



RollerFORM Scanners Phased Array Wheel Probe

User's Manual

DMTA-20073-01EN — Rev. E
September 2022

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

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

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

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Important Information — Please Read Before Use

Intended Use

The RollerFORM is designed to perform nondestructive inspections on industrial and commercial materials.



WARNING

Do not use the RollerFORM 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 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 components illustrated in this manual may differ from the components installed on your device. However, the operating principles remain the same.

Device Compatibility

Only use this device with the approved ancillary equipment provided by Evident. Equipment provided by Evident and approved for use with this device is described later in this manual.



CAUTION

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

Repair and Modification

This device does not contain any user-serviceable parts. Opening the device might void the warranty.



CAUTION

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

Safety Symbols

The following safety symbols might appear on the device 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.



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 device:



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.

Note Signal Words

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

IMPORTANT

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

NOTE

The NOTE signal word calls attention to an operating procedure, practice, or the like, which 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 provides hints on how to effectively use the capabilities of the product.

Safety

Before turning on the device, verify that the correct safety precautions have been taken (see the following warnings). In addition, note the external markings on the device, which are described under “Safety Symbols.”

Warnings



WARNING

General Warnings

- Carefully read the instructions contained in this instruction manual prior to turning on the device.
- 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 device 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 device.
- Service instructions, when applicable, are for trained service personnel. To avoid the risk of electric shock, do not perform any work on the device unless qualified to do so. For any problem or question regarding this device, contact Evident or an authorized Evident 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 Warning**

The device must only be connected to a power source corresponding to the type indicated on the rating label.

**CAUTION**

If a non-approved power supply cord not dedicated to Evident products is used, Evident will not be able to ensure 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.
- For California (USA) only:
The device may contain a CR battery. 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 an external charger approved by Evident to charge the batteries.
- Only use batteries supplied by Evident.
- 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 RollerFORM unit during device storage.

Regulations for Shipping Products with Lithium-Ion Batteries

IMPORTANT

When shipping a 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 Evident. Contact your local Evident representative or material disposal professionals.

Equipment Disposal

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

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. The internal battery charger within this device has been tested and certified pursuant to the California Energy Commission's (CEC) requirements; this device is listed on the online CEC's (T20) database.

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 2015/863 which amends 2011/65/EU concerning restriction of hazardous substances (RoHS). The CE marking is a declaration that this product conforms to all the applicable directives of the European Community.

UKCA (United Kingdom)



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

RCM (Australia)



The regulatory compliance mark (RCM) 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.

WEEE Directive



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



China RoHS

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



The China RoHS mark indicates the product’s Environment-Friendly Use Period (EFUP). The EFUP is defined as the number of years for which listed controlled substances will not leak or chemically deteriorate while in the product. The EFUP for the RollerFORM 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.



电器电子产品有
害物质限制使用
标志

本标志是根据“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器电子产品上的电器电子产品有害物质使用限制标志。

（注意）电器电子产品有害物质限制使用标志内的数字为在正常的使用条件下有害物质等不泄漏的期限，不是保证产品功能性能的期间。

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	×	○	○	○	○	○

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)
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)



Seller and user shall be noticed that this equipment is suitable for electromagnetic equipment for office work (class A) and it can be used outside the home. This device complies with the EMC requirements of Korea.

The MSIP code for the RollerFORM is the following:
MSIP-R-R-OYN-ROLLERFORM.

The MSIP code for the RollerFORM XL is the following:
MSIP-R-R-OYN-ROLLERFORMXL.

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

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 RollerFORM 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.

IMPORTANT

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

FCC Supplier's Declaration of Conformity

Hereby declares that the product,

Product name: RollerFORM

Model: RollerFORM-MR/RollerFORM-CW

Conforms to the following specifications:

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

Supplementary information:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Responsible party name:

EVIDENT CANADA

Address:

3415, Rue Pierre-Ardouin Québec (QC) G1P 0B3 Canada

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.

Warranty Information

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

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

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

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

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

Technical Support

Evident is firmly committed to providing the highest level of customer service and product support. If you experience any difficulties when using our product, or if it fails to operate as described in the documentation, first consult the user's manual, and then, if you are still in need of assistance, contact our After-Sales Service. To locate the nearest service center, visit the Service Centers page on the Evident Scientific Web site.

Introduction

This manual contains instructions on assembling, installing, and operating the RollerFORM and RollerFORM XL scanners (Figure i-1 on page 21).

The RollerFORM and RollerFORM XL scanners hereinafter called RollerFORM unless otherwise specified.

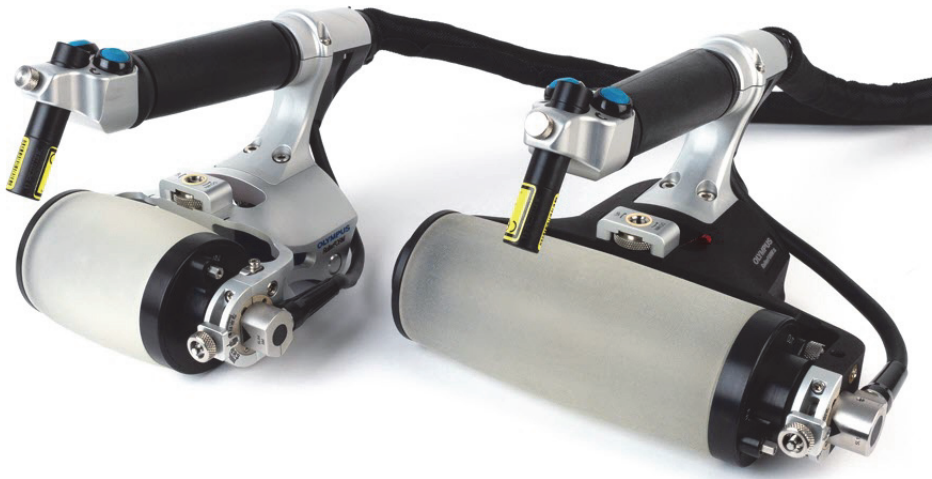


Figure i-1 RollerFORM and RollerFORM XL scanners

The RollerFORM is an phased array wheel probe designed for encoded scanning inspection of composite and other smooth materials.

