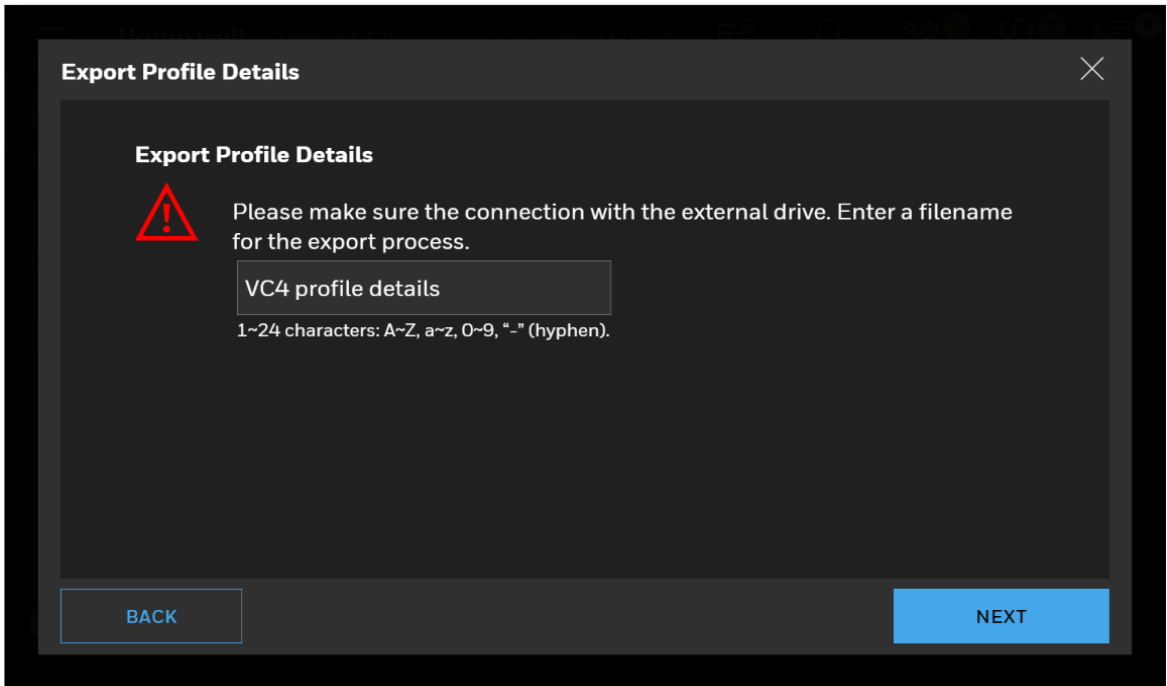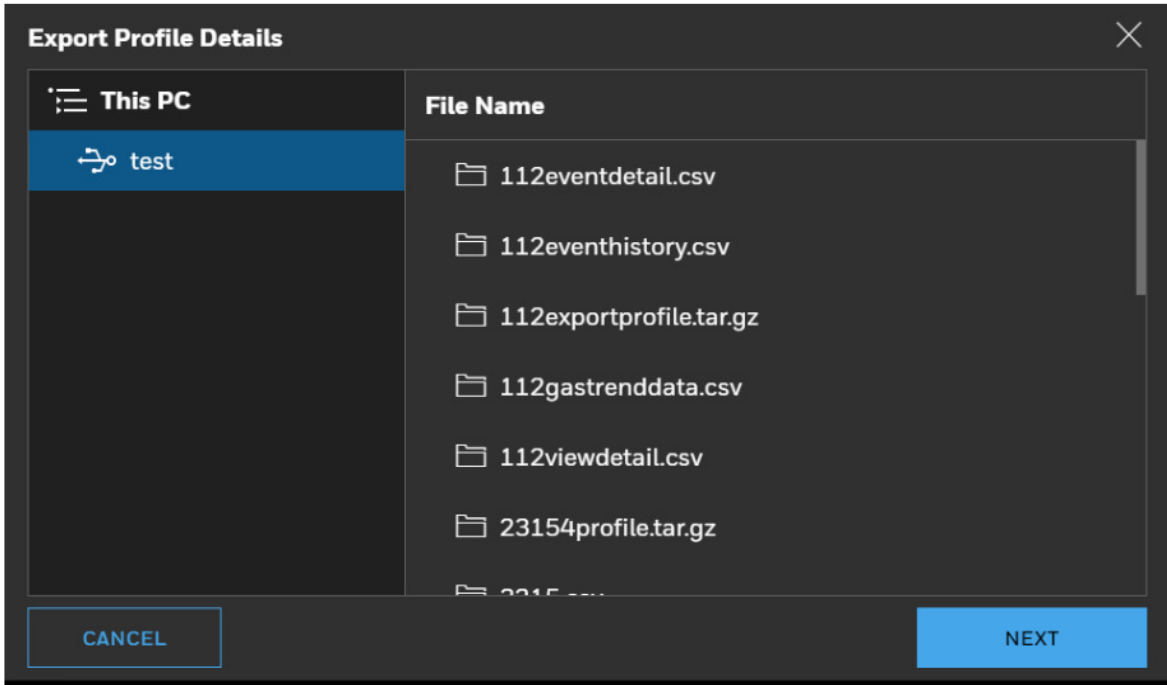4. Optional Step to export the detailed profile information, tap **Export**.

   Select a USB port to export the information, and then tap **NEXT**. In the File name field, enter a file name for the export process, and then tap **NEXT**. Follow the instruction to complete the process.

Export Profile Details   ✕

This PC	File Name
⇨ test	📁 112eventdetail.csv
	📁 112eventhistory.csv
	📁 112exportprofile.tar.gz
	📁 112gastrenddata.csv
	📁 112viewdetail.csv
	📁 23154profile.tar.gz
	📁 2215.csv

CANCEL   NEXT

Export Profile Details   ✕

Export Profile Details

⚠️ Please make sure the connection with the external drive. Enter a filename for the export process.

VC4 profile details

1~24 characters: A~Z, a~z, 0~9, "-" (hyphen).

BACK   NEXT


View Detailed Point Data

Review point status, alarm settings and trend chart of the selected point. The point status includes gas name, gas concentration, measurement unit and live chart of the point. In the Point Detailed Status screen, alarm settings and k-factor are displayed along with real time gas concentration.

1. From the main menu, tap **OVERVIEW** ⊞ .
2. Tap the selected Point.
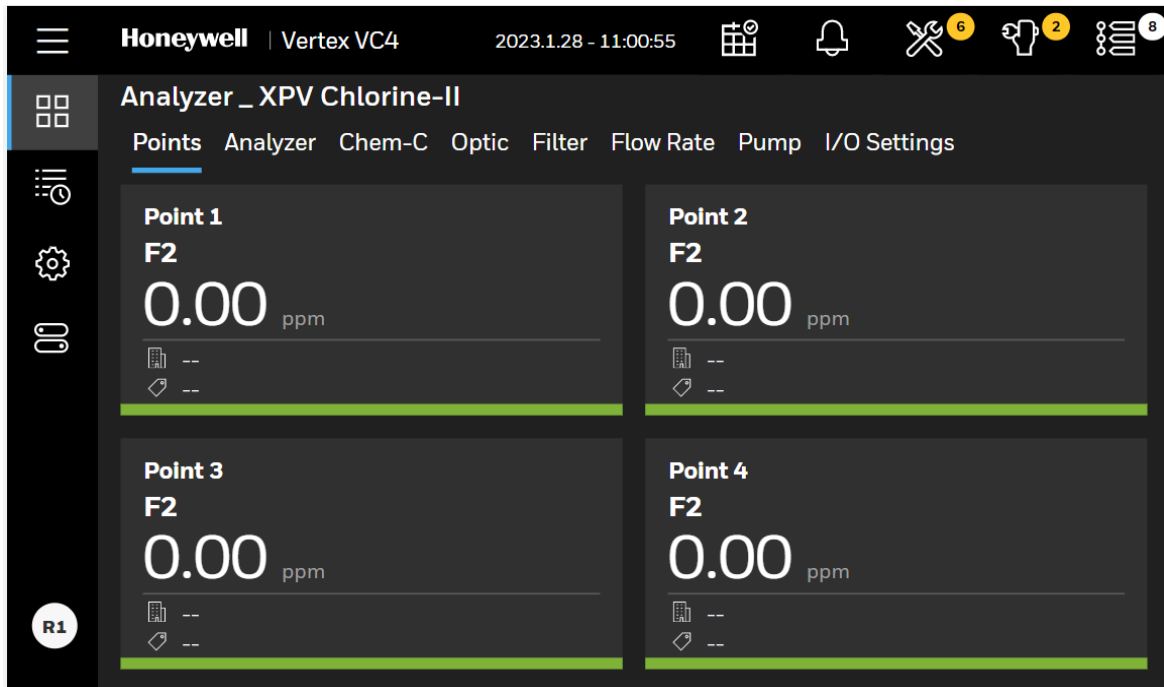
3. From the detailed point information screen, you can perform several operations such as:
   - Live chart.
   - Trend chart for up to 30 days.
   - Scroll left and right on the gas chart.
   - Tap on the chart to view the gas concentration value.
   - Adjust the range using the slider.
   - Change the time-line.
   - Export gas data of the trend chart.
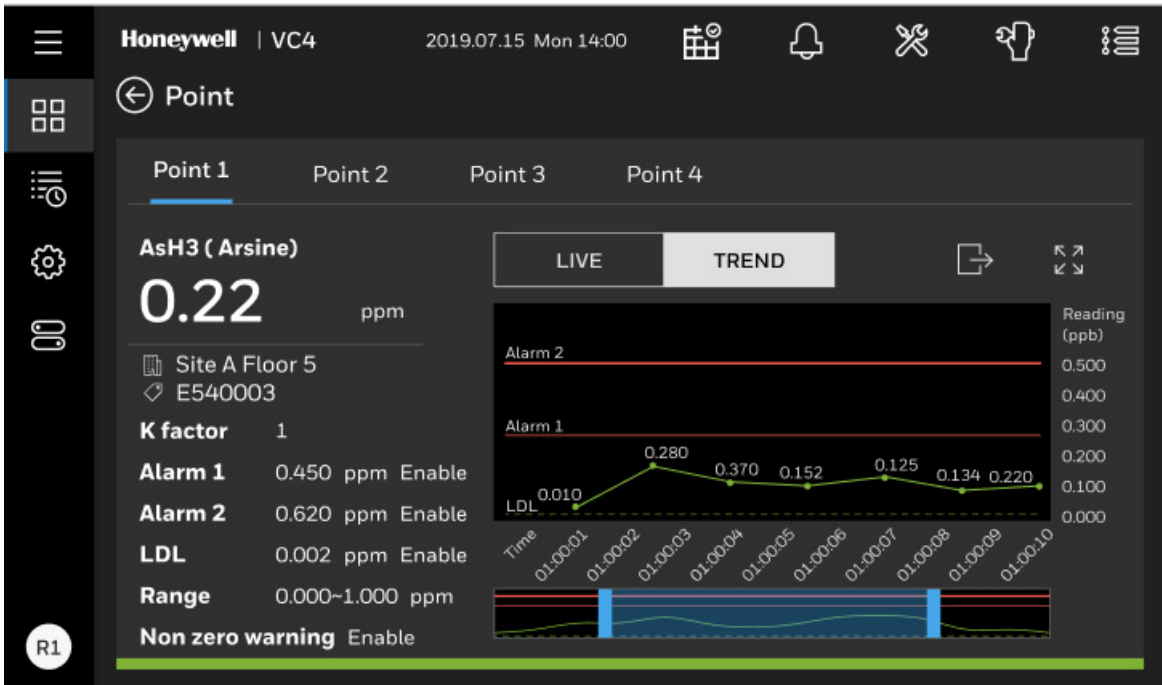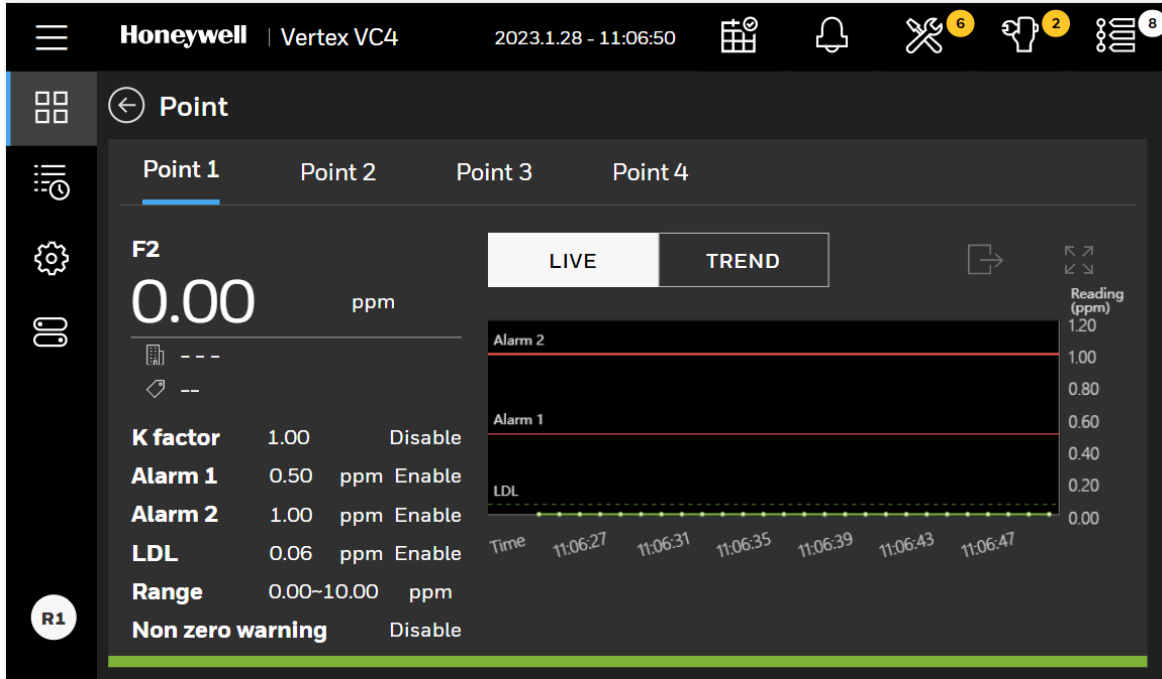
4. Tap the back button ⊙ to return to the Overview screen.

Acknowledge Notifications

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

1. From the upper right side of the main screen, tap on any of the notification icons of
    to view notification details. The selected icon is highlighted with a blue underline. The number within the circles indicate the sum of events for each type of notification.

	Service Due
	Alarm
	Instrument Fault
	Maintenance Fault
	All Events

> **NOTE**
> If there is a new alarm or fault, the notification panel will expand automatically.

> **NOTE**
> High Prioritized events are filtered first.

2. Acknowledge or reset individual notifications by tapping on individual **Ack** or **Reset** button on each notification, or acknowledge or reset all notifications from selected panel by tapping on **ACK ALL** or **RESET ALL** button. When the buttons are blue, they are active and can be tapping, when the color turn into dark grey, it means they already been acknowledge and the buttons are temporarily inactive, and the acknowledged event moves to the bottom of the list, and its color diminishes.

Maintain The Pump Close to Due Date

Service is required when pump uptime is reaching to the end. Normally, recommend to maintain the pump every 6 months.

1. In the Pump maintenance page, if runtime is due or there are some faults, the color of texts would turn into yellow, otherwise, when the pump status is good, the color is white. When pump runtime is due, contact the service people to maintain the pump.
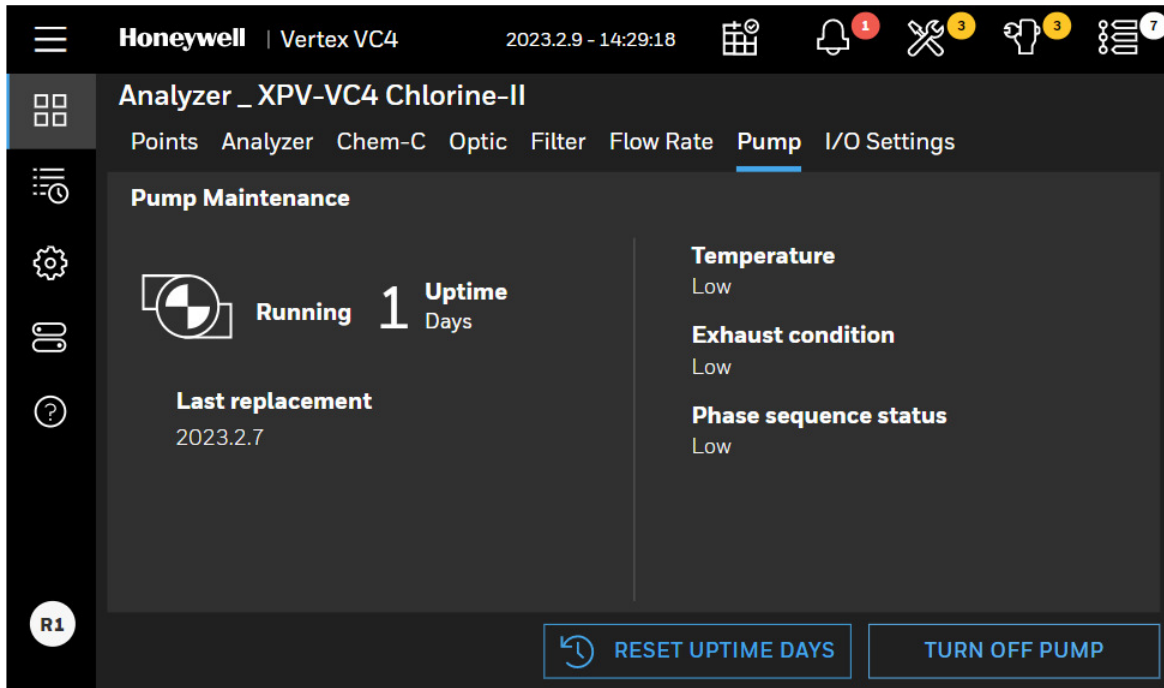
2. Optional step. When you want to reset the uptime of the pump, tap **RESET UPTIME DAYS** button, then the time will be reset as zero and initiate the count from the beginning.

3. Tap **CONFIRM** to reset the counted uptime days. The highlighted uptime resets to zero.
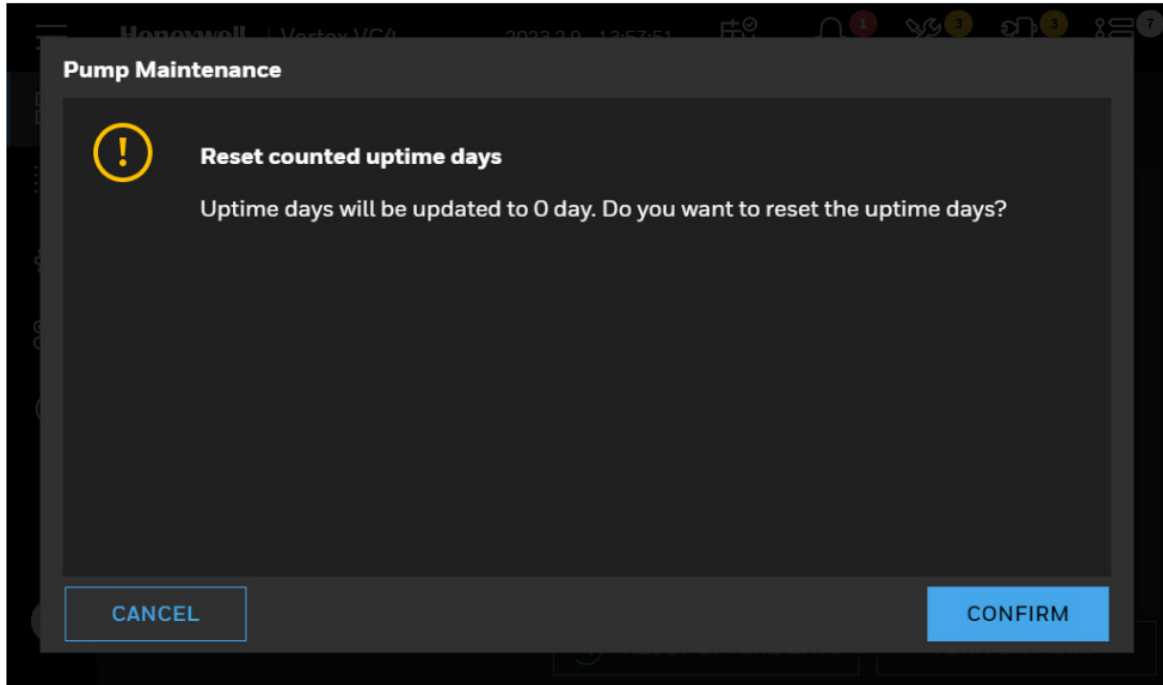
4. Optionally the temperature status in the pump module and high pressure status at exhaust line can be checked. When there is any issue in temperature and exhaust pressure, the text of Temperature and Exhaust tubing will be highlighted in yellow.

