



DELTA Family Handheld XRF Analyzer

Quick Start Guide

Models:

DELTA 50

DELTA Premium

DELTA Professional

DELTA Classic Plus

DELTA Element

International edition

103076-01EN [U8998318] — Rev. E

June 2015

This instruction manual contains essential information on how to use this Olympus 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.

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IMPORTANT

- Read the Important Information section carefully before handling this product.
- Refer to the DELTA User’s Manual (P/N: 103201-01EN) for more detailed information.

1. Unpacking the Instrument and Docking Station

This *Quick Start Guide* applies to the following models of DELTA handheld XRF analyzers:

- DELTA Premium
- DELTA 50 Premium
- DELTA Professional
- DELTA 50 Professional
- DELTA Classic Plus
- DELTA Inspector
- DELTA Element

To unpack the instrument



1. Locate and remove the shipping papers and documentation.
2. Open the carrying case, and then remove the DELTA and all of the components.

NOTE

Please note that there are two layers of protective foam padding.

3. Make sure the top layer of the foam is clear of any items, then lift it to expose the docking station and optional AC power adaptor.
4. Inspect all components for damage and report any problems to Olympus immediately.

Item checklist for DELTA handheld XRF analyzer

Component Key		DELTA – All models except DELTA Element and DELTA Inspector
Foam: top layer		
1	Carry case	
2	DELTA analyzer	
3	Docking station charger	
4	USB cable 1 (see page 6 for details)	
5	USB cable 2 (see page 6 for details)	
6	Li-ion batteries (2)	
7	Calibration check (Cal Check) coupon	
8	Extra windows (bag of 10)	
9	End user documentation (not shown)	
Foam: second layer		
10	Docking station	
11	AC power cord	

NOTE

For the DELTA Element and DELTA Inspector, the docking station is replaced by the battery charger.

2. Instrument Overview

2.1 Handheld Analyzer

Component Key		DELTA – All models
1	DELTA analyzer (Premium model shown)	
2	Probe	
3	Measurement window (Prolene or Kapton film)	
4	Hinged window plate	
5	Docking station connector	
6	Trigger	
7	Handle – Non-slip rubber grip	
8	Battery boot	
9	Data port with rubber cover	
10	Heat sink	
11	I/O (power) switch with LED indicator	
12	X-ray warning light array	
13	User interface touch screen	
14	Navigation keys	

2.2 Docking Station



Component Key		DELTA – All models except DELTA Element and DELTA inspector
Docking station (empty)		
1	Analyzer signal/control connector	
2	Second battery charger socket	
3	Cal Check test cup (316 stainless steel)	
Docking station (loaded)		
5	Second battery in socket	
6	Data port(s): a) Docking station (rear) b) Analyzer (left side)	
7	Input power (18 VDC)	
8	Indicator lights: a) Second battery charging b) Analyzer engaged	

NOTE

The DELTA docking station is a standard accessory for all DELTA models except the DELTA Element and the DELTA Inspector series.



2.3 Battery Charger






The battery charger (U8990854) with an AC input and a single Li-ion battery socket comes standard with DELTA Element and DELTA Inspector models. This battery charger is described in section 4.2.2 on page 11.

Component key		DELTA – All models (standard on the DELTA Element and DELTA Inspector)
Battery charger (empty)		
1	Input power (12 VDC)	
2	Battery cradle and connectors	
3	Charging error indicator	
4	Battery charging/charged indicator	
Battery charger (loaded)		
5	Battery in cradle	

2.4 Components and Accessories

The items included with the DELTA analyzer and docking station are shown below. Unless otherwise noted, all parts are standard accessories.

Item	Description	
Li-ion batteries	Two high capacity batteries	
USB cable 1	1.83 m (6 ft) in length, 480 Mbps, USB A to USB B connectors.	

Item	Description	
USB cable 2	Mini USB B to USB A connectors.	
AC power adaptor	Provides DC power to docking station. Input: 110–240 VAC; Output: 70 W, 18 VDC, 3.9 A.	
DELTA 50 probe shield	Provides maximum shielding, recommended for extended handheld use of the DELTA 50. NOTE: The probe shield is included as a standard accessory with DELTA 50 analyzers.	
AC power adaptor	Li-ion battery replacement; 110– 240 VAC power source. This unit is an optional accessory.	
Cal Check coupon	316 stainless steel	
Prolene Windows – Premium, Premium Plus, Standard and Professional models	Bag with 10 pieces of 6 µm film windows.	N/A
Kapton Windows – Classic, Classic Plus, Inspector, Element models	Bag with 10 pieces of 6 µm film windows.	N/A
DELTA Documentation Suite	– <i>User's Manual</i> (digital version, P/N: 103201-01EN) – <i>User Interface Guide</i> (digital version, P/N: 103202-01EN) – <i>Quick Start Guide</i> (printed version, P/N: 103076-01EN)	N/A

2.5 Packing and Shipping

If the DELTA handheld XRF analyzer is not returned in its transport case, it could be damaged during shipping. Olympus reserves the right to void the warranty on instruments damaged while in transit if they are shipped without their transport case. Prior to returning any units, contact Customer Service to obtain the required RMA number(s) and any important shipping information

To return your XRF analyzer

1. Pack the analyzer back into the transport case that it came in using the original packing materials.
2. Include the RMA in the case, and reference the RMA number in your shipping documents.
3. Close the transport case and either:

- Secure it with plastic zip ties, or;
- Pack the transport case within another box.

