OLYMPUS®

OmniScan X3
PA/UT Flaw Detector
User's 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. Use the product as instructed.

Keep this instruction manual in a safe, accessible location.

Table of Contents

List of Abbreviations

AC	alternating current
AIM	Acoustic Influence Map
CLK	clock
DC	direct current
DIR	direction
EFUP	Environment-Friendly Use Period
FMC	Full Matrix Capture
GPS	Global Positioning System
I/O	input/output
IP	International (ingress) Protection
LAN	local area network
LCD	liquid crystal display
N/A	not applicable
P/N	part number
PA	phased array
RH	relative humidity
RoHS	Restriction of Hazardous Substances
SDHC	Secure Digital High Capacity
TCG	time-corrected gain
TFM	Total Focusing Method
TFT	thin film transistor
TOFD	time-of-flight diffraction
TTL	transistor-transistor logic
UT	ultrasonic testing

WEEE   Waste Electrical and Electronic Equipment

WLAN   wireless local area network

Labels and Symbols

Safety-related labels and symbols are located on the instrument as shown in Figure i-1 on page 1 through Figure i-4 on page 6. If any or all of the labels or symbols are missing or illegible, please contact Olympus. More details of regulatory markings and related declarations and notifications are provided under "Important Information" on pages 13–17.

Warranty seals
(removal voids warranty)

Location of rating label
(see Table 1 on page 2)

Figure i-1 Label location on instrument

Table 1 Rating label and instrument warning symbols

Label content	
C E	The CE marking is a declaration that this product conforms to all the applicable directives of the European Community. Contact your Olympus representative for more information.
(15)	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 OmniScan X3 flaw detector 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.
(BC)	The BC marking is a declaration that the battery charger of this product has been tested and complies with the Appliance Efficiency Regulations of California, USA.
RCM	The regulatory compliance mark (RCM) label 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.

Table 1 Rating label and instrument warning symbols *(continued)*

	The WEEE symbol indicates that the product must not be disposed of as unsorted municipal waste, but should be collected separately.
	Seller and user shall be notified that this equipment is suitable for electromagnetic equipment for office work (Class A) and it can be used outside the home. The KC marking is a declaration that this product conforms to all the applicable standards of South Korea. Contact your Olympus representative for more information. The MSIP code for the OmniScan X3 is the following: R-R-OYN-OMNIX3.
	The direct current symbol.
	The DC adaptor polarity symbol.
S/N	The serial number.
Mfg. Date	The manufacturing date.
Warning symbols on instrument	
	The warning symbol indicates that the user must read the user's manual in order to find out the nature of the potential hazards and any actions to avoid them. The locations of this symbol are shown in Figure i-2 on page 4 and Figure i-3 on page 5.
	This symbol is used to alert the user to potential electric shock hazards. The location of this symbol is shown in Figure i-2 on page 4.

⚠ **CAUTION** ⚡

To avoid the risk of electric shock, do not touch the inner conductor of the probe connectors. Up to 350 V can be present on the inner conductor of the UT connectors, and up to 120 V can be present on the PA connector. The warning symbols between the connectors shown in Figure i-2 on page 4 warn of this electric shock risk.
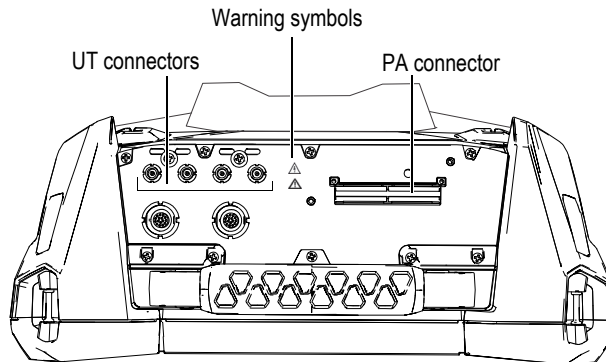
Figure i-2 Warning symbols on the instrument

⚠ **WARNING**

The warning symbol behind the battery compartment door (see Figure i-3 on page 5) signals that to avoid the risk of injury or equipment damage, precautions must be taken concerning the battery. See "Battery Precautions" on page 12.
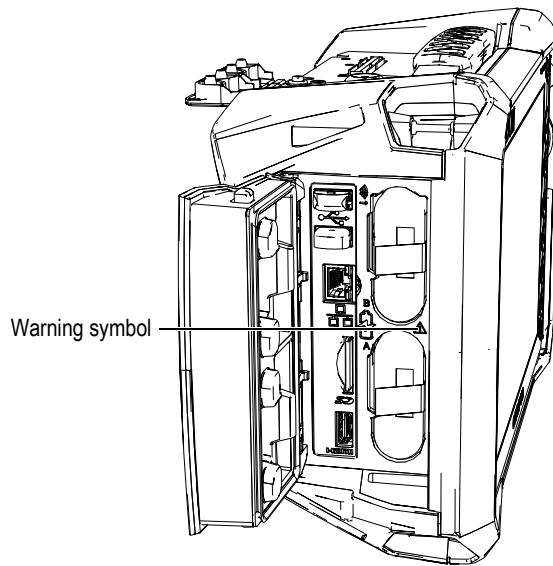
Figure i-3 Warning symbol in battery compartment behind door

⚠️   **CAUTION**

The membrane vent (see Figure i-4 on page 6) is used to counterbalance the internal and external pressures and to maintain the instrument watertightness. Do not puncture the membrane vent. When the membrane vent is punctured, the instrument fails to comply with the IP65 rating.

Membrane vent (not visible) located behind instrument panel
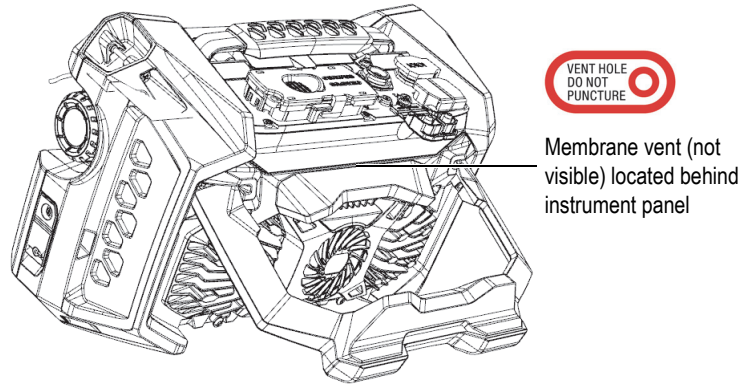
Figure i-4 Membrane vent

⚠️ **CAUTION**

The display touch screen is a sensitive area that must be protected from impacts by objects (see Figure i-5 on page 6). To avoid instrument malfunction and loss of watertightness, take care not to puncture or damage the screen. Do not use a sharp object to tap on the screen.
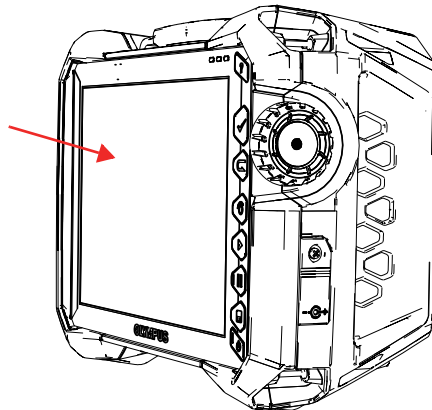
Figure i-5 Display touch screen

Important Information — Please Read Before Use

Intended Use

The OmniScan X3 flaw detector is designed to perform nondestructive inspections on industrial and commercial materials.

⚠️ **WARNING**

Do not use the OmniScan X3 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 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.

IMPORTANT

Some of the details of component and/or software images in this manual may differ from your instrument's components or software display. However, the principles remain the same.

Instrument Compatibility

See Table 13 on page 71 for examples of ancillary equipment that are compatible with the OmniScan X3 flaw detector.

⚠️ **CAUTION**

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

Repair and Modification

The OmniScan X3 does not contain any user-serviceable parts except for the fan and certain parts mounted on the instrument exterior, such as connector caps, handle, etc. (see Table 14 on page 73). Opening the instrument might void the warranty.

⚠️ **CAUTION**

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.

⚠️ 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:

⚠️ **DANGER**

The DANGER signal word indicates an imminently hazardous situation. It calls attention to a procedure, practice, or the like that 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 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, which are described under "Safety Symbols."

Warnings

WARNING

General Warnings

- Carefully read the instructions contained in this instruction manual prior to 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 Olympus or an authorized Olympus representative.
- Do not touch the connectors directly by hand. Otherwise, a malfunction or electric shock may result.
- 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

Electrical Warnings

- If there is any possibility that the ground protection on the DC power adaptor cord could be impaired, you must disconnect the adaptor and secure the adaptor and instrument from unintended connection.
- The instrument must only be connected to a power source corresponding to the type indicated on the rating label.

> ⚠ **CAUTION**
>
> If an unauthorized power supply cord is used to power the instrument or charge the batteries, Olympus cannot guarantee the electrical safety of the equipment.