Turn a Pump On And OFF

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

1. In the Pump Maintenance window, tap **TURN ON PUMP** or **TURN OFF PUMP** as needed.
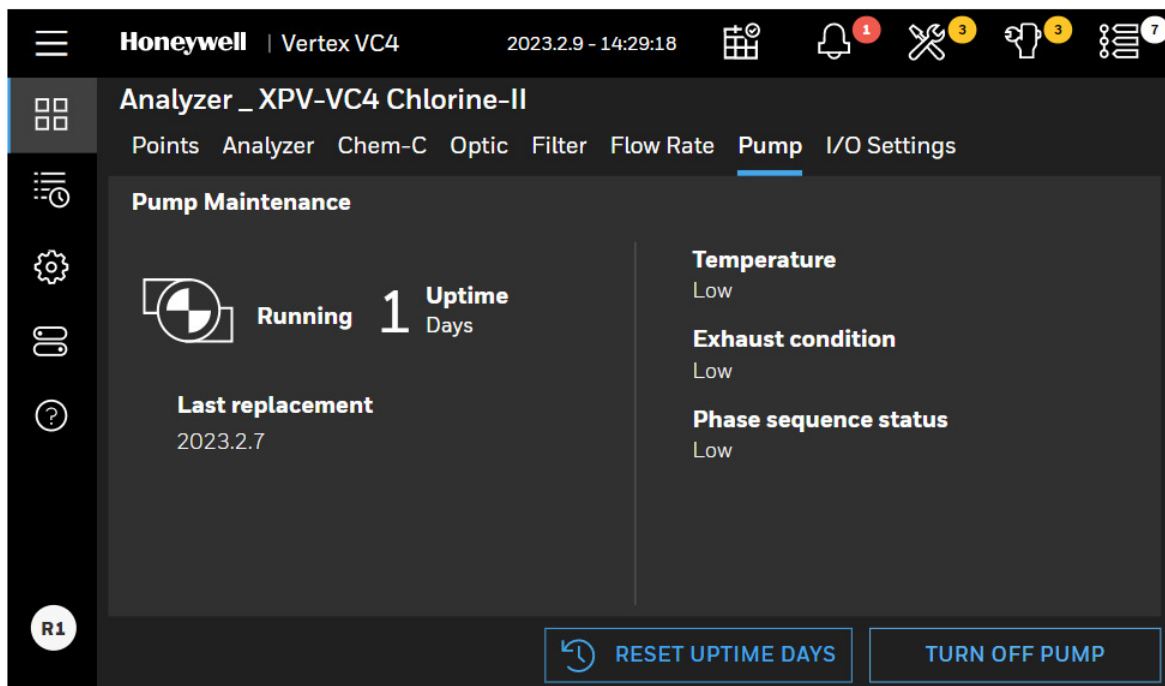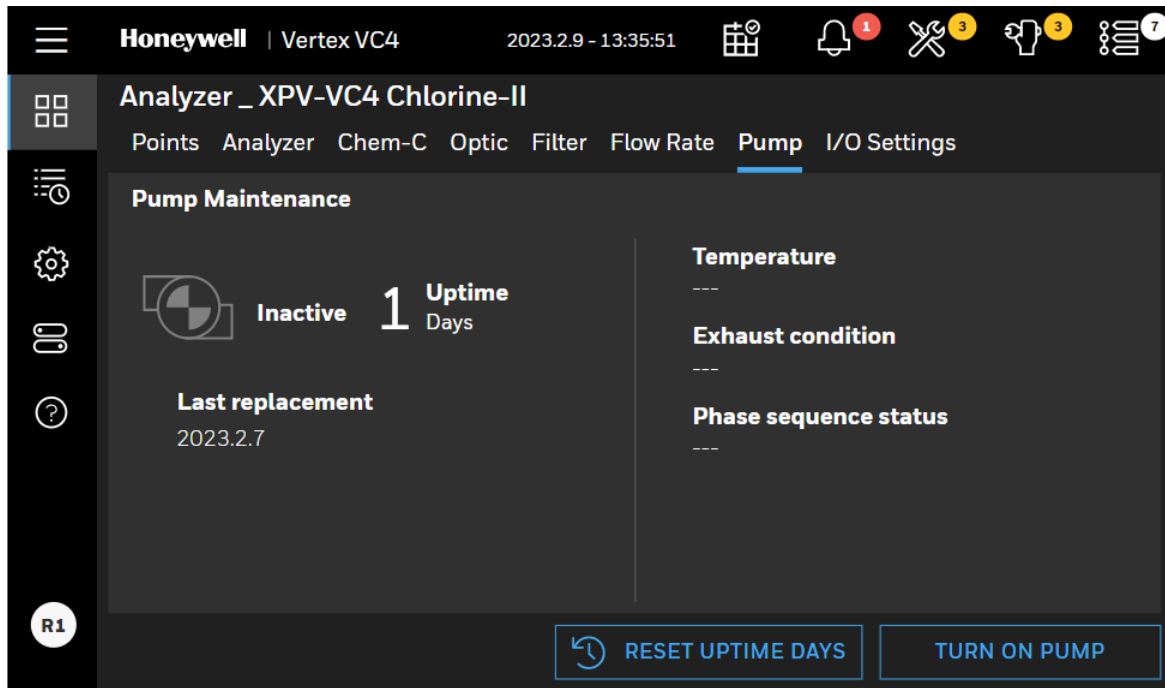
Turn the Monitoring Mode On and OFF

1. In the left navigation panel, tap **OVERVIEW** ⊞ .
2. Tap on the **Analyzer** button to enter to the analyzer detail page.
3. In below page, switch the toggle button of **Monitoring mode** can setup the analyzer either as **Monitor** or as **Idle**.
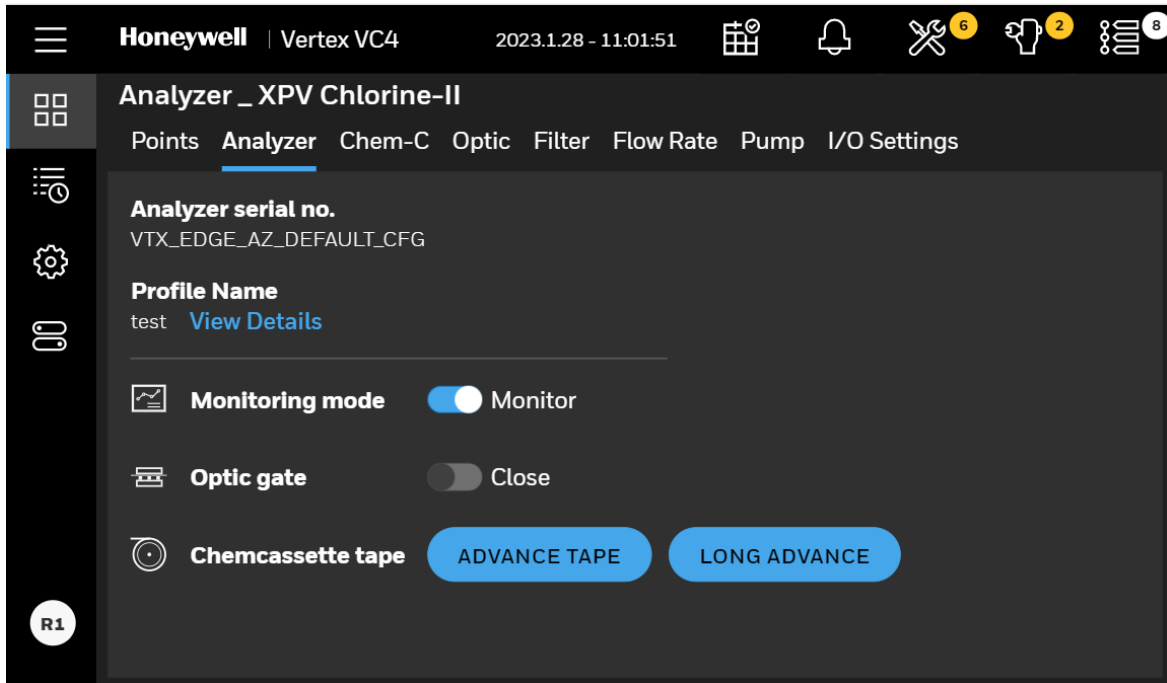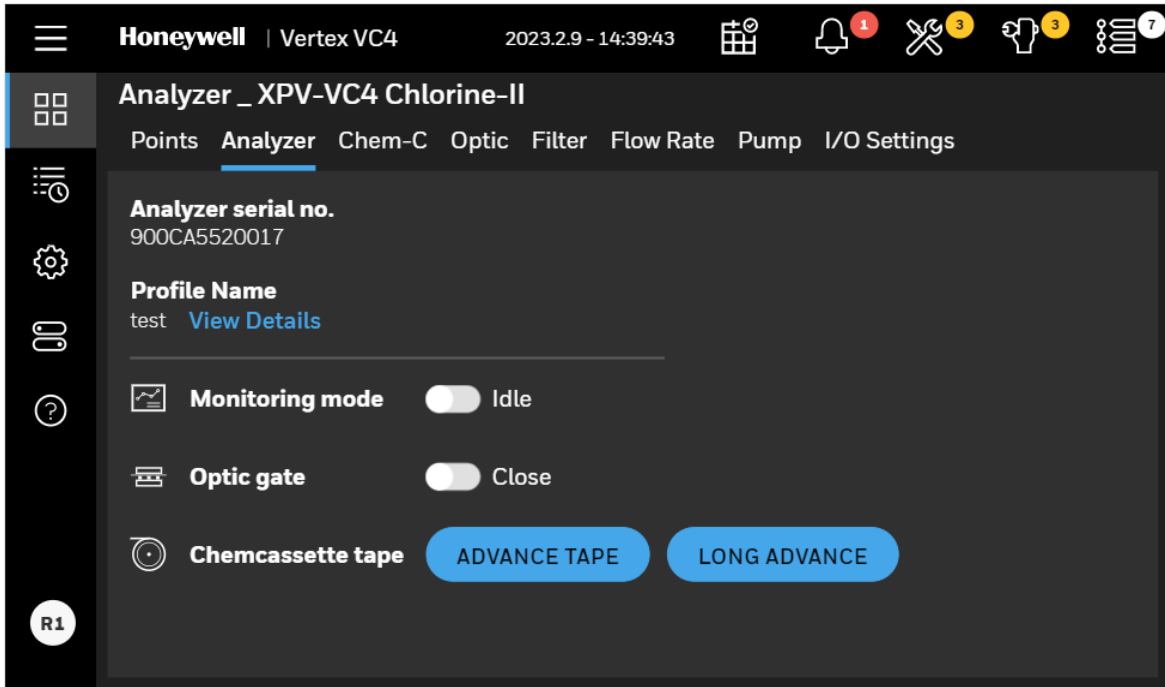
NOTE
The Optic gate is closed when Monitoring mode is on.

Open the Optic Gate

1. In the left navigation panel, tap **OVERVIEW** ⊞ .
2. Tap on the **Analyzer** button to enter to the analyzer detail page.
3. In below page, switch the toggle button of Optic gate into Open.
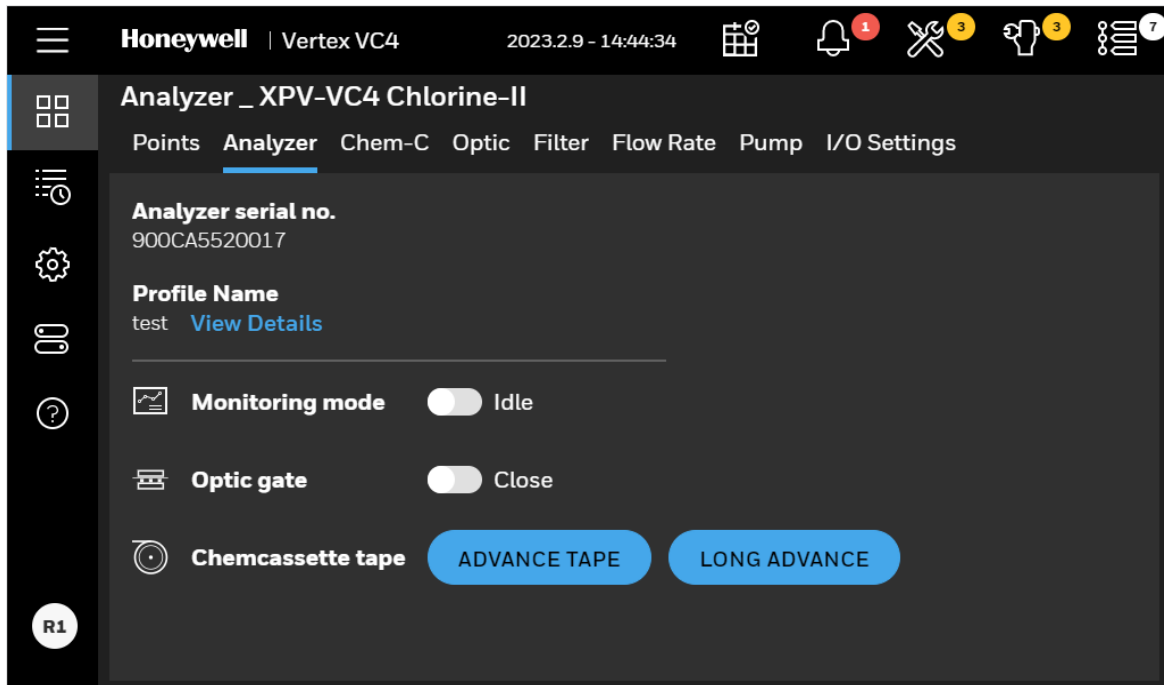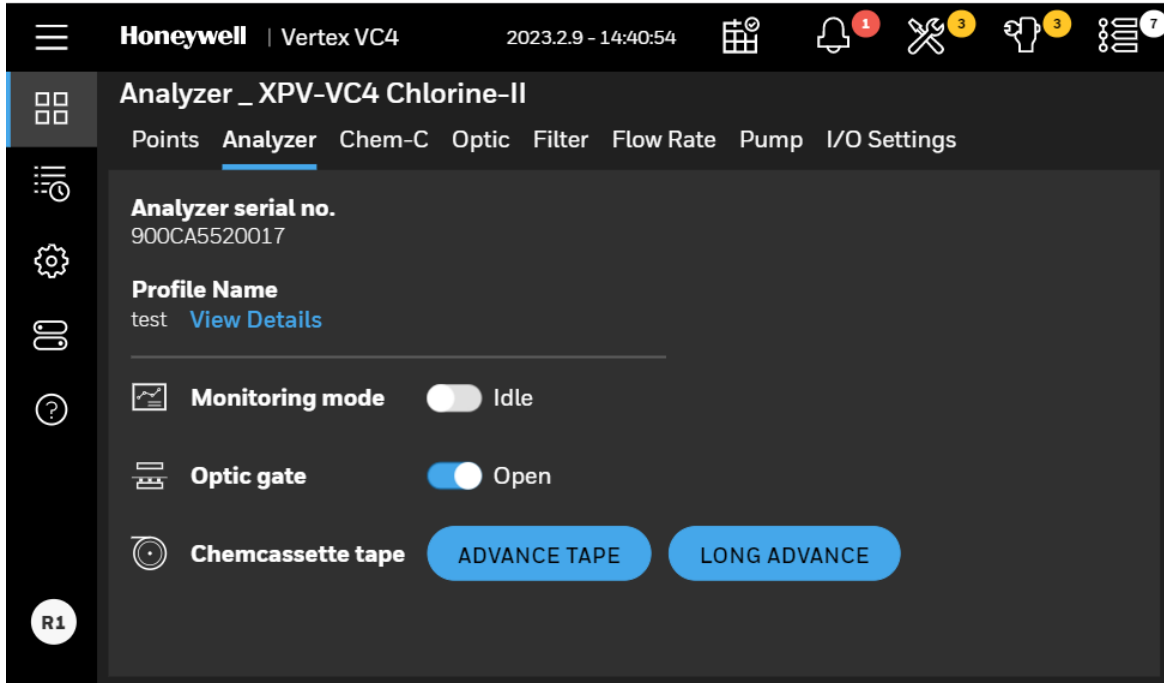
> **NOTE**
>
> The Optic gate is closed when Monitoring mode is on.

Advance the Chemcassette® Tape

1. In the left navigation panel, tap OVERVIEW 🔲 .
2. Tap on the **Analyzer** button to enter to the analyzer detail page.
3. In below page, tap **ADVANCE** button next to Advance tape. Or tap **LONG ADVANCE** button, Chemcassette® tape will advance long distance.
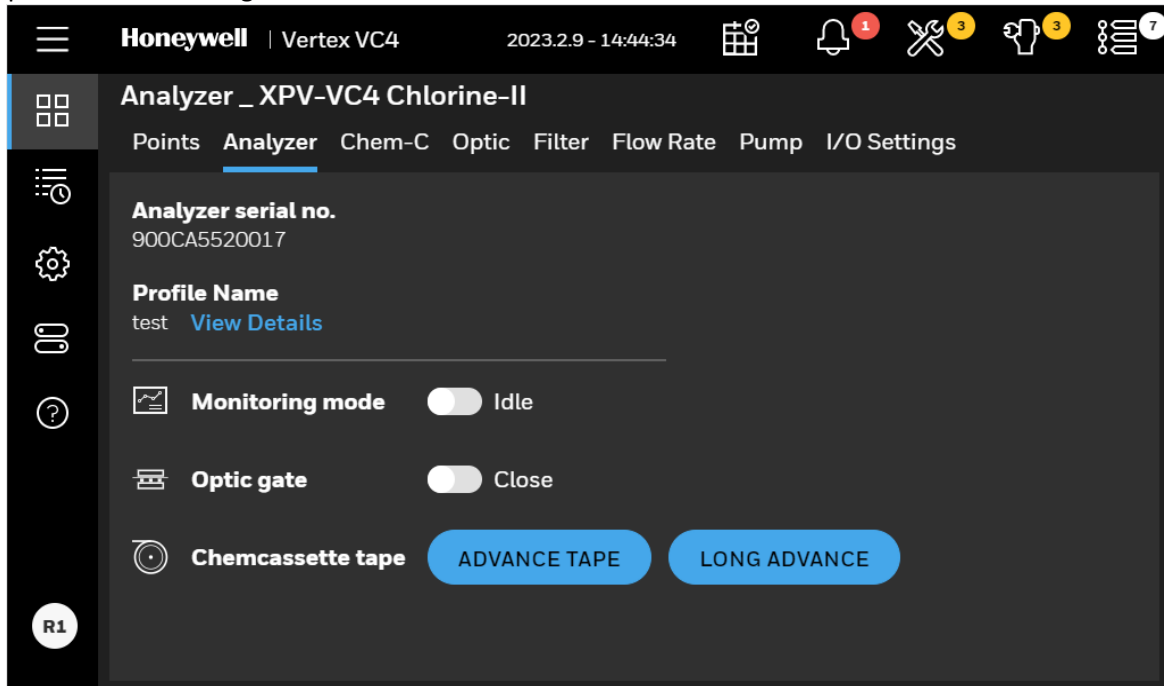
View Optic Status

View Optic status of the selected analyzer such as optic drive status, optic block status and optic cleaning due.