IMPORTANT

When shipping the Li-ion battery, be sure to follow all local transportation regulations.

3. Safety Information

3.1 Radiation Safety Information

Olympus handheld XRF analyzers are secure and dependable instruments when used in accordance with recommended testing techniques and safety procedures.



WARNING

- Olympus analyzers must only be used by trained and authorized operators in accordance with proper safety procedures. Improper use may impair safety protection and cause potential harm to the user.
 - Read all warning signs and labels.
 - **DO NOT USE** the instrument if there is any evidence of damage, as doing so could cause unintentional emission of stray radiation. In such a case, arrange for qualified personnel to perform a radiation safety test and repair any damage to the instrument.
-



Figure 3-1 Caution radiation label underneath probe/nose


3.2 Safety Interlock Structure

To control X-ray emissions, thereby minimizing the possibility of accidental exposure, the DELTA handheld XRF analyzer has a standard safety interlock structure consisting of the three features listed below:

1. Software proximity sensor

At the start of the test, the analyzer detects the sample in front of the measurement window. If no sample is detected the test aborts to prevent accidental exposure, the filter wheel goes to position 0, and the X-rays shut off. The tube current is reduced to 0.0 μ A, and the red light stops blinking. Also, if the probe/nose is pulled away from the sample while a test is in progress, testing stops in approximately one second.

2. Software trigger lock

If five minutes elapse between tests (default time), the trigger automatically locks and you must tap on the Lock button () to unlock it.

3. Safeguards

As an owner of an Olympus handheld XRF analyzer, your safeguards include those items indicated below:

- Limited access

Keep the instrument in a controlled location to which only trained and authorized users have access.

- Trained operators

Post a sign near the analyzer indicating that it must only be used by operators who have completed a training class provided by your company, or who have attended an Olympus training course and completed any other requirements stipulated by the local regulating authority. When the Olympus instrument is turned on, the user interface screen displays a message indicating that the instrument should only be used by authorized personnel.

- Shielding issues

An Olympus handheld XRF analyzer emits a tightly collimated beam of X-ray radiation. Although attenuation occurs, the beam may project many meters in open air.

Adequate shielding is achieved by:

- Establishing a no-admittance zone sufficiently distant from the instrument's measurement window to allow air to attenuate the beam.
- Enclosing the beam working area with protective panels (for example, 3.0 mm stainless steel can attenuate the beam to background levels)

Contact your Olympus representative for assistance and suggestions on interlocks and applications that limit radiation exposure.

- Trigger issues

"Deadman trigger" mode requires the user to pull and hold down the trigger for the duration of the test. Releasing the trigger immediately aborts the test.

3.3 Indicators and Statuses

This section explains the DELTA handheld XRF analyzer's indicators (see Figure 3-2 on page 9) and statuses.

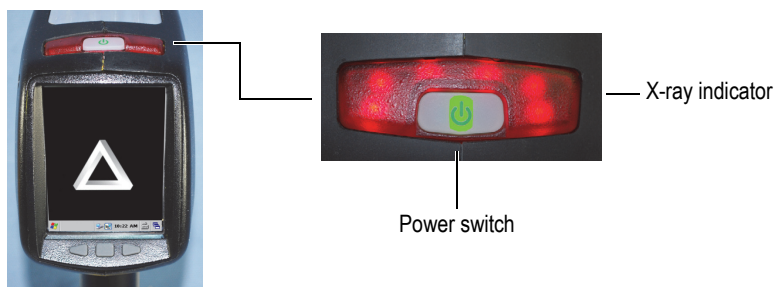


Figure 3-2 Power switch and X-ray indicators

3.3.1 Power Switch with Integral Indicator Light

The power switch is located at the upper rear of the analyzer (see Figure 3-2 on page 9).

POWER ON

- ◆ Press the I/O switch to turn on the power.
A green LED indicator illuminates.

NOTE

This switch DOES NOT turn the X-ray tube on. No tube power is supplied until the Olympus software is launched.

POWER OFF

- ◆ Press and hold switch for more than three seconds.
The instrument powers off (see section “Exit Options” on page 17 for more exit options).

3.3.2 X-Ray Indicator

The X-ray indicator is located on the upper rear of the instrument (see Figure 3-2 on page 9). It consists of a six-element red LED array and provides two key functions:

X-ray indicator continuously ON (solid red LED array)

This signifies that:

- The X-ray tube is enabled.
- There is no radiation exposure to you or bystanders.

The instrument can be carried or set down safely in this condition.

X-ray indicator flashing ON (blinking red LED array)

This signifies that:

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

In this condition, the analyzer must be pointed towards a test sample.

3.3.3 Test Screen

During Cal Checks or while samples are being tested, the test screen’s lower status bar provides an indication of the progress (see Figure 3-3 on page 10). Upon completion, a **Ready** indicator is displayed (ready for next operation).