Battery Precautions

> ⚠ **CAUTION**
>
> - Before disposing of a battery, check your local laws, rules, and regulations, and follow them accordingly.
>
> - Transportation of lithium-ion batteries is regulated by the United Nations under the United Nations Recommendations on the Transport of Dangerous Goods. It is expected that governments, intergovernmental organizations, and other international organizations shall conform to the principles laid down in these regulations, thus contributing to worldwide harmonization in this field. These international organizations include the International Civil Aviation organization (ICAO), the International Air Transport Association (IATA), the International Maritime Organization (IMO), the US Department of Transportation (USDOT), Transport Canada (TC), and others. Please contact the transporter and confirm current regulations before transportation of lithium-ion batteries. See also "Regulations for Shipping Products with Lithium-Ion Batteries" on page 18.
>
> - For California (USA) only:
>
>   The CR battery contains perchlorate material, and special handling may be required. Refer to http://www.dtsc.ca.gov/hazardouswaste/perchlorate.
>
> - Do not open, crush, or perforate batteries; doing so could cause injury.
>
> - Do not incinerate batteries. Keep batteries away from fire and other sources of extreme heat. Exposing batteries to extreme heat (over 80 °C) could result in an explosion or personal injury.
>
> - Do not drop, hit, or otherwise abuse a battery, as doing so could expose the cell contents, which are corrosive and explosive.
>
> - Do not short-circuit the battery terminals. A short circuit could cause injury and severe damage to a battery making it unusable.
>
> - Do not expose a battery to moisture or rain; doing so could cause an electric shock.

- Only use the OmniScan X3 flaw detector or an external battery charger approved by Olympus to charge the batteries.
- Only use batteries supplied by Olympus.
- Do not store batteries that have less than 40 % remaining charge. Recharge batteries to between 40 % and 80 % capacity before storing them.
- During storage, keep the battery charge between 40 % and 80 %.
- Do not leave batteries in the OmniScan X3 during instrument storage.

Equipment Disposal

Before disposing of the OmniScan X3 flaw detector, check your local laws, rules, and regulations, and follow them accordingly.

CE (European Community)

This device complies with the requirements of directive 2014/30/EU concerning electromagnetic compatibility, directive 2014/35/EU concerning low voltage, and directive 2011/65/EU concerning restriction of hazardous substances (RoHS). The CE marking indicates compliance with the above directives.

BC (Battery Charger — California, USA Community)

The BC marking indicates that this product has been tested and complies with the Appliance Efficiency Regulations as stated in the California Code of Regulations Title 20, Sections 1601 through 1608 for Battery Charger Systems.

WEEE Directive
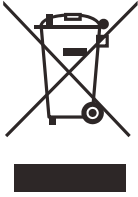
 In accordance with European Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE), this symbol indicates that the product must not be disposed of as unsorted municipal waste, but should be collected separately. Refer to your local Olympus distributor for return and/or collection systems 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 OmniScan X3 flaw detector 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。

 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。

电气电子产品
有害物质
限制使用标识

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 KN 61000-6-2 and KN 61000-6-4 concerning electromagnetic compatibility. The KC marking indicates compliance with the above standards.

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 OmniScan X3 flaw detector 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 is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

⚠️ **WARNING**

Changes or modifications to the product 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: OmniScan X3
> Model: OMNIX3-PATFM16128PR, OMNIX3-PATFM32128PR, OMNIX3-PATFM1664PR

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:

Olympus Scientific Solutions Americas Corp.

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.

Packing and Return Shipping

If the OmniScan X3 flaw detector 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.

Follow the steps below to return your OmniScan X3:

1. Pack the OmniScan X3 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 do at least one of the following:
   — Secure it with plastic zip ties.
   — Pack the transport case within another box.

Regulations for Shipping Products with Lithium-Ion Batteries

IMPORTANT

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

⚠ **WARNING**

Damaged batteries cannot be shipped through normal routes — DO NOT ship damaged batteries to Olympus. Contact your local Olympus representative or material disposal professionals.

Warranty Information

Olympus guarantees your Olympus product to be free from defects in materials and workmanship for a specific period, and in accordance with 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 file a damage claim. After notifying the carrier, contact Olympus for assistance with the damage claim and equipment replacement, if necessary.

This instruction manual explains the proper operation of 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 as the criticality of the application increases. 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, visit the Service Centers page at: http://www.olympus-ims.com.

Introduction

Olympus is a long-standing leader in NDT test platforms, with thousands of its inspection instruments in use throughout the world. The new OmniScan X3 flaw detector offers technical advancements to further enhance inspection capabilities in many specialized applications.

NOTE

Refer to the *OmniScan MXU Software User's Manual* for information on software functions.

NOTE

The illustrations used in this manual were prepared with the instrument version available at the time of publication, and may differ slightly in appearance from the version of the OmniScan X3 that you are using.

1. Package Content

The OmniScan X3 package includes the following items:

- OmniScan X3 flaw detector
- Transport case
- Li-ion battery (1)
- Anti glare screen protector (1)
- DC power adaptor
- Power cord (model varies according to country)
- Microfiber cloths
- USB key (16 GB)
- Wireless LAN dongle (optional item, sold separately—availability depends on your location)
- USB flash drive (key), which contains:
    - Instrument software
    - *OmniScan X3 Getting Started Guide*
    - *OmniScan X3 User's Manual*
    - *OmniScan MXU Software User's Manual*

NOTE

For examples of typical accessories with part numbers, see "Accessories and Spare Parts" on page 71.

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2. Overview

The front panel of the OmniScan X3 flaw detector contains the main controls, keys, and indicators (see Figure 2-1 on page 25).
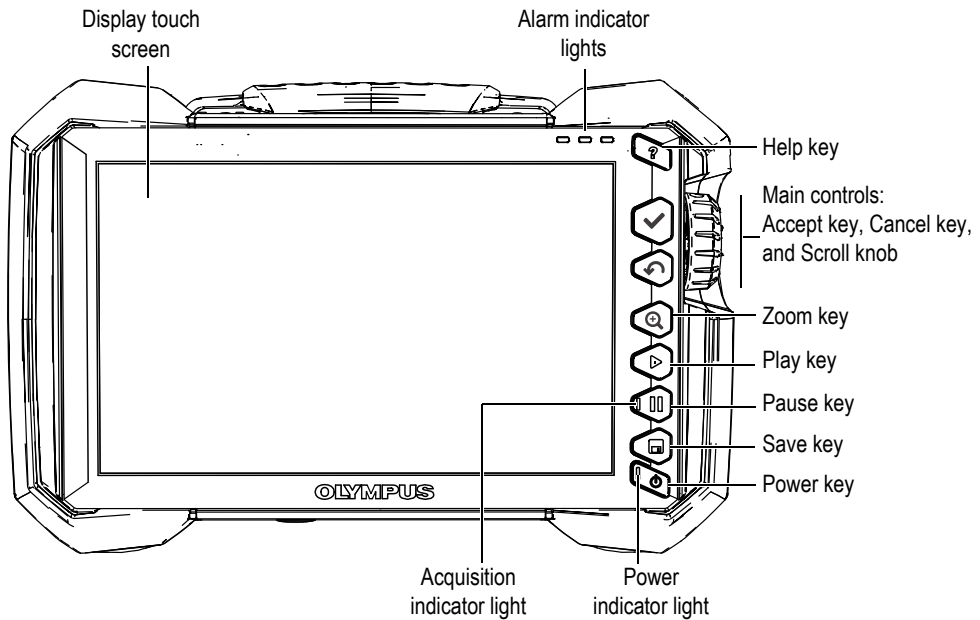

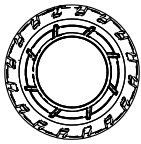**Figure 2-1 Front panel controls of the OmniScan X3**

2.1   Display Touch Screen

The display touch screen acts as a pointing device. To select an interface element, touch the screen surface lightly with your finger. Refer to the *OmniScan MXU Software User's Manual* for advanced operating instructions for the touch screen.

2.2   Main Controls

The three main controls shown in Table 2 on page 26 enable full operation of the OmniScan MXU software.

Table 2 Main controls for OmniScan X3 flaw detector

Image	Name	Description
	Scroll knob	Rotate the Scroll knob clockwise or counterclockwise to select a desired software button or change a parameter value.
	Accept key	Press the Accept key to activate the current selection and move on to the next level in the menu hierarchy. In an alphanumeric parameter value field, pressing the Accept key twice (or tapping the parameter twice) opens the software keyboard.
	Cancel key	Press the Cancel key to cancel the current selection and move back to the previous level in the menu hierarchy.

2.3   Power Key

The Power key ( ) is used to start or shut down the OmniScan X3 flaw detector. The indicator light on the key provides power status information (see "Power Indicator Light" on page 27).

2.4   Help Key

The Help key ( ) is located on the upper-right side of the OmniScan X3 front panel. This key is intended to display help information, if available, for the currently selected function.

2.5   Function Keys

The Zoom ( ), Play ( ), Pause ( ), and Save ( ) keys are used to activate specific functions in the software. For details, refer to the *OmniScan MXU Software User's Manual*.

2.6   Indicator Lights

There are three types of indicator lights on the OmniScan X3 front panel: power, acquisition, and alarm. Each indicator light is described below.

2.6.1   Power Indicator Light

The power indicator light is located on the Power key ( ). The color of this light identifies the power status of the OmniScan X3 (see Table 3 on page 27).

Table 3 Power indicator light statuses

Indicator light	Status
Off	The OmniScan X3 is turned off.
Flashing orange	The OmniScan X3 is turned off. The battery is charging.

Table 3 Power indicator light statuses *(continued)*

Indicator light	Status
Orange	The OmniScan X3 is turned off. The battery charging is complete.
Green	• The OmniScan X3 is turned on. • The OmniScan X3 is turned on and the battery is charging.
Flashing red	A critical factor (excessive temperature, very weak battery, etc.) requires immediate attention.