1. In the left navigation panel, tap **OVERVIEW** ▦ .
2. Tap on the **Optic** button to enter to the optic detail page.
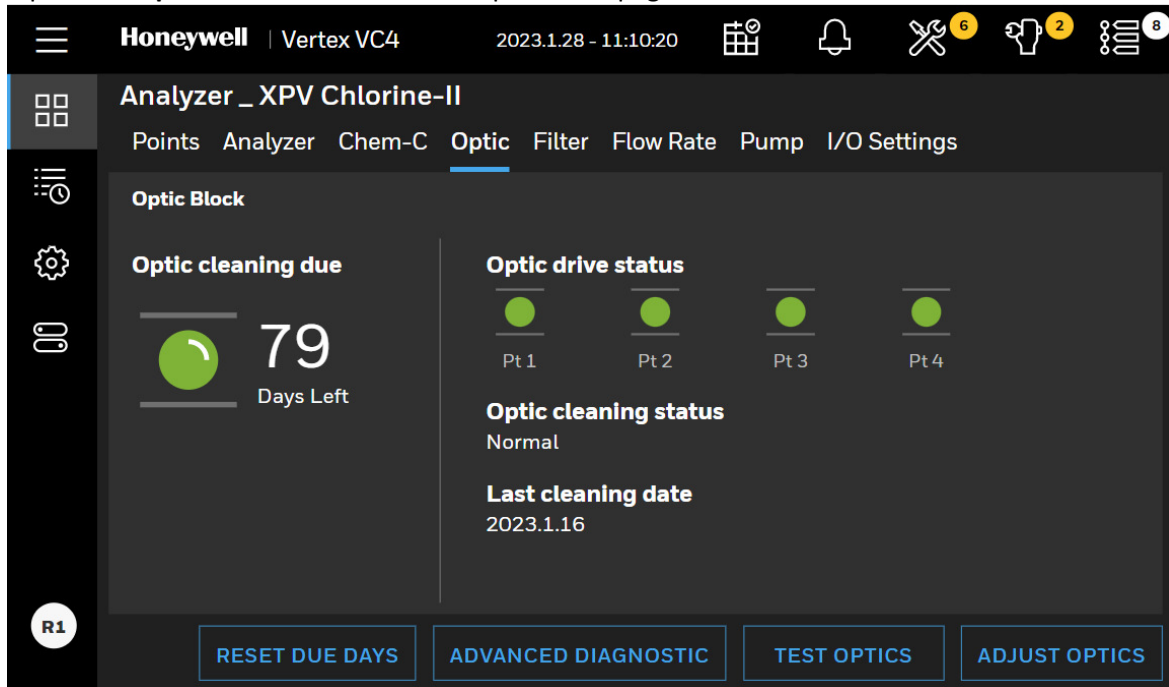
3. Tap **ADVANCED DIAGNOSTIC** to view LED drive and Optic value levels for 4 points and check whether the LED drive levels are within the recommended range.
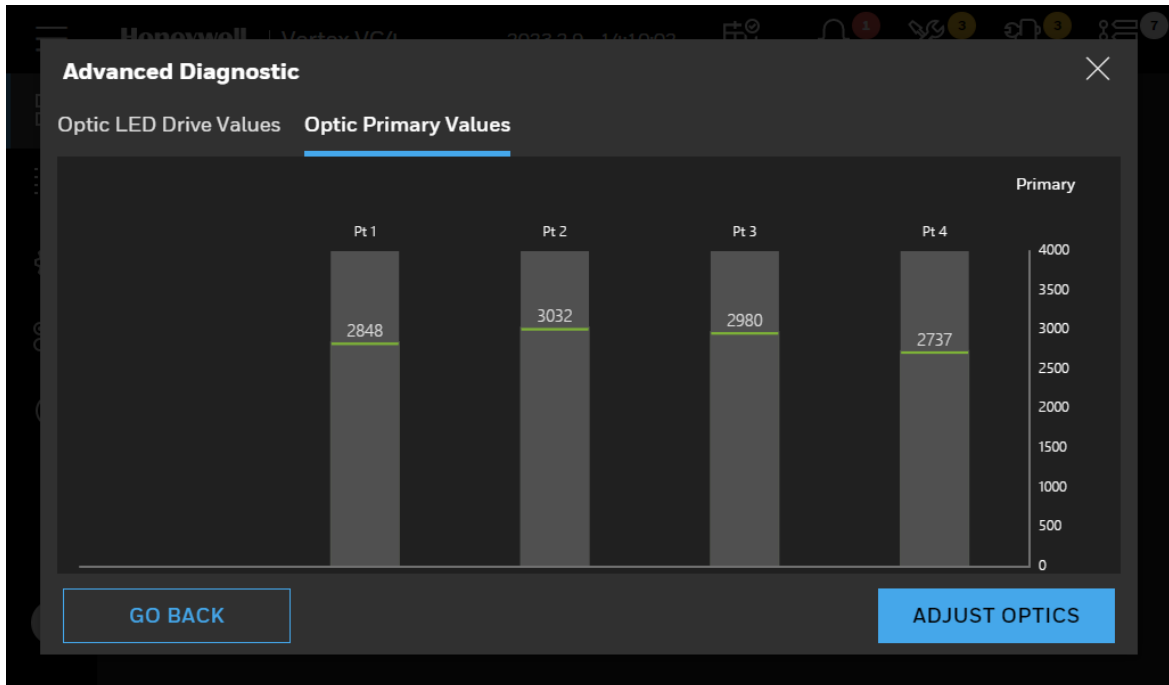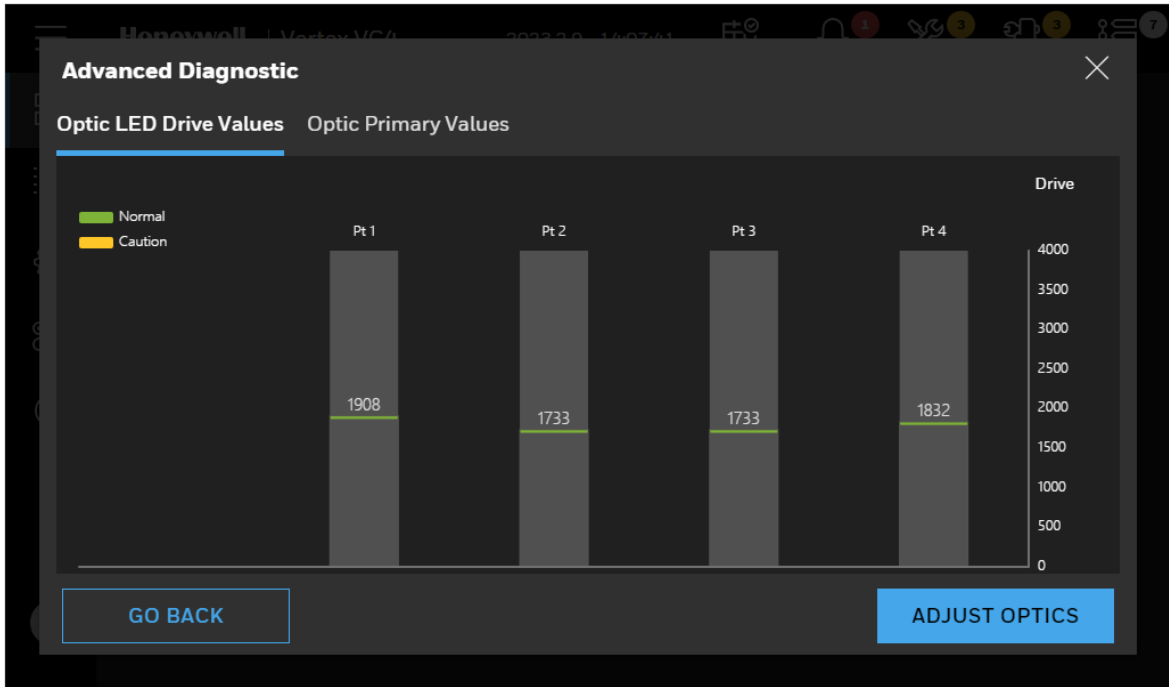
Adjust the Optic Block

1. In the left navigation panel, tap **OVERVIEW** ⊞ .

2. Tap on the **Optic** button to enter to the optic detail page.
3. In the Optic Block page, tap **ADJUST OPTICS**, and then tap **CONFIRM**. Follow up on screen instructions and when **Next** button appear, tap **NEXT** button to continue.
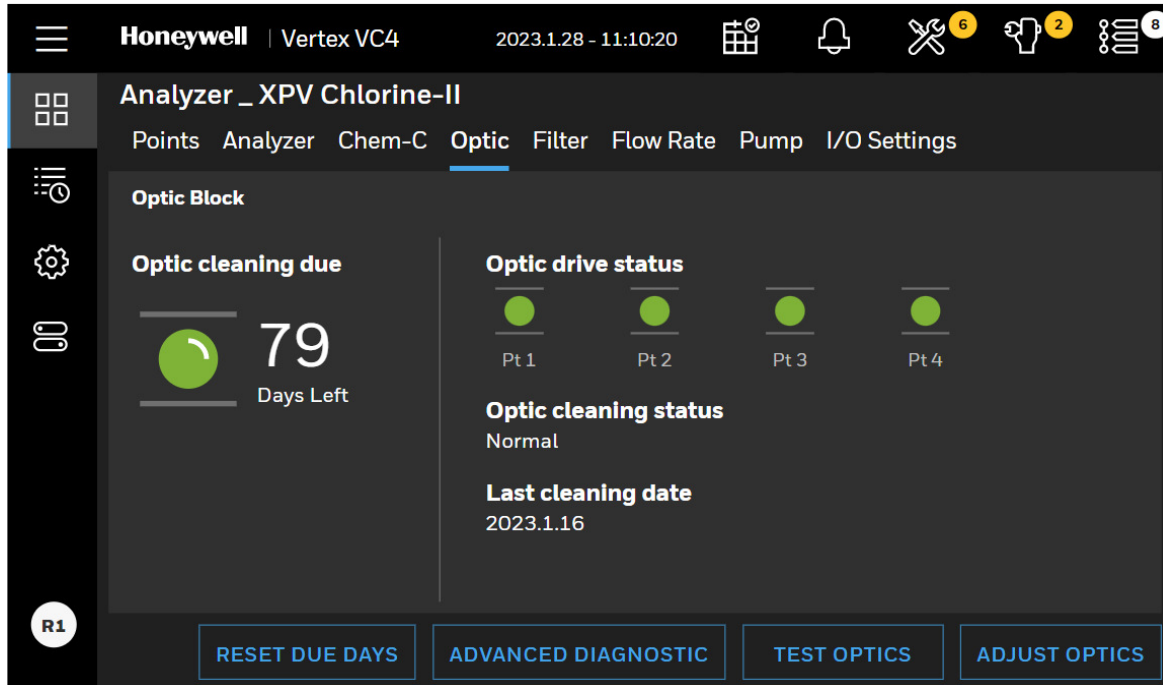
4. If the cleaning date has expired, there is maintenance fault reported. Tap **ADJUST OPTICS** and clean the Optics block by referring to instructions and when completed the process, tap the **RESET DUE DAYS** button to reset the due days.
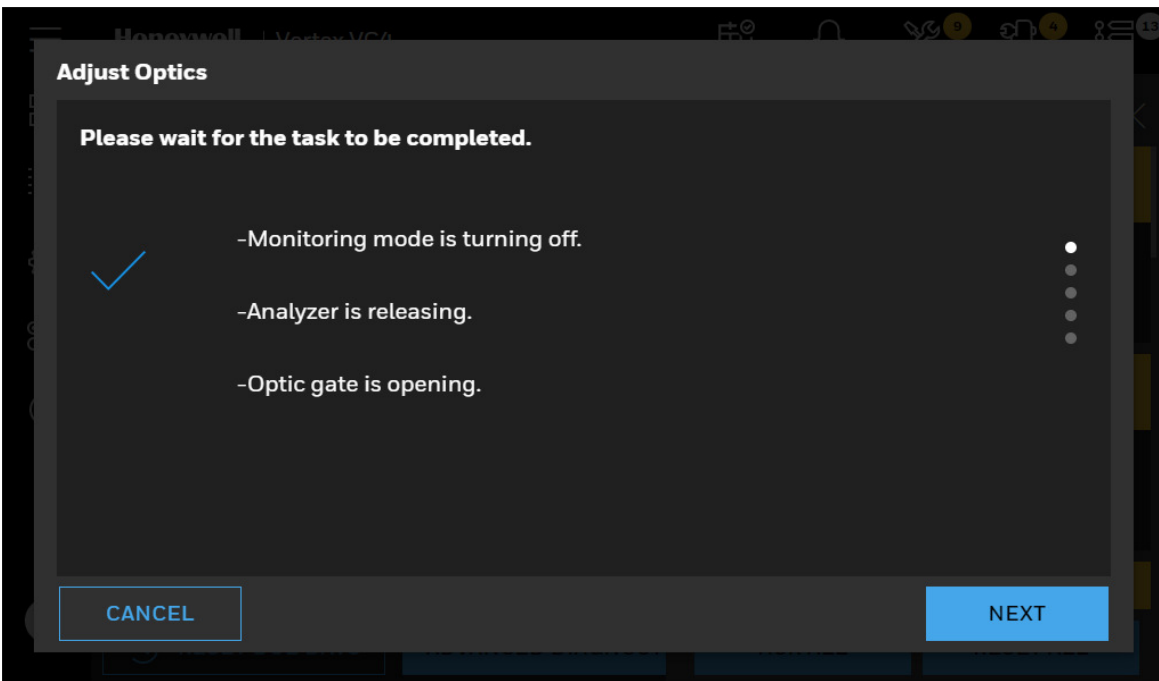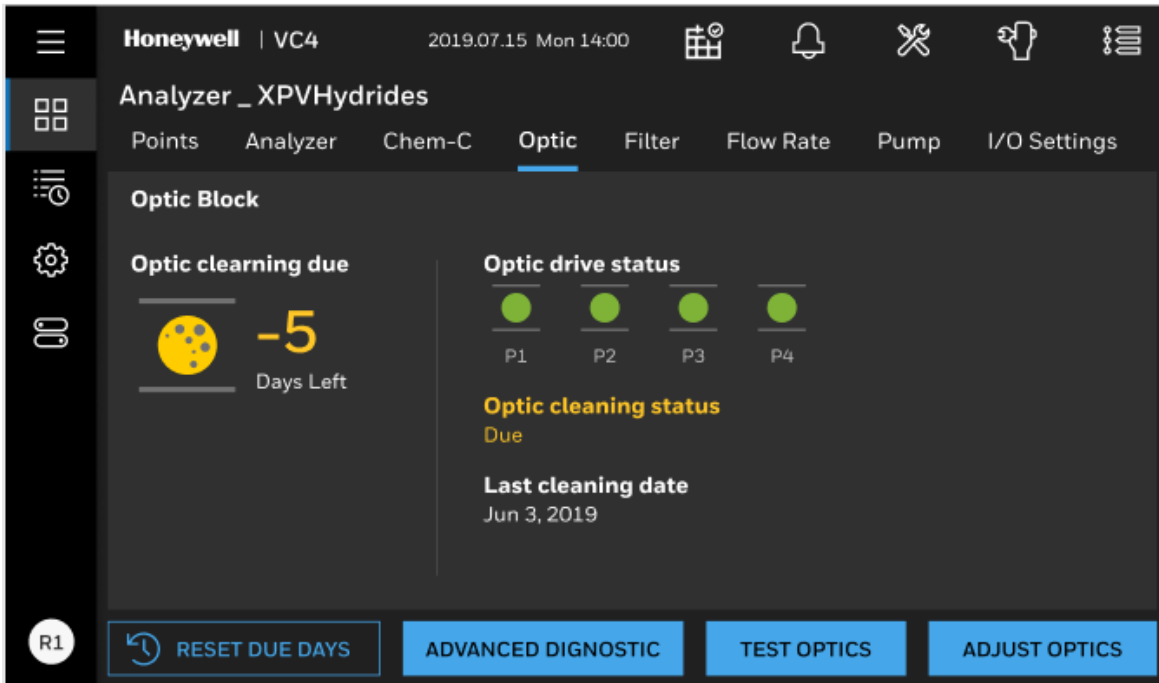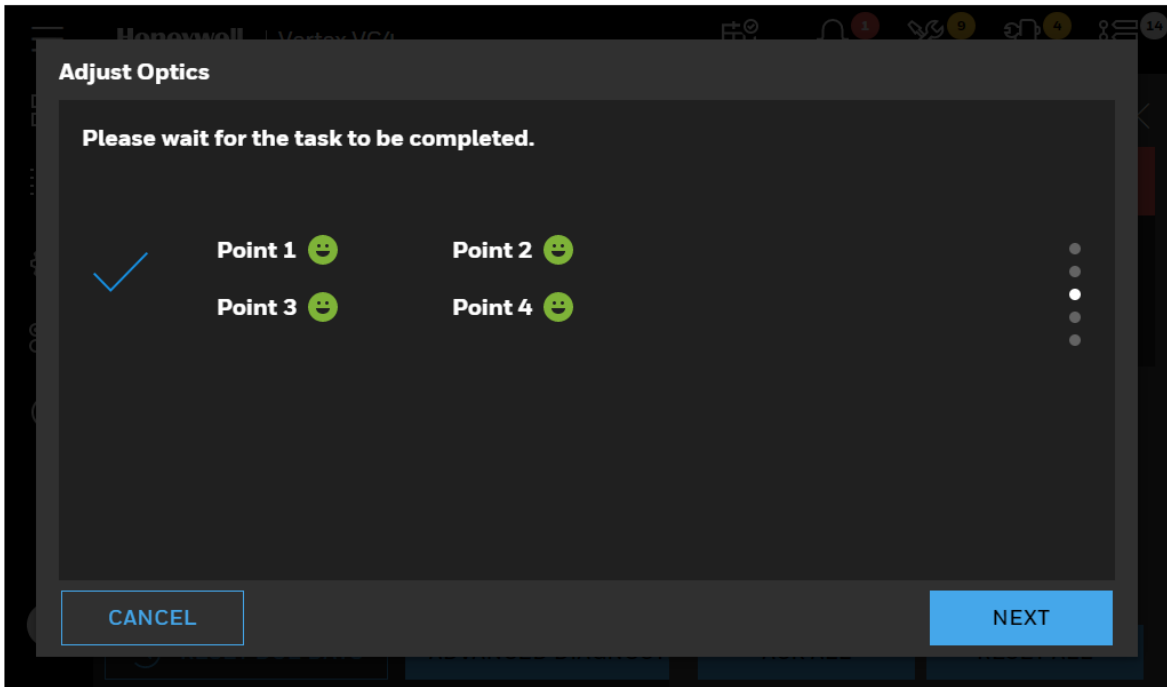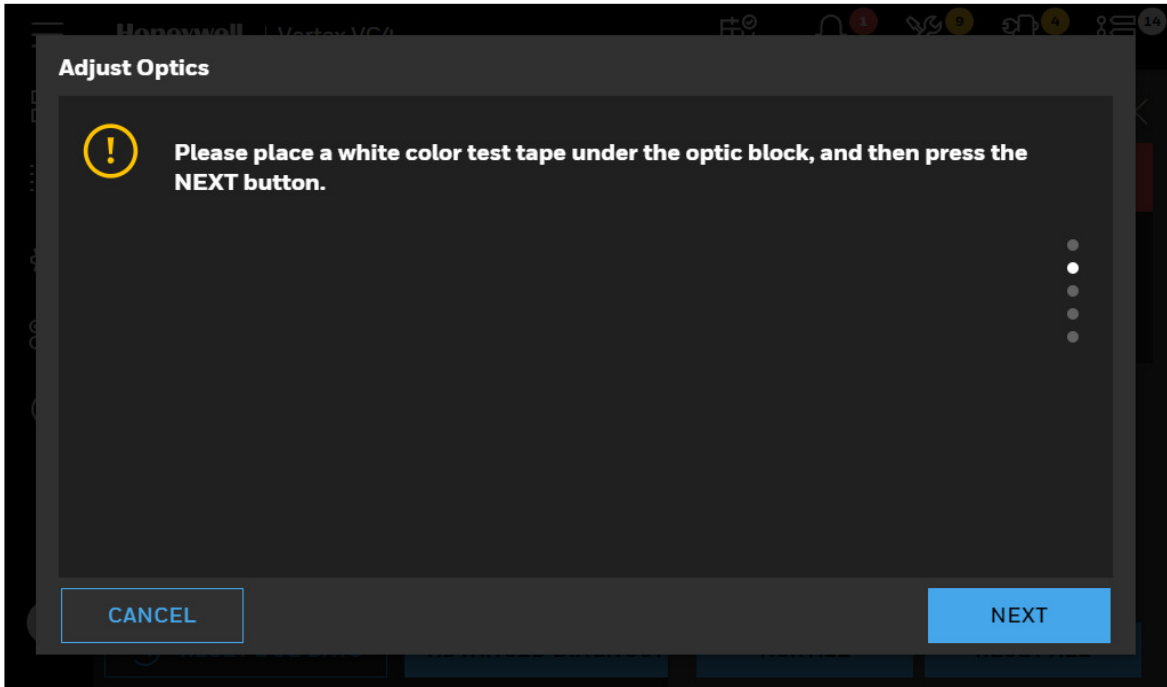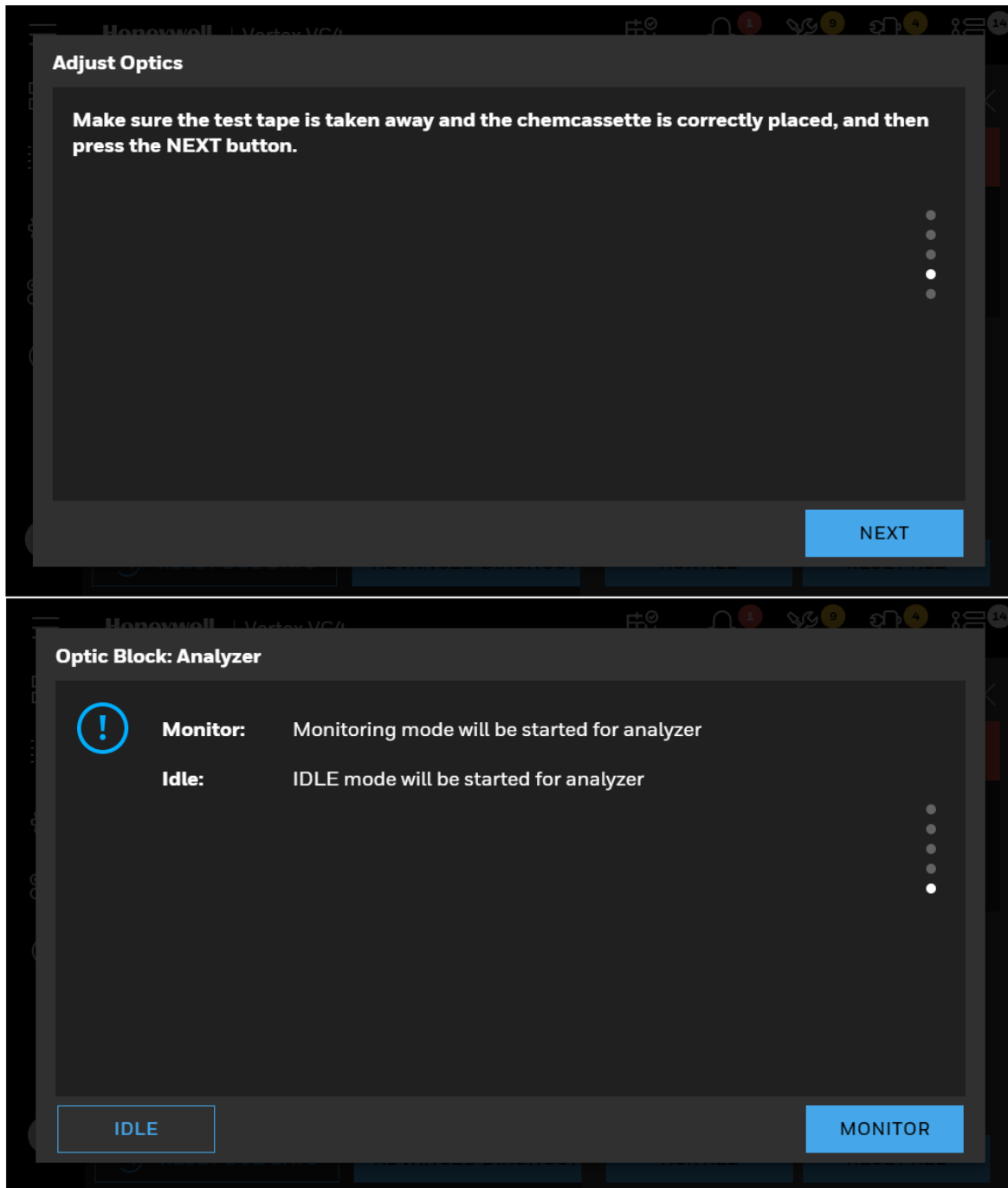
5. Optional Step. Tap the **RESET DUE DAYS** button to reset the configured Optic cleaning interval.