The unique tire material of the RollerFORM has been specifically developed to guarantee high-quality, immersion-like ultrasonic testing. Minimal couplant and pressure is required for the RollerFORM to provide excellent coupling and a strong signal, even in difficult scanning positions.

In addition to providing exceptional coupling, the tire of the RollerFORM's acoustic wheel is made of a unique material that closely matches the acoustic impedance of water. This design feature permits the efficient transmission of energy to the part without unwanted echoes, obtaining an optimum 1 mm (0.04 in.) near-surface resolution in composites when using the 5 MHz phased array probe model. The 3.5 MHz phased array probe model is better suited for certain thicker, more attenuating materials. The 1 MHz RollerFORM XL model features a larger active aperture elevation and is better suited for very attenuative and thick materials such as the one found in wind turbine blades. Since the tire is transparent, you can easily identify the presence of air bubbles or contaminants within the liquid chamber.

With its integrated indexing button, the ergonomic RollerFORM allows you to map the surface of an inspected material by acquiring multiple one-line C-scans and combining them together in real time in the instrument. The built-in laser guide facilitates straight and precise one line scans.

The light weight of the RollerFORM makes it highly maneuverable and convenient for performing upside-down surface inspections on the underside of objects such as airplane fuselages and wings.

1. RollerFORM Scanner Overview

This chapter provides an overview of the RollerFORM scanner. The scanner comes with several accessories and a carrying case. The contents of a RollerFORM case are shown in Figure 1-1 on page 23.

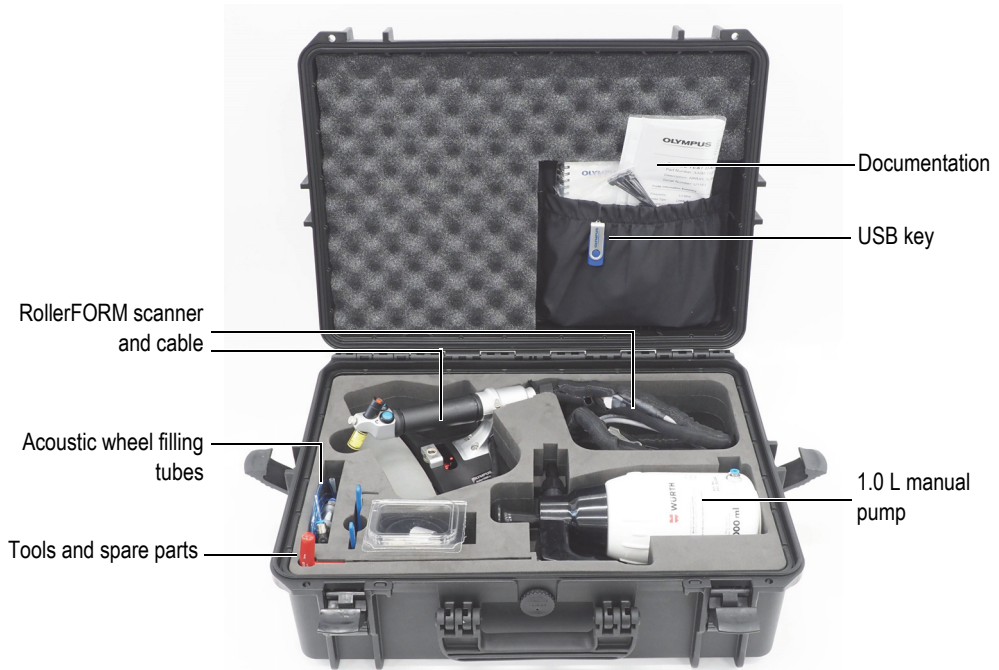


Figure 1-1 Contents of the RollerFORM case

1.1 RollerFORM

The RollerFORM scanner's outstanding feature is its phased array probe inserted in a tire, located at the front of the scanner. This assembly constitutes the acoustic wheel, which is filled with glycol or water and is equipped with a probe angle adjustment mechanism.

The RollerFORM is also equipped with a wheel in the center of the RollerFORM, with a height adjustment mechanism, and a roller at the rear where the encoder is mounted.

The RollerFORM's handle provides several controls: a Start Acquisition button, an Indexer Clicker, and a laser guide with an On/Off button (Figure 1-2 on page 25, Figure 1-3 on page 26, and Figure 1-4 on page 28).