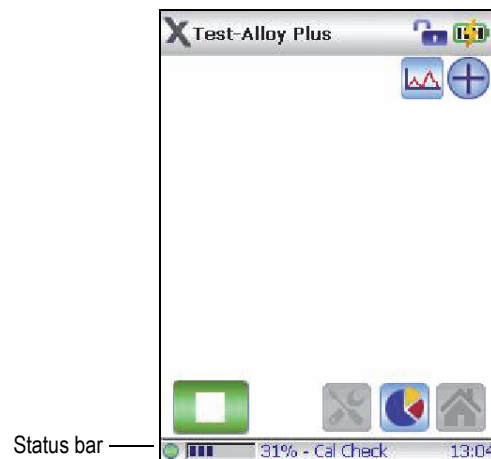


Figure 3-3 Test screen status bar

4. Instrument Batteries

This section explains how to use and charge the batteries of a DELTA handheld XRF analyzer.

4.1 Battery Status

To test a Li-ion battery charge status, press the white button on the battery (see Figure 4-1 on page 11). The green lights indicate the percent of charge remaining, ranging from less than 25 % to 100 %. If a battery has a charge of less than 25 %, use the docking station to perform a full charge.



Figure 4-1 Battery charge status button

4.2 Charging Batteries

4.2.1 Charging Batteries Using the Docking Station

The DELTA handheld XRF analyzer comes with a new multipurpose tool: a docking station (see section “Docking Station” on page 5 for hardware details). In addition to providing an automatic Cal Check, the docking station delivers two charging functions:

- It can be used to charge the installed Li-ion battery located in the instrument’s handle.
- Simultaneously, it can be used to charge a second battery with its special battery charging socket.

The charge status is shown in real-time on the DELTA’s display screen (see Figure 4-2 on page 11).

The status of the second docked battery (either charging = red or full = green) is also shown on the battery indicator located on the left rear side of the docking station.




Figure 4-2 Battery charge status

4.2.2 Charging Batteries Using the Battery Charger

The battery charger is a standard accessory with the DELTA Element and DELTA Inspector models. It is an optional accessory for all other models.

The charger takes about two hours to completely charge a battery. The battery charge status is indicated by two lights on the power adaptor.

Left light (green only)	Right light (red only)	Status
		
On — Flashing	Off	The battery is charging.
On — Solid	Off	The battery is charged.

Left light (green only)	Right light (red only)	Status
Off	On – Solid	Error. Remove the battery, and then place it back on the charger. If the error persists, call Olympus Technical Support.
Off	Off	There is no battery on the charger.

4.3 Hot Swap for a DELTA Battery

A battery hot-swap capability is a standard feature with the DELTA handheld XRF analyzer. You can remove and replace a battery without having to shut down, restart, or perform a Cal Check.

A “shutdown” status display gives the percentage of internal charge remaining when the battery is removed (see Figure 4-3 on page 12). If the internal charge reaches 0, insert a new battery and then, restart the analyzer with the I/O switch. If the red X-ray indicator lights are flashing, the battery voltage is too low.

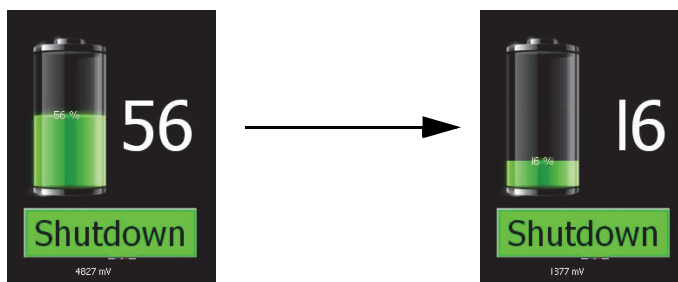


Figure 4-3 Shutdown status

4.4 Replacing the Battery

Perform the following procedure to replace the battery of the DELTA handheld XRF analyzer. See also Figure 4-4 on page 12.

To replace the battery

1. Hold the analyzer upside down by the handle, with the bottom of the analyzer base pointing upward, and the nose pointing away from the operator.
2. Pull the rubber latch and lift the cover.
3. Pull the tab to remove the existing battery.
4. Insert the charged battery into the analyzer with the battery connectors facing to the left. The battery slot is keyed so that the battery can only be inserted one way.



Figure 4-4 Battery replacement

5. User Interface

The DELTA handheld XRF analyzer's user interface opens with the startup radiation safety and initialization screens (see chapter "Operation" on page 15). The main operations are accessible from the **Home** screen (see Figure 5-1 on page 13). Refer to the *User Interface Guide* (P/N: 103202-01EN) for complete software details.