Test Optic Block

1. In the left navigation panel, tap **OVERVIEW**
2. Tap on the **Optic** button to enter to the optic detail page.
3. In the Optic Block status screen, tap on the **TEST OPTICS** button
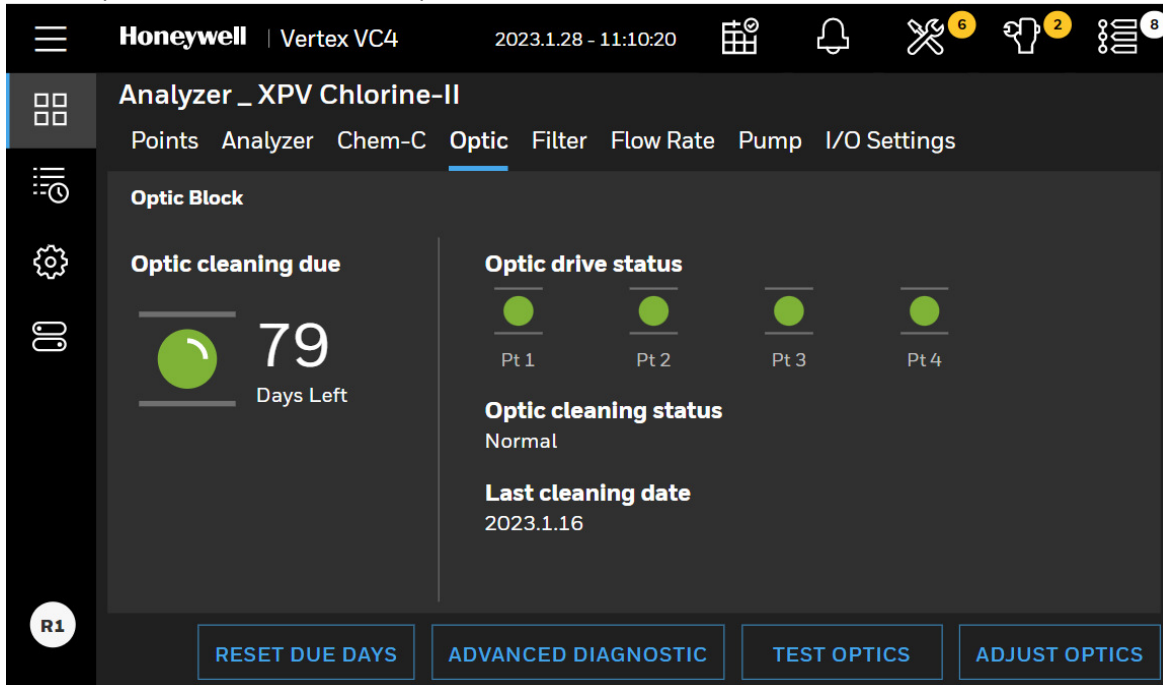
Prepare a tape leader and follow the instruction to test optic block. The whole process is manual operation.

When Optic block is tested with light gray tape and optic readings meet the criteria of color change, the alarm level 1 will be generated

When Optic block is tested with dark gray tape and optic readings meet the criteria of color change, the alarm level 2 will be generated

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NOTE

While testing optic block, real gas alarms may be generated.
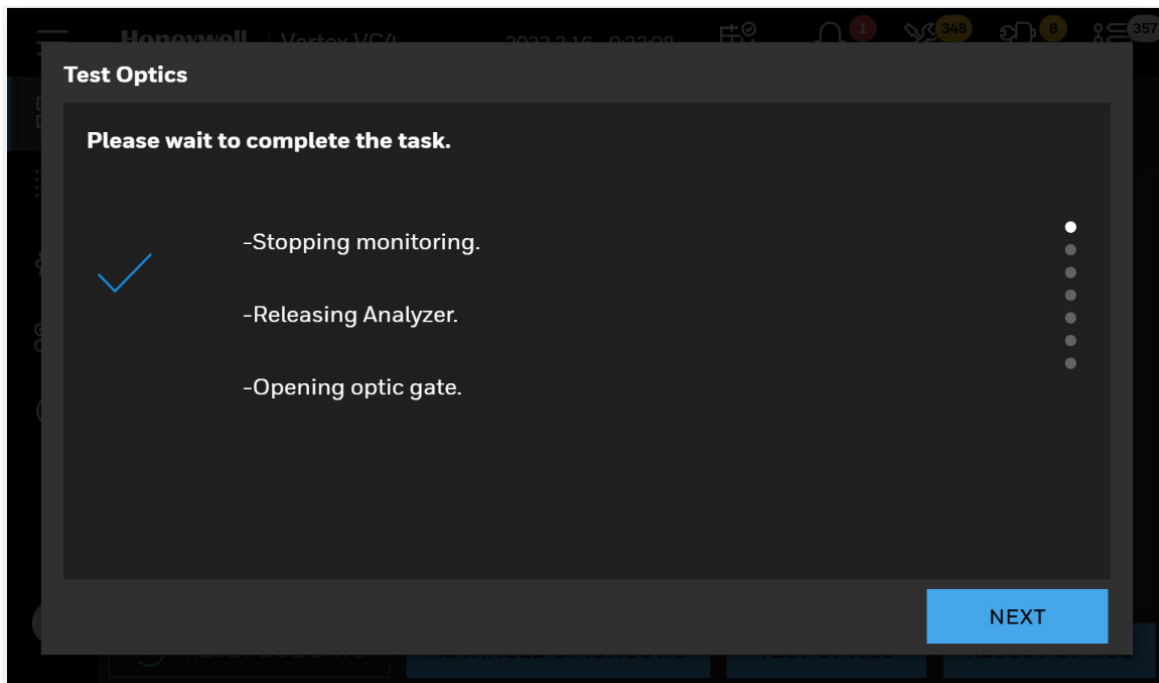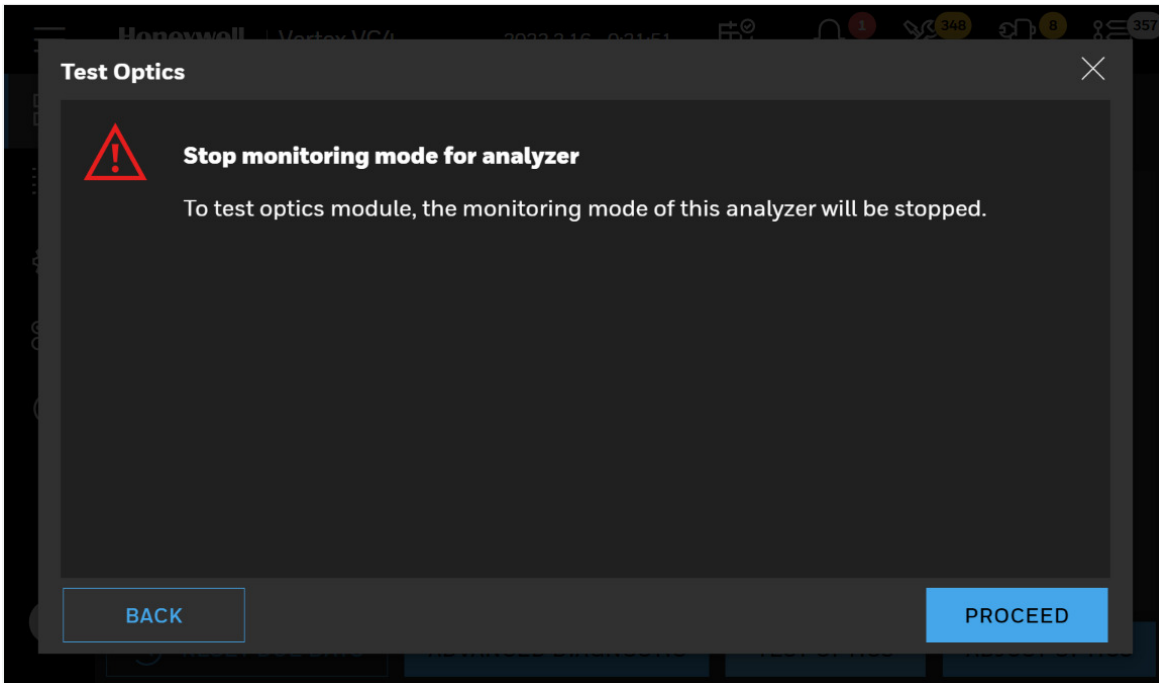
4. Insert the white tape leader to the Optic block carefully to make sure white tape leader is placed and well aligned Optic block and tap on the **NEXT** button.
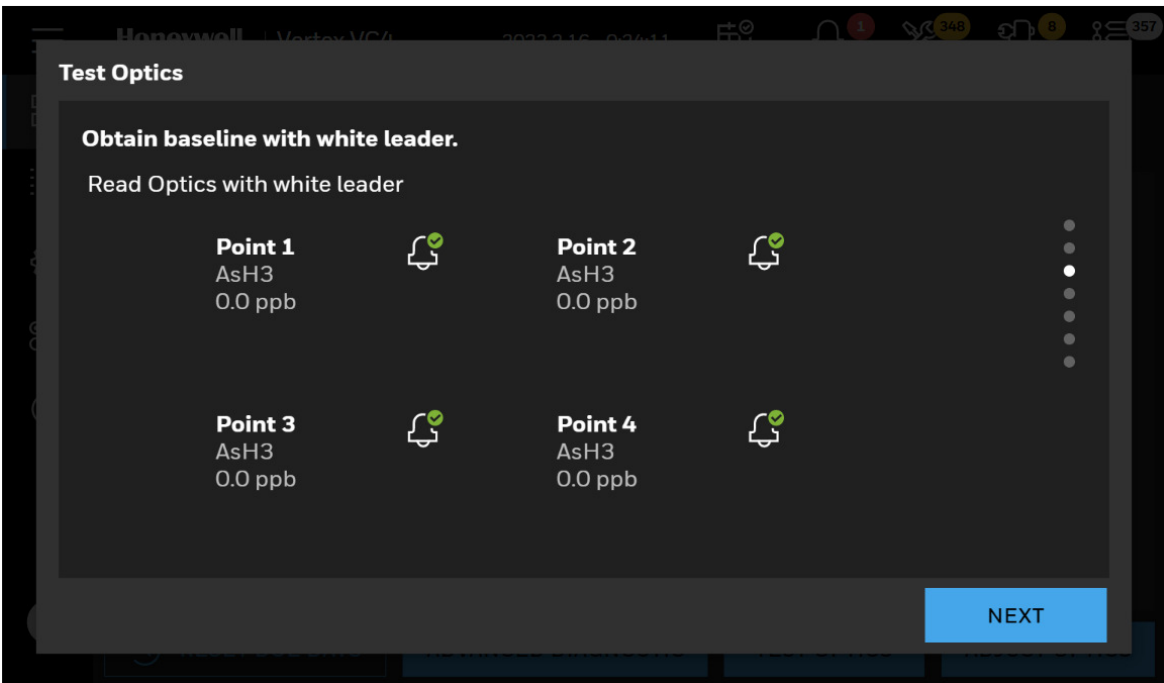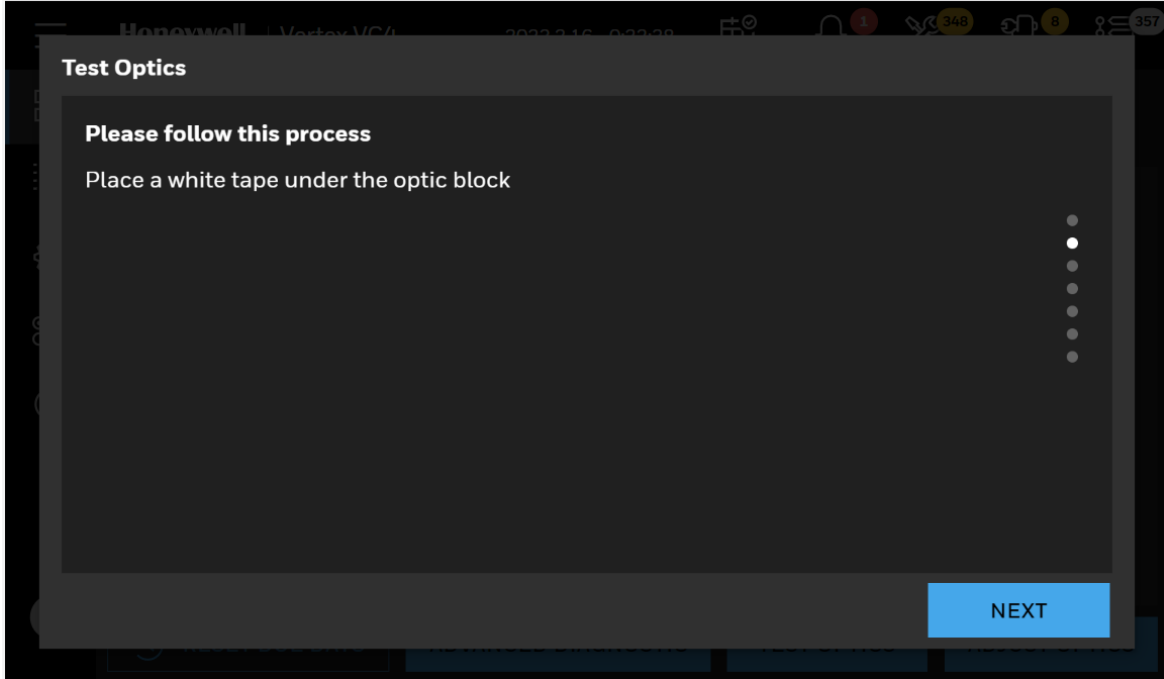
5. Insert the light gray tape leader to the Optic block carefully to make sure light gray tape leader is placed and well aligned Optic block and tap on the **NEXT** button.

