



Vanta GX

X-Ray Fluorescence Analyzer

User's Manual

10-031736-01EN — Rev. 3
March 2023

This instruction manual contains essential information on how to use this Evident product safely and effectively. Before using this product, thoroughly review this instruction manual. Use the product as instructed. Keep this instruction manual in a safe, accessible location.

EVIDENT SCIENTIFIC, INC.
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This document was prepared with particular attention to usage to ensure the accuracy of the information contained therein, and corresponds to the version of the product manufactured prior to the date appearing on the title page. There could, however, be some differences between the manual and the product if the product was modified thereafter.

The information contained in this document is subject to change without notice.

Part number: 10-031736-01EN

Rev. 3

March 2023

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List of Abbreviations

AC	alternating current
ALARA	as low as reasonably achievable
DC	direct current
EDXRF	energy dispersive X-ray fluorescence
EFUP	environment-friendly use period
LED	light-emitting diode
mrem	millirem
SDD	silicon drift detector
Sv	sievert

Important Information — Please Read Before Use

Intended Use

The Vanta GX analyzer is designed to perform identification and analysis of elements (from Ti to U) in precious metals.



WARNING

Do not use the Vanta GX for any purpose other than its intended use. It must never be used to inspect or examine human or animal body parts.

Instruction Manual

This instruction manual contains essential information on how to use this Evident product safely and effectively. Before using this product, thoroughly review this instruction manual. Use the product as instructed.

Keep this instruction manual in a safe, accessible location.

If you have any questions or comments about any information in this manual, please contact Evident.

IMPORTANT

Some of the details of components illustrated in this manual may differ from the components installed on your instrument. However, the operating principles remain the same.

Instrument Compatibility

The Vanta GX analyzer is primarily a self-contained unit. However, it does have USB ports that enable you to connect compatible peripherals. It also derives its required DC input power from a standard accessory AC adapter.



CAUTION

Always use accessories and peripherals that meet Evident specifications. Using incompatible accessories or peripherals could cause equipment malfunction and/or damage, or human injury.

Repair and Modification

The Vanta GX analyzer does not contain any user-serviceable parts, apart from one exception: the measurement window. If the measurement window is damaged, the window assembly should be replaced as soon as possible. See “Maintenance” on page 59 for the window-assembly removal and reinstallation instructions.

Opening of the instrument housings (lid, base, and control enclosure, including the touch-screen display) by anyone other than an Evident-trained service person will void the warranty.

**CAUTION**

In order to prevent human injury and/or equipment damage, do not disassemble, modify, or attempt to repair the instrument.

Safety Symbols

The following safety symbols might appear on the instrument and in the instruction manual:



General warning symbol

This symbol is used to alert the user to potential hazards. All safety messages that follow this symbol shall be obeyed to avoid possible harm or material damage.



Radiation warning symbol (International)



Radiation warning symbol (Canada)



当心电离辐射 Radiation warning symbol (China)

These symbols are used to alert the user to the presence of potentially harmful ionizing radiation generated within the XRF or XRD analyzer. All safety messages that follow this symbol shall be obeyed to avoid possible harm.



Shock hazard caution symbol

This symbol is used to alert the user to potential electric shock hazards. All safety messages that follow this symbol shall be obeyed to avoid possible harm.

Safety Signal Words

The following safety signal words might appear in the documentation of the instrument:



WARNING

The **WARNING** signal word indicates a potentially hazardous situation. It calls attention to a procedure, practice, or the like that if not correctly performed or adhered to could result in death or serious personal injury. Do not proceed beyond a **WARNING** signal word until the indicated conditions are fully understood and met.



CAUTION

The **CAUTION** signal word indicates a potentially hazardous situation. It calls attention to a procedure, practice, or the like that if not correctly performed or adhered to may result in minor or moderate personal injury, material damage, particularly to the product, destruction of part or all of the product, or loss of data. Do not proceed beyond a **CAUTION** signal word until the indicated conditions are fully understood and met.

Note Signal Words

The following note signal words could appear in the documentation of the instrument:

IMPORTANT

The **IMPORTANT** signal word calls attention to a note that provides information that is important or essential to the completion of a task.

NOTE

The **NOTE** signal word calls attention to an operating procedure, practice, or the like, that requires special attention. A note also denotes related parenthetical information that is useful, but not imperative.

TIP

The TIP signal word calls attention to a type of note that helps you apply the techniques and procedures described in the manual to your specific needs, or that provides hints on how to effectively use the capabilities of the product.

Safety

Before turning on the instrument, verify that the correct safety precautions have been taken (see the following warnings). In addition, note the external markings on the instrument.

Warnings

**WARNING**

General Warnings

- Carefully read the instructions contained in this instruction manual before turning on the instrument.
- Keep this instruction manual in a safe place for further reference.
- Follow the installation and operation procedures.
- It is imperative to respect the safety warnings on the instrument and in this instruction manual.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment could be impaired.
- Do not install substitute parts or perform any unauthorized modification to the instrument.
- Service instructions, when applicable, are for trained service personnel. To avoid the risk of electric shock, do not perform any work on the instrument unless qualified to do so. For any problem or question regarding this instrument, contact Evident or an authorized Evident representative (see “Technical Support” on page 22).
- Do not allow metallic or foreign objects to enter the device through connectors or any other openings. Otherwise, a malfunction or electric shock may result.



Radiation Safety Warnings

- The Vanta GX analyzer is a closed-beam instrument with respect to ionizing radiation. Therefore, when properly using the analyzer, the operator and near-by associates will not encounter radiation levels greater than those allowed by local regulations.
- Do not attempt to bypass or defeat the safety interlock system.

NOTE

See “Safety Information” on page 37 for more information about safety.



WARNING

Mechanical Safety Warnings

The Vanta GX analyzer is comprised of three major mechanical assemblies:

- A shielded lid with a bismuth-acrylic viewing window.
- A shielded main body with a test chamber, XRF measurement window, and failsafe LED array.
- A control enclosure that includes:
 - An I/O display with touch-screen panel
 - A power switch
 - Navigation keys
 - USB ports
 - A mechanical lid latch

The lid and main body are connected by integral hinges assisted by two dampening closures. The control enclosure is permanently fixed to the front of the shielded body.

When closing the analyzer in preparation for relocation, shipment, or storage, refer to the following guidelines:

- Make sure that you do not pinch your finger(s).
- If you encounter resistance when closing the unit, do not force the assemblies together.
- Secure the lid using the lid lock.

**WARNING****Electrical Warnings**

- Before turning on the instrument, you must connect the standard IEC 3-conductor power cord of the AC power adapter to a properly grounded AC socket of appropriate voltage, as marked on the adapter.
- Never negate the protective action by using an extension cord (power cable) without a protective conductor (grounding).
- If there is any possibility that the ground protection could be impaired, you must make the instrument inoperative and secure it against any unintended operation.
- The instrument must be connected only to a power source corresponding to the type indicated on the rating plate label.
- Do not operate the unit in the rain or near standing water.