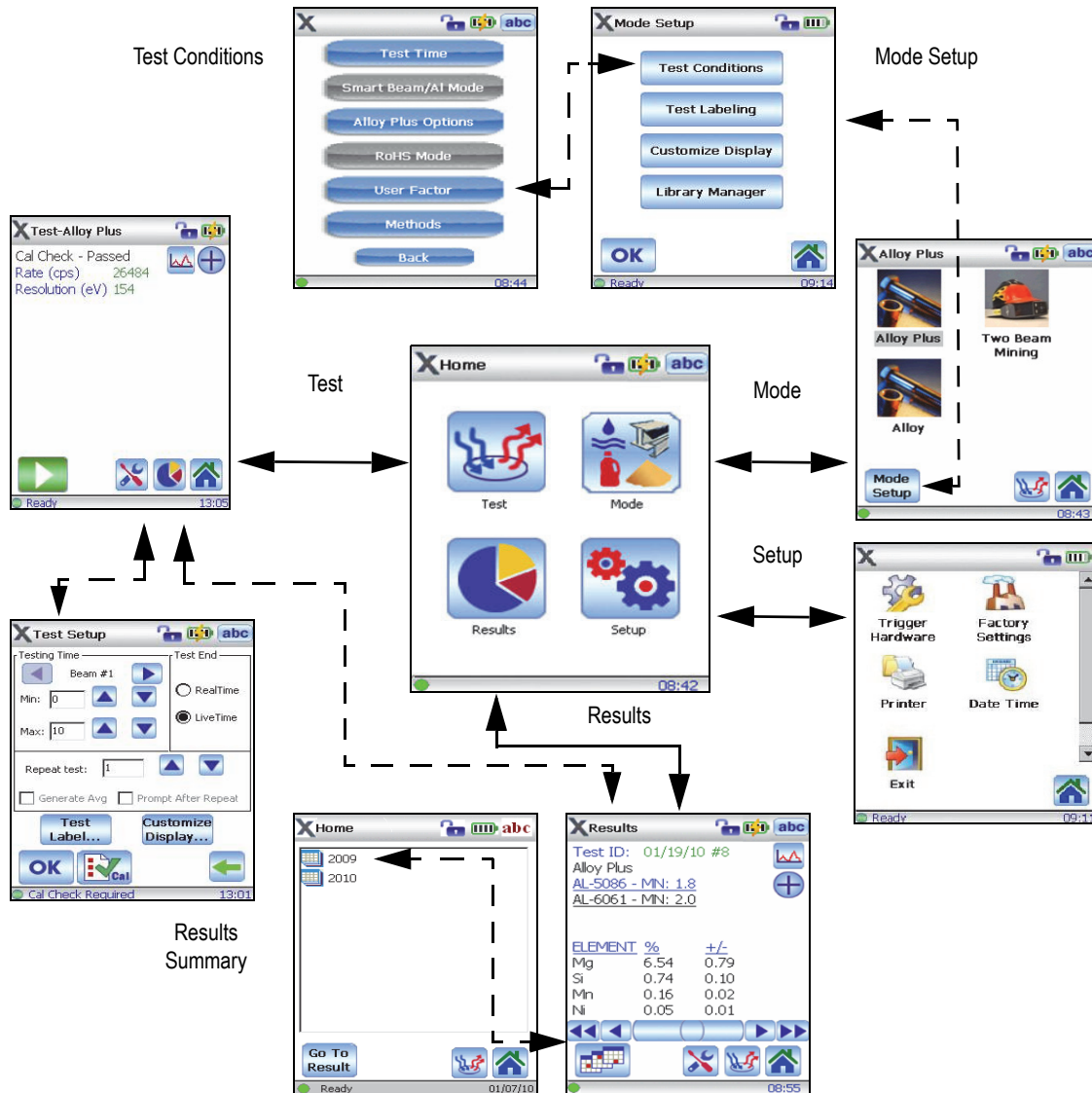


Figure 5-1 DELTA user interface

5.1 Buttons



Figure 5-2 Buttons

5.2 Indicators

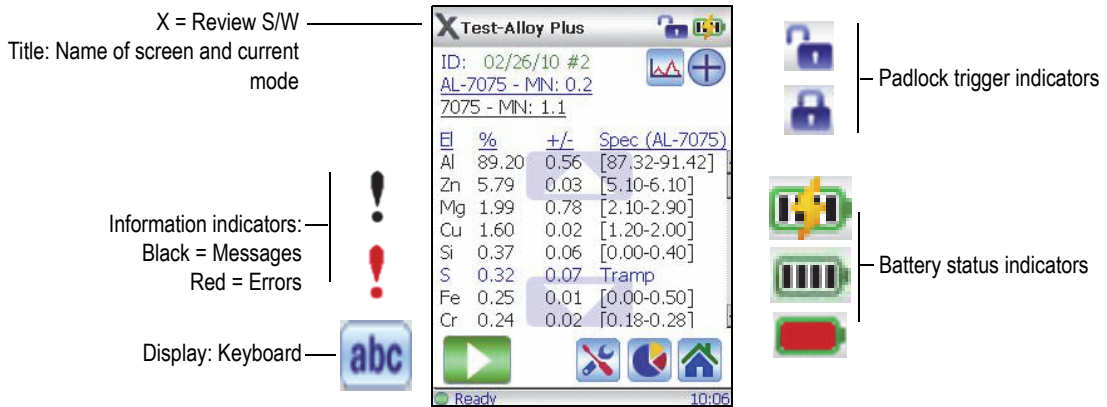


Figure 5-3 User interface indicators

5.3 Horizontal and Vertical Scrolling

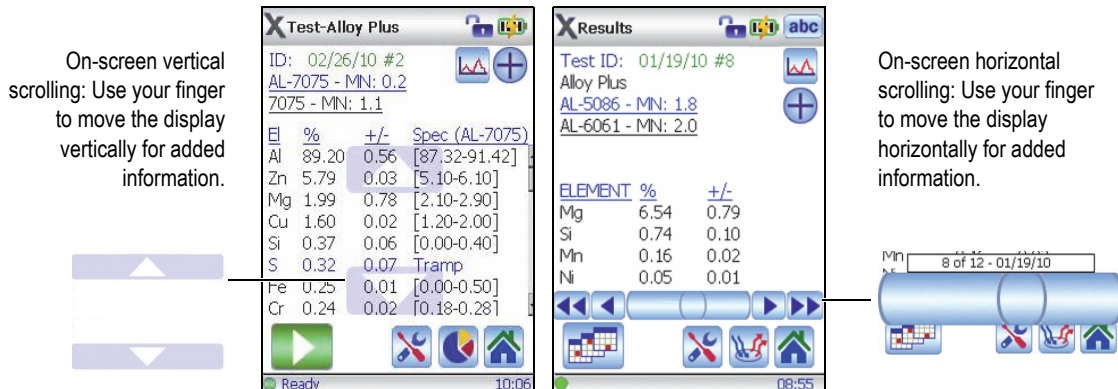


Figure 5-4 Scrolling tools

5.4 Lower Status Bar

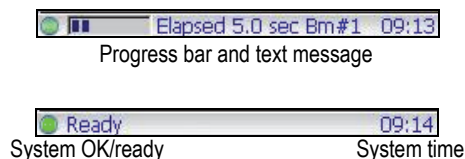


Figure 5-5 Lower status bar

6. Operation

This chapter describes a typical operational sequence for the DELTA handheld XRF analyzer.

6.1 Typical Operating Procedure

To use the instrument

1. Insert a charged battery into the analyzer handle.
2. Turn on the analyzer using the I/O switch.
3. Read the radiation safety notice (see Figure 6-1 on page 15), and then confirm that you are a certified user. System initialization begins immediately.



Figure 6-1 Radiation safety notice

The analyzer launches a test screen using the last selected mode (see Figure 6-2 on page 15).

4. If the mode is to be changed:
 - a) Go to the **Home** screen.
 - b) Select the Mode button.
 - c) Choose the desired mode.

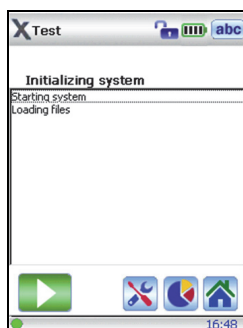


Figure 6-2 Test screen

5. When the “Cal Check Required” message is displayed, place the analyzer in the docking station.