2.6.2   Acquisition Indicator Light

The acquisition indicator light is located on the Pause key (⏸). The color of this light indicates the operating mode of the OmniScan X3 flaw detector (see Table 4 on page 28).

Table 4 Acquisition indicator light statuses

Off	Inspection mode
Orange	Analysis mode

2.6.3   Alarm Indicator Lights

There are three alarm indicator lights located on the upper-right corner of the OmniScan X3. These lights only flash one color (red) and indicate the trigger status of their respective alarms (set within the software).

NOTE

For more details about how to set the alarms that can trigger the alarm indicator lights, refer to the *OmniScan MXU Software User's Manual*.

2.7   Left Side Panel

The left side panel of the OmniScan X3 flaw detector (see Figure 2-2 on page 29) has a door that provides access to the batteries, memory card, and various input and output ports.

To unlock the door, push
against the two latches.

USB 2.0 port

USB 3.0 port

Ethernet port

Battery compartment door

Hidden USB 2.0 port for
wireless LAN dongle

Memory card slot

HDMI™ output port

Figure 2-2 Left side panel of the OmniScan X3

Battery compartment door

This door provides access to the battery compartment. Battery replacement is covered in "Removing and Installing a Battery" on page 42.

HDMI output

The OmniScan X3 flaw detector incorporates HDMI connectivity. An external monitor that mirrors the OmniScan X3 display may be connected to the HDMI port.
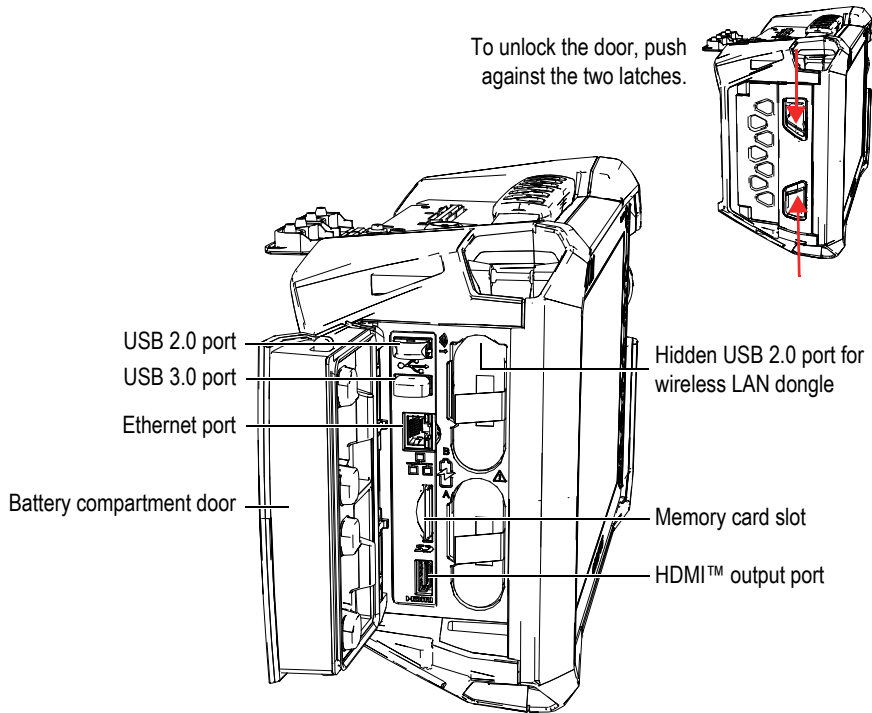
Memory card slot

Slot for inserting a Secure Digital High Capacity (SDHC) memory card.

USB ports

The USB 2.0 and USB 3.0 ports accommodate USB peripherals such as external storage devices or printers.

Ethernet port

Used to connect the OmniScan X3 to an Ethernet network.

Hidden USB 2.0 port—for wireless LAN dongle

Used to connect a dongle for accessing a wireless local area network (WLAN). The dongle is not included in a standard OmniScan X3 package but, depending on your local regulatory requirements, may be separately supplied by Olympus. To access the port, remove the top battery, then push against the cover at the top of the interior of the battery compartment, and pull it out (see Figure 2-3 on page 30).

Figure 2-3 Push the cover (*left*) and pull out the hidden USB 2.0 port (*right*)

2.8   Right Side Panel

The right side panel of the OmniScan X3 flaw detector (see Figure 2-4 on page 31) contains the DC power adaptor plug, which is protected by a flexible cap. The plug is used to connect an external DC power adaptor to the OmniScan X3.

DC power adaptor plug
(flexible cap not shown in
illustration)
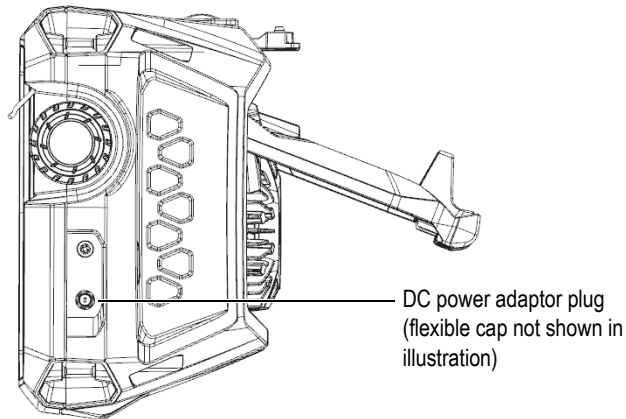
Figure 2-4 Right side panel of the OmniScan X3

2.9   Top Panel

⚠️   **CAUTION**   ⚡

- To reduce the risk of electric shock, avoid touching the inner conductor of the probe connectors. Up to 350 V can be present on the inner conductor of the UT connectors, and up to 120 V can be present on the PA connector. The warning symbol near the PA and UT connectors signals this electric shock risk.

- Reinforced insulation must be provided for the probes connected to the OmniScan X3 flaw detector.

⚠️   **CAUTION**

To avoid the risk of equipment malfunction or damage, use only compatible Olympus probes.

The top panel of the OmniScan X3 contains several types of connectors, as shown in Figure 2-5 on page 32.
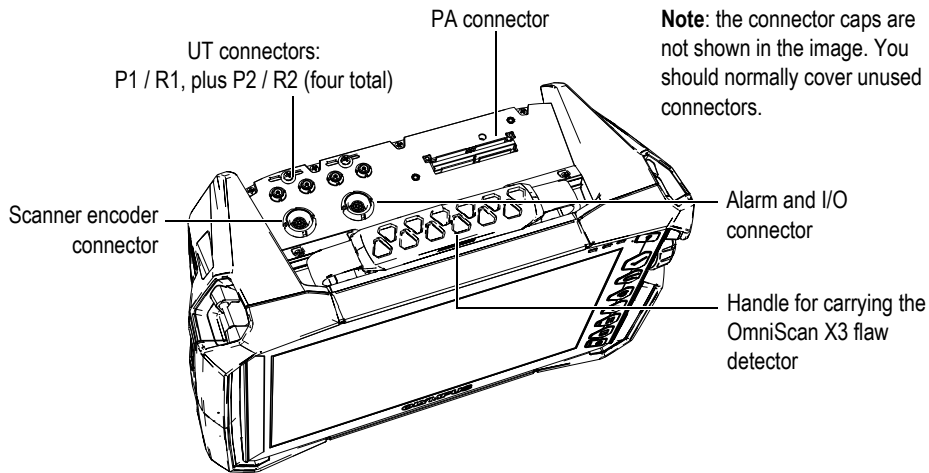
Figure 2-5 Top panel of the OmniScan X3

UT transmission connector: P1 and P2

LEMO connector used for the transmission of ultrasonic signals when using the pitch-catch inspection technique.

UT reception connector: R1 and R2

LEMO connector used for the reception of ultrasonic signals when using the pitch-catch inspection technique.

Alarm and I/O connector

LEMO connector used to connect an external alarm or transmit input and output signals for other external devices.

Scanner encoder connector

LEMO connector used to connect a scanner equipped with an encoder or transmit input and output signals for other external devices.

PA connector

Used to connect a phased array probe.

Figure 2-6 on page 33 shows the connectors that are compatible with those listed above.

LEMO connector   Conventional PA connector   Latching PA connector
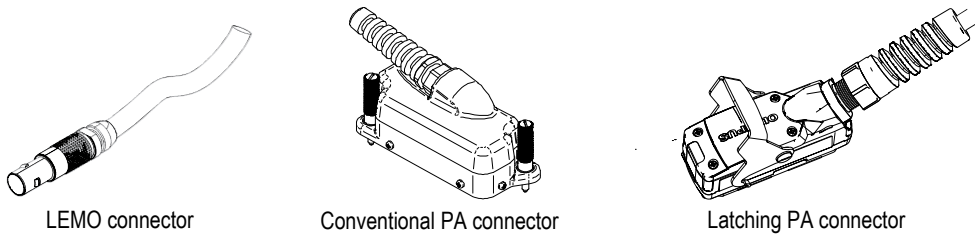
Figure 2-6 LEMO and phased array probe connectors

2.10   Rear Panel

The rear panel incorporates the heat sink with cooling fan and the support stand (see Figure 2-7 on page 34).

⚠️   **CAUTION**

To avoid the risk of equipment malfunction or damage from overheating, never obstruct the free movement of air in the area around the heat sink and cooling fan. Do not cover the rear of the OmniScan X3 flaw detector with any object or place it against a surface, which could reduce the movement of air over the heat sink or block the cooling fan.