**CAUTION**

If an unauthorized power supply cord is used to power the instrument, Evident cannot guarantee the electrical safety of the equipment.

Equipment Disposal

Before disposing of the Vanta GX, check your local laws, rules, and regulations, and follow them accordingly.

California Battery Disposal

For California (USA) only:

The CR battery contains perchlorate material, and special handling may be required. Refer to <https://www.dtsc.ca.gov/hazardouswaste/perchlorate> for details.

Electrostatic Discharge Precautions

The Vanta GX analyzer must never be disassembled by an end user.



CAUTION

If a nonqualified service technician or end user disassembles the instrument:

- The instrument's warranty will be void.
 - The instrument's internal components could be damaged.
-

CE (European Conformity)



This device complies with the requirements of directive 2014/30/EU concerning electromagnetic compatibility, directive 2014/35/EU concerning low voltage, and directive 2015/863 which amends 2011/65/EU concerning restriction of hazardous substances (RoHS). The CE marking is a declaration that this product conforms to all the applicable directives of the European Community.

UKCA (United Kingdom)



This device complies with the requirements of the Electromagnetic Compatibility Regulations 2016, the Electrical Equipment (Safety) Regulations 2016, and the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012. The UKCA marking indicates compliance with the above regulations.

RCM (Australia)



The regulatory compliance mark (RCM) indicates that the product complies with all applicable standards, and has been registered with the Australian Communications and Media Authority (ACMA) for placement on the Australian market.

WEEE Directive



In accordance with European Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE), this symbol indicates that the product must not be disposed of as unsorted municipal waste, but should be collected separately. Refer to your local Evident distributor for return and/or collection systems available in your country.



China RoHS

China RoHS is the term used by industry generally to describe legislation implemented by the Ministry of Information Industry (MII) in the People's Republic of China for the control of pollution by electronic information products (EIP).



The China RoHS mark indicates the product's Environment-Friendly Use Period (EFUP). The EFUP is defined as the number of years for which listed controlled substances will not leak or chemically deteriorate while in the product. The EFUP for the Vanta GX has been determined to be 15 years.

Note: The Environment-Friendly Use Period (EFUP) is not meant to be interpreted as the period assuring functionality and product performance.

“中国 RoHS”是一个工业术语，一般用于描述中华人民共和国信息工业部（MII）针对控制电子信息产品（EIP）的污染所实行的法令。



电气电子产品
有害物质
限制使用标识

中国 RoHS 标识是根据“电器电子产品有害物质限制使用管理办法”以及“电子电气产品有害物质限制使用标识要求”的规定，适用于在中国销售的电气电子产品上的电气电子产品有害物质限制使用标识。

注意：电气电子产品有害物质限制使用标识内的数字为在正常的使用条件下有害物质不会泄漏的年限，不是保证产品功能性的年限。

产品中有害物质的名称及含量

部件名称		有害物质					
		铅及其化合物 (Pb)	汞及其化合物 (Hg)	镉及其化合物 (Cd)	六价铬及其化合物 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
主体	机构部件	×	○	○	○	○	○
	光学部件	×	○	○	○	○	○
	电气部件	×	○	○	○	○	○
附件		×	○	○	○	○	○

本表格依据 SJ/T 11364 的规定编制。

○：表示该有害物质在该部件所有均质材料中的含量均在 GB/T26572 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。

Korea Communications Commission (KCC)



이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

KC (South Korea Community)

This device complies with the requirements of KS C 9610-6-2 and KS C 9610-6-4 concerning electromagnetic compatibility. The KCC marking indicates compliance with the above standards. The MSIP registration number for the Vanta GX is the following: R-R-OYN-VANTA-GX.

EMC Directive Compliance

This equipment generates and uses radio-frequency energy and, if not installed and used properly (that is, in strict accordance with the manufacturer's instructions), may cause interference. The Vanta GX has been tested and found to comply with the limits for an industrial device in accordance with the specifications of the EMC directive.

FCC (USA) Compliance

NOTE

This product has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the product is operated in a commercial environment. This product generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, might cause harmful interference to radio communications. Operation of this product in a residential area may cause harmful interference, in which case you will be required to correct the interference at your own expense.

IMPORTANT

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the product.

FCC Supplier's Declaration of Conformity

Hereby declares that the product,

Product name: Vanta GX

Model: VGP/VGS

Conforms to the following specifications:

FCC Part 15, Subpart B, Section 15.107 and Section 15.109.

Supplementary information:

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.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Responsible party name:

EVIDENT SCIENTIFIC, INC.

Address:

48 Woerd Avenue, Waltham, MA 02453, USA

Phone number:

+1 781-419-3900

ICES-001 (Canada) Compliance

This Class A digital apparatus complies with Canadian ICES-001.

Cet appareil numérique de la classe A est conforme à la norme NMB-001 du Canada.

Code de la santé publique (France)

Conformément aux articles L. 1333-4 et R. 1333-17 du Code de la santé publique, l'utilisation ou la détention de ces analyseurs sont des activités soumises à autorisation de l'Autorité de sûreté nucléaire.

Packing and Return Shipping

If the Vanta GX analyzer is not returned in its protective carton, it could be damaged during shipment. Evident reserves the right to void the warranty on instruments that are damaged while in transit if they are not shipped in the protective carton. Before returning any units, call Customer Service at (+1)866-446-6689 to obtain the required return merchandise authorization (RMA) number(s) and any important shipping information.

Follow the steps below to return your Vanta GX analyzer:

1. Secure the lid using the lid lock.
2. Put the analyzer back into the protective carton that it was shipped in, using the original packing materials to pack the item.
3. Include the RMA number in the case, and reference the RMA number on your shipping documents.
4. Close the carton, and then do one of the following:
 - Secure it with tape.
OR
 - Pack the protective carton within another box.

Warranty Information

Evident guarantees your Evident product to be free from defects in materials and workmanship for a specific period, and in accordance with conditions specified in the Terms and Conditions available at <https://evidentscientific.com/evident-terms/>.

The Evident warranty only covers equipment that has been used in a proper manner, as described in this instruction manual, and that has not been subjected to excessive abuse, attempted unauthorized repair, or modification.

Inspect materials thoroughly on receipt for evidence of external or internal damage that might have occurred during shipment. Immediately notify the carrier making the delivery of any damage, because the carrier is normally liable for damage during shipment. Retain packing materials, waybills, and other shipping documentation needed in order to file a damage claim. After notifying the carrier, contact Evident for assistance with the damage claim and equipment replacement, if necessary.

This instruction manual explains the proper operation of your Evident product. The information contained herein is intended solely as a teaching aid, and shall not be used in any particular application without independent testing and/or verification by the operator or the supervisor. Such independent verification of procedures becomes increasingly important as the criticality of the application increases. For this reason, Evident makes no warranty, expressed or implied, that the techniques, examples, or procedures described herein are consistent with industry standards, nor that they meet the requirements of any particular application.

Evident reserves the right to modify any product without incurring the responsibility for modifying previously manufactured products.