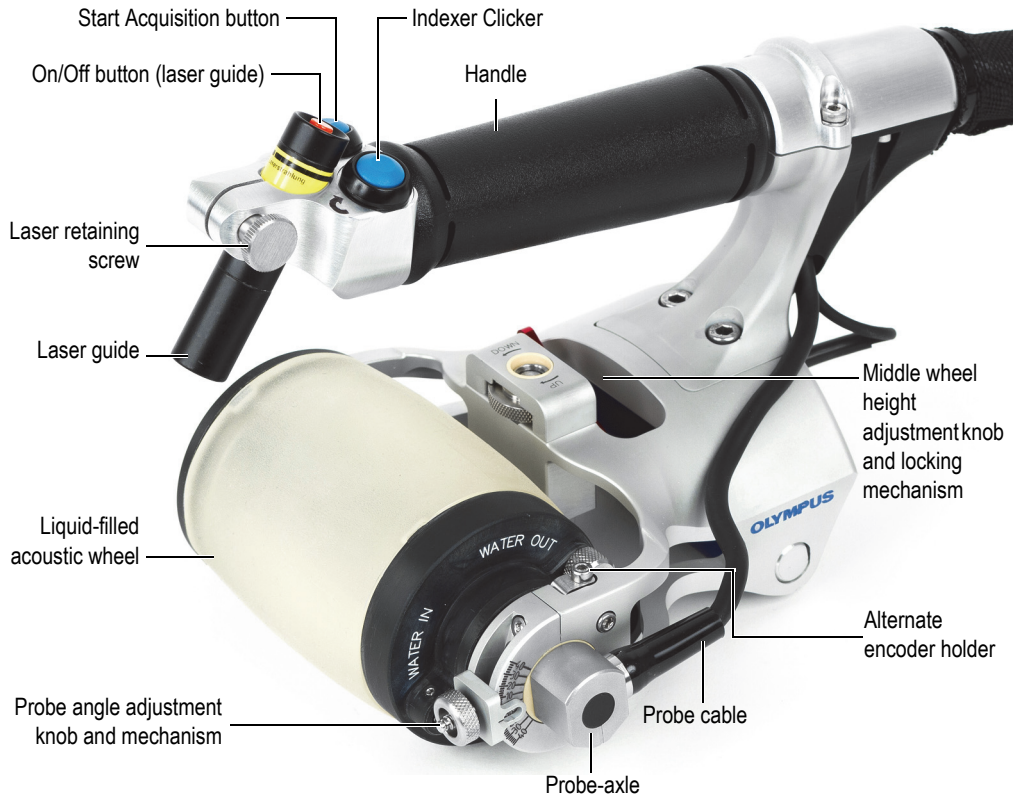


Figure 1-2 RollerFORM components

1.2 Acoustic Wheel

The RollerFORM's liquid-filled acoustic wheel is composed of several components that constitute the liquid chamber and ensure its watertightness (Figure 1-3 on page 26).

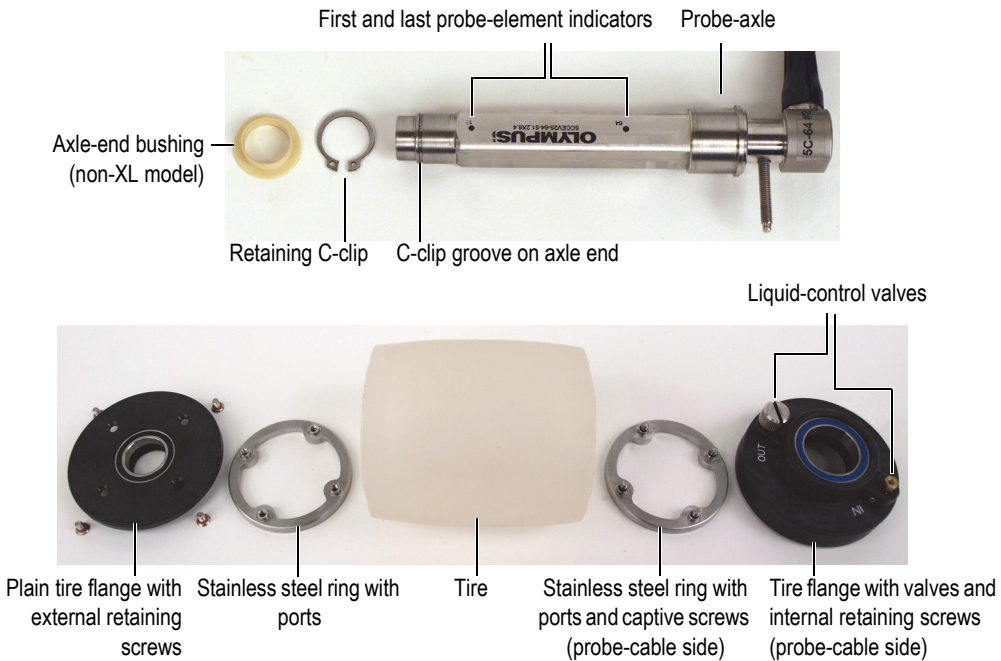


Figure 1-3 Acoustic wheel components

The acoustic wheel's main components are the transparent tire, the acoustic wheel flanges, one plain and the other holding the liquid-control valves, and a pair of stainless steel rings that hold the flanges to the tire and seal the acoustic wheel. When assembled, these components constitute a watertight chamber.

The acoustic wheel contains the phased array probe, which is integrated to the acoustic wheel's axle. This probe-axle can be removed from inside the acoustic wheel to clean the liquid chamber or to change the probe-axle. For more information, see the following sections:

- "Cleaning the Liquid Chamber" on page 91
- "Changing the Probe-Axle" on page 83

The tire is made of a unique low-attenuation material that provides exceptional coupling with the inspected part and also possesses an acoustic impedance nearly identical to water.

The tire must be replaced when it shows signs of wear. For more information, see the following sections:

- “Removing the Acoustic Wheel from the RollerFORM Scanner” on page 77
- “Emptying the Acoustic Wheel’s Liquid Chamber” on page 80
- “Removing the Probe-Axle from the Acoustic Wheel” on page 83
- “Changing the Tire” on page 98
- “Installing the Probe-Axle in the Acoustic Wheel” on page 86

1.3 Wheels

The RollerFORM features three different wheel systems: the acoustic wheel with its tire and two flanges, the middle wheel with two rollers, and the rear roller (Figure 1-4 on page 28).

Depending on the type of part to be inspected, two or three of the wheel systems should be in contact with the surface to guarantee a stable inspection. For flat or slightly curved surfaces, the normal combination is the rear roller plus the acoustic wheel. For curved or narrow surfaces, the acoustic wheel, the rear roller, and the middle wheel’s two rollers or skid plate are in contact with the part.