Heat sink with cooling fan. Always allow free air movement in this area.

Support stand

Support stand fasteners (2) — to hold stand against instrument when closed
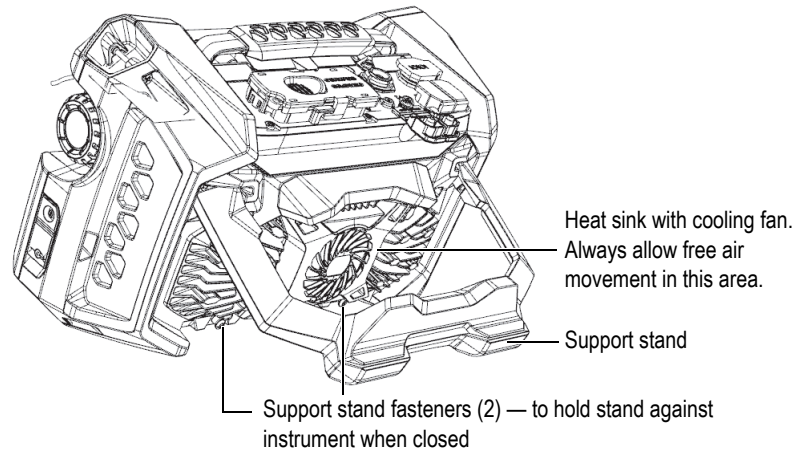
Figure 2-7 Rear panel of the OmniScan X3

⚠ **CAUTION**

- To prevent the OmniScan X3 from falling over when propped up on a desktop or similar flat surface, you must make sure the support stand is opened to the middle detent position.

- Do not use the support stand as a handle. Using the support stand as a handle could cause equipment damage or human injury.

2.11 Harness Anchor Points

The OmniScan X3 flaw detector has four anchor points for attaching a harness used to carry it (see Figure 2-8 on page 35).

Figure 2-8 The four anchor points for a harness

3. Basic Operation

This chapter describes the basic principles and procedures involved in operating the OmniScan X3 flaw detector.

3.1   Turning On and Off the OmniScan X3

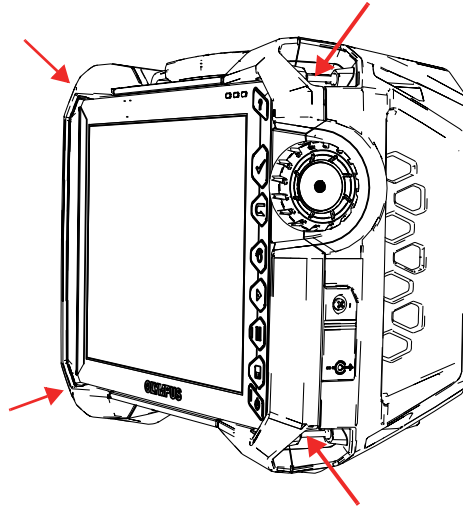This section explains how to turn on and off the OmniScan X3 flaw detector. The OmniScan MXU software shuts down automatically when you turn off the OmniScan X3 flaw detector.

To turn on the OmniScan X3

1. Press and hold the Power key ( ) for one second.

    The system starts up, performs a memory check, and the launch screen appears.

<pre>
         NOTE
</pre>

If the system encounters a problem during the start-up phase, the power indicator light will indicate the nature of the problem using a color code (for details, see "Power Indicator Light" on page 27).

---

2. Tap to start the desired application and/or, if applicable, configure connections such as a removable drive, wireless, or cloud.

To turn off the OmniScan X3

1. Quickly press the Power key ( ).

2. Tap the **Shut Down** button on the confirmation window to turn off the OmniScan X3 flaw detector.

| IMPORTANT |

If the OmniScan X3 does not react after a short press of the Power key (or after selecting **Shut Down**), press and hold the Power key for at least five seconds. This initiates a power-down sequence. However, your setup will NOT be saved with this method.

 CAUTION

Never attempt to turn off the OmniScan X3 by removing all power sources, because this could cause a faulty start-up the next time you turn it on.

3.2   Activating the Automatic Start-Up Mode

The OmniScan X3 flaw detector has an automatic start-up mode, which is also referred to as autoboot mode. Use the autoboot mode to remotely start the OmniScan X3 unit. When this mode is enabled, you do not need to press the Power key ( ) to start the OmniScan X3. The OmniScan X3 starts up automatically when connected to the DC power adaptor. This mode is disabled by default.

To activate the automatic start-up mode

1. Turn off the OmniScan X3 flaw detector, remove the batteries, and then disconnect the DC power adaptor.
2. Press and hold the Power key ( ).
3. Connect the OmniScan X3 to the DC power adaptor.
4. Wait for the power indicator light to blink two times, and then release the Power key.
5. To deactivate the autoboot mode, repeat steps 1 to 4.

3.3   Operating on AC Power

You can operate the OmniScan X3 flaw detector on AC power using the DC power adaptor (P/N: OMNI-A-AC [U8767093]). The OMNI-A-AC has a universal AC power input, which operates with any line voltage from 100 VAC to 120 VAC or from 200 VAC to 240 VAC, and at 50 Hz to 60 Hz line frequency.

⚠️ **WARNING**

To avoid the risk of injury or equipment damage, only use the DC power adaptor indoors.

To operate on AC power

1. Connect the AC power cord to the DC power adaptor (P/N: OMNI-A-AC [U8767093]) and to an appropriate power outlet.

⚠️ **CAUTION**

- To avoid the risk of human injury or equipment damage, use only the AC power cord supplied with the OmniScan X3. Do not use this AC power cord with other products.
- The OmniScan X3 must only be connected to a power source corresponding to the type indicated on the rating label. Therefore, use only the DC power adaptor that is delivered with the OmniScan X3.

2. On the right-hand side of the OmniScan X3, lift the flexible rubber cap to expose the DC power adaptor plug (see Figure 3-1 on page 40).
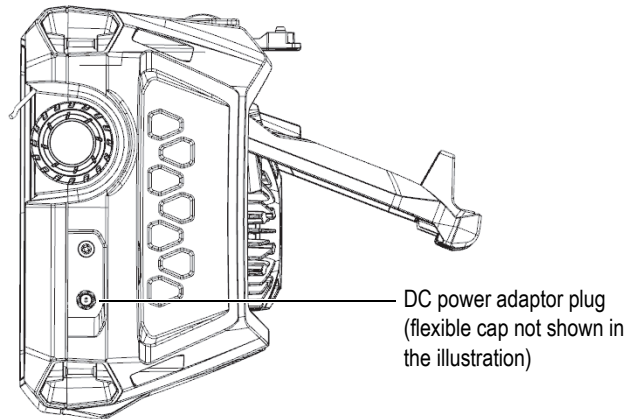
DC power adaptor plug
(flexible cap not shown in
the illustration)

Figure 3-1 DC power adaptor plug

3. Connect the DC power adaptor to the plug on the OmniScan X3.

4. Press the Power key (⏻) to start the OmniScan X3.

3.4   Lithium-Ion Battery

The OmniScan X3 flaw detector holds two lithium-ion batteries (P/N: OMNI-A-BATT [U8760010]). The lithium-ion batteries can be inserted and removed without shutting down the OmniScan X3, as long as it remains connected to another valid power source (DC power adaptor).

The OmniScan X3 also includes a lithium coin battery that does not need to be removed or replaced by the user. The coin battery maintains the instrument's real-time clock.

⚠️ **CAUTION**

To avoid the risk of human injury and/or equipment damage, only use Olympus batteries (P/N: OMNI-A-BATT [U8760010]) in the OmniScan X3.

3.4.1   Battery Status Indicators

The battery status indicators at the top of the display screen indicate the amount of power remaining in the batteries:

- The percentage of remaining power is displayed next to the indicators. The OmniScan X3 flaw detector must be turned on for approximately 15 minutes before it is able to accurately display this information.

- The bar length in the battery status indicator represents the approximate amount of power remaining in each battery (for example, 70 % ▇).

| IMPORTANT |

The maximum ambient temperature for OmniScan X3 battery discharging is 45 °C (the maximum OmniScan X3 operating temperature).

| NOTE |

If you attempt to turn on the OmniScan X3 with one or two batteries that are too low for operation, the power indicator light blinks red rapidly for about three seconds. Replace the battery or batteries, or plug in the DC power adaptor to operate the OmniScan X3.