Technical Support

Evident is firmly committed to providing the highest level of customer service and product support. If you experience any difficulties when using our product, or if it fails to operate as described in the documentation, first consult the User's Manual, and then, if you are still in need of assistance, contact our After-Sales Service. To locate the nearest service center, visit <https://www.evidentscientific.com/service-and-support/service-centers/>.

Introduction

The Vanta GX analyzer is a compact benchtop instrument with specially concentrated analytical power. It is a closed-beam unit for on-site elemental analysis of elements in precious metal samples. Energy dispersive X-ray fluorescence (EDXRF) technology is used to perform these nondestructive tests and analyses.

Testing can be performed in the laboratory, in a commercial setting, or in the field. Results are available in as little as a few seconds.

A complete Vanta GX package consists of the following components:

- An enclosure
- Analysis hardware
- Software

Enclosure

The enclosure is comprised of three mechanical assemblies:

- **Main body/chassis** with a test platform and measurement window that (in conjunction with the hinged lid) form a closed beam, radiation-safe test chamber.
 - This assembly is fabricated from powder-coated steel.
 - The test chamber's side and back walls, in addition to the test platform, have an integrated shielded layer.
 - The back wall has an LED array to enhance sample observation.
 - An LED X-ray indicator is 360-degree visible and located on the main housing at the level of the deck.
 - A DC power socket is located at the rear of the chassis.

- **Hinged lid** with a bismuth-laden acrylic viewing window and integrated shield layer that has safety interlocks. These elements ensure a closed-beam system within the test chamber.
- **Control enclosure** housing a color LCD display with a touch-screen panel, On/Off button, and navigation keys.

Analysis Hardware

- Tube excitation
 - 35 kV, 2 W (maximum power)
 - Anodes: W (tungsten)
- Detection (varies by model)
 - Silicon drift detector (example model: VGS)
 - PiN detector (example model: VGP)
- Integrated camera

Computer

- Integrated group of analyzer components, including the following:
 - Controller
 - Color user interface touch-screen with virtual keyboard
 - Membrane navigation keys
 - Separate system power switch with LED indicator
- Power ports
 - Socket for AC adapter
- I/O ports
 - Standard USB (x2)
 - Mini USB
 - microSD card

Software

Vanta GX uses the Vanta family device software. For all information regarding the functionality of the software on the Vanta GX, refer to the *Vanta Family X-Ray Fluorescence Analyzer User Interface Guide*.

1. Analyzer Overview

This chapter provides an overview of the Vanta GX analyzer and its accessories.

1.1 Packing List

The Vanta GX analyzer and its accessories are shipped in a heavy-duty corrugated carton with foam protection. There is also an optional hard-sided transport case, in which the instrument may be additionally protected during shipment.

Make sure to carefully remove all the contents of the package, check them for any damage, and verify that there are no missing components. Report any problems or missing components to Evident immediately.



WARNING

If there is any damage to any of the components, do not attempt to use the analyzer.

Table 1 on page 28 lists the Vanta GX analyzer standard components.

Table 1 Vanta GX analyzer standard components

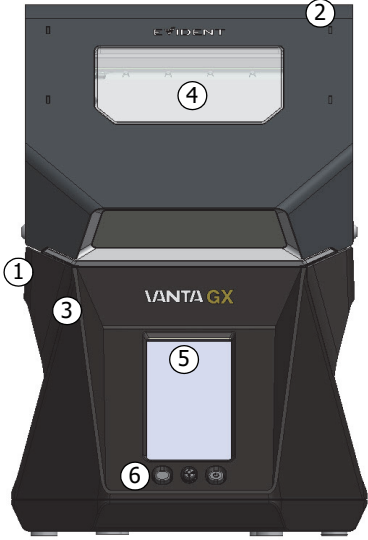
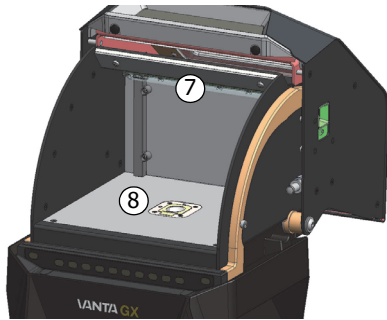
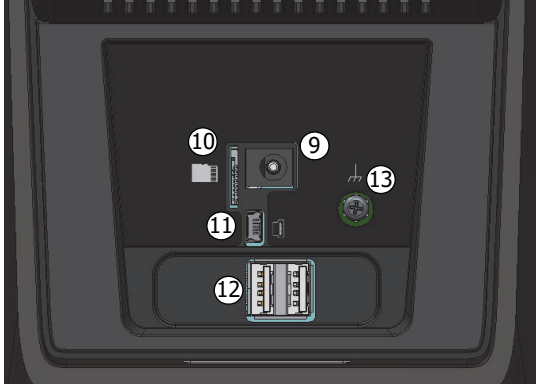
Component key		Vanta GX – All models
1	Vanta GX analyzer	
2	Hinged lid	
3	Main body (or chassis)	
4	Test chamber	
5	User interface touch-screen	
6	Navigation keys	
7	LED array	
8	Measurement window	

Table 1 Vanta GX analyzer standard components (continued)

Component key		Vanta GX – All models
9	Input power port	
10	microSD card slot	
11	Mini USB port	
12	USB port (x2)	
13	Grounding screw (M3)	

(Rear view of the Vanta GX)

1.2 Standard Accessories



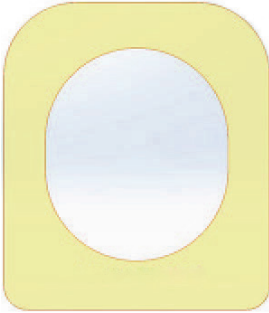
Table 2 on page 30 lists the Vanta GX analyzer standard accessories.



WARNING

To reduce the risk of injury or equipment damage, only use the AC power adapter supplied by Evident.

Table 2 Vanta GX analyzer standard accessories

Accessories	Description	
AC power adapter and power cord	<ul style="list-style-type: none"> • AC power adapter <ul style="list-style-type: none"> – Has a straight barrel output connector – Electrical output is 70 W at 18 V and 3.9 A – Electrical input is 100–240 VAC (50–60 Hz) • Line cord <ul style="list-style-type: none"> – 1.8 m (6 ft) long – 18 AWG – U/L listed – C13 (female) to NEMA 515 (male) connectors 	
Standard USB cable	<ul style="list-style-type: none"> • P/N: U8990455 • 0.9 m (3 ft) long 	
Extra windows	<ul style="list-style-type: none"> • P/N: Q0204129 (10-026487-10) • New windows (10) 	

1.3 Optional Transport Case

The transport case (P/N: Q0204142) is a watertight protective luggage shell (see Figure 1-1 on page 31) that features the following:

- In-line wheels
- Telescoping handle
- Custom foam insert

The case weighs 10.6 kg (23.4 lb), including the foam.



Figure 1-1 Optional transport case

1.4 Physical Planning

The Vanta GX analyzer weighs 10 kg (22 lb).

