the disabled point - run time
2018	Inhibited point switches back to normal (times out)
2019	New hardware configuration stored
2020	Analyzer accepts new location

Event ID	Description
2021	Reset filter replacement counter
2022	Reset optics cleaning counter
2023	Reset pump maintenance counter
2024	Time changed. Az clock out by >30 seconds
2025	The analyzer rebooted by watchdog
2026	A new chemcassette was installed
2027	Mon stopped for no enabled points
2028	Az Button Resets Alm&Flts
2029	Az Button - Starts Monitoring
2030	Az Button - Stops Monitoring
2031	Az Button Triggers to reset
2032	Pump has been swapped per request
2033	Extra window pull because of flow problems
2034	Analyzer Programmed Successfully
2035	Analyzer Program Failed
2036	Optics Programmed Successfully
2037	Optics Program Failed
2038	Ctrl Module Programmed Successfully
2039	Ctrl Module Program Failed
2040	PDU Module Programmed Successfully
2041	PDU Module Program Failed
2042	Gas table updated
2043	Rejected gas table file

Event ID	Description
2044	Imported license file successfully
2045	Rejected license file
2046	Failed to verify update file
2047	Line integrity test characterized
2048	Line integrity test performed
2049	Az lacks LIT option (LIT option not purchased)
2050	Alarm/Fault Reset Request
2051	Reset All Alarms and Faults
2052	Reset All Alarms and Faults - Modbus
2053	Az Configuration updated
2054	Point Configuration updated

Manual Analyzer Override

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

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

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

NOTE

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

1. Manually release the Analyzer by sliding the Removal key into slot located in the bottom of the Analyzer front (key located in Software Binder shipped with each Vertex Edge rack) and slide the Analyzer out of the cabinet.
2. Locate the Ethernet cable on the rear panel and disconnect it.
3. Open the side of the Analyzer by unscrewing the 4 thumbscrews at the top of the left side.
4. Approximately 20 seconds after the Ethernet Cable has been disconnected, the Analyzer will recognize that it has lost communications with the DAq and activate the “Manual Override” button. The LED’s on the front of the Analyzer will flash to show a Maintenance Fault per the LED status flash pattern.

To reset faults and alarms press and hold button for 1-3 seconds.

To Exit Monitor and Open Gate press and hold button for 10 seconds and above

5. Close and reattach the Analyzer cover, reconnect the Ethernet Communications Cable and slide the Analyzer into the cabinet.

Filter Compatibility

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

For monitoring corrosive gases, such as chlorine (Cl₂), hydrogen fluoride (HF), hydrogen chloride (HCl), and hydrogen bromide (HBr), sample lines in a dusty environment or for outdoors, use filter type B, (P/N 1830-0055), or type C, (P/N 1991-0147) filter assembly for

corrosive gases. The Teflon membrane particulate filter is designed to prevent dust and dirt greater than one micron from entering the sample line. Unlike standard particulate filters, it does not exhibit sample loss with corrosive monitoring.

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

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

Filter A - P/N 780248 Filter B - P/N 1830-0055 Filter C - P/N 1991-0147

The following table shows sample filter requirements.

Symbol	Gas Name	Filter Type A	Filter Type B	Filter Type C
NH ₃	Ammonia		X	X
AsH ₃	Arsine	X		
AsH ₃	Arsine - Low Level	X		
BF ₃	Boron Trifluoride		X	X
Cl ₂	Chlorine		X	X
B ₂ H ₆	Diborane	X		
DMA	Dimethylamine		X	X
F ₂	Fluorine		X	X
GeH ₄	Germane	X		
H ₂ S	Hydrogen Sulfide	X		
H ₂ S-LL	Hydrogen Sulfide - Low Level		X	X
HBr	Hydrogen Bromide		X	X
HBr-LL	Hydrogen Bromide - Low Level		X	X
HCl	Hydrogen Chloride		X	X
HCl	Hydrogen Chloride - Low Level		X	X
HCN	Hydrogen Cyanide	X		
HF	Hydrogen Fluoride		X	X
HF-LL	Hydrogen Fluoride - Low Level		X	X
H ₂ Se	Hydrogen Selenide	X		
NO ₂	Nitrogen Dioxide	X		
COCl ₂	Phosgene	X		

Symbol	Gas Name	Filter Type A	Filter Type B	Filter Type C
COCl ₂ /HL	Phosgene - High Range	X		
PH ₃	Phosphine	X		
SiH ₄	Silane	X		
SO ₂	Sulfur Dioxide		X	X
TDMAT	Tetrakis Dimethylamino Titanium		X	X

Nominal Transport Times

The following table shows the time required for samples to move from the sampling point to the Vertex SF System for various lengths of sample lines.