Figure 3-2 on page 42 provides details about the variations of the battery charge indicator.
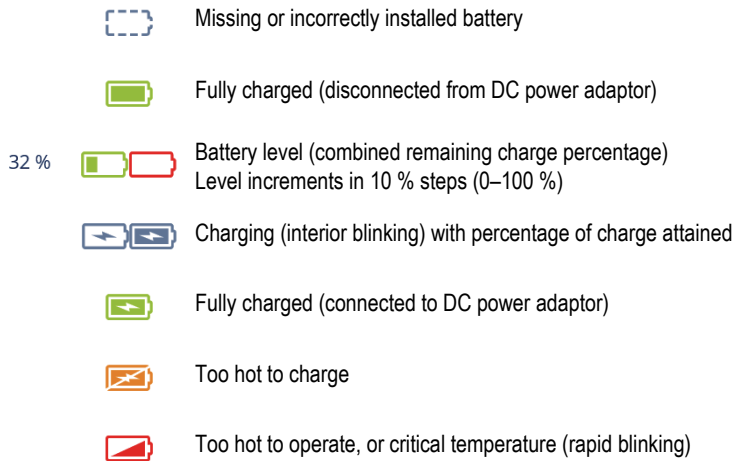
`[- - ]`	Missing or incorrectly installed battery
▭	Fully charged (disconnected from DC power adaptor)
32 % ▭▭	Battery level (combined remaining charge percentage) Level increments in 10 % steps (0–100 %)
⇥⇥	Charging (interior blinking) with percentage of charge attained
⇥	Fully charged (connected to DC power adaptor)
⇥	Too hot to charge
◢	Too hot to operate, or critical temperature (rapid blinking)

Figure 3-2 Battery indicator variations

3.4.2   Removing and Installing a Battery

To remove and install a battery

1. On the left side panel, push the two latches to open the battery compartment door.
2. Push the battery inward, then pull leftward on the battery tab, and pull the battery out (see Figure 3-3 on page 43).
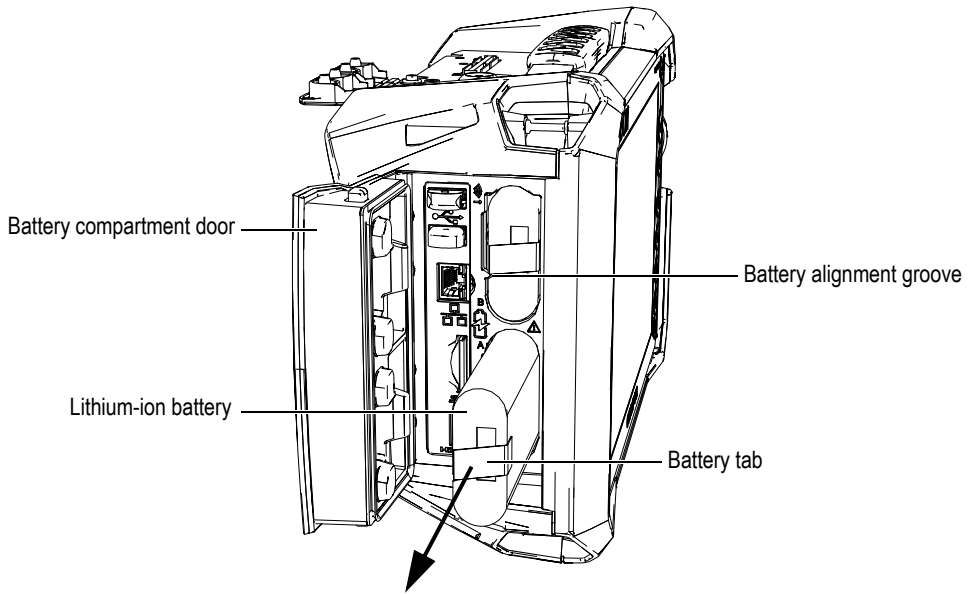
Figure 3-3 Removing a lithium-ion battery

3. Align the groove on the new battery with the key in the compartment, push the battery into the compartment until it bottoms, and then pull rightward to lock it in place.

4. Close the battery compartment door.

    Make sure that both latches lock when the door is closed.

The battery is recharged inside the OmniScan X3 flaw detector when it is connected to a DC power adaptor. Connecting the adaptor automatically starts the recharging process. The battery can also be recharged using an optional external battery charger (P/N: OMNI-A-CHRG [U8767077]).

3.4.3   Charging a Battery

IMPORTANT

The maximum ambient temperature for OmniScan X3 battery charging is 30 °C. Above this temperature, the battery will not charge, although the OmniScan X3 flaw detector can be operated up to a maximum ambient temperature of 45 °C.

WARNING

The OmniScan X3 DC power adaptor (P/N: OMNI-A-AC [U8767093]) is designed to power the OmniScan X3 and charge the lithium-ion batteries only (P/N: OMNI-A-BATT [U8760010]). Do not attempt to charge any other type of battery or use any other chargers/adaptors (except those recommended by Olympus—for example, the optional external battery charger P/N: OMNI-A-CHRG [U8767077]). Doing so might cause an explosion or injury. Do not attempt to power or charge other electronic equipment with the DC power adaptor (P/N: OMNI-A-AC [U8767093]) or external battery charger (P/N: OMNI-A-CHRG [U8767077]), unless specifically instructed in the manual. Misuse of the DC power adaptor or external battery charger can cause other batteries and/or instruments to explode, which could lead to serious injury or death.

IMPORTANT

The lithium-ion batteries are not fully charged when the OmniScan X3 is shipped. You must charge the batteries for two to three hours before using the battery power to operate the OmniScan X3.

To charge a battery

◆ Connect the OmniScan X3 flaw detector to the DC power adaptor that is connected to an appropriate AC power source.

OR

Insert a battery into the optional external battery charger (P/N: OMNI-A-CHRG [U8767077]) that is connected to an appropriate AC power source.

Battery charging in the OmniScan X3 flaw detector is performed as follows:

— When the OmniScan X3 is turned off:

When the OmniScan X3 is connected to a proper DC power source and is turned off, it will automatically recharge the battery.

The power indicator light flashes orange to indicate that the battery is currently being recharged. When the charge is complete, the power indicator light emits a steady orange light. The battery can take up to 3 hours to fully charge from a completely discharged state (less than 5 % remaining charge).

— When the OmniScan X3 is running:

When the OmniScan X3 is running and connected to a proper DC power source, it will automatically recharge the battery. The power indicator light is green during charging (when running).

Because the OmniScan X3 is running, less power is available from the DC source to recharge the battery. As such, it could take up to 8 hours to charge a completely discharged battery. For more information about battery charge status, see "Battery Status Indicators" on page 41.

3.4.4 Storing Batteries and Extending Life

This section describes lithium-ion battery care and maintenance.

To store batteries

1. Drain, recharge, and store as follows:

◆ Before recharging, drain the battery by running the OmniScan X3 flaw detector on battery power until it shuts down or until you get a low-battery warning. Do not leave the battery dormant for long periods of time. Olympus recommends using the battery at least once every two to three weeks. If a battery has not been used for a long period of time, perform the steps of "To extend the life of batteries" on page 46.

If you do not plan to use the OmniScan X3 on battery power within three or more weeks, charge the battery to between 40 % and 80 % capacity (three or four bars on the charge indicator on the battery), and then remove and store the battery in a clean, cool, and dry place.

> **NOTE**
>
> Even when the OmniScan X3 is turned off and unplugged, it draws a small amount of power from the battery, which could completely discharge the battery in about 3 months at room temperature (25 °C [77 °F]).

2. Check the remaining charge of any stored batteries approximately once a month to ensure that they have 40 % to 80 % remaining capacity, and recharge any that do not. This is necessary because lithium-ion batteries self-discharge over time. Failure to do so may render a battery permanently unusable if it falls below a critical level (less than 1 %).

3. When you are ready to use a battery after an extended period of storage, recharge it before use.

To extend the life of batteries

1. Anytime you acquire a new rechargeable lithium-ion battery, use it four to eight times consecutively in the OmniScan X3, and ensure that you completely discharge and recharge it after each use. Doing so will enable it to reach maximum capacity, providing maximum run time.

2. After the first 10 to 15 periods of normal use (or after two to three weeks), it is good practice to completely discharge and recharge the battery to maintain a good run time and maximize battery life.

> **NOTE**
>
> Frequently switching from external DC power to battery power and vice versa may result in shorter battery life, because the charge/discharge cycles are limited (approximately 300 cycles). Even a partial discharge and recharge of the battery represents one cycle.

3. To maximize battery life, before charging, always run the OmniScan X3 on battery power until it shuts down, or until you get a low-battery warning. For a shorter recharge time, recharge the battery in the OmniScan X3 while it is turned off, or recharge using an optional external battery charger.

3.4.5   Used Battery Disposal

Although lithium-ion batteries do not contain any environmentally hazardous components such as lead or cadmium, the batteries should be disposed of in accordance with local regulations. Batteries should be disposed of in a discharged state to avoid heat generation and, if applicable, in accordance with the European Directive on Waste Electrical and Electronic Equipment (WEEE). Refer to your local Olympus distributor for return and/or collection systems available in your country. Also see "Regulations for Shipping Products with Lithium-Ion Batteries" on page 18.

3.4.6   Warnings on Battery Use

Carefully read and observe the following warnings on battery use.

⚠ WARNING

- Do not open, crush, or perforate batteries; doing so could cause human injury.
- Do not incinerate batteries. Keep batteries away from fire and other sources of extreme heat. Exposing batteries to extreme heat (over 80 °C [176°F]) could result in an explosion or personal injury.
- Do not drop, hit, or otherwise abuse a battery, as doing so could expose the cell contents, which are corrosive and explosive.
- Do not short-circuit the battery terminals. A short circuit could cause injury and severe damage to a battery, making it unusable.
- Do not expose a battery to moisture or rain; doing so could cause an electric shock.
- Only use the OmniScan X3 flaw detector or an external battery charger approved by Olympus to charge the battery.
- Do not recharge a battery unless the indicators light up when the capacity check button on the battery is pressed. Doing so could be dangerous.
- Do not store batteries that have less than 40 % remaining charge. Recharge batteries to between 40 % and 80 % capacity before storing them.
- During storage, keep the battery charged to between 40 % and 80 %.
- Do not leave the battery in the OmniScan X3 during instrument storage.