To make a minimum footprint, add at least 152.4 mm (6 in.) to the actual 239.3 mm (9.42 in.) width and 324.1 mm (12.76 in.) depth. Plan for a height of 387.7 mm (15.26 in.) when the lid is open to its maximum extent (see Figure 1-2 on page 32 to Figure 1-4 on page 34).



Figure 1-2 Vanta GX front view (lid closed)

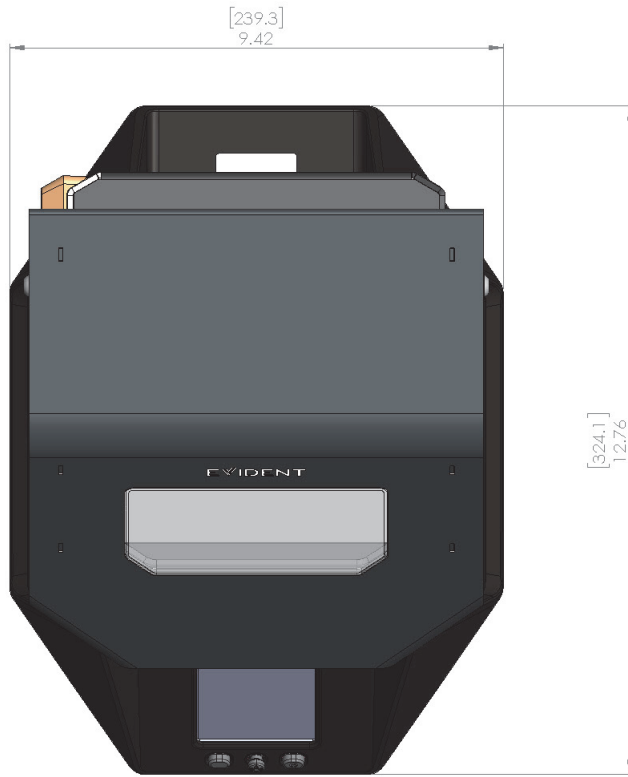


Figure 1-3 Vanta GX top view

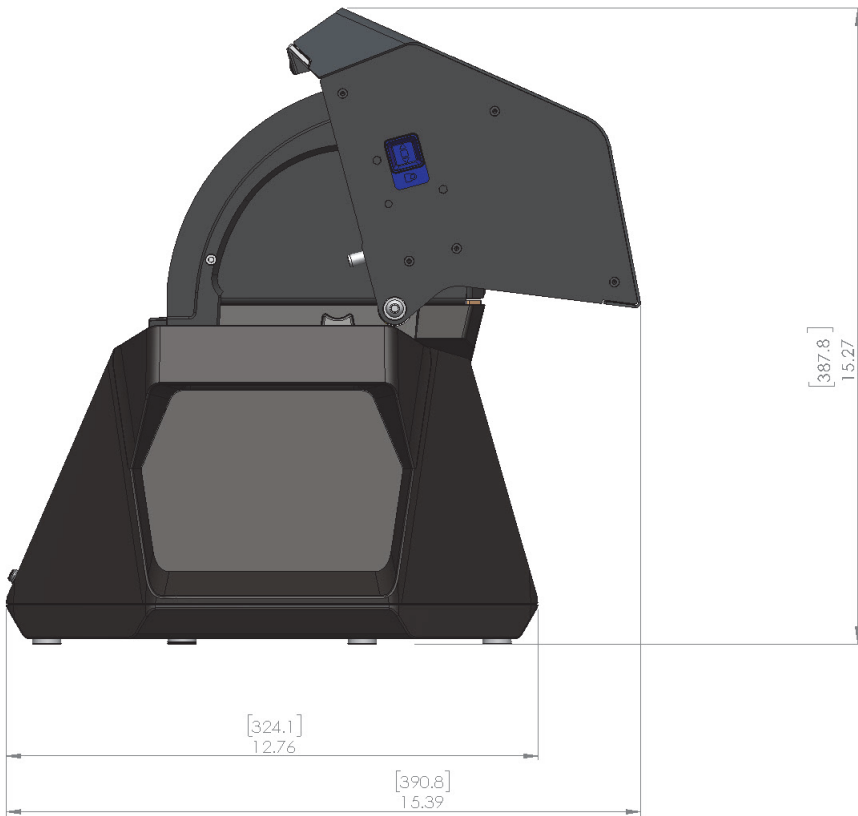


Figure 1-4 Vanta GX side view (lid open)

1.5 Power Supply

The Vanta GX analyzer comes standard with an AC power adapter. The wattage should be less than 70 W when the analyzer is powered from the adapter.

1.6 Cable Connections

The Vanta GX analyzer contains five ports (See Figure 1-5 on page 35):

- The power port for the AC power adapter
- One microSD card slot
- One Mini USB port
- Two USB ports that can be used for the following:
 - Local data storage using a flash memory device
 - A keyboard
 - Connection to a PC for PC software use

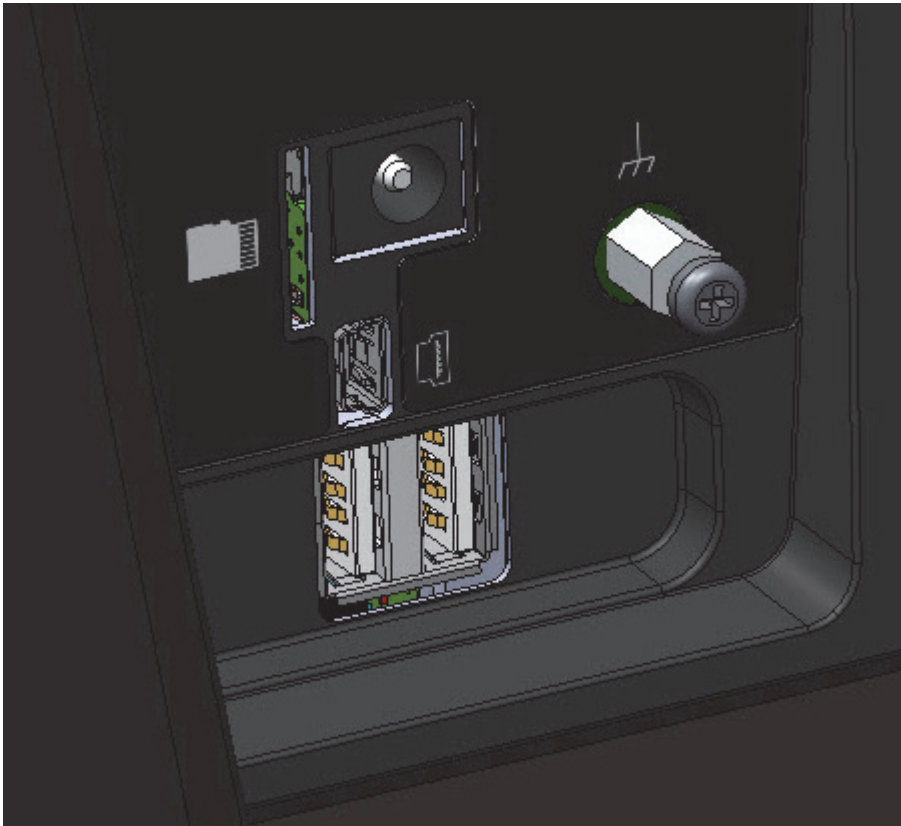


Figure 1-5 Vanta GX I/O ports

2. Safety Information

This chapter contains important safety information related to the use of the Vanta GX analyzer.