6. If color change (stain development) is detected by Optic blocks, the Analyzer computes gas concentrations and generate a gas alarm1.
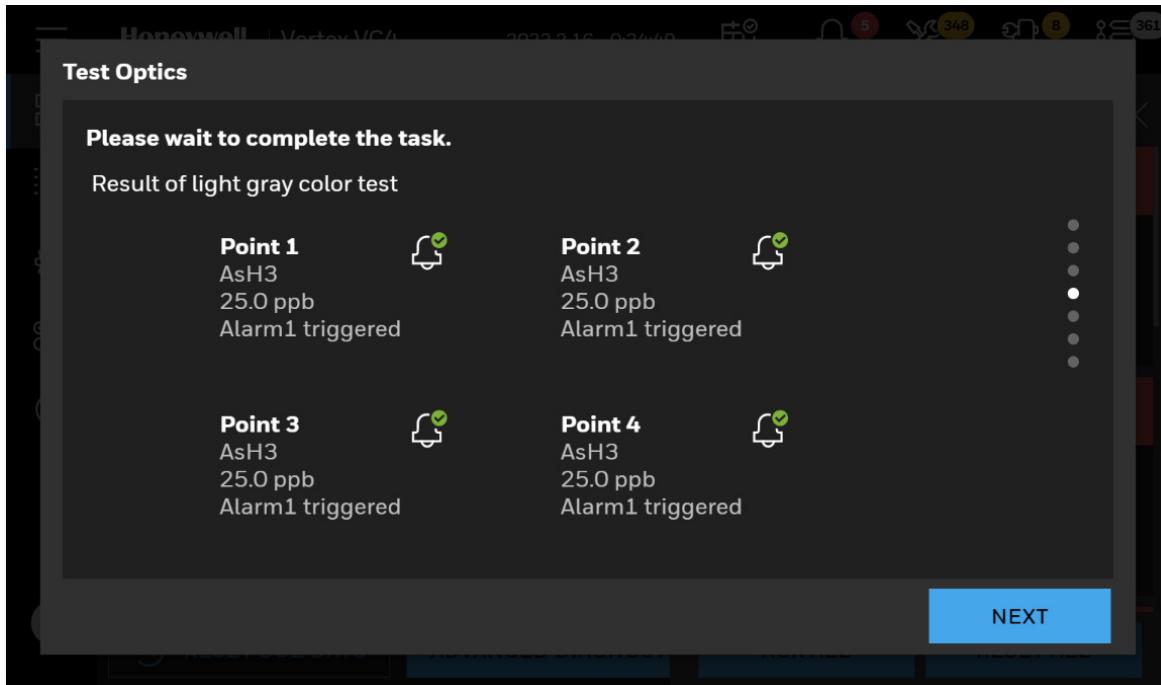
7. Insert the dark gray tape leader to the Optic block carefully to make sure dark gray tape leader is placed and well aligned Optic block and tap on the **NEXT** button.
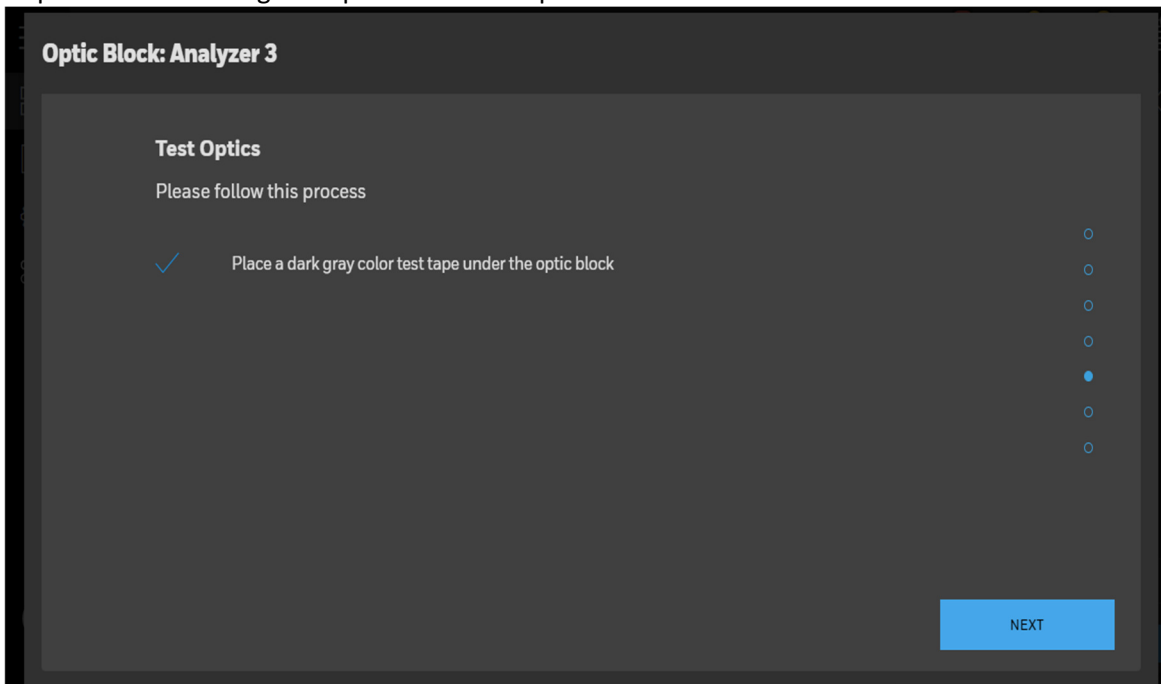
8. If color change (stain development) is detected by Optic blocks, the Analyzer computes gas concentrations and generate a gas alarm2.
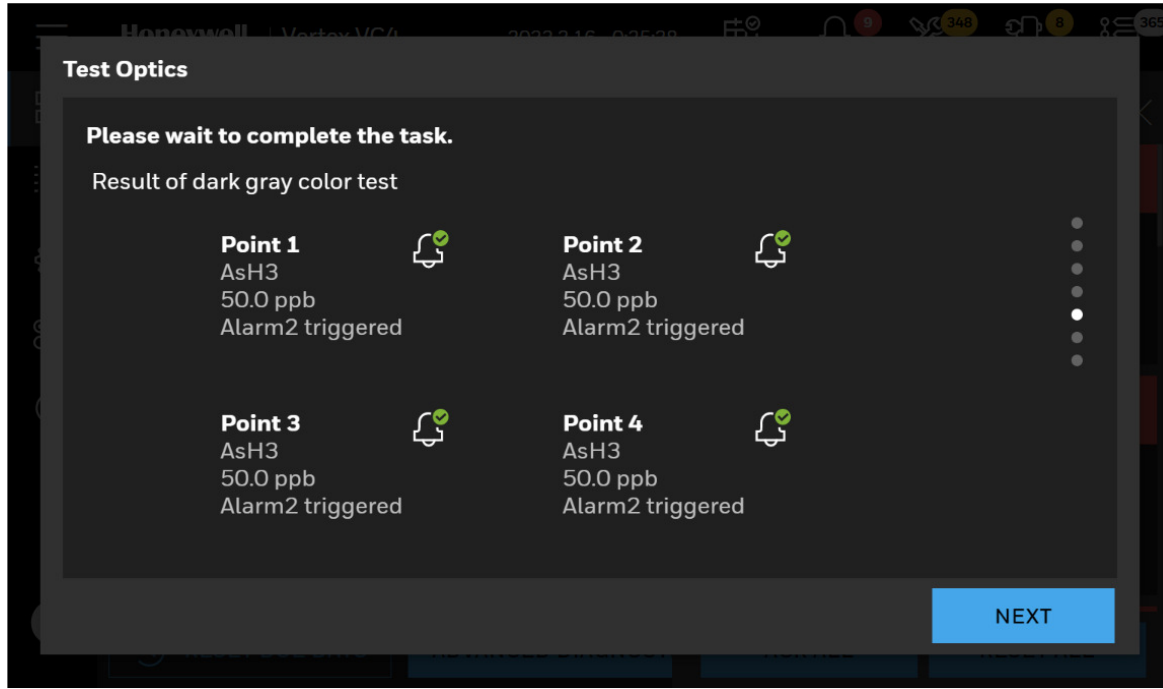
9. Take out the test leader, re-install the chemcassette® tape and tap on the **NEXT** button.
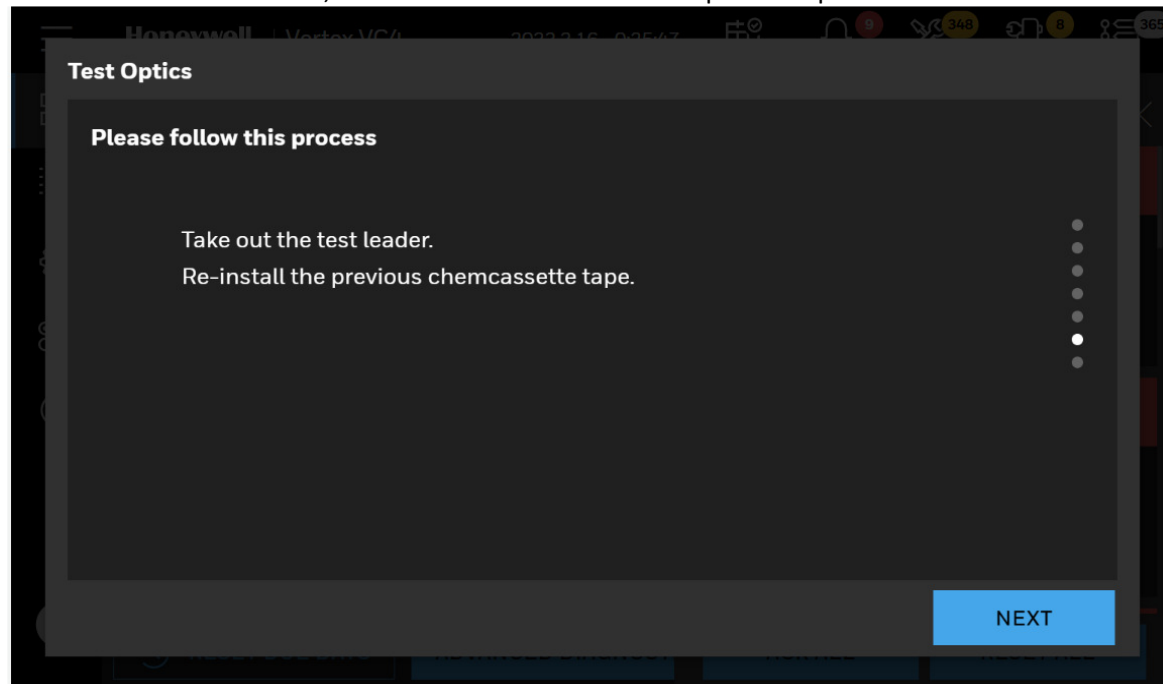
10. Choose a mode for this analyzer, **MONITOR** or **IDLE**.
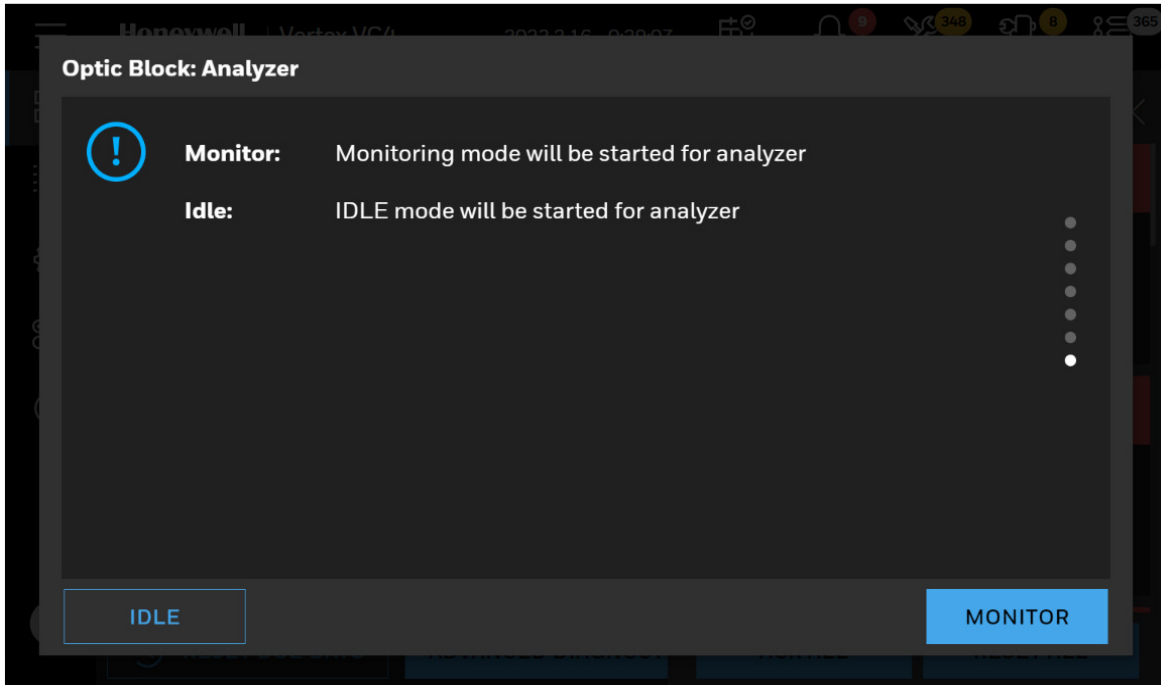
Leak Checking Sample Lines

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

1. Put the analyzer in idle mode.

2. Go to Overview and open Flow Rate screen.

3. Tap on the Adjust Flow button.

4. Securely plug the end of the sample line being tested.

5. Verify that the sample flow is less than 20cc, and that the Sample Pressure equals the Supply Vacuum within a

   tolerance of +/-0.5 inHg.

6. After testing all points, tap on the Stop Flow button.

> **NOTE**
> Tap on the Start Flow button on Flow Rate screen even if the pump is operating. Tapping on Start Flow turns on the solenoid valve to provide vacuum to the analyzer. A sample point failing to meet both the flow and vacuum conditions of step 6 indicates either a leak in the sample line or a faulty sample inlet connection. To troubleshoot the condition, disconnect the sample line at the inlet port at the back of the Vertex™ VC4. Securely plug the inlet port and repeat the above leak check procedure.
> If the sample point passes the test with the top port plugged, the leak is somewhere in the sample line and the line must be replaced. If the sample point fails the leak check procedure with the back inlet port plugged, contact Honeywell Analytics for assistance.

Adjust the Flow Rate

With the system vacuum level set, the unit is now ready to adjust flow for all the points. Release analyzer from the cabinet, and you can find the needle valves on the analyzer.
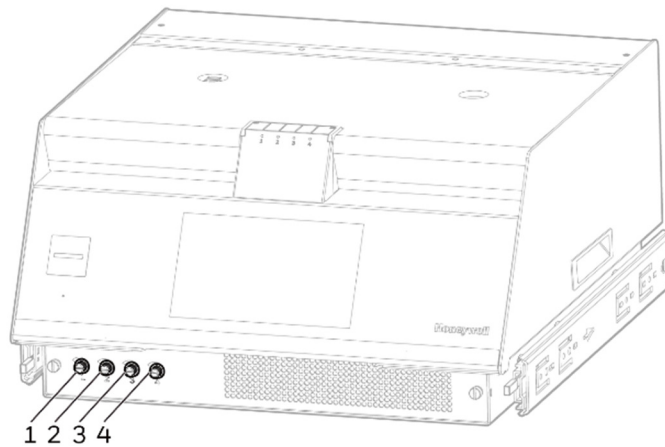
1. In the left navigation panel, tap **OVERVIEW** .

2. Tap on the **Flow Rate** button to enter the flow detail page.
3. Check the flow rate, and if there is any point marked in yellow, you must adjust the rate.
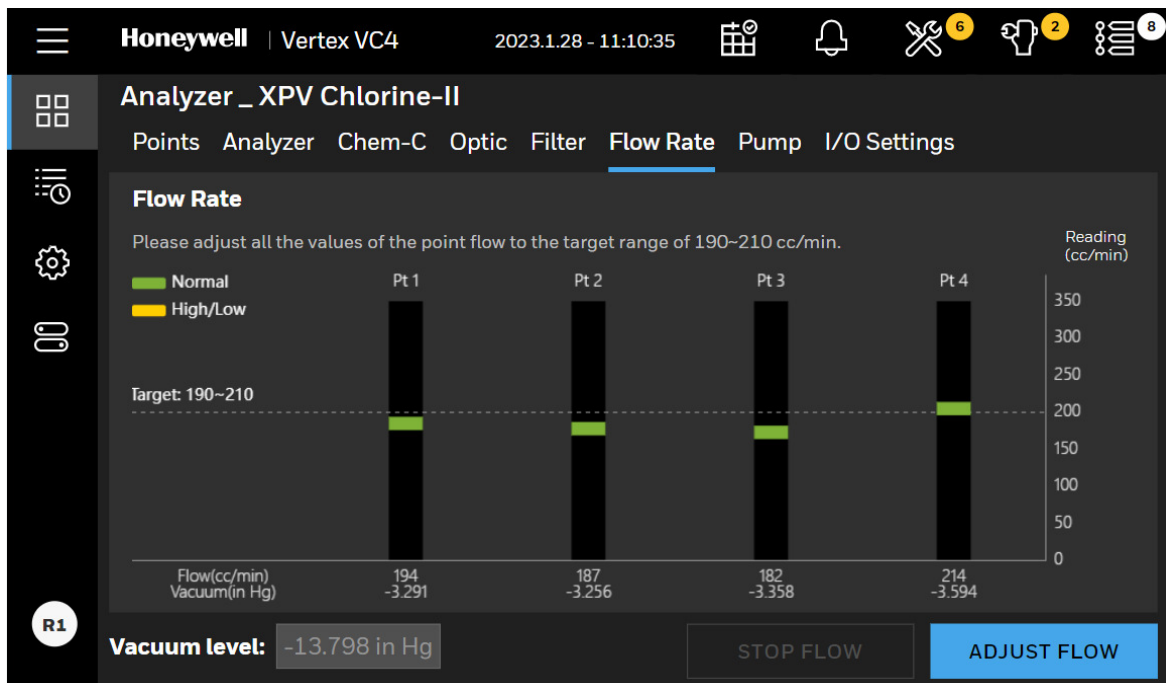
4. Click **ADJUST FLOW** and adjust the needle valve on the side of the analyzer whilewatching the flow rate on the graph.
5. Once the flow reaches the target flow rate of 200 ± 10cc/min, the bar will change color to green.
6. Repeat for all points that are out of range.
7. Once complete, press **STOP FLOW** for each analyzer. This will stop for the flow for each analyzer.
8. Once all analyzers have the flow stopped, the pump will turn off.

Sample Line Filter Replacement Counter

1. In the left navigation panel, tap **OVERVIEW** .

2. Tap on the **Flow Rate** button to enter the flow detail page.

   Either the regular replacement window highlighted in green or the expired time windowhighlighted in yellow is displayed.
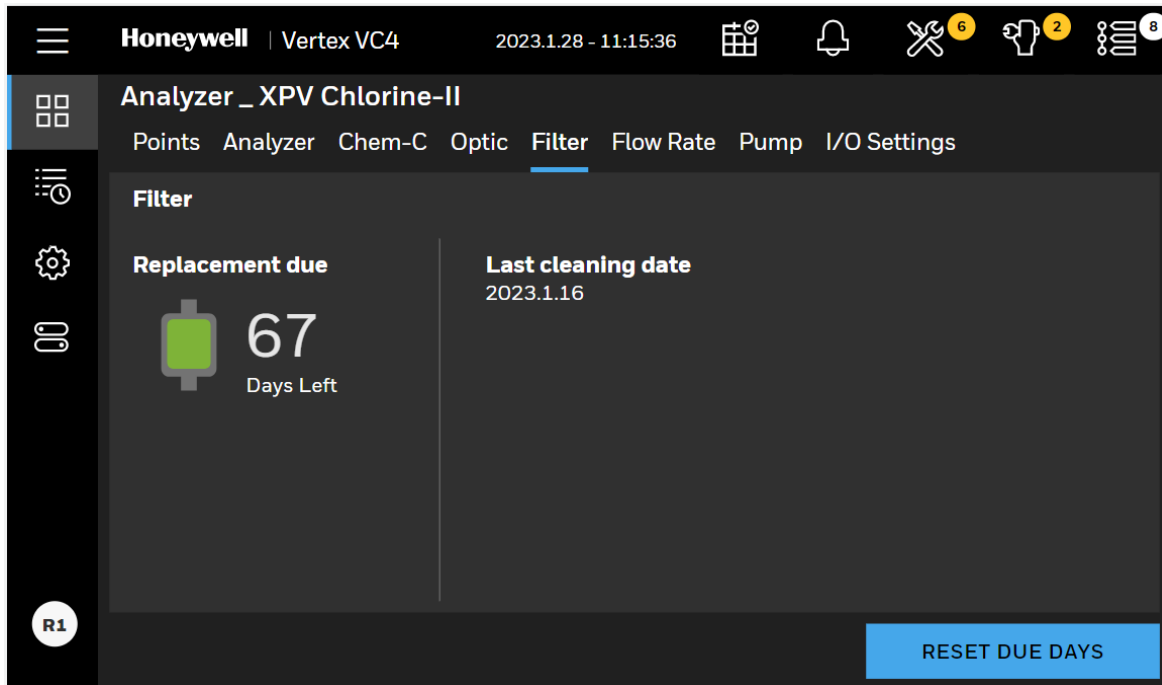
3. End of sample line filters should be replaced on a regular interval of 3 months
4. Tap the **RESET UPTIME DAYS** button to reset the due days.