3.5   Software

The OmniScan X3 flaw detector operates using OmniScan MXU software, which may periodically be updated. For details, refer to the *OmniScan MXU Software User's Manual*. You can download the latest MXU software version at http://www.olympus-ims.com.

3.6   Global Positioning System (GPS)

The OmniScan X3 flaw detector incorporates a GPS, which provides the geographic coordinates (location) of the instrument. The GPS is automatically activated when the OmniScan X3 is turned on. After the OmniScan X3 is turned on, there may be a delay of up to two minutes before it is able to obtain the coordinates.

NOTE

GPS functionality is not available in all countries. Contact your local Olympus representative for details.

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4.   Maintenance and Troubleshooting

The OmniScan X3 flaw detector only requires minimal maintenance to keep it in good physical and working condition.

4.1   Preventative Maintenance

The OmniScan X3 does not have many moving parts; it therefore only requires minimal preventative maintenance. Simply perform regular inspections to keep the OmniScan X3 in proper working order. Any dust that has accumulated on the fan can be carefully cleaned away. If damaged or malfunctioning, fan components can be changed. The touch-screen protector can be replaced if it is overly dirty or damaged. The following sections detail these maintenance procedures.

4.2   Instrument Cleaning

The OmniScan X3 flaw detector's external surfaces may be cleaned as needed. This section provides the appropriate procedure for cleaning the instrument.

4.2.1   Cleaning the Casing

To clean the casing

1.   Make sure that the OmniScan X3 flaw detector is turned off and the power cord is disconnected.
2.   Disconnect all cables and connectors, and make sure that all external ports and connectors (including PA probe connector) on the OmniScan X3 have been covered with their caps.

3. Make sure that the battery compartment door is closed correctly.

4. To restore the instrument's original finish, clean the casing with a soft cloth.

5. To remove persistent stains, use a damp cloth with a mild, soapy solution. Do not use abrasive products or powerful solvents, which could damage the finish.

6. After you have finished cleaning and the connector protectors are removed, make sure that the connectors are dry before connecting anything to them. If they are wet, carefully dry them, or let them air dry.

4.2.2   Cleaning the Screen and Screen Protector

Never use abrasive products or powerful solvents to clean the OmniScan X3 touch screen and screen protector. Clean the touch screen and screen protector using a damp cloth moistened with a standard, evaporating glass cleaner. If necessary, remove any paper-towel residue with a soft-bristle brush.

4.2.3   Cleaning or Changing the Fan

If the cooling fan is dirty or functioning incorrectly, the OmniScan X3 flaw detector may overheat.

To clean or change the fan

1. Check for presence of dust or dirt in the fan openings and carefully blow it away using compressed air in any direction from the exterior of the enclosure (maximum pressure 207 kPa [30 psi]), but do not blow directly into the cable hole in the fan enclosure (see Figure 4-1 on page 51).

⚠️ **CAUTION**

To avoid damaging the instrument seal, do not blow compressed air directly into the cable hole in the fan enclosure.

Cable hole to avoid
(behind cover, which is
removed from this illustration to
better show the hole's location)
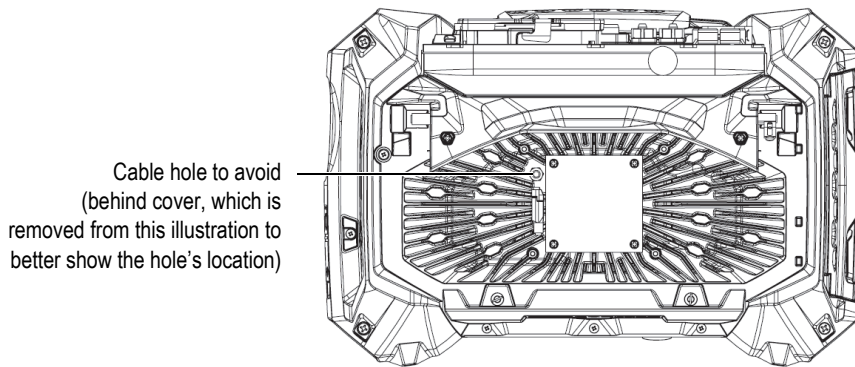
Figure 4-1 Interior of cooling fan enclosure (cover removed to show cable hole)

2. If it is difficult to clean from the exterior of the enclosure or if the fan appears to need servicing, remove the fan cover—and, if necessary, the fan—and carefully clean the part surfaces as required (see Figure 4-2 on page 52).

3. If the fan is damaged or malfunctioning, carefully disconnect the cable (see Figure 4-3 on page 52) and replace the fan with a new one.

4. If the fan cable was disconnected or moved, make sure that it is properly reconnected and placed for reassembly (see Figure 4-3 on page 52).

5. Reassemble the parts in reverse order, and sufficiently tighten all screws.

Fan P/N: OMNIX3-SP-FAN (Q8301490) ——

Four screws on fan

Note: Use a Phillips #1
screwdriver for all screws.

Four screws on cover
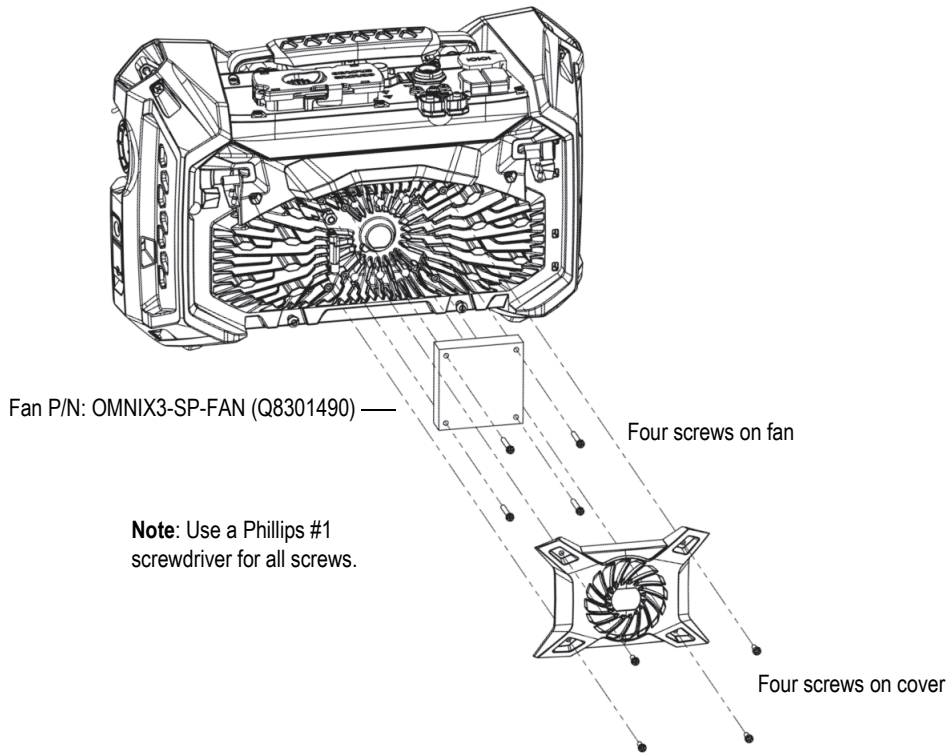
Figure 4-2 Assembly of fan and cover parts

Use a flathead screwdriver to pull up
the tab, and then disconnect the cable.
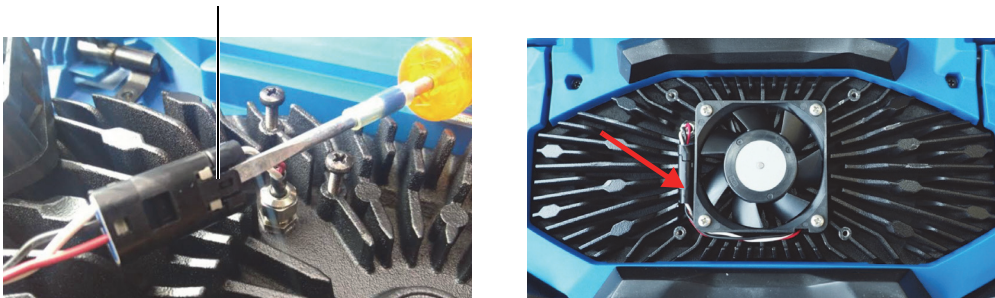
Figure 4-3 Fan cable disconnection (*left*) and final placement (*right*)

4.3   Replacing the Touch-Screen Protector

This section explains how to replace the touch-screen protector.

To replace the touch-screen protector

1. Remove any dust or dirt on the touch screen (dust and dirt cause bubbles to appear on the protective film). See "Cleaning the Screen and Screen Protector" on page 50.

TIP

Use a can of compressed air to blow away any dust particles that may be on the touch screen and screen protector.

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2. Remove the label marked No. 1, and peel away the protective film on the back.

NOTE

Avoid touching the back of the screen protector after the protective film on the back is peeled away. Doing so will leave a trace of your finger prints.

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3. Align the protector into the correct position on the screen, and slowly install the screen protector.
4. Remove the label marked No. 2, and peel away the film on the front. Provided that there is no dust trapped underneath, all small bubbles will dissipate within 48 hours.

4.4   Troubleshooting

Table 5 on page 54 lists some problems that may arise during operation, and it provides possible causes and suggested solutions. It is presumed that the OmniScan X3 flaw detector has not been modified and that all cables and connectors used are those provided and documented by Olympus.