2.1 Grounding and Power Information

Evident XRF analyzers are high-precision instruments.

- To ensure safe operation, it is recommended to use only the AC power adapter provided with the instrument.
- To avoid any adverse effect on instrument performance in the presence of electromagnetic interference from nearby electrical equipment, Evident recommends you use the grounding screw on back panel of the instrument (see Figure 1-5 on page 35) to connect the chassis to an earth ground. Use #18 AWG wire or larger for connections between earth ground and the chassis. An earth ground connection is optional.

2.2 Radiation Safety Information

IMPORTANT

Always make operational safety a top priority.

The Vanta GX analyzer is a secure and dependable instrument when used according to the recommended testing techniques and safety procedures. However, this instrument produces ionizing radiation; only individuals trained in correct operating techniques and authorized to use X-ray producing devices should be permitted to use the analyzer.

The radiation detected in the area outside the closed analyzer is below the level that is required for an unrestricted area (See “Vanta GX Radiation Profile” on page 61).

- Pay attention to all warning labels and messages.
- Take note of the safety-interlock features.



WARNING

The X-ray tubes inside the Vanta GX analyzer can emit dangerous levels of ionizing radiation. Prolonged exposure can cause serious illness, injury, or death. It is the responsibility of Evident customers to follow the operating instructions and safety recommendations outlined in this manual, and good radiation control practices.

2.3 Radiation Safety Program

Evident strongly recommends that organizations using Vanta GX analyzers implement a formal radiation safety program that includes the following measures:

- Dose monitoring of critical personnel
- Monitoring of area radiation levels
- Information specific to the site and application of the XRF system
- An annual review (and update, if necessary)
- Annual safety system checks

“Operation” on page 53 provides a more comprehensive safety discussion for operators and managers.

2.4 X-Ray Safety

X-ray safety is a priority at all times and in all testing situations.

**WARNING**

- Evident analyzers must be used by trained and authorized operators in accordance with proper safety procedures. Improper usage may circumvent safety protections and could potentially cause harm to users.
 - Pay attention to all warning labels and messages.
 - Do not use the instrument if there is any chance that it is damaged or might unintentionally emit stray radiation. In such case, arrange for qualified personnel to perform a radiation safety test. Contact Evident or its authorized service representative to repair any analyzer damage.
-

2.5 Safety Interlock Structure

The safety interlock structure ensures that the Vanta GX analyzer functions as a closed-beam X-ray instrument. The lid must be completely closed over the test platform in order for a radiation-safe test chamber to be established. Unless this condition is met, the test-analysis procedure cannot be initiated.

Examples of the safety interlock structure:

- If the lid is not closed (the safety interlock structure is not enabled for X-ray emission), the **Start Test** button is disabled (grayed out). You cannot force the X-ray On condition.
- If the lid is opened during an active test, the X-ray tube turns off immediately. A “Test Aborted” message is then displayed.

2.6 General Precautions

Apply these general safety guidelines when managing or operating the Vanta GX analyzer:

- Retain and follow all product safety and operating instructions.
 - Comply with all warnings on the product and in the operating instructions.
 - Comply with the precautions listed in this chapter to reduce the following risks:
 - Users
-

- Physical injury
- Electric shock
- Radiation exposure
- Equipment damage
 - Measurement window
 - Overheated electronics and other internal components

2.7 Service Considerations

Except as expressly noted in this document, do not service any Evident product yourself. Opening or removing the external housings may expose you to electric shock and the instrument to mechanical damage. It also voids the warranty.

IMPORTANT

Any required service must be performed by Evident, or one of its authorized service representatives. Failure to observe this can result in voiding of a warranty. The **ONLY EXCEPTION** to this rule is the replacement of a damaged measurement window. See “Maintenance” on page 59 for more details about measurement-window replacement.

Types of problems or conditions that require service are, but not limited to, the following:

- Damaged power cords
- Excessive spills or corrosive liquids on the instrument or accessories
- A battered, dropped, or physically damaged instrument
- Noticeable signs of overheating
- An instrument that does not operate normally when the operating instructions are followed

2.8 Electrical Precautions

The following list of guidelines is essential for safe electrical operation of the Vanta GX analyzer:

- Use the correct AC power adapter.
- Install the AC power adapter carefully. Do not damage the connections.
- Use the correct external AC power sources for the AC power adapter.
- Make sure that the voltage is appropriate (100–240 V/ 50–60 Hz) for operation with the AC power adapter. See “Specifications” on page 63 for electrical specifications.
- Do not overload an electrical outlet, power strip, or convenience receptacle.
- Do not exceed 80 % of the branch circuit rating.

2.8.1 AC Power Adapter

The following list of guidelines is essential for safe electrical operation of the AC power adapter.

AC power adapter

- Do not expose to water.
- Do not open the case.
- Do not place in confined area where the unit cannot dissipate internally generated heat.

2.8.2 Cables and Cords

The Vanta GX is delivered with the following cable and cord accessories:

- One AC power adapter (standard)
This device has a standard IEC 3-conductor power cord, which includes a safety grounding plug.
- One USB cable (standard)

To ensure safety and proper equipment performance:

- Connect the power cords to a properly grounded and easily accessible power outlet.
- Use a surge protector device, if possible.
- Do not defeat or bypass the ground conductor.
- Do not pull on cords or cables. Grasp the plug housing when removing the cord from the electrical outlet.

- Install all cords in accordance with applicable regulations.
- If you substitute a USB cable, make sure that the length does not exceed 3 m (10 feet).

2.9 Indicators and Statuses

The Vanta GX analyzer has three indicators that alert or inform you about the current status of the unit.

2.9.1 Power Button and Chamber Light

When powered on, the Vanta GX analyzer's power button lights up, and a light is activated in the measurement chamber. These lights indicate the unit is on.

2.9.2 X-Ray Indicator

An X-ray indicator alerts the operator when the tube is receiving power, and when X-rays are emitted from the analyzer through the measurement window. The X-ray indicator is located on the main housing at the deck level and consists of a failsafe LED array.

X-ray indicator flashing (blinking LED array)

A flashing indicator light signifies the following:

- The X-ray tube is powered to full operational level.
- The analyzer is emitting X-ray radiation through the measurement window.

2.9.3 Information Bar

The information bar (see Figure 2-1 on page 42) presents the status of the test, including the following information:

- How much time is remaining in the test interval
- Whether the test was completed successfully
- Whether the test was terminated due to an error



Figure 2-1 Examples of real-time statuses presented by the information bar

2.10 Physical Safety

Several mechanical precautions should be observed.