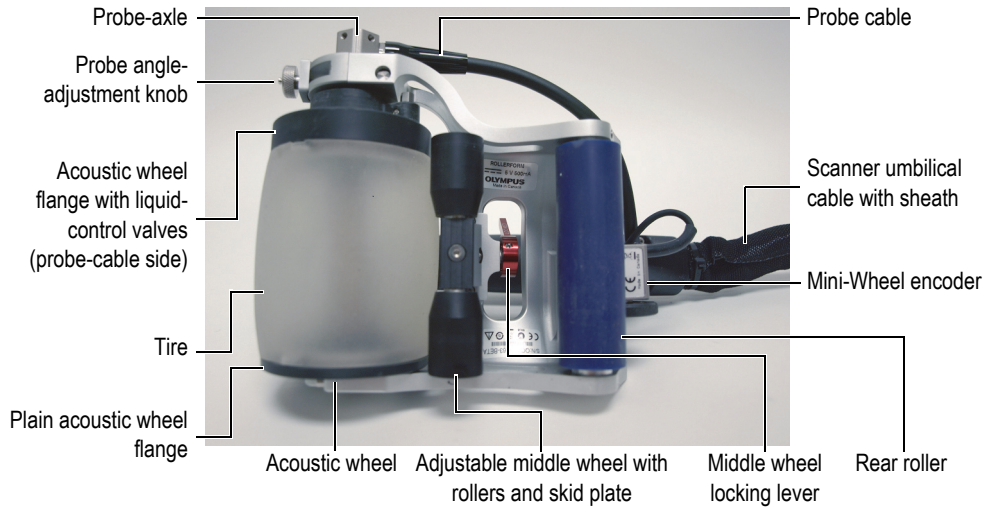


Figure 1-4 Underside of RollerFORM, showing the three wheels and encoder

The RollerFORM is equipped with the following wheels:

- **The liquid-filled acoustic wheel**

The liquid-filled acoustic wheel contains the phased array probe, which is housed in its axle. When the acoustic wheel's liquid chamber is filled with water, it must be cleaned periodically. When the chamber is filled with noncorrosive glycol, it does not require periodic cleaning. The probe-axle can also be changed. For more information, see the following sections:

- "Cleaning the Liquid Chamber" on page 91
- "Changing the Probe-Axle" on page 83

- **The adjustable middle wheel**

The middle wheel's height can be adjusted, depending on the surface to inspect. For more information, see "Adjusting the Middle Wheel" on page 58.

- **The rear roller**

The rear roller is the primary location of the Mini-Wheel encoder.

The encoder can be relocated to an alternate position on the top of the acoustic wheel. For more information, see "Installing the Mini-Wheel Encoder on the Acoustic Wheel" on page 111.

1.4 Manual Pump

A 1.0 L manual pump and a feeding tube are supplied with the RollerFORM (Figure 1-5 on page 29). The manual pump serves two purposes: filling the acoustic wheel's liquid chamber and applying water couplant to the surface to inspect.

For more information about filling the liquid chamber, see “Filling the Acoustic Wheel’s Liquid Chamber” on page 43.

The manual pump is also available as a spare parts kit (P/N: ROLLERFORM-A-PUMP [Q7790006]). For more information, see “Manual Pump Spare Parts Kit” on page 137.

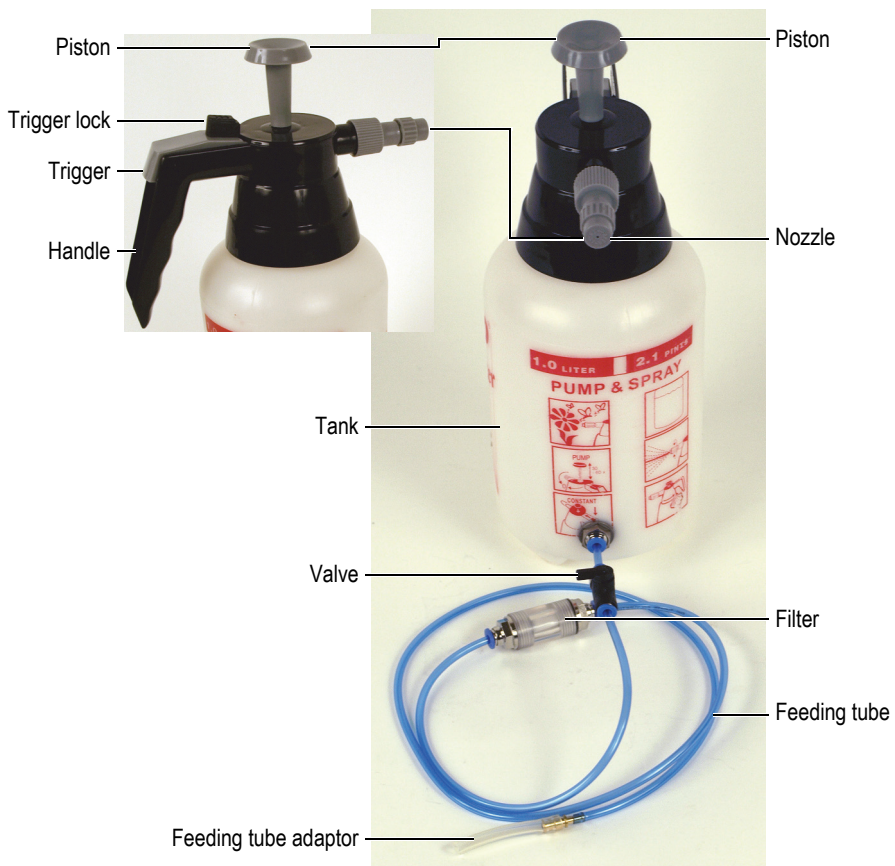


Figure 1-5 1.0 L manual pump and feeding tube

NOTE

Evident highly recommends filling the liquid chamber with noncorrosive glycol, distilled water, or deionized water, depending on the inspection conditions. For more information, see “Choosing a Liquid to Fill the Chamber” on page 43.

TIP

Before filling the acoustic wheel’s liquid chamber with water, let the water stand in the unpressurized manual pump for a few hours to allow the air dissolved in it to be released.

**CAUTION**

When manipulating noncorrosive glycol while operating the RollerFORM, the safety measures found in the product’s MSDS must be applied. For more information, see “Safety” on page 10.