Table 5 Troubleshooting guide

Problem	Possible cause	Solution
OmniScan X3 flaw detector does not start up.	DC power connection	Check that the DC power adaptor is connected to both the OmniScan X3 and a power outlet with the proper voltage. Only use the adaptor supplied with the OmniScan X3.
	Battery connection or charge	Make sure that the battery is charged to at least 10 % capacity and correctly inserted into the battery compartment.
	Power key (⏻) press	Press and hold the Power key for three seconds or longer.
OmniScan X3 battery does not charge.	Incompatible battery	Make sure that the battery model used in the OmniScan X3 is compatible with the model suggested by Olympus. An incompatible battery may be able to power the unit, but the recharge protocol may not recognize it.
	DC power adaptor connection	Make sure that the DC power adaptor is connected correctly.
	Charging method	Charge the battery using an external battery charger. The battery charges much quicker when the OmniScan X3 is not in use. However, the battery will charge very slowly, if at all, if the power consumption is too high.
	Elevated temperature	Shut down the OmniScan X3 and wait for it to cool. Battery charging is disabled when the battery temperature or the system's internal temperature is too high. This status will be indicated on the battery status indicator (see "Battery Status Indicators" on page 41 for more details). Check if the instrument's cooling fan is functioning correctly, and clean or change it if needed (see "Cleaning or Changing the Fan" on page 50).

Table 5 Troubleshooting guide *(continued)*

Problem	Possible cause	Solution
Low battery life (does not last as long as it used to)	Battery drain before charging	Drain the battery completely before recharging it to extend its life.
	Battery needs reconditioning	Recondition the battery once a month using an external battery charger, according to the instructions in "Storing Batteries and Extending Life" on page 45. Although the OmniScan X3 lithium-ion battery does not suffer from the "memory effect" commonly affecting other battery types, it should be reconditioned for optimum efficiency.
	Instrument configuration	Verify your current configuration. There may be an option or combination of options that are causing the battery to drain too quickly. Such options could include the brightness, voltage level, and acquisition rate.

5.   Specifications

This chapter covers the OmniScan X3 flaw detector's general specifications, as well as the acoustic, acquisition, and data specifications of the acquisition connectors.

5.1   General Specifications

The general specifications are provided in Table 6 on page 57.

Table 6 OmniScan X3 general specifications

Housing	
Size (width × height × depth)	335 mm × 221 mm × 151 mm (13.2 in. × 8.7 in. × 5.9 in.)
Weight	5.7 kg (12.6 lb) [with one battery inside]
Environmental conditions	
Operating temperature	0 °C to 45 °C (32 °F to 113 °F)
Storage temperature	−20 °C to 60 °C [−4 °F to 140 °F] (with battery inside) −20 °C to 70 °C [−4 °F to 158 °F] (with no battery inside)
Relative humidity (RH)	Max. 70 % RH at 45 °C (113 °F) noncondensing
Altitude	Up to 2000 m
Outdoor use	Yes: battery power must be used, door must be closed, connectors must be covered or connected.
IP rating	IP65 Certified
Shockproof rating	Drop-tested according to MIL-STD-810G
Pollution level	2
Installation category	II

Table 6 OmniScan X3 general specifications *(continued)*

Battery	
Battery model	OMNI-A-BATT (U8760010)
Battery type	Smart lithium-ion battery
Number of batteries	2
Battery storage temperature	−20 °C to 60 °C (−4 °F to 140 °F) at 80 % relative humidity
Battery charge time	Typically 3 hours per battery, depending on ambient temperature (max. 30 °C), using the internal charger or an optional external battery charger
Battery life	5 hours of continuous instrument operation using two batteries
Size	Approximately 214 mm × 58.7 mm × 21.9 mm (8.4 in. × 2.3 in. × 0.9 in.)
External DC supply (DC power adaptor)	
DC-IN voltage	15 VDC to 18 VDC (min. 50 W)
Connector	Circular, 2.5 mm pin diameter, center-positive
Model	OMNI-A-AC (U8767093)
Display	
Display size (diagonal)	269 mm (10.6 in.)
Resolution	1280 × 768 pixels
Number of colors	16 million
Type	TFT LCD with resistive touch screen
Viewing angles	Horizontal: −85° to 85° Vertical: −85° to 85°
Data storage	
Storage devices	SDHC and SDXC cards, or most standard USB storage devices. Storage extensible using external USB drive.
Maximum data file size	25 GB
I/O ports	
USB ports	Two USB 2.0 ports (one hidden behind battery) One USB 3.0 port
Video output	Video out (HDMI)
Memory card	SDHC port
Communication	Ethernet

Table 6 OmniScan X3 general specifications *(continued)*

I/O lines	
Encoder	2-axis encoder line (quadrature or clock/direction)
Digital input	6 digital inputs, TTL
Digital output	5 digital outputs, TTL
Acquisition on/off switch	Through configuration of a digital input
Power output line	5 V nominal, 1 A (short-circuit protected) and 12 V output at 1 A (short-circuit protected)

5.2   Acquisition Connector Specifications

CAUTION

- To reduce the risk of electric shock, avoid touching the inner conductor of the LEMO connectors. Up to 350 V can be present on the inner conductor of the UT connectors, and up to 120 V can be present on the PA connector. The warning symbols near the LEMO connectors signals this electric shock risk (see Figure 5-1 on page 59).

- Reinforced insulation must be provided for the probes connected to the instrument.

Warning symbols

UT connectors   PA connector
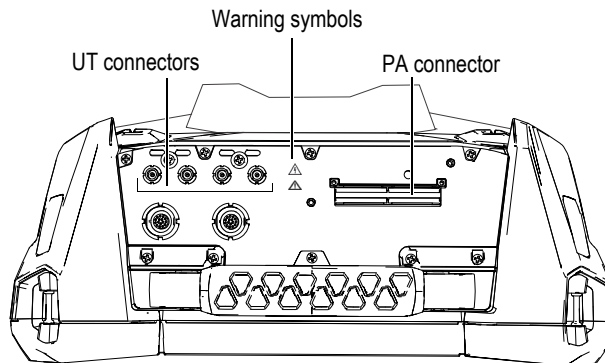
Figure 5-1 Acquisition connectors

When the UT channel is the only channel used, place the PA connector cap over the PA connector to protect it against dirt and water.

NOTE

Before using a phased array probe that is not equipped with a latching PA connector (shown in Figure 2-6 on page 33), remove the anchor base, which is secured by two screws.

5.2.1   Acoustic Specifications

This section details the acoustic specifications of the pulser, receiver, and beam formation, for both UT and PA modes (see Table 7 on page 60 and Table 8 on page 61).

Table 7 Acoustic specifications—UT channel using UT connector

Certification	
Calibration certification	EN 12668-1:2010
Pulser	
Voltage	85 V, 155 V, and 295 V
Pulse width	Adjustable from 30 ns to 1000 ns; resolution of 2.5 ns
Fall time	<10 ns
Pulse shape	Negative square pulse
Output impedance	<30 Ω
Receiver	
Gain range	0 dB to 120 dB; maximum input signal 30 Vp-p (full-screen height)
Input impedance	50 Ω in pulse-echo mode 50 Ω in pitch-catch mode
System bandwidth	0.25 MHz to 28.5 MHz

```
  NOTE
```

When the UT channel is used in pulse-echo mode, pulses occur on both the P1 and R1 connectors. When pulse-echo mode is selected, Olympus recommends using only one probe on the P1 connector.

Table 8 Acoustic specifications—PA channel

Certification	
Calibration certification	ISO 18563-1:2015
Pulser	
Voltage	40 V, 80 V, and 115 V
Pulse width	Adjustable from 30 ns to 500 ns; resolution of 2.5 ns
Fall time	<10 ns
Pulse shape	Negative square pulse
Output impedance	28 Ω in pulse-echo 24 Ω in pitch-catch
Receiver	
Gain range	0 dB to 80 dB; maximum input signal 800 mVp-p (full-screen height).
Input impedance	57 Ω ±10 % at 9 MHz in pulse-echo 100 Ω ±10 % at 9 MHz in pitch-catch
System bandwidth	0.5 MHz to 18 MHz
Beam formation	
Scan type	Single, linear, sectorial, compound, and TFM (includes FMC and AIM)
Aperture	OMNIX3-PATFM1664PR = 16 elements OMNIX3-PATFM16128PR = 16 elements OMNIX3-PATFM32128PR = 32 elements
Number of elements	OMNIX3-PATFM1664PR = 64 elements OMNIX3-PATFM16128PR = 128 elements OMNIX3-PATFM32128PR = 128 elements
Number of focal laws	1024
Delay range transmission	0 µs to 10 µs in 2.5 ns increments
Delay range reception	0 µs to 6.4 µs in 2.5 ns increments

5.2.2   Acquisition Specifications

This section lists the acquisition specifications for frequency, data display, and synchronization (see Table 9 on page 62).

Table 9 Acquisition specifications

Frequency	
Effective digitizing frequency	Up to 100 MHz (16 bits)
Maximum pulsing rate	Up to 12 kHz
Display	
Refresh rate	A-scan: 60 Hz; S-scan: 20 Hz to 30 Hz
Synchronization	
On internal clock	1 Hz to 10 kHz
On encoder	On 2 axes: from 1 to 65536 steps

5.2.3   Data Specifications

This section details the data specifications of processing, TCG, and TFM/FMC (see Table 10 on page 62).