Weight

The analyzer weighs 10 kg (22 lb). Ensure your physical safety, and that of the analyzer, when carrying the unit in the field, resting it on the ground, or placing it on benches or tables in the lab.

Hinges

The analyzer lid is hinged (see Figure 2-2 on page 44).



CAUTION

- When closing the lid for a test, or before moving the analyzer, be careful not to pinch your fingers.
 - Do not force close the analyzer.
 - Lock the lid closed before moving the device.
 - Make sure that nothing is lodged in the hinge area on either side of the test chamber.
-

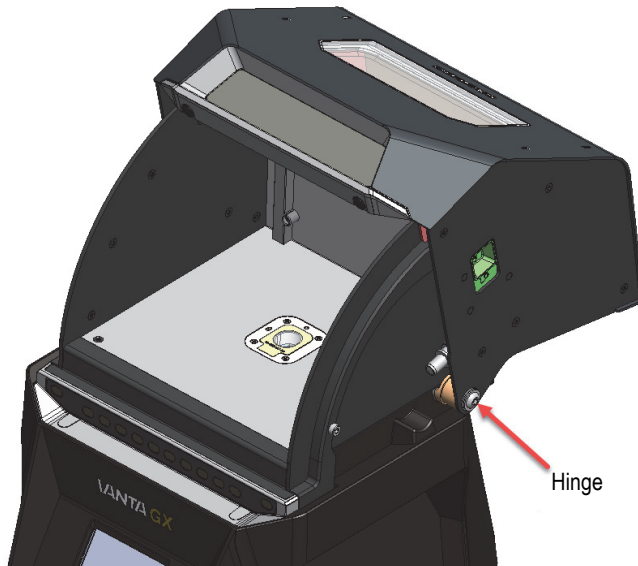


Figure 2-2 Vanta GX hinges

2.11 Safety Administration

This section provides information on radiation safety training recommendations, dosimeter badges (including safety programs and suppliers), frequently asked questions, and registration requirements.

2.11.1 Radiation Safety Training Recommendations

Respective countries or regions have specific regulations and guidelines for using ionizing radiation generated by X-ray tubes.

NOTE

For your convenience, Evident has compiled a list of recommendations. These recommendations:

- Provide generic guidance on the ALARA (as low as reasonably achievable) approach to radiation safety.
 - Do not replace the specific policies of any government entity or organization.
-

Personal Monitoring

Radiation control regulations may require implementation of a radiation monitoring program, in which each instrument operator wears a dosimeter device for an initial period of one year to establish a baseline exposure record. Continued radiation monitoring after this period is recommended, but may be discontinued if accepted by radiation control regulators. See “Dosimeter Suppliers” on page 48 for a list of film badge providers.

Proper Usage

- When located in a laboratory environment, try to ensure that the analyzer is securely stationed on a bench with adequate clearance for comfortable operations. When used in the field, try to position the analyzer on a level surface. If necessary, the analyzer can operate when placed at a small incline angle with the horizontal plane.
 - Do not move or shake the analyzer when conducting a test.
 - Do not operate the analyzer outdoors in any sort of precipitation.
-

IMPORTANT

The following recommendations do not take precedence over the laws, regulations, and acts currently in effect.

Specific Controls

- Make sure that the instrument is only used under the direct control of a factory-trained, certified operator.
 - It is good practice to store the instrument in a locked case or cabinet when not in use.
-

Trained Operators

In your laboratory, place a sign with the following information near the analyzer:

- In order to use the unit, operators must have completed a training class provided by your company.

OR

- In order to use the unit, operators must have attended an Evident training course.

AND

- Operators must also comply with any other requirements prescribed by local regulating authorities.

Preventing Exposure to Ionizing Radiation

All reasonable measures, including labeling, operator training and certification, and the concepts of time, distance, and shielding, should be implemented to limit radiation exposure to as low as reasonably achievable (ALARA).

The Vanta GX analyzer is a closed-beam system. Never attempt to defeat or override the safety interlocks.

When the instrument is used properly, exposure to ionizing radiation does not exceed regulatory limits.

2.11.2 Dosimeters

Dosimeters record accumulated radiation exposure over a specific period of time (see Figure 2-3 on page 47). Dosimeters are used to monitor individuals who work with devices that emit ionizing radiation or who work in close proximity to someone else working with such devices.



Figure 2-3 Dosimeters – Various styles

When purchasing badges or rings, always select the type used for X-ray and low-energy gamma radiation.

IMPORTANT

Dosimeter badges are required in some countries or regions and are optional in others. Evident recommends that all Vanta GX analyzer operators wear a dosimeter (badge or ring) for at least the first year of operating their analyzer(s).

Evident recommends that the ring badge be worn on a finger of the hand opposite to the one holding the analyzer to ensure that the most common source of accidental exposure (from grasping small samples during analysis) is recorded.

NOTE

Every country (including each region, state, or province within a country) may have different regulations. Always consult your local Radiation Protection Authority or Evident for information and recommendations.

2.11.3 Dosimeter Safety Program

A typical dosimeter-based safety program follows the steps listed below:

1. The company develops a dosimeter program with an independent service contractor. Together, they establish the quantity of badges needed and the frequency of analysis (a monthly or quarterly interval).
 2. The company receives the first lot of badges and distributes them to its analysts/operators.
 3. At the end of the interval:
 - a) The company collects the badges and returns them to the service contractor for analysis.
 - b) At the same time, the service contractor delivers another lot.
 4. The company distributes the new set of badges, thereby maintaining a continuous protection/monitoring program for its employees.
 5. The service contractor prepares a report for the company. The report tabulates any X-ray dose received, and identifies any persons with readings that exceed typical background radiation.
 6. The safety monitoring cycle is repeated from steps 1 to 5. Any dose which exceeds limits set by the program (determined by monitoring use patterns) must be investigated and, if sufficiently high, reported to your regulatory agency.
-

NOTE

The service contractor's written records are very important to a company's overall safety documentation plan.

2.11.4 Dosimeter Suppliers

IMPORTANT

For suppliers approved for use in Canada see Table 4 on page 49.

Some of the leading dosimeter supply companies are listed in Table 3 on page 49.

Table 3 Dosimeter suppliers approved internationally

Company	Location	Telephone
AEIL	Houston, Texas	1-713-790-9719
Sierra Dosimetry	Escondido, CA	1-866-897-8707
Mirion Dosimetry Services	Irvine, California	1-800-251-3331 (toll free US/CAN)
Landauer	Glenwood, Illinois	1-708-755-7000
Landauer, Inc.	Oxford, England	44 1865 373008
Nagase Landauer, ltd.	Japan	81 33-666-4300
LCIE Landauer	Paris, France	33 1 40 95 62 90
Landauer	Beijing, China	86 10 6221 5635

Dosimeter supply companies currently approved by Canadian Federal, Provincial, and Territorial Radiation Protection committees are listed in Table 4 on page 49.