To apply water couplant on the surface to inspect

1. Make sure that the feeding tube’s valve is closed (Figure 1-6 on page 31).

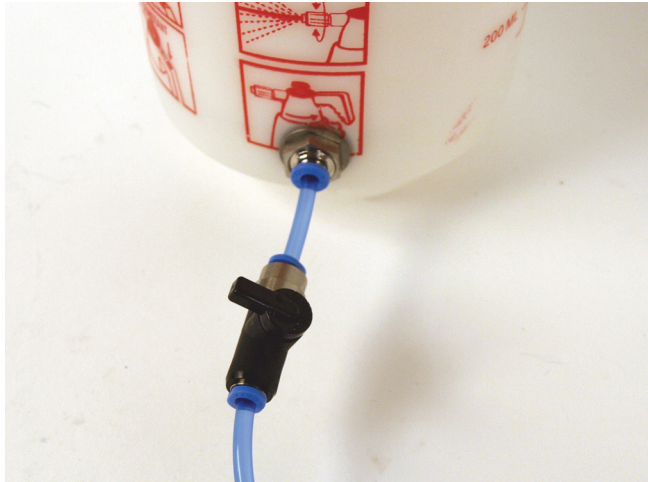


Figure 1-6 The feeding tube valve in the closed position

2. If necessary, fill the manual pump's tank with water.

NOTE

Before filling the tank with water, if the manual pump's tank contains glycol for filling the RollerFORM acoustic wheel's liquid chamber, empty the glycol from the tank, rinse the inside of the tank, and scrub it with water to remove all traces of glycol.

3. Pump the piston fifteen to twenty times to pressurize the manual pump (Figure 1-7 on page 32).



Figure 1-7 The manual pump piston and trigger mechanism

4. Press the trigger on the handle to spray water couplant over the surface to inspect.

TIP

The manual pump's trigger can be locked open by pushing the trigger lock toward the piston.

5. To adjust the spray width, turn the nozzle.

2. Setting Up the Instrument

Before performing inspections, you must connect the RollerFORM scanner to a compatible instrument, and then properly configure the instrument to scan using the RollerFORM.

2.1 Connecting the RollerFORM Scanner to the Instrument

The RollerFORM can be connected to OmniScan PA series or FOCUS series instruments.

To connect the RollerFORM scanner to the instrument

1. Connect the LEMO encoder connector to the instrument (Figure 2-1 on page 34).



Figure 2-1 OmniScan instrument with RollerFORM cables connected

2. Connect the OmniScan probe connector to the instrument.

NOTE

When connecting the LEMO encoder connector to an OmniScan MX or to a TomoScan FOCUS series instrument, an adaptor is required. For more information, see “Connector Reference” on page 126.

2.2 Setting Up the Instrument

The RollerFORM comes with a USB key that contains predefined setups for OmniScan PA series instruments. You can download one of these predefined setups to the instrument.

NOTE

When no predefined setup applies to the type of instrument you are using or your inspection requirements, you must perform the procedures found in the sections of this manual that contain the setup operations for the RollerFORM, as well as the setup operations for your instrument, which are contained in its user's manual.

2.2.1 Using a USB key with Predefined Setups

To set up the RollerFORM on the OmniScan using a USB key

- ◆ Insert the USB key provided with the RollerFORM into the instrument's USB port, and then download the predefined setup that is best suited for your configuration. Doing so you can review the setup and skip the rest of this section.

2.2.2 Using the Scanner Library on an OmniScan X3

To set up the RollerFORM using the scanner library on an OmniScan X3

- ◆ Build your Scan Plan for a 0° with overlap and then go to **Scan > Inspection > Type = Raster Encoded**, click **Edit Encoders**, select the RollerFORM, and then click **Done**.

2.2.3 Setting Up the RollerFORM on the FocusPC Software

To set up the RollerFORM on the FocusPC software for FOCUS PX acquisition

- ◆ To scan, press the Play button and release the button between each scan line. The clicker function works the same way as the OmniScan, which means that the index value increments each time the button is pressed. Figure 2-2 on page 36 shows the parameters to input in FocusPC.

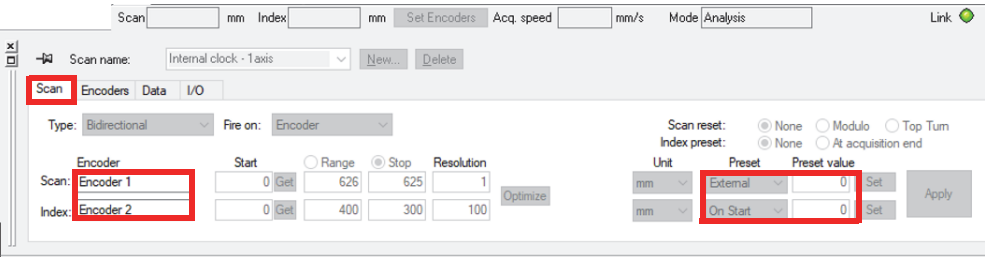


Figure 2-2 Parameters in FocusPC

Figure 2-3 on page 36 indicates the index resolution values to enter. The Encoder 1 resolution is 12 steps/mm while the Encoder 2 resolution is calculated using this formula: $1/\text{index value}$.

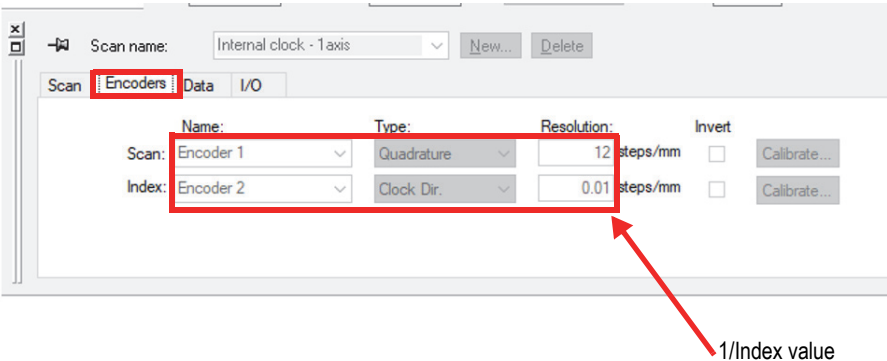


Figure 2-3 Resolution values

2.2.4 Manually Setting Up the RollerFORM on the OmniScan MX2 and SX

To manually set up the RollerFORM on the OmniScan MX2 and SX

1. In the OmniScan MXU software, select **Scan > Inspection > Type = Raster Scan**.
2. Select either the unidirectional or bidirectional scanning mode.