Table 10 Data specifications

Processing	
Maximum number of A-scan data points	Up to 16384
Real-time averaging	PA: 2, 4, 8, 16 UT: 2, 4, 8, 16, 32, 64
Rectification	RF, full wave, half wave+, half wave−
Filtering	PA channel: 8 low-pass, 6 band-pass, and 4 high-pass filters UT channel: 8 low-pass, 6 band-pass, and 4 high-pass filters (4 additional filters when configured in TOFD)
Video filtering	Smoothing (adjusted to the probe frequency range)
Programmable TCG	
Number of points	32: one TCG (time-corrected gain) curve per focal law

Table 10 Data specifications *(continued)*

Range	PA (standard): 40 dB per step of 0.1 dB PA (extended): 65 dB per step of 0.1 dB UT: 100 dB per step of 0.1 dB
Maximum slope	PA (standard): 40 dB/10 ns PA (extended): 0.1 dB/10 ns UT: 40 dB/10 ns
TFM/FMC	
Supported modes	Pulse-echo: L-L, TT, and TT-TT Self-tandem: TT-T, LL-L, LT-T, TL-T, TT-L, and TL-L
Parallel multimode TFM	4 simultaneous TFM groups (wave sets)
Live envelope process	Yes
Maximum aperture	64-element extended aperture (32:128PR only). 32-element extended aperture for 16:64PR and 16:128PR.
Image resolution	Up to 1024 × 1024 (1 mm points) [for each TFM wave set]

6. Connector References

WARNING

Always use equipment and accessories that meet Olympus specifications. Using incompatible equipment can result in a malfunction, equipment damage, or human injury.

This chapter provides technical descriptions for the following two OmniScan X3 connectors:

- Scanner encoder connector
- Alarm and I/O connector

The following information is provided for both connectors: a brief description, the manufacturer's number, the number of the corresponding cable connector, an illustration, and a table with the signal pinout for the connector.

The following OmniScan X3 connectors comply with their respective standards:

- SDHC (memory card slot)
- Circular DC power jack, 2.5 mm pin diameter, 15 VDC to 18 VDC (polarity: ⊕——⊙——⊝)
- USB 2.0 and USB 3.0
- Ethernet
- HDMI

6.1   Scanner Encoder Connector

Description

LEMO, 16-pin female circular connector

Manufacturer, number

LEMO, EEG.1K.316.CLL

Suggested cable connector

LEMO, FGG.1K.316.CLAC65Z
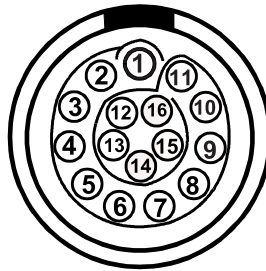
Figure 6-1 Scanner encoder LEMO connector (contact view)

Table 11 Pinout for the scanner encoder LEMO connector

Pin	I/O	Signal	Description	Current	Level
1	NC[a]				
2	Out	+5 V	External power supply	1 A[b]	+5 V
3	In	DIN1	Digital input 1	N/A	TTL
4	In	DIN2	Digital input 2	N/A	TTL
5	In	DIN3	Digital input 3	N/A	TTL
6	In	DIN4	Digital input 4	N/A	TTL
7	Out	DOUT1	Digital output 1	±20 mA	TTL
8	Out	DOUT2	Digital output 2	±20 mA	TTL

Table 11 Pinout for the scanner encoder LEMO connector *(continued)*

Pin	I/O	Signal	Description	Current	Level
9	In	PhA1	Encoder 1 / Phase A_CLK	N/A	TTL
10	In	PhB1	Encoder 1 / Phase B_DIR	N/A	TTL
11	In	PhB2	Encoder 2 / Phase B_DIR	N/A	TTL
12	In	PhA2	Encoder 2 / Phase A_CLK	N/A	TTL
13	Out	DOUT3	Digital output 3	±20 mA	TTL
14	In	DIN5 / PhA3	Digital input 5 / Encoder 3 / Phase A_CLK	N/A	TTL
15	In	DIN6 / PhB3	Digital input 6 / Encoder 3 / Phase B_DIR	N/A	TTL
16	–	GND	Ground	N/A	N/A

a.   NC = Not connected.
b.   Shared with Alarm and I/O connector.

6.2   Alarm and I/O Connector

Description
    LEMO, 14-pin female circular connector

Manufacturer, number
    LEMO, HMA.1K.314.CLLP

Suggested cable connector
    LEMO, FGA.1K.314.CLAC65Z

Figure 6-2 Alarm and I/O LEMO connector (contact view)

Table 12 Pinout for the Alarm and I/O connector

Pin	I/O	Signal	Description	Current	Level
1	Out	AL1	Alarm output 1. Disabled on reset, and is at 0 V. When active, it is at 5 V.	±20 mA	TTL
2	Out	AL2	Alarm output 2. Disabled on reset, and is at 0 V. When active, it is at 5 V.	±20 mA	TTL
3	Out	AL3	Alarm output 3. Disabled on reset, and is at 0 V. When active, it is at 5 V.	±20 mA	TTL
4	Out	HP_OUT	Analog headphone output	50 mW	
5	Out	AUD_OUT+	Analog audio output +	600 mW	
6	Out	AUD_OUT−	Analog audio output −		
7	Out	5 V	5 V external power supply	1 A[a]	5 V
8	Out	DOUT4	Digital output 4	±20 mA	TTL
9	Out	DOUT5	Digital output 5	±20 mA	TTL
10	NC[b]				
11	NC				
12	–	NU[c]	–	–	–

Table 12 Pinout for the Alarm and I/O connector *(continued)*

Pin	I/O	Signal	Description	Current	Level
13	Out	12 V	12 V external power supply	1 A	12 V
14	–	GND	Ground	N/A	N/A

a. Shared with Encoder connector.

b. NC = Not connected.

c. NU = Not used at time of writing of this manual revision. However, pin could be used for accessories detection.

Appendix: Accessories and Spare Parts

Table 13 on page 71 lists some typical accessories that are compatible with the OmniScan X3 flaw detector. However, this is not a complete list; compatible accessories are not limited to the items listed here. Table 14 on page 73 lists the OmniScan X3 spare parts.

Table 13 Compatible accessories

Accessory (marketing code)	Part order number	Description
OMNI-A2-SPLIT128	U8100133	"Y" adaptor (splitter) with OmniScan connectors to support two phased array probes with a maximum of 64 elements each on a 128 channel OmniScan X3 flaw detector.
OMNI-A2-SPLIT128-4UT	U8100134	"Y" adaptor (splitter) with OmniScan connectors to support two phased array probes with a maximum of 62 elements each and 4 UT channels with LEMO 00 connectors on a 128 channel OmniScan X3 flaw detector. UT channels are connected to elements: 63, 64, 127, 128
OMNI-A2-ADP03	U8775202	Adaptor to connect PA probe with Hypertronic connector on an OmniScan X3 flaw detector with OmniScan connector.

Table 13 Compatible accessories *(continued)*

Accessory (marketing code)	Part order number	Description
EIB-T-8-M-5-OM	U8775086	Interbox extension and splitter with two PA connectors and two pairs of TOFD connectors that use a TRPP amplifier. Several models are available.
EIB-NT-0-P-10-OM	U8779855	
		For example, the accessory code EIB-T-8-M-5-OM indicates the following characteristics:
		• EIB: Interbox extension
		• T: TRPP included or not (NT = no, T = yes)
		• 8: Number of UT connectors
		• M: Cable jacket type (P = PVC, M = metal)
		• 5: Cable length in meters (*0* = 0.5 m)
		• OM: Instrument connector (OM = OmniScan connector, HY = Hypertronic connector)
E128P0-0202-OM	U8800635	Extension cable with an OmniScan connector at both ends. Can be fitted with four LEMO 00 connectors enabling the simultaneous use of conventional UT and PA probes with a PA instrument. Several models are available.
E128P0-0004-OM	U8800429	
E128P5-0202-OM	U8800442	
E128P10-0004-OM	U8800431	For example, the accessory code E128P0-0202-OM indicates the following characteristics:
E128P10-0202-OM	U8800432	
		• E: Extension cable
		• 128: number of elements
		• P: Cable jacket type (P = PVC, M = metal)
		• 0: Cable length in meters (*0* = 0.5 m)
		• 0202: UT connectors configuration
		• OM: OmniScan connectors
OMNI-A2-ADP20	U8775201	Cable with scanner encoder adaptor to connect scanner encoder cables with DE15 connector to OmniScan X3 flaw detector, which has a LEMO scanner encoder connector.
Wireless LAN dongle	N/A	USB 2.0 dongle for accessing a wireless local area network (WLAN)—not included in standard OmniScan X3 package, but may be shipped separately, depending on local regulatory requirements.
OMNI-A-CHRG	U8767077	External battery charger

Table 14 Spare parts

Spare part (marketing code)	Part order number	Description
OMNIX3-SP-FAN	Q8301490	Fan (does not include fan cover)
OMNIX3-SP-BATTERYDOOR	Q8301491	Battery compartment door
OMNIX3-SP-STAND	Q8301492	Support stand
OMNIX3-SP-KNOB	Q8301493	Scroll knob (includes set screw)
OMNIX3-SP-DUSTCAPS	Q8301494	Kit of connector caps, including screws and washers (does not include PA connector cap)
PAPROBE-A-BASECAP	U8100138	PA probe connector cap
OMNIX3-SP-HANDLE	Q8301495	Handle for carrying the OmniScan X3

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