Table 4 Dosimeter suppliers approved in Canada

Company	Location	Telephone
Mirion Dosimetry Services	Irvine, CA	1-800-251-3331
Landauer	Glenwood, Il	1-708-755-7000
National Dosimetry Services (Health Canada)	Ottawa, Canada	1-800-261-6689

2.11.5 Radiation Safety FAQ

This section contains the frequently asked questions (FAQ) about radiation safety.

Question:

Do I need to create restricted areas within the area in which I am using the analyzer?

Answer:

No. Provided that you are following normal operating procedures, there is no reason to restrict access to an area in which the analyzer is in use. However, the operator should take precautions to keep any personnel from disturbing the analyzer, particularly when the X-ray indicator is flashing.

Question:

How does the X-ray tube in the Vanta GX analyzer compare to a radiography system used to take images of metal parts?

Answer:

The X-ray tube used in the Vanta GX analyzer produces between 1000 and 10000 times less power than most radiography systems (2 W versus multiple kW). XRF analyzers are designed to perform surface analysis of alloys and other samples, whereas a radiography system is designed to shoot X-rays entirely through metal components in order to obtain an image on the other side of the test object. For example, many tube-based radiography systems use a 300–400 kV tube and currents up to several hundred milliamperes (mA). The Vanta GX uses a tube operating at a maximum of 35 kV and 0.05 mA (50 μ A).

Question:

Should we use dosimeter badges with the Vanta GX analyzer?

Answer:

Dosimeter badges are required by some regulatory agencies, and optional for others. Evident recommends that operators wear badges during at least the first year of operation as a general precaution that can serve to identify any misuse of the analyzer. Dosimeter badges are available for the torso (generally worn in a lanyard style), and they are also available in a style that can be worn as a ring.

IMPORTANT

These badges generally have a threshold of 10 μ Sv (1 mR/h), and are renewed monthly or quarterly. As such, several incidences of misuse must occur in order to obtain a reading on a typical badge. When purchasing badges, select the type used for X-ray and low-energy gamma ray radiation.

2.11.6 Registration Requirements

IMPORTANT

As the manufacturer, in many jurisdictions, Evident is required by law to inform local regulators of all X-ray analyzer shipments to their area of responsibility. Evident complies with these regulations.

Typical Device Registration Information

The following information is usually requested by a licensing agency:

Purpose of device

Radiation safety officer

List the person who monitors training and safe use, and who controls access to the system.

Authorized users

List the analysts/operators who have been trained and authorized to operate the XRF equipment by the instrument owner and/or regulating agency.

Operating parameters of the Vanta GX analyzer

35 kV at up to 50 μ A, or 2 W maximum tube power dissipation.

Type of system

Portable.

User training specification

Indicate that only individuals who have received manufacturer training (confirmed with a manufacturer's training certificate) can operate the system. Additional training may be required. Contact local regulating agencies to determine the level and type of training required.

Personal monitoring

Many government-agency registration forms ask you indicate whether or not you intend to perform dosimeter monitoring.

IMPORTANT

Always keep the following documentation on hand at the job site:

- A copy of the license registration (if supplied or required)
 - Other pertinent government-agency documentation
 - Copies of any dosimeter analysis reports
 - A copy of the user manual for this equipment
 - Other documentation or posts, in accordance with applicable regulations
-

NOTE

See “Dosimeter Safety Program” on page 47 for information regarding typical personal radiation monitoring.

3. Operation

This chapter provides information about operating the Vanta GX analyzer.



WARNING

Read the “Safety Information” chapter carefully before handling the analyzer. Misuse of the analyzer can cause serious illness, injury, and/or death.

3.1 Sample Analysis

This section explains the steps required to analyze a sample.

IMPORTANT

Read the “Safety Information” chapter carefully before handling this instrument.

3.1.1 Starting Up the Analyzer

This section explains how to power up the analyzer and display the initial test screen.

To start the analyzer

1. Connect the analyzer to a main power source using the AC power adapter.
 2. Set up all other inputs and outputs (see “Cable Connections” on page 35).
-



Figure 3-1 Vanta GX power switch

3. Turn on the analyzer using the power switch (membrane switch) in the bottom-right corner (see Figure 3-1 on page 54).
 - The LED (in the center of the power switch) turns on.
 - The analyzer is powered up and system initialization begins.
 - The analyzer launches a login screen.

IMPORTANT

The default Admin PIN is 0000.

3.1.2 Conducting a Test

Before measuring a sample, make sure that you have done the following:

- Read the “Important Information” section on page 9.

- Attained a thorough understanding of the radiation safety issues presented in “Safety Information” on page 37.
- Studied the dimensions (volume) of the test chamber to establish that your test samples will fit. The lid must be closed securely to activate the security interlocks.

NOTE


See “Operation” on page 53 for start-up, Cal Check, and shutdown procedures.

To conduct a test

1. Press the lid latch to open the test chamber.
2. Place the sample over the measurement window (see Figure 3-2 on page 55).

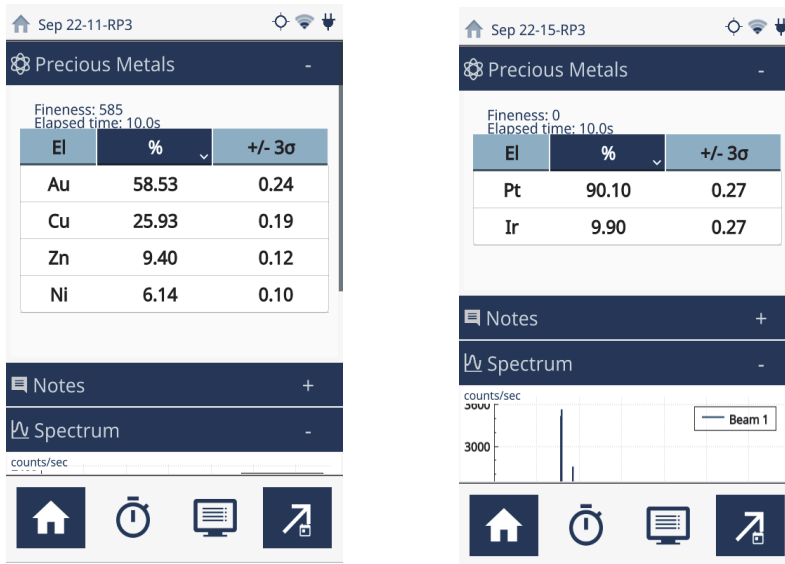


Figure 3-2 Example: gold jewelry positioned over the measurement window

3. Close the lid.
4. Press the Start Test button ().

Progress and results are shown on the screen.

Figure 3-3 on page 56 displays two test examples.



Example 1:
Gold content at 58.53 %
Real-time results \approx Fineness 585

Example 2:
Platinum content at 90.10 %
Real-time results \approx Fineness 0

Figure 3-3 User interface: typical test screens for gold/platinum samples

3.2 Shutdown Procedures

There are several techniques for turning off the Vanta GX analyzer. They can be categorized by whether the action is taken under normal or emergency conditions. “Turned off” means that the analyzer cannot generate any X-ray emissions.