Replacement Parts & Consumables

Consumables

Chemcassette	P/N
ALIPHATIC AMINES NH ₃	1295-0221
FLUORINE	1295-0220
HYDRIDES	1295-0300
HYDROGEN CYANIDE	1295-0222
HYDROGEN SULFIDE	1295-0223
MINERAL ACIDS	1295-0225
XP CHLORINE (Extended Play)	1295-0227
XP HYDRIDES (Extended Play)	1295-0226
XP PHOSGENE (Extended Play)	1295-0228
XP AMINES/AMMONIA (Extended Play)	1295-0405
XP MINERAL ACIDS (Extended Play)	1295-0507
XP4-V for AMINES/AMMONIA	1257-9309
XP4-V for CHLORINE	1257-9308
XP4-V for HYDRIDES	1257-9300

Chemcassette	P/N
XP4-V for MINERAL ACIDS	1257-9310
XP4-V for PHOSGENE	1257-9307
XP6-V for Amines/Ammonia	1507-9309
XP6-V for Hydrides	1507-9300
XP6-V for Mineral Acids	1507-9310

End of Line Particulate Sample Filters	P/N
For non-corrosive gases	780248
For corrosive gases	1830-0055
Replacement membrane, for corrosives (pk/100)	0235-1072
For corrosive gases	1991-0147

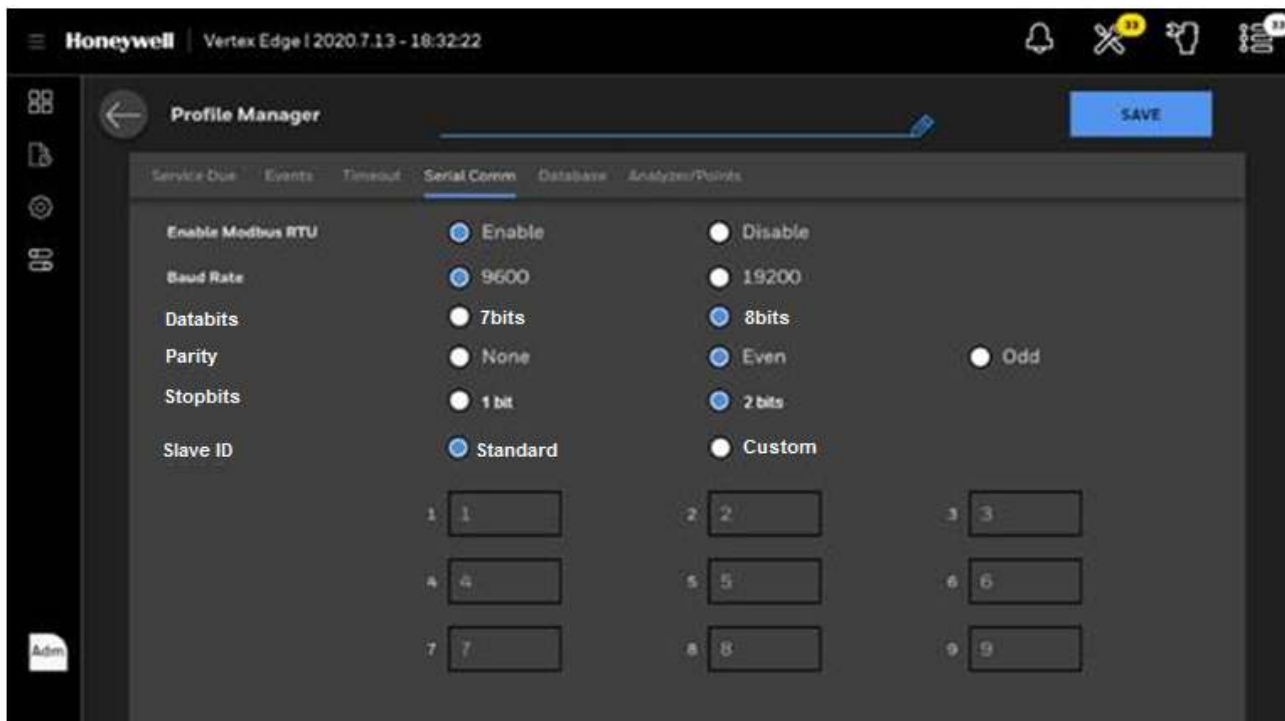
Spare Part Numbers	P/N
Closed Loop Optics Block Assembly (4 points) 1295A0607	1295A0607
Optics Cover	1502-0136
Stepper Motor Assembly (tape advance) 1295A0095	1502A0128
Encoder Assembly	1502A0422
Encoder Brake Assembly	1295A0091
Chemcassette Sprocket	1874-0322
Tape Guide	1295-0026
Microtube Assembly (one point)	1502A0111
Aluminum Gate Actuator Kit	1874K0407
Gate Motor Assembly	1502A0145
Orifice .021	1502-0113
24VDC Fan Assembly	0220-0023
Tubing, FEP Teflon 0.190" (3/16") I.D. x 0.250" (1/4") O.D. - 1000 ft roll (304m)	0235-0109
Tubing, FEP Teflon 0.190" (3/16") I.D. x 0.250" (1/4") O.D - 400 ft roll	0235-0157