6. Navigate to the **Test Setup** screen, and then tap the Cal Check button (see Figure 6-3 on page 16).

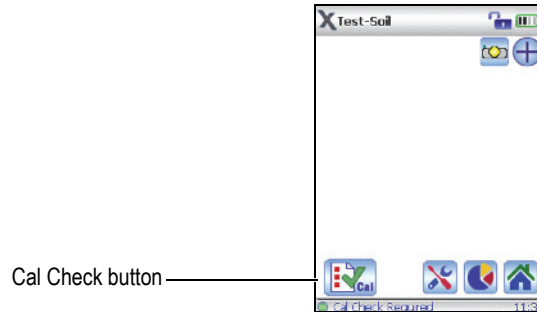




Figure 6-3 Cal Check Required message

The Cal Check takes approximately 15 seconds. After a successful Cal Check, the analyzer is ready for use.

7. Position the measurement window over the test sample.
8. Pull the trigger or tap the Start Test button ().
Results are displayed immediately upon test completion.
9. Tap the Spectrum button () to view spectral results (see Figure 6-4 on page 16).

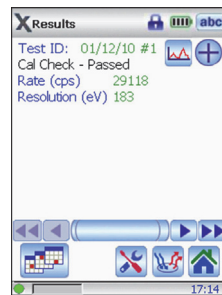


Figure 6-4 Results

10. At the end of the session, export the results to a PC using the data port and USB cable.
11. When testing and exporting are complete, turn off the analyzer using the I/O switch, or insert it into the docking station.

6.2 About Calibration Check (Cal Check)

DELTA analyzers use advanced techniques for Cal Checking.

- The docking station (with its special 316 s/s test cup) provides an automatic Cal Check. The analyzer must be ON when inserted.
- When in the field (and away from the docking station) you can use the 316 s/s standardization coupon to perform a Cal Check. This check only takes 15 seconds.