3.2.1 Shutting Down Under Normal Conditions

To shut down the Vanta GX

1. Go to the **Home** screen.
2. Tap the **Logout Session** icon to initiate a software shutdown.

3.2.2 Shutting Down Under Emergency Conditions

Because the Vanta GX main power is DC voltage-based, the emergency response plan is simple. If the array light is blinking and you believe that the analyzer is locked in an On condition, perform the following procedure.

To shut down the Vanta GX in the case of an emergency

- ◆ Raise the lid.
The safety interlocks should shut off the tube power.



WARNING

If the X-ray tube does not turn off when the lid is raised, make sure that you are not in the path of the X-ray beam.

To shut down the Vanta GX in the unlikely event of multiple interlock failure



CAUTION

This procedure should only be performed in the case of an emergency. Shutting down the instrument by pressing the membrane switch or pulling the DC power jack from the power port could cause hard drive corruption or other electrical problems.

1. Without entering the X-ray beam path, shut the lid immediately.
2. Press and hold the power switch until the analyzer turns off.
OR
Pull the DC power jack from the power port at the rear of the analyzer.

4. Maintenance

Because the Vanta GX analyzer is a self-contained, ruggedized, environmentally sealed hardware unit, there are only two maintenance tasks that you need to perform:

- Keep the touch-screen computer panel clean.
- Replace the measurement window on the test platform when the window is damaged.

4.1 Touch-Screen Care

The touch-screen computer panel can get dirty and smeared when you use your fingers to operate the UI. Proper care involves regular cleaning with a micro fiber cloth.



CAUTION

Do not use water, solvents, cleaning powders, harsh paper towels, cloths, or cleaning rags to clean the touch-screen, since such items could damage the touch-screen and/or the housing.

4.2 Replacing the Measurement Window

If the measurement window is damaged or dirty, you must replace it as soon as possible. The Vanta GX measurement window is made of milinex plastic.

To ensure that no damage occurs to the internal components, follow the guidelines and procedures mentioned in this section.

To remove the window



CAUTION

To avoid analyzer damage, comply with the instructions below:

- Take **EXTREME CARE** to not damage any internal components.
- Do not insert anything into the analyzer.
- Keep dust and foreign materials out of the analyzer.
- Make sure that your hands are clean before touching the analyzer.
- Do not touch the film in the center opening.

-
1. Raise the analyzer lid to its maximum height.
 2. Ensure the test chamber is free of dust and debris.
 3. Peel off the damaged/dirty window.

To install the new window

1. Remove the backing from the new window.
2. Align the window over the sensor, and press it down along all edges.
3. Close the analyzer lid.

5. Vanta GX Radiation Profile

The current radiation profile is shown in Table 5 on page 61. The Radiation Profile table represent the upper bounds on the worst case scenario—maximum beam conditions—using a highly scattering EC-681K sample. The Vanta GX was operated at the maximum filtered beam conditions of 35 kV, 50 μ A, and the single beam filter.

Table 5 Radiation profile

Maximum dose rate in μ Sv/h (mR/h)—secondary radiation (scatter leakage)				
Surveyed Location	Surface*	10 cm	30 cm	100 cm
Chamber top	BK	BK	BK	BK
Chamber back	BK	BK	BK	BK
Chamber front	BK	BK	BK	BK
Chamber left	BK	BK	BK	BK
Chamber right	BK	BK	BK	BK
Front lower	BK	BK	BK	BK
Back lower	1.6	BK	BK	BK
Left side lower	BK	BK	BK	BK
Right side lower	2.4	BK	BK	BK
Lower bottom	BK	BK	BK	BK

*Closest measurement taken at instrument surface.

BK = Background radiation level (1 μ Sv/hr).

To convert μ Sv/hr to mrem/hr, divide table values by 10.

Appendix: Specifications

This *Appendix* outlines the specifications for the Vanta GX analyzer, its accessories, and hardware safety features (see Table 6 on page 63 to Table 9 on page 65).

Table 6 Analyzer specifications

Component	Description
Enclosure	<ul style="list-style-type: none"> The analyzer enclosure is fabricated from polycarbonate and ABS injection molded parts. Dimensions (closed) [H × W × D]: 35.73 cm × 23.93 cm × 32.41 cm (14.07 in. × 9.42 in. × 12.76 in.) Dimensions (open) [H × W × D]: 38.78 cm × 23.93 cm × 39.08 cm (15.27 in. × 9.42 in. × 15.39 in.) See “Physical Planning” on page 31 Weight: 10 kg (22 lb)
Sample chamber	<ul style="list-style-type: none"> Dimensions [H × W × D]: 9.39 cm × 17.67 cm × 17.34 cm (3.70 in. × 6.96 in. × 6.83 in.) The lid has safety interlocks that create a closed-beam system. The chamber is equipped with a failsafe LED array.
Power requirements	100 VAC to 240 VAC, 50 Hz to 60 Hz, 70 watts at 18 V and 3.9 A
Excitation system	<ul style="list-style-type: none"> 2 W, 35 kV, 50 μA (max.) X-ray tube Anode: Tungsten

Table 6 Analyzer specifications (continued)

Component	Description
Detection system	<ul style="list-style-type: none"> • Si PIN diode (example P/N: VGP-PM) • Si drift detector (example P/N: VGS-PM) • Thermo-electrically cooled, high resolution
Operating system	Linux
Operating environment	<ul style="list-style-type: none"> • Temperature: -10 °C to 40 °C (14 °F to 122 °F) • Humidity: 10 % to 90 % relative humidity, noncondensing
Application software	Evident proprietary data acquisition and processing package
Camera	Full-color VGA
Display	Color “transflective” touch-screen (800 × 480, WVGA) with 16-bit LCD interface; capacitive touch panel supporting gesture control
Power for analyzer	AC power adapter

Table 7 Standard accessory specifications

Component	Description
AC power adapter	<ul style="list-style-type: none"> • Output: 70 W, 18 VDC, 3.9 A with straight-barrel output connector • Input: 100–240 VAC, 50–60 Hz
AC line cord	1.8 m (6 ft), 18 AWG cable with UL listed, IEC male plug
USB cable	<ul style="list-style-type: none"> • P/N: U8990455 • 0.9 m (3 ft) data cable

Table 8 Optional accessory specifications

Component	Description
Industrial transport case	<ul style="list-style-type: none"> • P/N: Q0204142 • Watertight, lightweight enclosure with a telescopic handle and in-line wheels • Dimensions: 62.5 cm × 50 cm × 36.6 cm (24.6 in. × 19.7 in. × 14.4 in.) • Weight (empty): 10.6 kg (23.4 lb)
Measurement windows	<ul style="list-style-type: none"> • P/N: Q0204129 (10-026487-10)

Table 9 Hardware safety features

Component	Description
X-ray indicator	High-intensity LEDs that flash when the X-ray beam is on
Shielding	The entire test chamber (lid and measurement platform) is shielded.
Interlock sensors	Lid interlocks ensure that the lid is closed before X-ray operation. The interlocks interrupt the beam (X-rays off) if the lid is lifted during an active test.

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