Spare Part Numbers	P/N
(121m)	
Tubing, Teflon FEP, 3/8" I.D. x 1/2" O.D. - 20 ft roll (6m)	0235-0278
Fan, 230VAC	0220-0028
Ethernet Switch	0185-0086
Fitting, union 1/4 inch	0235-0095
Transformer 480/230 VAC 60 Hz, 5 KVA	0060-1020
Transformer 208/240 VAC 60 Hz, 5 KVA	0060-1021
Needle Valve	0235-1219
Power Distribution Module (complete)	1502A0210
Pump Assy, 220VAC High Flow	1502A0254
Pump Rebuild Kit	0235-1205
Pump Stem and O-Ring	0235-1212
Neoprene Isolation Mount	0950-1061
Thermal Switch (170F)	0170-0082
Fan, 24VDC	0220-0023
Vacuum Fitting Assembly - Exhaust	1295K0547
O RING NO.112 VITON BLUE TEFLON COATED	0235-0187
Unused Point Filter Kit - Inlet Extension with Dust Filter	1295A0702

Network Interfaces and Options

Modbus RTU

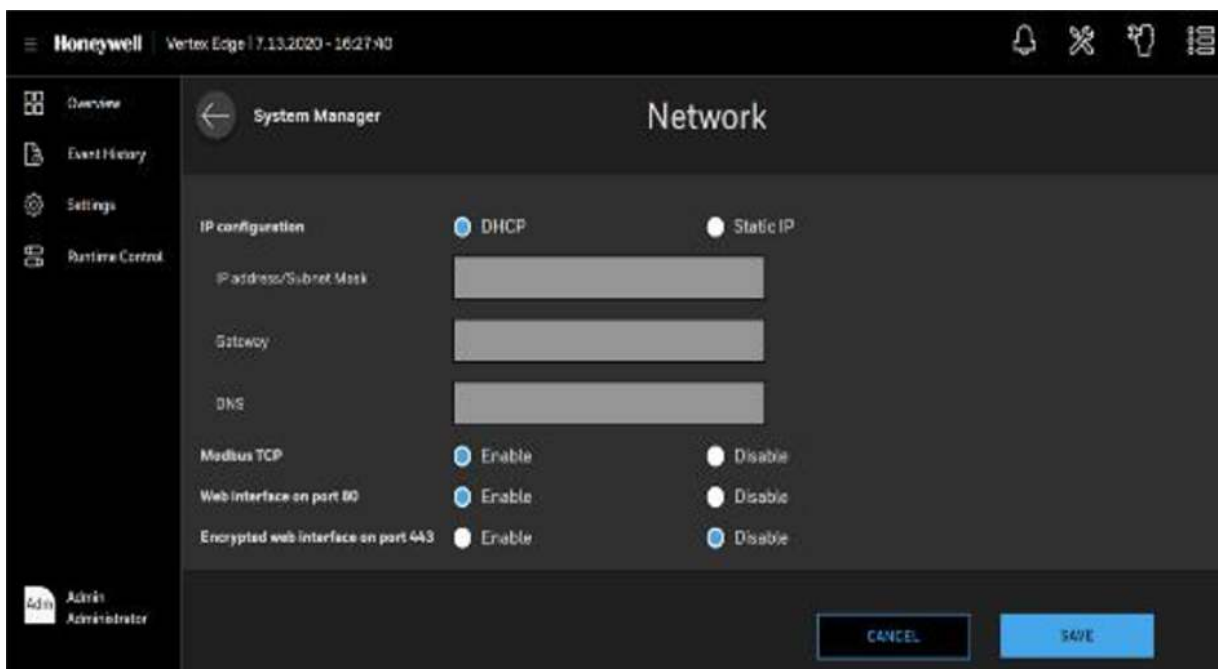
- Enable or Disable
- Baud rate (User Selectable)
 - 9600 (Default)
 - 19200
- Data bits
 - 7 bits
 - 8 bits
- Parity (User Selectable)
 - None
 - Even (Default)
 - Odd
- Stop Bits
 - 2 (when Parity is set to None)
 - 1 (when Parity is set to Odd or Even)
- Slave ID option
 - Used for each Analyzer (Default 1-9 as shown)