6.3 Exit Options

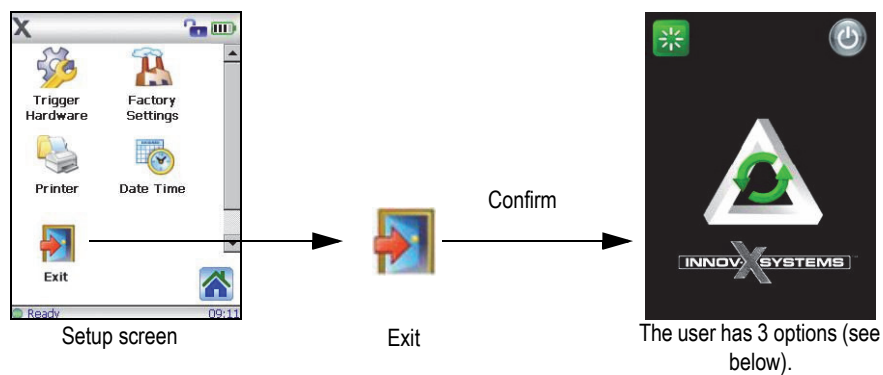


Figure 6-5 Exit options

The user has three options:

1. Soft reboot
Restart operating system (OS) and the application.
2. Power OFF
Turn the analyzer off after confirmation.
3. Relaunch
Restart the application.

NOTE

All user interface (UI) screens have a time-out (power-saving) feature that causes the screen to go blank if the UI is not accessed or if the instrument is not moved within a 90-second interval. However, when this mode is enabled, the analyzer is still running. To restore the screen, tap it or move the instrument.

7. DELTA Radiation Profile

This chapter includes the radiation profiles for the DELTA handheld XRF analyzers.

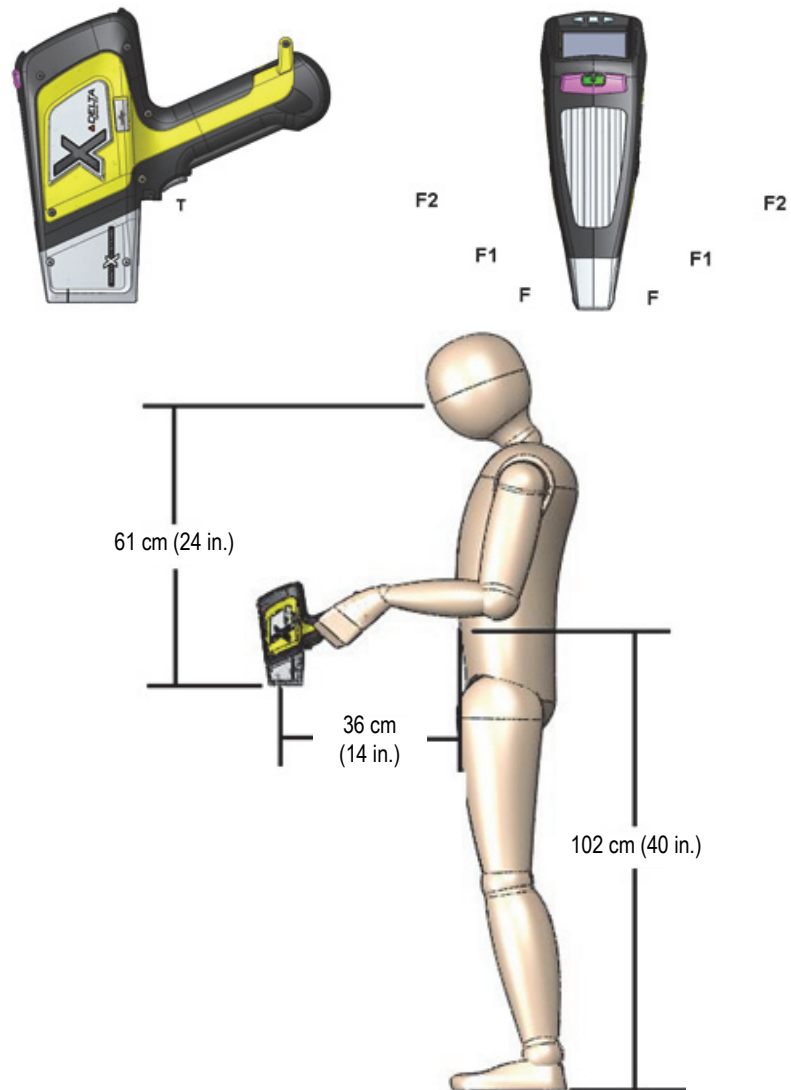


Figure 7-1 DELTA radiation profile key to measured distances

NOTE

The values in this table are maximum values. The Radiation Profile was taken under maximum power conditions and does not indicate typical use values. Please contact Olympus for details.