> **NOTE**
> This counter should be used with end of sample line filters only.

> **NOTE**
> Internal filters protecting the orifice should be inspected and cleaned on a regular interval of 6 months. See the "Orifice Filter Inspection, Cleaning & Replacement" part for more information.

2 mA Fault Operation

Use the 2 mA fault operation function to enable a 2 mA signal on the current loop that indicates when an instrument fault occurs. The VERTEX™ VC4 differentiates between a power loss and a fault by dropping the signal to 0 mA after a power loss or CPU failure and 2 mA when an instrument fault occurs. When enabled, the fault operation function causes the calibrate current loop function from the Calibration Mode to include the 2 mA outputs as part of the VERTEX™ VC4's fault routine.

Calibrate Current Loop

The Calibrate Current Loop function calibrates the external analog devices connected to the module by generating a 2 mA to 20 mA analog signal from each individual point. If 2 mA fault indication is disabled, then the minimum current will change from 2 mA to 4 mA. This function provides three methods to calibrate connected devices:
- Toggling between 2 mA, 4 mA, and 20 mA signal levels
- Automatically changing output signal levels beginning at 2 mA and going up to 20 mA
- Step up the current loop from 4 mA to 20 mA in 1 mA increments.

Selecting the Signal Levels Manually

Selecting Signal Levels – Automatic Ramping

Selecting Signal Levels – Step

Tune Current Loop

The Tune Current Loop function allows you to adjust the VERTEX™ VC4 monitor's output level so that it is correlated from zero to full scale with a driven device (an instrument used to monitor 4-20 mA output).
This is necessary only if new current loop hardware has been field installed.

Set Relay State

Select the state of the relay contacts to either energized

NOTE: The default condition is de-energized for all relay contacts except the watchdog relay, which remains energized as a failsafe precaution in the event of power loss.

Selecting the energized state changes all relay states, except the watchdog. If power is lost, energized relays change state if they are selected to be energized. Be sure that this will not initiate a false alarm condition in your facility

CAUTION

Selecting the energized state changes all relay states, except the watchdog. If power is lost, energized relays change state if they are selected to be energized. Be sure that this will not initiate a false alarm condition in your facility

Set Serial Communication

The rear panels of the VERTEX™ VC4 monitor allows installation of up to three optional serial interface ports. These ports are designed to allow output to other devices, and two-way communication between the VERTEX™ VC4 monitor and another device.

There are three serial interfaces available for the VERTEX™ VC4 monitor, each designed for a specific communication application. The options are:
• RS-232 for remote bidirectional binary communication
• RS-422 for remote bidirectional binary communication
• RS-485 for remote multi-drop bidirectional binary communication via two-wire transmission

View and Export the Events History Listed By Time

1. In the left navigation panel, tap Event History ![icon].

2. Tap in the listed **By Time** tab. A list of all events is displayed.

3. Tape the filter ![icon] button, there are more filter types can be seleceted.

4. Tape the ![icon] button, you can fliter the events by time range.

Export the Events History

1. Insert a USB flash drive to Vertex™ VC4 HMI PC.

2. Tap the **Export** icon to export the event histories to CSV file.

3. Export event history screen will pop up asking the user to enter a file name. Type a file name and touch **NEXT** button.

4. Select a USB drive to export the event histories and touch **NEXT** button. Once exporting is complete, the "Exporting is completed" screen will be shown as below. It may take several minutes depending on number of events to be exported.
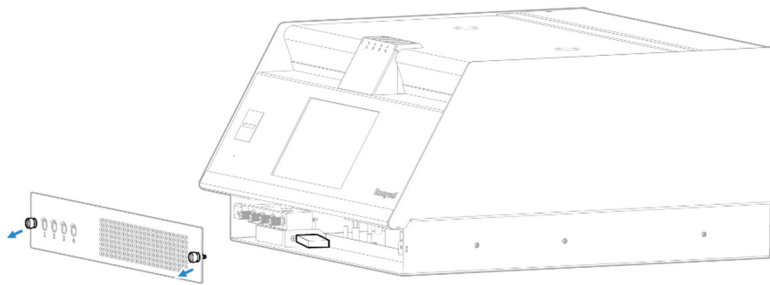
View and Export The Events History by Analyzer

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.

View System Version Information

Version Manager shows version information of Vertex™ VC4 system components such as Analyzer, DAq and PDU. The version information includes FW version, HMI application version, part numbers, serial numbers and Rack ID.

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

2. Tap on the **HMI Version** or **PDU Version** tab to view detailed version information of the system components.

3. In Version Information tab, the summary of version information is shown and can be exported to a CSV file. Tap on the **EXPORT** button and enter file name to export a version

Fault/Alarm Test

Fault Test

Use the Fault Test to verify operation of fault relays

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

Alarm Test

Use the alarm test to simulate a gas concentration for any analyzer
Note:
The alarm test simulates an actual alarm condition and the Vertex System activates all alarm relays. Notify appropriate personnel that you plan to conduct an alarm test.

View Help File

1. In the left navigation panel, tap HELP

2. Navigate the help using navigation panel on the top of help.

Update an Analyzer Firmware

To update an analyzer firmware, a CD or USB flash drive with an update file should be prepared. Please contact Honeywell Analytics to get the latest update SW files.

1. From the main menu, go to **System Manager** > **Version Manager**
2. Insert the CD or USB flash drive to the Vertex™ VC4 HMI PC.
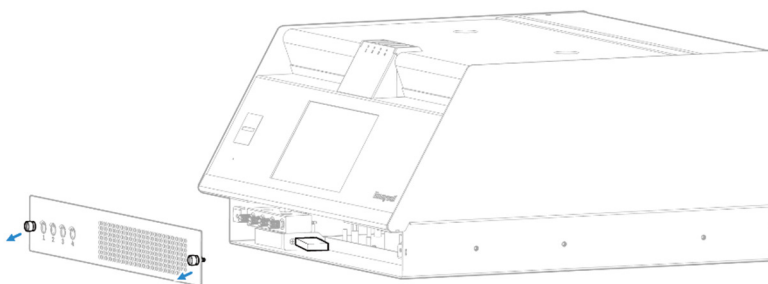
3. Tap on the IMPORT button to copy an update file from USB flash drive to HMI PC
4. Select an analyzer update file. If the selected update file is valid, HMI will import it successfully as below.

5. After importing the target update file, select the Analyzers to be updated and tap on "Update" button. A user will be asked to select the system type and a target firmware file in the list as below. The updatable firmware is as below：
   - Analyzer firmware
   - Control firmware
   - Optic firmware

6. Tap on the **Next** button. Select the analyzers you are going to update firmware. Tape on the Next button, the Stop monitoring screen will pop up asking a user to confirm it.

7. Tap on **CONTINUE** button and firmware update will be started. The firmware update progress has two steps. The first step is that the update file is being transferred to Analyzers, and the second step is that the Analyzers are updating the firmware. If there is any communication error or any issue in updating the firmware, the Error message page will be shown instead.

8. Tap on **Done** button when Firmware update is done with green smile face and it moves back to Version Manager screen with updated version information.

System Shutdown

Failure to properly shut down the Vertex™ VC4 could result in system file corruption

1. Go to Runtime Operation and stop monitoring mode for all analyzers.

2. Go to Settings->System Switch and touch System Shutdown Touch Proceed on the confirmation screen

3. Set all analyzer switches on PDU to "Off"
4. Once all analyzers are off, set the main power switch to "Off"

5 Maintenance

This section describes routine maintenance procedures.

Maintenance Schedule

Component	Frequency
Sample line filters (end of line)	3-6months
Teflon Corrosive Filter Membrane (end of line)	1 month
Teflon Corrosive Filter	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
Orifice Filter	3-6 months

Replace the Chemcassette®

Change the Vertex™ VC4 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 **Analyzer** button to enter to the analyzer detail page.
3. In the Components status bar,
   tap on the Chemcassette® button .
4. In the Chemcassette® page, tap **REPLACE CHEMCASSETE**.

5. **Stopping monitoring mode** confirmation screen pops up. Tap **CONFIRM**.

6. The tape replacement procedure gets started. The Analyzer is released, and the Optics gateopens.

7. When you see this page, pull out the Analyzer and remove old Chemcassette® tape.

8. Route the Chemcassette®tape through Optics blocks and guide rollers.
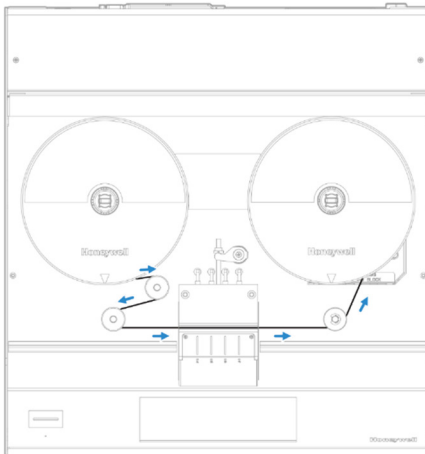
9. Install the leader tape into slot of the pick-up reel.
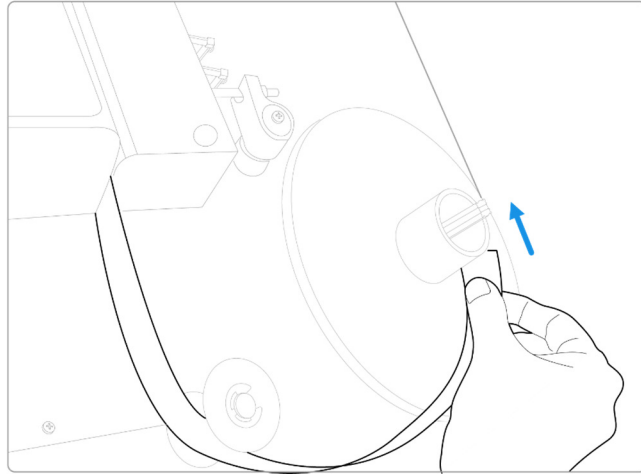
10. When the Chemcassette® leader is installed, adjust the leader tape by verifying the optics block should be placed between the two "ALIGN" marks on the tape leader. The alignment is essential to adjust and verify the Optics module before gas monitoring.
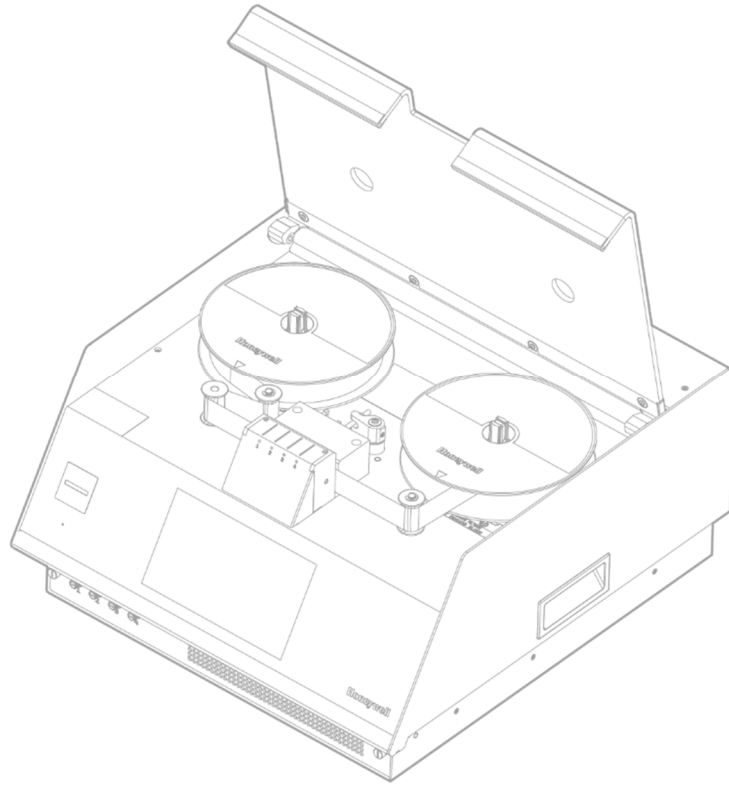
11. When new Chemcassette®is installed correctly, tap **NEXT**.

12. The Analyzer reads the RFID tag on the Chemcassette® tape and shows the tape information.Check the Chemcassette® information and if no issue appears, 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 as below picture, Optics adjustment and verification steps will be skipped.

14. After completing the Optics adjustment/Verification, either turn the analyzer into monitoring or leave them as idle by tapping **MORNITOR** or **IDLE**.

Replace Pump

The Vertex™ VC4 System includes one vacuum pumps. ~~One pump operates while the other is idle.~~You may replace a defective pump with a new good one.

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

 WARNING

The pump to be disconnected must be off

1. Power off VC4 and disconnect power/internet/digit cable and inlet/exhaust 1/4-inch tubes in backside of VC4 Monitor. Push down the latch on both sides of VC4' slide and pull out VC4 from Rack. (if VC4 monitor is setted up in Rack)

2. Open cover and chassis top to service position; disconnect pump power connect and barb fitting from pump's quick connector fitting.

3. Unscrew six screw on rear cover of VC4 and disassemble rear cover.

4. Loose screw nut 1 and disassemble screw nut 2 and ground wire from screw bolt 2.

5. Disconnect tube from pump's quick connector fitting. Slide out pump assembly on proper location and Then take out pump assembly.

6. Unscrew these four nuts , disassemble ground wire and pump from bracket.

7. Reinstall new pump into bracket and assemble ground wire and fasten the four nuts.

8. Repeat steps in reverse order to finish the pump replacement.

Replace Internal Filters

The Model VERTEX™ VC4 will use one of the filter blocks shown in Figure 9-7. Note the positions of the filters for your type of filter block. The filter block is keyed to fit only one way into the instrument

1. Open VC4 cover to the servicing position.

2. Take away the right Chemcassette tape.

3. Grasp the filter block handle (2) and pull out.

4. The filters are attached with a quick disconnect connector. Remove the filter by pressing the gray ring (3) against the fitting and sliding the filter out of the fitting.

5. Install the new filters by fully inserting the fittings. Filters have an arrow on the filter body indicating the direction of flow. The arrows should point toward the filter block. Be sure to orient the filters correctly

6. Reinstall the filter block (1).

7. Reinstall the Chemcassette tape and close VC4 cover

Fuse Replacement

The Vertex™ VC4 is protected with a fuse located on the rear panel beneath the power cord.

To replace the AC line fuse,
1. Unplug the power cord.
2. With a slotted screwdriver, carefully pry the fuse cap outward.
3. Always replace fuses with the same type and style.
4. Replace the fuse cap.

NOTE: A spare fuse is located on top side of fuse cap.
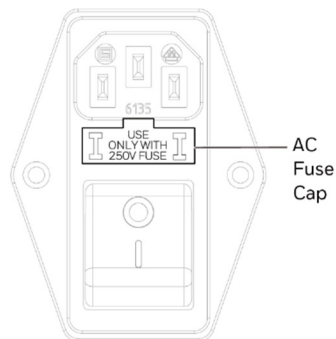
This section describes the AC line fuse. The acceptable fuse values,

Orifice Inspection, Cleaning & Replacement

The orifice is protected by filter. In general, there is no need to replacement or cleaning. In the event that a particle or foreign object makes it past the end of sample line filter, the orifice is clogging and slowing down sample transport times, you may clean or replace orifice.

> **NOTE**
> This inspection should only take place on analyzers that are disconnected from the rack, or if the ENTIRE rack is out of monitor mode.

1. Open VC4 cover to the servicing position.

2. Take away the right Chemcassette tape.

3. Use needle nose pliers to clamp orifice cartridge head and pull out it from the manifold

4. Once removed, cleaning the cartridge for any debris on the surface. (check orifice on the end of cartridge.)
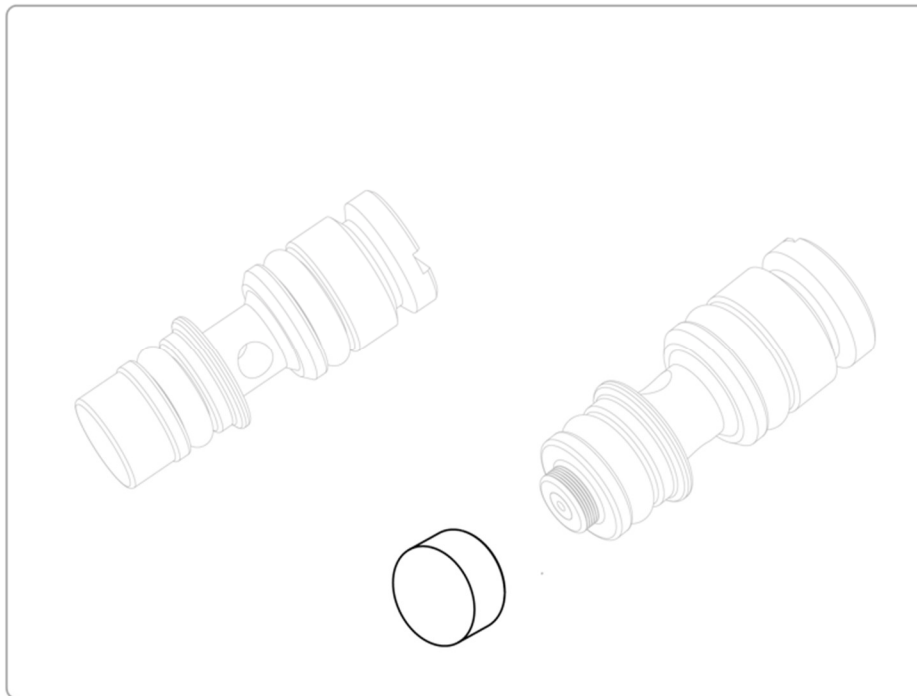
5. Replace the cleaned or new orifice into the cavity it came from, check that the orifice is fully installed into the manifold
6. Align the slot on the back side of the orifice to be horizonal.
7. Repeat the process with the rest of the points
8. Once all points are cleaned replace the orifice panel

Clean the Optics

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

Compressed air is requirC-ed or per the locations PM schedule.

1. Make sure the Analyzer is out of Monitor Mode.
2. Open the Optics Block Gate.
3. Remove the Chemcassette® by releasing and pulling out the analyzer.
4. Open the Vertex™ VC4 Analyzer side panel.
5. Remove tubing (shown in photo) one at the time and blow out with compressed air.

6. 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 bereset to avoid unnecessary maintenance warning due to Optics cleaning due. (See "Adjust the Optics" above for more information.)

CAUTION

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

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.

6 Additional Information

Learn from about strategic information related to the Honeywell Vertex™ VC4 Detector.