Modbus TCP

- IP Configuration
 - DHCP (Default)
 - Static IP: Static IP address, Gateway, DNS
- Enable or Disable
- Web interface on port 80
 - Enable (Default)
 - Disable
- Encrypted web interface on port 443
 - Enable
 - Disable (Default)



HMI PC Security Considerations

Connectivity

The Vertex Edge HMI PC has two one-gigabit ethernet ports, one for connecting to the internal analyzer network, and one for connecting to an external network. The Vertex Edge HMI PC has no wireless connectivity.

Internal Network

The internal analyzer network is 192.168.254.0/24, and the HMI PC has the address 192.168.254.1 on this network. Only connect analyzers and the HMI PC to this internal network; Do not connect any other device.

External Network

The connection to the external network is not required but enables additional features, including remote web access and the Modbus TCP server. These services are enabled by default but can be disabled via the General > Network configuration page. The default configuration of the Vertex Edge HMI PC external network connection is via DHCP. However, if desired, a static configuration is possible via the General > Network configuration page. Care should be taken both in DHCP server configuration as well as in the static configuration that the network assigned to the external connection, and that does not overlap with the internal analyzer network.

Vertex Edge HMI External Network Services

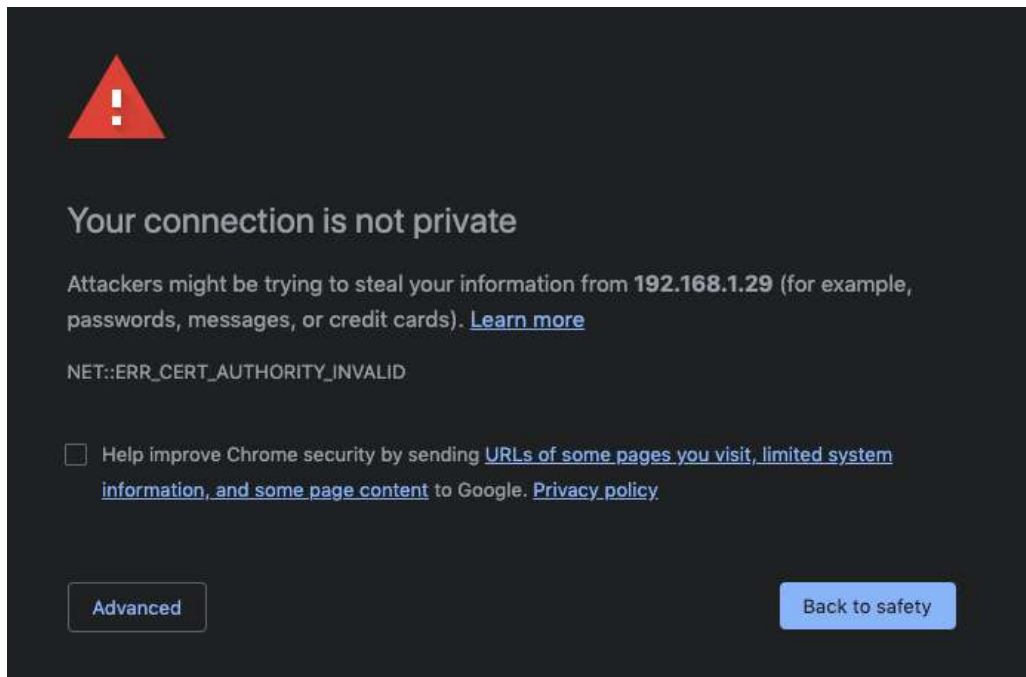
Service	Port	Transport Protocol	Default Setting
HTTP	80	TCP	ON
HTTPS	443	TCP	ON
Modbus TCP	502	TCP	ON