Table 1 Radiation profile^a – Aluminum probe head^b

Model: DELTA Series					Date: June 2015				
Survey instruments		Ludlum Model 3 44-7 probe 44-3 probe	Ludlum Model 2241 44-172 probe	Performed by: D. Smatlak	Validated by: M. L. Tremblay				
Probe head: Aluminum									
Measured dose rate in $\mu\text{Sv/h}^c$ – Secondary radiation (scatter)									
Mode(s)	Substrate	Voltage (kV)	Amperage (μA)	Filter	Trigger – T	Close – F	5 cm – F1	10 cm – F2	30 cm (calculated)
Alloy Plus, Mining, Mining Plus, GeoChem 1, 3-Beam Soil, HalFree, RoHS 1 (plastic)	316 stainless	40	100	1	BK ^d	57	18	9	BK
	Al (319 AA)				BK	140	53	28	3
	EC 680K				37	2640	2640	1320	147
	Soil (SiO ₂)				12	1650	660	396	44
RoHS 1, 4-Beam RoHS 1 (plastic), RoHS 2, 4-Beam RoHS 2 (alloy)	PVC-Blank	50 ^e	80	6	5	858	528	185	21
	71X SR2 (solder)				BK	BK	BK	BK	BK
Alloy, Mining	316 stainless	35	100	1	BK	24	9	4	BK
	Soil (SiO ₂)				7	1650	528	211	23
Alloy Plus 3	316 stainless	8	200	7	BK	BK	BK	BK	BK
	Al (319 AA)				BK	BK	BK	BK	BK
Alloy Plus 2	316 stainless	13	200	7	BK	BK	BK	BK	BK
	Al (319 AA)				BK	BK	BK	BK	BK
Alloy 2	316 stainless	15	200	7	BK	BK	BK	BK	BK
	Al (319 AA)				BK	BK	BK	BK	BK
Alloy	Al (380 AA)	38	100	1	6	1500	420	204	23
	Soil (SiO ₂)				50 ^e	80	6	5	924
3-Beam Soil 1	Soil (SiO ₂)	40	100	3	16	2640	990	462	51
		50 ^e	80	6	5	924	528	264	29
RoHS 2 (alloy)	PVC-Blank	40	100	3	8	1650	528	185	21
	EC 680K				66	2640	2310	1320	147
Geochem 2, Mining Plus 2	Soil (SiO ₂)	10	200	7	BK	BK	BK	BK	BK
3-Beam Soil 3	Soil (SiO ₂)	15	200	5	BK	BK	BK	BK	BK
Lead 2	71X SR2 (solder)	18	200	1	BK	BK	BK	BK	BK
Lead 1	71X SR2 (solder)	25	100	1	BK	3	BK	BK	BK
HalFree 2	EC 680K	12	200	7	BK	360	144	8	BK
		10	200	7	BK	48	24	BK	BK

- a. Table revision E, June 2015.
- b. Aluminum probe head only, no probe shield in place.
- c. To convert measurements to mR/h, divide results by 10.
- d. BK = Background reading (< 1 $\mu\text{Sv/h}$).
- e. All 50 kV readings are taken with standard probe shield in place.

Table 2 Radiation profile^a – Brass probe head^b

Model: DELTA Series					Date: Oct. 2012 and Jan. 2013									
Survey instrument	Ludlum Model 3 44-7 probe	Ludlum Model 2241 44-172 probe		Performed by: F. Cook R. Nasella	Validated by: M. L. Tremblay									
Probe head: Brass alloy														
Measured dose rate in $\mu\text{Sv/h}^c$ – Secondary radiation (scatter)														
Mode(s)	Substrate	Voltage (kV)	Amperage (μA)	Filter	Trigger – T		Close – F		5 cm – F1		10 cm – F2		30 cm (calculated)	
					Probe head only ^d	Probe shield ^e	Probe head only	Probe shield	Probe head only	Probe shield	Probe head only	Probe shield	Probe head only	Probe shield
Alloy Plus, Mining, Mining Plus, GeoChem 1, 3-Beam Soil 2, HalFree 1, RoHS 1 (plastic)	316 stainless	40	100	Aluminum	BK ^f	BK	BK	BK	BK	BK	BK	BK	BK	BK
	Al (319 AA)				BK	BK	5	BK	BK	BK	BK	BK	BK	BK
	EC 680K				50	7	1500	950	700	370	400	160	26	14
	Soil (SiO ₂)				20	4	850	300	500	280	200	110	19	10
RoHS 1, 4-Beam RoHS 1 (plastic), RoHS 2, 4-Beam RoHS 2 (alloy)	PVC-Blank	50	80	Copper	25	5	650	400	600	200	120	60	22	7
	EC 680K				60	9	1500	1000	1500	1000	750	200	56	37
	71X SR2 (solder)				BK	BK	BK	BK	BK	BK	BK	BK	BK	BK
	Al (319 AA)				1	BK	25	15	10	10	6	5	BK	BK
Alloy, Mining	316 stainless	35	100	Aluminum	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK
	Soil (SiO ₂)				BK	BK	BK	BK	BK	BK	BK	BK	BK	BK
Alloy Plus 3	316 stainless	8	200	Open	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK
	Al (319 AA)				BK	BK	4	BK	BK	BK	BK	BK	BK	BK
Alloy Plus 2	316 stainless	13	200	Open	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK
	Al (319 AA)				BK	BK	4	BK	BK	BK	BK	BK	BK	BK
Alloy 2	316 stainless	15	200	Iron	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK
	Al (319 AA)				BK	BK	BK	BK	BK	BK	BK	BK	BK	BK
3-Beam Soil 1	Soil (SiO ₂)	50	80	Copper	70	7	1000	500	750	350	300	50	28	13
		50	60	Copper	30	5	750	370	550	500	170	110	21	19
3-Beam Soil 1	Soil (SiO ₂)	40	100	Copper	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK
RoHS 2 (alloy)	316 stainless	40	100	Copper	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK
	Al (319 AA)				BK	BK	BK	BK	BK	BK	BK	BK	BK	BK
Geochem 2, Mining Plus 2	Soil (SiO ₂)	10	200	Open	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK
Mining Plus	Soil (SiO ₂)	50	80	Copper	100	10	1750	750	750	350	300		28	13
		50	15	Copper	15	4	300	170	160	100	80	40	6	4
3-Beam Soil 3	Soil (SiO ₂)	15	200	Thin aluminum	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK
Lead 2	71X SR2 (solder)	18	200	Aluminum	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK
Lead 1	71X SR2 (solder)	25	100	Aluminum	BK	BK	BK	BK	BK	BK	BK	BK	BK	BK
HalFree 2	EC 680K	10	200	Open	BK	BK	3	BK	1	BK	BK	BK	BK	BK
HalFree 2	EC 680K	12	200	Open	BK	BK	3	BK	1	BK	BK	BK	BK	BK