NOTE

The RollerFORM is optimized for unidirectional inspection mode. Evident recommends performing unidirectional inspections with this scanner. When performing a bidirectional inspection, the guiding laser beam cannot be used to maintain the scanner's alignment with the guide lines traced on the surface to inspect during scan passes in the reverse direction.

When using the RollerFORM, the following two modes are available with OmniScan PA series instruments (equipped with the OmniScan MXU 4.1R9 software and higher):

- **Unidirectional Mode**

The principal advantage of performing a unidirectional scan is that the same starting reference is retained for each scan, because the encoder in the scan direction is always reset to the origin value each time the clicker is pressed. This improves the precision of position recording in the scan direction, because the error from the encoder-wheel motion during the index is eliminated (Figure 2-4 on page 37). This mode allows to use the laser guide for improved scanning precision.

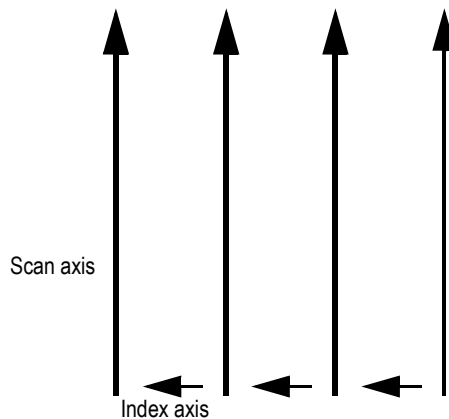


Figure 2-4 Unidirectional scan

- **Bidirectional Mode**

The main advantage of a bidirectional scan is the limited back-and-forth movement of the RollerFORM. This way, faster mapping can be achieved when scanning a long part (Figure 2-5 on page 38).

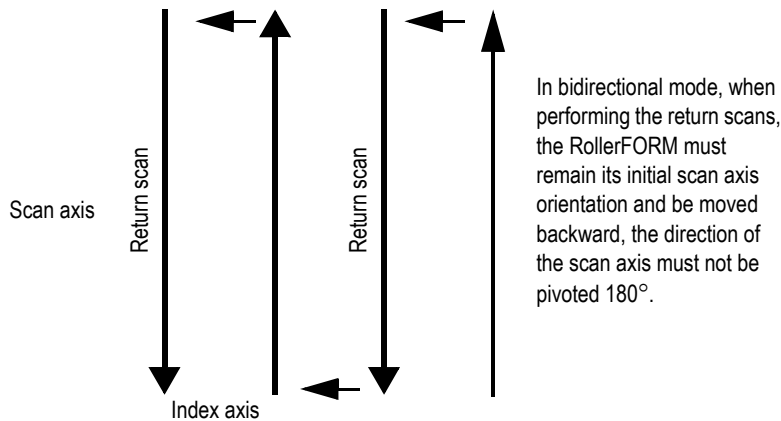


Figure 2-5 Bidirectional scan

To configure the Indexer Clicker and the Start Acquisition button when no setup files are to be used, or to validate the configuration of these two buttons when a predefined setup has been downloaded to an instrument, perform the following procedures:

- “Setting Up the Indexer Clicker” on page 38
- “Setting Up the Start Acquisition Button” on page 41

2.2.4.1 Setting Up the Indexer Clicker

The RollerFORM’s Indexer Clicker must be configured in the OmniScan MXU software on the OmniScan PA series instrument. The Indexer Clicker is located at the front of the RollerFORM handle, on the top left-hand side (Figure 2-6 on page 39).

The Indexer Clicker is set up differently when the inspection mode is unidirectional or bidirectional.

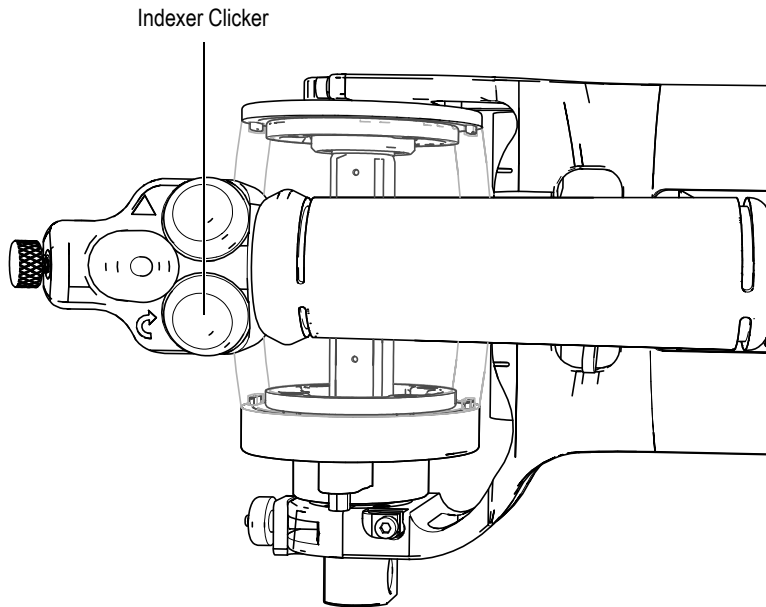


Figure 2-6 Indexer Clicker on the top left-hand side of the RollerFORM handle

To set up the Indexer Clicker in unidirectional mode

1. In the OmniScan MXU software, set the scanner encoder as encoder 1 (**Scan > Encoder > Encoder = 1**), and then set the encoder type to Quad (**Scan > Encoder > Type = Quad**). Set the encoder resolution (**Scan > Encoder > Resolution = 12**) in steps/mm.
2. Set the Indexer Clicker as encoder 2 (**Scan > Encoder > Encoder = 2**), and then set the encoder type to Clicker + Preset (**Scan > Encoder > Type = Clicker + Preset**).