Specifications

Module	
Part No.	1904C-1000, 110V $\pm$ 10% VAC 50/60Hz 1904C-1002, 220V $\pm$ 10% VAC 50/60Hz
OVERALL SYSTEM DIMENSION	
Size	8.7"(H) x 17"(W) x 17.9"(D) (22 x 43 x 45cm) (Table mount) 8.7"(H) x 17.5"(W) x 17.9"(D) (22 x 45 x 45cm) (Rack mount)
Weight	≤ 23kg (51lbs)
POWER REQUIREMENTS	
Operating voltage	~3A @ 110V ~2A @ 230V
DISPLAY AND OUTPUTS	
Visual	7" 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)
Local Alarm indication	Audible and visual
Fieldbus Outputs	TCP/IP and RTU Modbus, Profibus (Optional), Relay output (Optional)
Serial Outputs (Optional)	RS232, RS422, and RS485

Relay Outputs	Relay contacts (500mA minimum) 2A @ 120VAC, form C contacts. Programmable low and high levels, maintenance, watch dog, energized or de-energized, latching or nonlatching
Current Loop Outputs (per Point)	4-20mA isolated (2-4mA range available for fault indicators)
SECURITY	
	Role-based access control Support HTTPS
CERTIFICATION AND SPECIFICATION	
	EN50270; UL/IEC/EN 61010; RED, FCC, NCC for RFID
PERFORMANCE	
	Refer to product manual for complete gas list
Flow rate	2.8 LPM
Transport time	Less than 40 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) Teflon tubing
Tubing length	Up to 400ft (120m) maximum
Exhaust line tubing	16 mm O.D. x 13 mm I.D. Teflon tubing or Polypropylene tubing
Exhaust length	Up to 50 ft. (15 m) maximum
OPERATING CONDITIONS	
Temperature	50°F to 140°F (10°C to 40°C)
Humidity	20-80% RH
Altitude	-1000 ft. (−305 m) to 6000 ft. (1829 m) above sea level
Pollution degree	2
WIRING REQUIREMENT	
Power	Singe phase power, Minimum 14 AWG
Outputs	Modbus TCP/IP: CAT5 shielded cable or equivalent (RJ45 connector) Modbus RTU: 2-wire stranded, shielded cable or equivalent (24-14 AWG) Serial outputs: DB9 connector Relay output: 24-14 AWG Current output: 24-14 AWG

Detectable Gases

Vertex™ VC4 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	25 ppb	50 ppb	0-500 ppb	3-500 ppb	30	<24 sec (Alarm @ 50 ppb with 100 ppbAsH3 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	<60 sec
		3	Diborane XP (B2H6)	100 ppb	15 ppb	10 ppb	50 ppb	100 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	100 ppb	200 ppb	0-2000 ppb	100-149 ppb 150-199 ppb 200-2000 ppb	480 360 240	<200 sec
		5	Phosphine XP (PH3)	50 ppb	5 ppb	5 ppb	25 ppb	50 ppb	0-3000 ppb	5-3000 ppb	15	<30 sec (Alarm @ 300ppb with 600ppbPH3 gas)
		6	Silane XP (SiH4)	5 ppm	0.5 ppm	0.3 ppm	2.5 ppm	5 ppm	0-50 ppm	0.5-4.9 ppm 5-9.9 ppm 10-19.9 ppm 20-50 ppm	60 45 30 15	<35 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	<35 sec
		8	Hydrogen Sulfide XP (H2S)	1 ppm	0.2 ppm	0.1 ppm	0.5 ppm	1 ppm	0-10 ppm	0.2-0.4 ppm 0.5 - 0.9 ppm1-1.9 ppm 2-10 ppm	45 30 15 10	20 sec
		9	Hydrogen Sulfide XP (H2S) Low Level	1 ppm	20 ppb	15 ppb	250 ppb	500 ppb	0-2000 ppb	20-99 ppb 100-199 ppb 200-399 ppb 400-2000 ppb	120 60 30 15	<20sec (Alarm @ 500 ppb with 1000 ppbH2S gas)
		10	Hydrogen Selenide XP (H2Se)	50 ppb	8 ppb	6 ppb	25 ppb	50 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	25 ppb	50 ppb	0-500 ppb	3-500 ppb	30	<24 sec (Alarm @ 50 ppb with 100 ppbAsH3 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	<60 sec
		3	Diborane XP4 (B2H6)	100 ppb	15 ppb	10 ppb	50 ppb	100 ppb	0-1000 ppb	15-49 ppb 50-99 ppb 100-1000 ppb	60 45 30	<45 sec
		4	Germane XP4 (GeH4)	200 ppb	100 ppb	100 ppb	100 ppb	200 ppb	0-2000 ppb	100-149 ppb 150-199 ppb 200-2000 ppb	480 360 240	<200 sec
		5	Phosphine XP4 (PH3)	50 ppb	5 ppb	5 ppb	25 ppb	50 ppb	0-3000 ppb	5-3000 ppb	15	<30 sec (Alarm @ 50ppb with 100ppbPH3 gas)
		6	Silane XP4 (SiH4)	5 ppm	0.5 ppm	0.3 ppm	2.5 ppm	5 ppm	0-50 ppm	0.5-4.9 ppm 5-9.9 ppm 10-19.9 ppm 20-50 ppm	60 45 30 15	<35 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	<35 sec
		8	Hydrogen Sulfide XP4 (H2S)	1 ppm	0.2 ppm	0.1 ppm	0.5 ppm	1 ppm	0-10 ppm	0.2-0.4 ppm 0.5 - 0.9 ppm1-1.9 ppm 2-10 ppm	45 30 15 10	20 sec
		9	Hydrogen Sulfide XP4 (H2S) Low Level	1 ppm	20 ppb	15 ppb	250 ppb	500 ppb	0-2000 ppb	20-99 ppb 100-199 ppb 200-399 ppb 400-2000 ppb	120 60 30 15	<20 sec (Alarm @ 500 ppb with 1000 ppbH2S gas)
		10	Hydrogen SelenideXP4 (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	25 ppb	50 ppb	0-500 ppb	3-500 ppb	30	<20 sec (Alarm @ 50 ppb with 100 ppbAsH3 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	<60 sec
		3	Diborane XP6 (B2H6)	100 ppb	15 ppb	10 ppb	50 ppb	100 ppb	0-1000 ppb	15-49 ppb 50-99 ppb 100-1000 ppb	60 45 30	<45 sec
		4	Germane XP6 (GeH4)	200 ppb	100 ppb	100 ppb	100 ppb	200 ppb	0-2000 ppb	100-149 ppb 150-199 ppb 200-2000 ppb	480 360 240	<200 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 con-centration, 10ft sample line
		5	Phosphine XP6 (PH3)	50 ppb	5 ppb	5 ppb	25 ppb	50 ppb	0-3000 ppb	5-3000 ppb	15	<30 sec (Alarm @ 50ppb with 100ppbPH3 gas)
		6	Silane XP6 (SiH4)	5 ppm	0.5 ppm	0.3 ppm	2.5 ppm	5 ppm	0-50 ppm	0.5-4.9 ppm 5-9.9 ppm 10-19.9 ppm 20-50 ppm	60 45 30 15	<35 sec
		7	Silane-M XP6 (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	<35 sec
		8	Hydrogen Sulfide XP6 (H2S)	1 ppm	0.2 ppm	0.1 ppm	0.5 ppm	1 ppm	0-10 ppm	0.2-0.4 ppm 0.5 - 0.9 ppm1-1.9 ppm 2-10 ppm	45 30 15 10	20 sec
		9	Hydrogen Sulfide XP6 (H2S) Low Level	1 ppm	20 ppb	15 ppb	250 ppb	500 ppb	0-2000 ppb	20-99 ppb 100-199 ppb 200-399 ppb 400-2000 ppb	120 60 30 15	<20 sec (Alarm @ 500 ppb with 1000 ppbH2S gas)
		10	Hydrogen SelenideXP6 (H2Se)	50 ppb	8 ppb	6 ppb	25 ppb	50 ppb	0-500 ppb	8-49 ppb 50-99 ppb 100-500 ppb	180 120 60	<45 sec
4	XP Mineral Acids (1295-0507)	1	Boron Trifluoride XP (BF3)	0.1 ppm	0.05 ppm	0.04 ppm	0.05 ppm	0.1 ppm	0-10 ppm	0.05-0.99 ppm 1.0-10.0 ppm	45 30	<100 sec (Alarm @0.1ppm with 0.2ppm BF3 gas)
		2	Hydrogen Bromide XP (HBr)	2 ppm	0.3 ppm	0.2 ppm	1 ppm	2 ppm	0-20 ppm	0.3-1.9 ppm 2-20 ppm	45 30	<50 sec
		3	Hydrogen Bromide XP (HBr) Low Level	2 ppm	30 ppb	20 ppb	100 ppb	200 ppb	0-2000 ppb	30-99 ppb 100-399 ppb 400-2000 ppb	180 120 60	<100 sec (Alarm @ 200 ppb with 400ppb HBr gas)
		4	Hydrogen Chloride XP (HCl)	2 ppm	0.2 ppm	0.2 ppm	1 ppm	2 ppm	0-20 ppm	0.2-0.9 ppm 1-3.9 ppm 4-20 ppm	60 30 20	<40 sec
		5	Hydrogen Chloride XP (HCl) Low Level	2 ppm	30 ppb	20 ppb	100 ppb	200 ppb	0-2000 ppb	30-199 ppb 200-399 ppb 400-2000 ppb	240 150 90	<135 sec (Alarm @ 200 ppb with 400 ppbHCl gas)
		6	Hydrogen Fluoride XP(HF)	0.5 ppm	0.4 ppm	0.4 ppm	1 ppm	2 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)

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	0.05 ppm	0.1 ppm	0-10 ppm	0.05-0.99 ppm 1.0-10.0 ppm	45 30	<100 sec (Alarm @0.1ppm with 0.2ppm BF3 gas)
		2	Hydrogen Bromide XP4 (HBr)	2 ppm	0.3 ppm	0.2 ppm	1 ppm	2 ppm	0-20 ppm	0.3-1.9 ppm 2-20 ppm	45 30	<50 sec
		3	Hydrogen Bromide XP4 (HBr) Low Level	2 ppm	30 ppb	20 ppb	100 ppb	200 ppb	0-2000 ppb	30-99 ppb 100-399 ppb 400-2000 ppb	180 120 60	<200 sec (Alarm @ 200 ppb with 400ppb HBr gas)
		4	Hydrogen ChlorideXP4 (HCl)	2 ppm	0.2 ppm	0.2 ppm	1 ppm	2 ppm	0-20 ppm	0.2-0.9 ppm 1-3.9 ppm 4-20 ppm	60 30 20	<40 sec
		5	Hydrogen Chloride XP4 (HCl) Low Level	2 ppm	30 ppb	20 ppb	100 ppb	200 ppb	0-2000 ppb	30-199 ppb 200-399 ppb 400-2000 ppb	240 150 90	<135 sec (Alarm @ 200 ppb with 400 ppbHCl gas)
		6	Hydrogen Fluoride XP4 (HF)	0.5 ppm	0.4 ppm	0.4 ppm	1 ppm	2 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)

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 con-centration, 10ft sample line
6	XP Ammonia (1295-0405)	1	Ammonia XP (NH3)	25 ppm	1.5 ppm	1.5 ppm	12.5 ppm	25 ppm	0-150 ppm	1.5 - 49.9 ppm 50 - 150 ppm	10 10	<25 sec
		2	Dimethylamine XP (DMA)	5.0 ppm	0.5 ppm	0.5 ppm	2.5 ppm	5.0 ppm	0-50 ppm	0.5-2.4 ppm 2.5-50.0 ppm	15 10	<30 sec
		3	Tetrakis Dimethylamino Titanium XP (TDMAT)	None Estimated	0.1 ppm	0.1 ppm	0.5 ppm	1.0 ppm	0-10 ppm	0.1-0.4 ppm 0.5-10.0 ppm	15 10	<30 sec (Alarm @1ppb with 2ppm TDMAT gas)
7	XP4 Ammonia (1257-9309)	1	Ammonia XP4 (NH3)	25 ppm	1.5 ppm	1.5 ppm	12.5 ppm	25 ppm	0-150 ppm	1.5 - 49.9 ppm 50 - 150 ppm	10 10	<25 sec
		2	Dimethylamine XP4 (DMA)	5.0 ppm	0.5 ppm	0.5 ppm	2.5 ppm	5.0 ppm	0-50.0 ppm	0.5-2.4 ppm 2.5-50.0 ppm	15 10	<30 sec
		3	Tetrakis Dimethylamino Titanium XP4 (TDMAT)	None Estimated	0.1 ppm	0.1 ppm	0.5 ppm	1.0 ppm	0-10 ppm	0.1-0.4 ppm 0.5-10.0 ppm	15 10	<30 sec (Alarm @1ppb with 2ppm TDMAT gas)
8	XP6 Ammonia (1507-9309)	1	Ammonia XP6 (NH3)	25 ppm	1.5 ppm	1.5 ppm	12.5 ppm	25 ppm	0-150 ppm	1.5 - 49.9 ppm 50 - 150 ppm	10 10	<25 sec
		2	Dimethylamine XP6 (DMA)	5.0 ppm	0.5 ppm	0.5 ppm	2.5 ppm	5.0 ppm	0-50.0 ppm	0.5-2.4 ppm 2.5-50.0 ppm	15 10	<30 sec
		3	Tetrakis Dimethylamino Titanium XP6 (TDMAT)	None Estimated	0.1 ppm	0.1 ppm	0.5 ppm	1.0 ppm	0-10 ppm	0.1-0.4 ppm 0.5-10.0 ppm	15 10	<30 sec (Alarm @1ppb with 2ppm TDMAT gas)
9	Phosgene (1295-0228)	1	Phosgene XP (COCl2)	100 ppb	10 ppb	7 ppb	50 ppb	100 ppb	0-4000 ppb	10-49 ppb 50-99 ppb 100-199 ppb 200-4000 ppb	60 45 30 15	<30 sec
		2	Phosgene XP (COCl2)High Range	100 ppb	10 ppb	7 ppb	50 ppb	100 ppb	0-4000 ppb	10-49 ppb 50-99 ppb 100-199 ppb 200-4000 ppb	60 45 30 15	<30 sec
10	Phosgene (1257-9309)	1	Phosgene XP4 (COCl2)	100 ppb	10 ppb	7 ppb	50 ppb	100 ppb	0-4000 ppb	10-49 ppb 50-99 ppb 100-199 ppb 200-4000 ppb	60 45 30 15	<30 sec
		2	Phosgene XP4 (COCl2) High Range	100 ppb	10 ppb	7 ppb	50 ppb	100 ppb	0-4000 ppb	10-49 ppb 50-99 ppb 100-199 ppb 200-4000 ppb	60 45 30 15	<30 sec
11	XPV Chlorine-II (1295-0560)	1	Fluorine XP-Cl2-II (F2)	0.1 ppm	0.06 ppm	0.06 ppm	0.5 ppm	1 ppm	0-10 ppm	0.06-1.99 ppm 2.0-3.90 ppm 4.0-10.0 ppm	90 60 30	<75 sec (Alarm @ 0.1ppm with 0.2 ppm F2 gas) <25 sec (Alarm @ 1.0ppmwith 2.0 ppmF2 gas)
		2	Fluorine XP-Cl2-II (F2) (Low Level)	0.1 ppm	0.05 ppm	0.03 ppm	0.05 ppm	0.1 ppm	0-1.0 ppm	0.05-0.199 ppm 0.2-1.0 ppm	120 60	<85 sec (Alarm @ 0.1ppm with 0.2ppm F2 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
		3	Chlorine XP-Cl2-II (Cl2)	0.1 ppm	0.06 ppm	0.05 ppm	0.1 ppm	0.2 ppm	0-5 ppm	0.06-0.24 ppm / 0.25-5.0 ppm	45 / 30	<40 sec (Alarm @ 0.1ppm with 0.2ppmCl2gas) <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	0.05 ppm	0.1 ppm	0-1.0 ppm	0.03 - 0.099 ppm / 0.1 - 0.199 ppm / 0.2 -1.0 ppm	120 / 90 / 60	<110 sec (Alarm @ 0.1ppm with 0.2ppmCl2 gas)
12	Fluorine/Oxidizer (1295-0220)	1	Chlorine (Cl2)	0.1 ppm	0.05 ppm	0.04 ppm	0.05 ppm	0.1 ppm	0-5 ppm	0.05-0.24 ppm / 0.25-0.49 ppm / 0.5-5 ppm	45 / 30 / 15	<40 sec (Alarm @ 0.5ppm with 1ppm Cl2gas)
		2	Fluorine (F2)	0.1 ppm	0.1 ppm	0.06 ppm	0.5 ppm	1 ppm	0-10 ppm	0.1-0.9 ppm / 1.0-10 ppm	60 / 30	<80 sec (Alarm @ 0.1ppm with 0.2 ppmF2 gas)
		3	Nitrogen Dioxide(NO2)	0.2 ppm	0.07 ppm	0.05 ppm	0.1 ppm	0.2 ppm	0-30 ppm	0.07-8.9 ppm / 9-30 ppm	240 / 120	350 sec
13	Sulfur Dioxide (1295-0552)	1	Sulfur Dioxide (SO2)	250 ppb	30 ppb	25 ppb	125 ppb	250 ppb	0-2500 ppb	30-249 ppb / 250-2500 ppb	60 / 30	<60 sec
14	Hydrogen Cyanide (1295-0222)	1	Hydrogen Cyanide (HCN)	4.7 ppm	1 ppm	0.5 ppm	2.3 ppm	4.7 ppm	0-30 ppm	1-9.9 ppm / 10-19.9 ppm / 20-30 ppm	30 / 20 / 15	<25 sec
15	XP4 Chlorine (1257-9308)	1	Chlorine (Cl2)	0.1ppm	0.05 ppm	0.05 ppm	0.05 ppm	0.1 ppm	0-5 ppm	0.05-0.24 ppm 0.25-5.0 ppm	45 / 30	<53 sec
		2	Chlorine (Cl2) (Low Level)	100 ppb	30 ppb	7 ppb	50 ppb	100 ppb	0 - 2000 ppb	30 - 199 ppb / 200 - 499 ppb / 500 -2000 ppb	120 / 90 / 60	<65 sec
TLV - Threshold Limit Value — LAL - Lowest Alarm Level — LDL - Low Detection Limit												

Maintenance Faults

A maintenance fault indicates the Vertex™ VC4 System requires attention but is continuing to monitor.

Event ID	Description	Possible Cause	Resolution
101	Flow is 70 cc/min less than nominal	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	Less than preset reminder on the Chemcassette®	Replace the Chemcassette®
103	Analyzer out of monitor too long	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 time out	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	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 70 cc/min more than nominal	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	Chemcassette® expiration date reached	Replace Chemcassette®
		Chemcassette® installed past its expiration date	Replace Chemcassette®
108	No polls from HMI for 10 seconds	Communications to HMI PC interrupted longer than 10 seconds	Check Ethernet cable at rear of analyzer
			Check Ethernet hub connection and operation
			Check Ethernet connection to HMI PC
			Contact Honeywell Analytics Service.