a. Table revision D, January 2013.

b. Brass probe head for DELTA models sold in Japan, and 50 kV models sold in Canada.

c. To convert measurements to mR/h, divide results by 10.

d. Probe head only = No shield in place.

e. Probe shield = Standard probe shield in place.

f. BK = Background reading (< 1 $\mu\text{Sv/h}$).

Important Information — Please Read Before Use

Intended Use

The DELTA is designed to perform identification and analysis of elements from magnesium to uranium (Mg to U), depending on the selected model, contained within test samples.



WARNING

DO NOT USE THE DELTA FOR ANY PURPOSE OTHER THAN ITS INTENDED USE.

Instruction Manual

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

Keep this instruction manual in a safe, accessible location.

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

Only use the DELTA analyzer with the following ancillary equipment:

- Rechargeable lithium-ion (Li-ion) battery pack (P/N: A003 [U8990853])
- Optional stand-alone external battery charger (P/N: A004 [U8990854]) [varies by configuration; must select power cord]
- AC adaptor (P/N: A013 [U8990860]) [varies by configuration; must select power cord]

The DELTA is primarily a self-contained unit. However, it does have a series of I/O ports that can be used to connect compatible peripherals and connect it to a PC. The unit derives its required DC input power from the DELTA AC adaptor or battery pack.



CAUTION

USING INCOMPATIBLE EQUIPMENT COULD CAUSE EQUIPMENT MALFUNCTION AND/OR DAMAGE.

Repair and Modification

The DELTA 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. For more details, refer to the DELTA User's Manual.



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:

This symbol is 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.



High voltage warning symbol:

This symbol is used to alert the user to potential electric shock hazards greater than 1000 volts. All safety messages that follow this symbol shall be obeyed to avoid possible harm.

Safety Signal Words

The following safety symbols might appear in the documentation of the instrument:



DANGER

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



WARNING

The WARNING signal word indicates a potentially hazardous situation. It calls attention to a procedure, practice, or the like, which, 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 an operating procedure, practice, or the like, which, 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.

Safety

Before applying power to the DELTA, verify that the correct safety precautions have been taken (see the following warnings). In addition, take note of the external markings on the instrument, which are described in "Safety Information" on page 8.

Warnings



General Warnings

- Carefully read the instructions contained in this manual prior to turning on the instrument.
- Keep the user's 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 the user's 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 apparatus, contact Olympus or an authorized Olympus representative.
- 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.

**WARNING**

If the analyzer is operated using a power cord, observe the following safety measures. (These safety measures are not applicable if the analyzer is operated using the battery.)

- Before turning on the instrument, you must connect the protective earth terminal of the charger/adaptor to the protective conductor (mains) of the power cord. The mains plug shall only be inserted into a socket outlet provided with a protective earth contact. 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 only be connected to a power source corresponding to the type indicated on the rating plate.

**CAUTION**

If a non-approved power supply cord not dedicated to Olympus products is used, Olympus will not be able to ensure the electrical safety of the equipment.

CE (European Community)

This device complies with the requirements of both directive 2004/108/EC concerning electromagnetic compatibility and directive 2006/95/EC concerning low voltage. The CE marking indicates compliance with the above directives.

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 Olympus 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 DELTA 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.

FCC (USA) Compliance

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

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

This equipment 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 equipment is operated in a commercial environment. This equipment 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 equipment in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

Warranty Information

Olympus guarantees your Olympus product to be free from defects in materials and workmanship for a specific period, and in accordance with the conditions specified in the *Olympus Scientific Solutions Americas Inc. Terms and Conditions* available at <http://www.olympus-ims.com/en/terms/>.

The Olympus 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 establish a damage claim. After notifying the carrier, contact Olympus for assistance with the damage claim and equipment replacement, if necessary.

This instruction manual explains how to safely operate your Olympus 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 in line with the criticality of the application. For this reason, Olympus 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.

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

Technical Support

Olympus 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, please contact the Sales Representative the product was purchased from.

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