Each time the clicker is pressed, the position on the corresponding axis is incremented according to the **Resolution** parameter value (which as already been set from the **Scan > Encoder > Resolution** menu) in mm/step, and the position of encoder 1 is reset to the Origin parameter value (which is set from the **Scan > Encoder > Origin** menu).

To set up the Indexer Clicker in bidirectional mode

1. In the OmniScan MXU software, set the scanner encoder as encoder 1 (**Scan > Encoder > Encoder = 1**), and then set the encoder type to Quad (**Scan > Encoder > Type = Quad**). Set the encoder resolution (**Scan > Encoder > Resolution = 12**) in steps/mm.
2. Set the Indexer Clicker as encoder 2 (**Scan > Encoder > Encoder = 2**), and then set the encoder type to Clicker (**Scan > Encoder > Type = Clicker**). Each time the Indexer Clicker is pressed, the position on the corresponding axis is incremented according to the **Resolution** parameter value (which as already been set from the **Scan > Encoder > Resolution** menu) in mm/step.

IMPORTANT

When you want to scan with an overlap between scan lines, you need to use the Linear at 0° mode in the Setup Wizard.

If an overlap is not required, or if you want to use an angle other than 0°, you need to use the Linear mode in the Setup Wizard, and you must set the resolution of the encoder 2 which is linked to the Indexer Clicker (**Scan > Encoder > Resolution**) to equal the index value. The index value is available by selecting **Scan > Area > Index Res.** (Figure 2-7 on page 41).



Figure 2-7 Index value in OmniScan

For more information, refer to the *OmniScan MXU Software User’s Manual*.

2.2.4.2 Setting Up the Start Acquisition Button

The Start Acquisition button must be configured in the OmniScan MXU software on the OmniScan PA series instrument. The Start Acquisition button is located at the front of the RollerFORM handle, on the top right-hand side (Figure 2-8 on page 42).

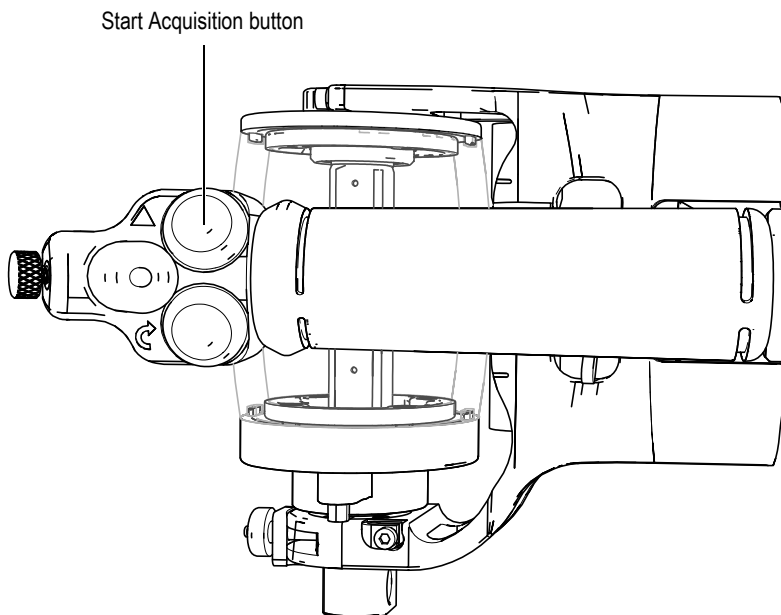


Figure 2-8 Start Acquisition button on the top right-hand side of the RollerFORM handle

To set up the Start Acquisition button

1. In the OmniScan MXU software, select **Preferences > Setup > DIN = DIN1**.
2. Select **DIN > DIN1 > Assign DIN = Clear All**.
3. Select **DIN > DIN1 > State = On**.

3. Preparing the RollerFORM Liquid Chamber

Prior to performing inspections, you must fill the RollerFORM scanner's acoustic wheel liquid chamber with noncorrosive glycol or water, and you need to make sure that it is devoid of any air bubbles.

3.1 Filling the Acoustic Wheel's Liquid Chamber

To be able to perform data acquisition with the RollerFORM scanner, you must first fill the acoustic wheel's liquid chamber with the appropriate liquid, using the supplied manual pump.

3.1.1 Choosing a Liquid to Fill the Chamber

Depending on the environmental and/or safety constraints of the inspection to be carried out, you can use noncorrosive glycol, distilled or deionized water, or ordinary tap water to fill the liquid chamber of the RollerFORM scanner.

The following list outlines the conditions under which you should consider using each of these liquids:

- Glycol, noncorrosive

NOTE

Evident recommends using *Propylene Glycol Dynalene PG*, or a noncorrosive glycol with the same specifications.

Using noncorrosive glycol inside the liquid chamber provides the following benefits:

- Prevents formation of algae or mold.
 - Prevents tire opacification.
 - Enables using the scanner at lower temperatures.
 - Has no adverse effects on the acoustic characteristics of the scanner.
-



CAUTION

When manipulating noncorrosive glycol while operating the RollerFORM, the safety measures found in the product's MSDS must be applied. For more information, see "Safety" on page 10.

IMPORTANT

When the liquid chamber is filled with noncorrosive glycol, follow all pertaining safety and environmental measures, and take special care to thoroughly clean any glycol that may spill on the acoustic wheel, on other parts of the scanner, or on any other surface.

- Distilled or deionized water
Use distilled or deionized water when noncorrosive glycol cannot be used because of environmental or security constraints, or when using glycol is impractical.
 - Tap water
Use tap water when noncorrosive glycol cannot be used because of environmental or security constraints, or when using glycol, distilled water, or deionized water is impractical.
-

3.1.2 Filling the Liquid Chamber

TIP

Before filling the acoustic wheel's liquid chamber with water, let the water stand in the unpressurized manual pump for a few hours to allow the air dissolved in it to be released.