NOTE

We strongly recommend using the Chrome browser to access HMI remotely.

HTTPS Connections

When making a connection to the Vertex Edge HMI PC via HTTPS, it will be necessary to accept the certificate. A message like the one using Google Chrome will be shown:



Tap on the **Advanced** button, and select “Proceed to <some IP> (unsafe).”

External Network Security Considerations

The Vertex Edge HMI PC is intended ONLY for connection to a private network – no connections from the internet should be allowed. All services not explicitly named above are disabled and filtered via the iptables rules. Access control is via users and roles defined in the security configuration. By default, anyone can view system state information, but elevated permissions are required for any configuration, control, or maintenance.

NOTE

Router with IPSec is recommended to secure Modbus TCP/IP communication in an insecure network.

Warranty Statement

All products are warranted by Honeywell International Inc (herein referred to as 'Honeywell') to be free from defects in material or workmanship under normal use and service for a period of twelve (12) months after start-up or eighteen (18) months after shipment.

Honeywell limited warranty only extends to the sale of new and unused products to the original buyer if the products were purchased from Honeywell or from a Honeywell distributor, dealer or representative. When, in the opinion of Honeywell, a warranty claim is valid, Honeywell will repair or replace the defective product free of charge and send it or any replacement back to the buyer. A warranty claim will only be accepted if a proof of purchase is submitted and all conditions contained within this Warranty are met.

Conditions

The obligations set forth in this warranty are conditional on:

- a) proper storage, installation, calibration, use, maintenance and compliance with the product manual instructions and any other applicable recommendations of Honeywell; and
- b) the buyer promptly notifying Honeywell of any defect and, if required, promptly making the product available for correction. No goods shall be returned to Honeywell until receipt by the buyer of shipping instructions from Honeywell.

Warranty Return Process:

When the buyer wishes to return a product under warranty, the buyer must obtain a Service Order Number from Honeywell and if practical return the product clearly marked with the Service Order Number and a full description of the fault at buyer's expense. If no description of the fault is provided, Honeywell reserves the right to charge an investigation fee. If the product is found to be of "no fault", Honeywell reserves the right to charge an investigation fee and return same product to buyer after the investigation fee and transport cost are reimbursed in full. The investigation fee in both cases will not exceed \$320. In the case of a fixed installation or where it is not practical to return the product, the buyer must submit a written claim to Honeywell's Service Department. A service engineer will attend on site on a day rate basis. Where a valid warranty claim is identified, the faulty product will be repaired or replaced free of charge but in all cases the day rate charge will apply. If, in the course of investigation Honeywell determines that recalibration of the instrument is required, Honeywell will recalibrate the instrument and calibration charges will apply. In no event shall Honeywell's liability exceed the original purchase price paid by the buyer for the product.

Exclusions:

Excluded from any warranty claim is any product, which in Honeywell's opinion, has been misused, altered, neglected or damaged by accident or abnormal conditions of operation, handling or use, defects attributable to improper installation including but not limited to: Physical damage, warping to the main PCB as a result of crushing, component or board damage at a point of impact or as a result of dropping of the unit from above the stated certification height, fluid ingress as a result of submergence beyond the I.P. rating specification, poisoning or inhibition of sensor, any damage or defects attributable to repair of the product by any person other than an authorized dealer or Honeywell's affiliate within the Honeywell group or installation of unapproved parts on the product. Excluded are consumable items such as dry-

cell batteries, filters and fuses or routine replacement parts due to the normal wear and tear of the product. After the effective date this warranty supersedes all existing warranty statements and Honeywell makes no other warranty expressed or implied except as stated above.

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