Event ID	Description	Possible Cause	Resolution
109	Single pumpfailure	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 ContactHoneywell Analytics Service
110	Optics Block Dirty - CleaningRequired	Optic block dirty	Clean optics.
			Contact Honeywell Analytics Service.
		Optic block is aged	Replace optics block
		Tape leader installed improperly	Reload Chemcassette® and recalibrateusing leader
111	Sample PressureHigh	End of line filter clogged	Replace end of line filter
		Sample line kinked	Isolate by disconnecting possiblecrimped 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 bychecking pressure with analyzer closed vs. open
112	Analyzer restart failed after pumpswap	Control related fault is issued because of an improper control response from another analyzer	Verify the pump connects areconnected.
			Verify all analyzers enter monitormode successfully.
113	Pump Over Temperature	Fan failure	Check fans in pump module
		Line voltage less than 342VAC or higher than 418VAC when high voltage(380VAC) is applied	Verify main line voltage
		Line voltage less than 198VAC or higher than 242VAC when low voltage(220VAC) is applied	
		Thermal Switch connections loose	Check the connections to the Thermal Switch. Sensor located in the middle of the top cover of the pump cabinet.
114	High ExhaustPressure	Kinked exhaust	Check exhaust tubing for kinks orrestrictions
		Exhaust tubing length exceeds 50ft. (15m.)	Reroute to reduce length
		Exhaust line restricted	Clean Exhaust line
			Replace Exhaust line
115	Power Supplyfailure	Power line disconnected	Check power line from PDU toAnalyzer
116	Optics Temperature Out of Range	Hot or Cold environment	Relocate Vertex™ VC4
		Electronic problem	Replace optics block
		Cooling air failure	Replace fans
117	PDU TemperatureOut of Range	Hot or Cold environment	Relocate Vertex™ VC4
		Electronic problem	Replace PDU
118	Filter Timer Expired	Maintenance reminder, no malfunction	Change filter and reset timer

Event ID	Description	Possible Cause	Resolution
119	Optics CleaningTimer Expired	Maintenance reminder, no malfunction	Clean the Optics and reset timer
120	Pump Maintenance Timer Expired	Maintenance reminder, no malfunction	Rebuild pump and reset timer
121	*Reserved for LIToption		
122	*Reserved for LIToption		
123	*Reserved for LIToption		
124	*Reserved for LIToption		
125	Possible debris inoptics block	Debris in optics block	Clean optics block
126	Abnormal Opticsreading detected	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	Low level background gas below lower detectablelimit	Locate source of background gas
128	Ethernet initialization failed	Failed load the driver, Electronic problem	Reboot the analyzers.
			Contact Honeywell Analytics Service.
129	File system ofAnalyzer is corrupted	File system corrupted	Contact Honeywell Analytics Service
130	Optics blocks havedifferent software versions	Program update done incorrectly	Reload program to both optics blocks.
131	Unable To Log event data	File system corrupted	Contact Honeywell Analytics Service
132	Software version mismatched among Analyzers	New analyzer was installed into the Vertex™ VC4 rack that contains a different software revision than the other analyzers	Upgrade analyzer Software
133	This Chemcassette® is nearing its expiration date	Chemcassette® not used too long	Replace Chemcassette®
134	Chemcassette® Type Not Matched	Chemcassette® with wrong gas family installed	Reinstall Configuration Profile
135	Analyzer configuration failed	Analyzer configuration failed	Reinstall Configuration Profile
136	Point configuration failed	Point configuration failed	Check alarm settings and reinstall Configuration Profile
137	Could not start monitoring	Instrument faults not cleared	Resolve the reported instrument faults and reset all faults
		Invalid RFID tag detected	Reinstall Configuration Profile or Replace Chemcassette®
		All points disabled	Reinstall Configuration Profile or enable runtime disabled points
		Invalid Analyzer/Point Configuration	Reinstall Configuration Profile
		LIT in progress	Wait until LIT test is complete and restart monitoring mode
		Tape Advance Failure	See recoveries for Fault 233
138	Analyzer RTC not set correctly	Low voltage of the coin battery	Replace the coin battery
		RTC failure on the analyzer board	Replace Analyzer
139	Power Supply Phase Error	Phase error for pump power supply	Switch the connection of L1 and L3 in Power Box
140	Pump1 current overload	Hardware failure	Contact Honeywell Analytics Service
141	Pump2 current overload	Hardware failure	Contact Honeywell Analytics Service
142	*Reserved for LIToption		

Instrument Faults

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

Event ID	Description	Possible Cause	Resolution
201	Chemcassette® tape decolored	Improper Chemcassette® storage	Confirm Chemcassette® storage meeting temperaturemeets or exceeds the Chemcassette® storage requirements
			Replace Chemcassette®
		Tape is too old	Confirm Expiration date will reach the tape length timeline
			Replace Chemcassette®
202	End of Chemcassette®	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 hardwareconfiguration	Non-volatile memory failure in analyzer CPU	Retry and reboot the Analyzer.Service or replace analyzer.
204	Failed reading hardwareconfiguration	Non-volatile memory failure in analyzer CPU	Retry and reboot the Analyzer.Service or replace analyzer.
205	Gate motor times out	Gate position sensor not activated beforetimeout	Check motor operation using Maintenance, AnalyzerOperations, Open Gate, or Close Gate
		Motor does not operate	Check motor connections to sensor interface PCB inanalyzer
		Bad sensor or cable	Check sensor connection on PCB.
			Contact Honeywell service
206	Gate motor driving failure	Gate position sensor not activated beforetimeout	Check motor operation using Maintenance, AnalyzerOperations, Open Gate, or Close Gate
		Motor does not operate	Check motor connections to sensor interface PCB inanalyzer
		Bad sensor or cable	Check sensor connection on PCB Contact Honeywellservice
207	Optics signals are noisy	Poor grounding	Replace Analyzer, Contact Honeywell service
		Optics block cover loose	Retighten or reinstall as required
208	Optics counts very low <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	Possible Cause	Resolution
209	Gas table file is bad ormissing	No configuration loaded	Reinstall Configuration Profile
210	Optics drive unusually low	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 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 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	See causes for Fault 109	See recoveries for Fault 109
		Circuit breaker tripped	Contact Honeywell
214	Loss of Flow	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 Analyzersmonitoring mode	Queen Analyzer (first in the rack) failed tocommunicate with other Analyzers	Replace first Analyzer in the rack
		Analyzer hardware failure	Replace Analyzer, Contact Honeywell service
216	Point Pressure Out of range	Miscalibrated sensor board or defectivetransducer	Replace Analyzer
217	System Pressure Out of range	Miscalibrated sensor board or defectivetransducer	Replace Analyzer
218	Inadequate AnalyzerVacuum	Improper system pressure adjustment	Adjust system pressure to 10"Hg
219	Optics SW corrupted	Hardware failure	Replace Analyzer
220	Optics Internal SW errors	Cable issue	Confirm cable connections
		Hardware failure	Replace Analyzer, Contact Honeywell service
221	LED adjustment failed due	Optic block dirty	Clean optics.

Event ID	Description	Possible Cause	Resolution
	to insufficient optical signal		Contact Honeywell Analytics Service.
		Optics LED not properly calibrated	Perform Load CC Operation to recalibrate
		LED degradated	Replace the optics block
		Optics board defective	Replace Analyzer, Contact Honeywell service
222	Q-Factor out of range	Chemcassette® leader not tight or improperly positioned during white to light gray calibration	Reload Chemcassette®
		Bad RFID tag	Load new Chemcassette®
		Dirty optics block	Clean and recalibrate
		Bad optics PCB set	Service or replace analyzer
223	Failed reading dark grayleader	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 grayleader	Chemcassette® leader not tight or improperlypositioned 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 SPIcommunication	Bad optics PCB	Replace Optics Block
			Service or replace analyzer
226	Optics reference photodiode out of range	Dirty Optics block	Clean optics. Contact Honeywell Analytics Service.
		Hardware failure	Contact Honeywell Analytics Service
227	LED Drive not stable inOptics	Hardware failure	Contact Honeywell Analytics Service
228	Control module not responding to Analyzer	Hardware failure	Contact Honeywell Analytics Service
229	PDU not responding toAnalyzer	Hardware failure	Contact Honeywell Analytics Service
230	No valid Chemcassette® detected	Chemcassette® changed without using ChangeTape utility	Reload Chemcassette®
		Non-Honeywell tape installed	Unauthorized Tape installed
			Contact Honeywell Analytics Service
231	Chemcassette® write failure	RFID Reader	Replace RIFD Board
			Replace Analyzer, Contact Honeywell service

Event ID	Description	Possible Cause	Resolution
232	Internal voltage error	Internal voltage hardware issue	Contact Honeywell Analytics Service
233	Tape advance failure	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	Hardware failure	Contact Honeywell Analytics Service
235	Abnormal Az current consumption is detected	Hardware failure	Contact Honeywell Analytics Service
236	Internal fault at controlmodule	Hardware failure	Contact Honeywell Analytics Service
237	Internal fault at PDUmodule	Hardware failure	Contact Honeywell Analytics Service
238	Analyzer SW corrupted	Software installation failure	Re-install analyzer software
			Replace Analyzer, Contact Honeywell service

Information Events

The Vertex™ VC4 System enters informational and other non-fault events into the event historydatabase. 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

nt 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
2055	Perform LIT characterization
2056	Unscheduled LIT

Transport Time

OD	0.25" Outside Diameter Tubing				
ID	0.190"(Thin Wall) ID				
Length in feet	100	200	300	327	400
Length in meters	30	61	91	100	122
Sample flow	Time in seconds				
1.6 LPM	20.5	40.9	61.4	66.9	81.9
2.1 LPM	15.6	31.2	46.8	51	62.4
2.2 LPM	14.9	29.8	44.7	48.7	59.5
2.4 LPM	13.6	27.3	40.9	44.6	54.6

Altitude: Flowrate decreases about 3% per 1000 feet

Altitude [ft]	Normal barometric pressure [inHg]	Multiplier
0	29.92	1
500	29.39	0.98
1,000	28.86	0.96
1,500	28.33	0.93
2,000	27.82	0.91
2,500	27.32	0.89
3,000	26.82	0.89
3,500	26.33	0.88
4,000	25.84	0.86
5,000	24.9	0.83
6,000	23.98	0.8

Manual Analyzer Override

The Vertex™ VC4 Analyzer is equipped with a Manual Override button in the event the communications to the Vertex™ VC4 Data Acquisition (DAq) computer halts. This button activatesonly 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™ VC4 HMI window. If the clock is still advancing, then the DAq CPU is not frozen/locked-up and yourlocal Authorized Service Center needs to be contacted for assistance.

On occasions, there may be the need to install a new Chemcassette® to continue monitoring yourfacility, 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 F108 – No polls from HMI

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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™ VC4 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.
   To restart monitoring mode, press and hold button for 4 to 9 seconds.
5. Close and reattach the Analyzer cover, reconnect the Ethernet Communications Cable and slide the Analyzer into the cabinet.

Fix an Unresponsive Vertex™ VC4 Touch Screen

Completely resetting the computer can resolve many issues that cause a frozen/unresponsive screen. Follow these steps to perform a hard reset:

1. Remove any USB devices from the USB ports of the HMI PC if non-default USB devices were inserted. The USB connection from touch screen should remain
2. Turn off the computer by pressing and holding the power button for a few seconds.

3. Turn on the PC by pressing the Power button.
4. Wait until HMI application starts up
5. Check if touch screen is responsive and all connected analyzers are shown on Overview screen

> **NOTE**
> When this occurs, the system will continue to monitor gas.

Filter Compatibility

When monitoring non-corrosive target gases, use filter type A, (P/N 780248), a sample linedust/ particulate filter.

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

The one micron Teflon membrane contained in the Filter B housing (P/N 0235-1096, 100 perpack) should be replaced every 30 days.

Filters have an arrow on the side of the filter pointing in the direction of airflow toward theVertex™ VC4 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_2H_6	Diborane	X		
DMA	Dimethylamine		X	X
F_2	Fluorine		X	X
GeH_4	Germane	X		
H_2S	Hydrogen Sulfide	X		
H_2S-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

Symbol	Gas Name	Filter Type A	Filter Type B	Filter Type C
HF-LL	Hydrogen Fluoride - Low Level		X	X
H_2Se	Hydrogen Selenide	X		
NO_2	Nitrogen Dioxide	X		
$COCl_2$	Phosgene	X		
$COCl_2$/-HL	Phosgene - High Range	X		
PH_3	Phosphine	X		
SiH_4	Silane	X		
SO_2	Sulful Dioxide		X	X
TDMAT	Tetrakis Dimethylamino Titanium		X	X

Replacement Parts & Consumables

Consumables

Chemcassette®	P/N
FLUORINE	
HYDROGEN CYANIDE	
HYDROGEN SULFIDE	
XPV HYDRIDES	
XPV PHOSGENE	
XPV AMINES/AMMONIA	
XPV MINERAL ACIDS	
XPV CHLORINE-II	
XP4-V for AMINES/AMMONIA	
XP4-V for CHLORINE	
XP4-V for HYDRIDES	
XP4-V for MINERAL ACIDS	
XP4-V for PHOSGENE	
XP6-V for Amines/Ammonia	
XP6-V for Hydrides	
XP6-V for Mineral Acids	

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

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 1-8 as shown)
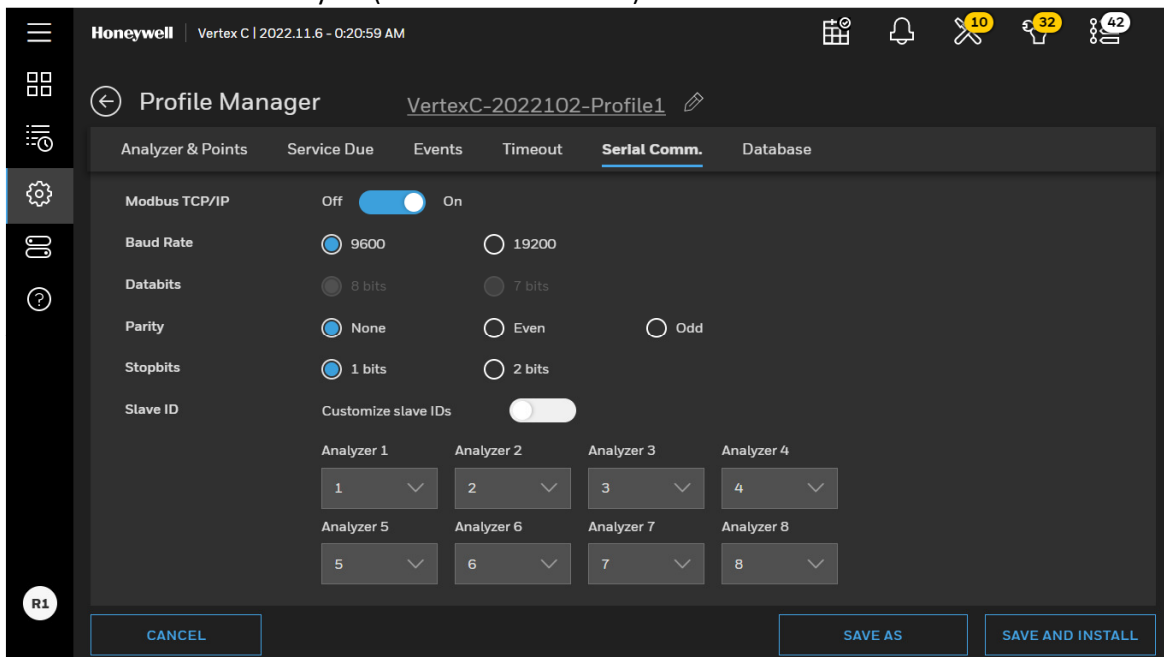
Modbus TCP

- IP Configuration
  - DHCP (Default)
  - Static IP: Static IP address, Gateway, DNS
- Modbus TCP/IP Enable or Disable
- Web interface on port 80
  - Enable
  - Disable (Default)
- Encrypted web interface on port 443
  - Enable
  - Disable (Default)
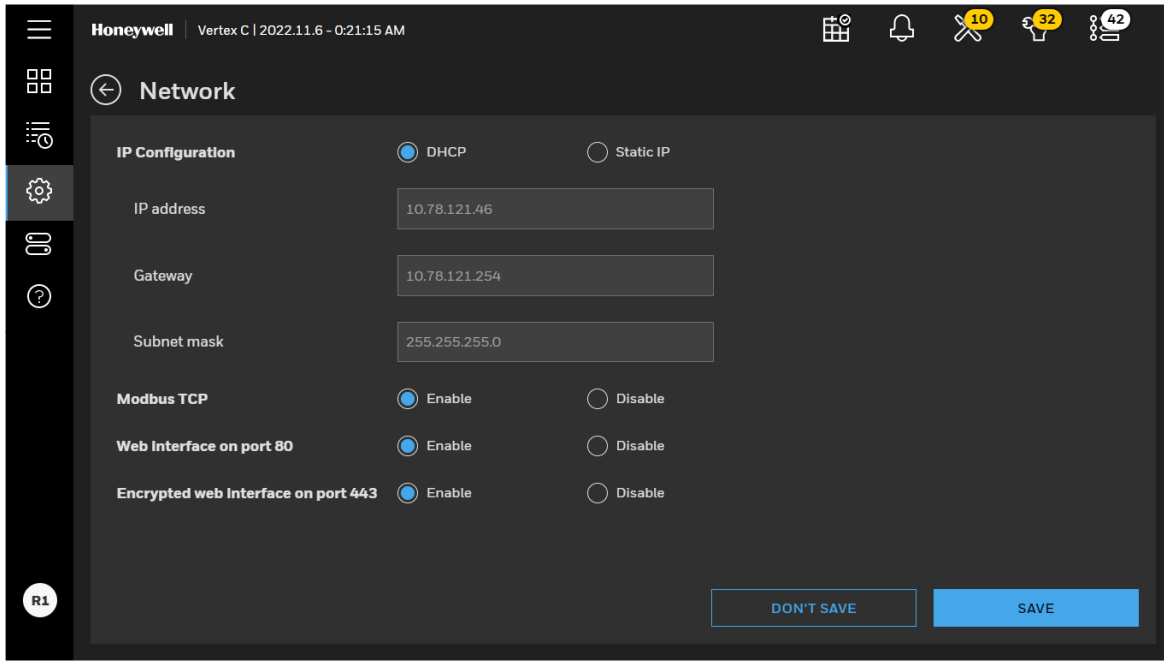
HMI PC Security Considerations

In general we provide out-of-box application and install application to single computer so it's not necessary and not allowed to modify application yourself. Please contact Honeywell service team before any firmware/software updates.
In order to protect your data please lock the device to forbidden touching USB port without permission , keep the key properly.

Connectivity

The Vertex™ VC4 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™ VC4 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, includingremote 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™ VC4 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™ VC4 HMI External Network Services

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

> **NOTE**
> Chrome browser of 93.0.xx or later version is strongly recommended to access to the HMI remotely.

> **NOTE**
> When the web interface is enabled/used, the encrypted interface on port 443 is strongly recommended since HTTP web service is not secure.

HTTPS Connections

When making a connection to the Vertex™ VC4 HMI PC via HTTPS, it will be necessary to acceptthe certificate. A message like the one using Google Chrome will be shown:
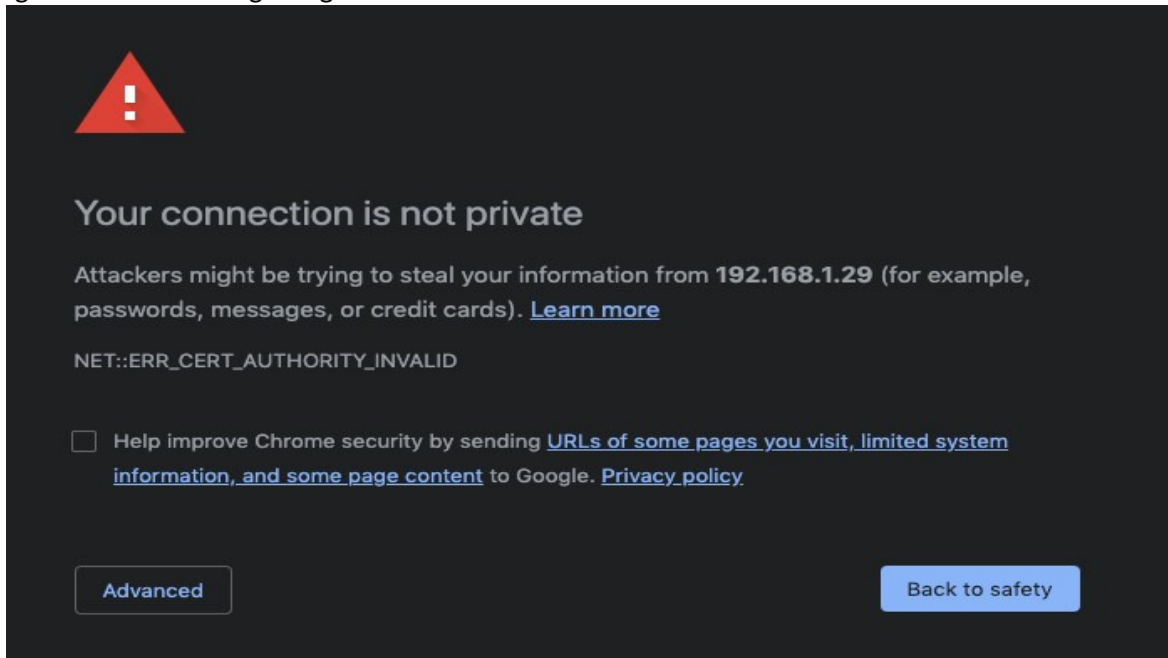
Tap on the Advanced button, and select "Proceed to <some IP> (unsafe)."

External Network Security Considerations

The Vertex™ VC4 HMI PC is intended ONLY for connection to a private network – no connectionsfrom 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 or Peer-to-Peer (P2P) Network is recommended to enhance security on Modbus TCP/IP communication.

Warranty Statement

All products are warranted by Honeywell International Inc (herein referred to as 'Honeywell') tobe 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 repairor 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 C with the productmanual 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 isfound 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 damageat 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 orinhibition 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 ofthe 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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