TIP

Ideally, fill the acoustic wheel the day before the inspection, this will give enough time for the liquid to degas as well as penetrate the tire material for better acoustic transmission.

IMPORTANT

When the liquid chamber of the RollerFORM is filled with water, Evident recommends that the water in the chamber be changed at least once a week, and that it be emptied when it will not be used for 48 hours or more. Evident highly recommends filling the liquid chamber with distilled or deionized water. Failure to follow these instructions will lead to algae formation, which requires more rigorous maintenance. When the chamber is filled with noncorrosive glycol, it does not need to be emptied periodically.

NOTE

Before filling the liquid chamber, make sure that its interior has been thoroughly cleaned. Even very small particles, dust, stains, or deposits present in the chamber will interfere with the propagation of ultrasound waves, thus preventing proper operation of the probe. When changing the liquid inside the chamber from glycol to water, the inside of the chamber must be cleaned to remove all traces of glycol before filling it with water. For more information, see “Cleaning the Liquid Chamber” on page 91.

To fill the liquid chamber

1. On the acoustic wheel flange on the probe-cable side, make sure that the OUT valve is open by turning it one-and-a-half turn (Figure 3-1 on page 46).



Figure 3-1 Open OUT valve on the flange

2. Connect the feeding tube adaptor to the IN check valve, which is also located on the acoustic wheel flange on the probe-cable side (Figure 3-2 on page 47).

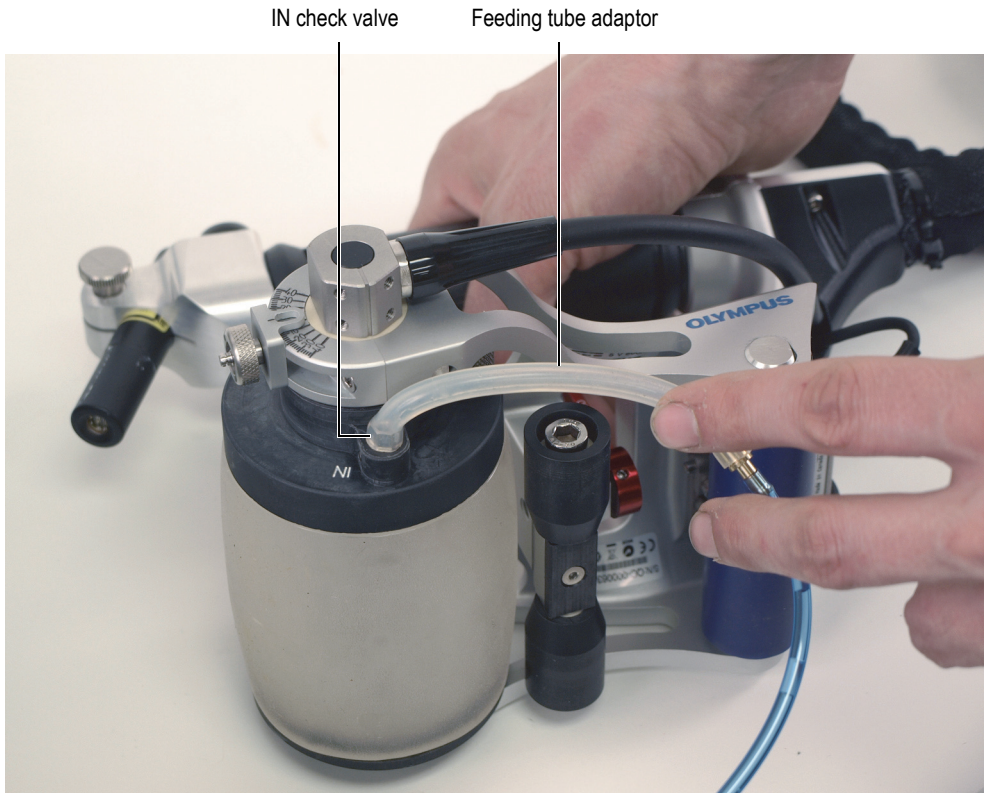


Figure 3-2 Connecting the feeding tube adaptor to the IN check valve

3. Open the valve on the manual pump's feeding tube (Figure 3-3 on page 48). Make sure that the trigger at the top of the pump is not engaged (Figure 3-4 on page 49).

NOTE

Do not pressurize the glycol or water in the manual pump. Doing so would increase the quantity of air dissolved into the liquid and consequently the amount of degassing time required for the acoustic wheel's liquid chamber would also be increased.

Pump feeding
tube valve

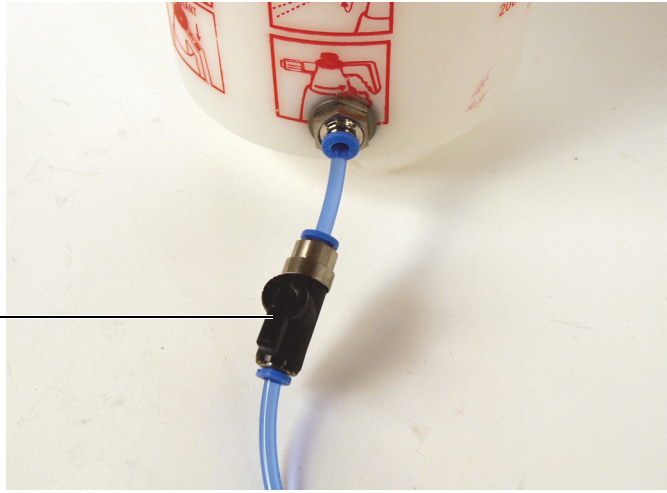


Figure 3-3 Feeding tube valve in the open position

4. Slowly pump the manual pump to feed liquid into the acoustic wheel's liquid chamber (Figure 3-4 on page 49).

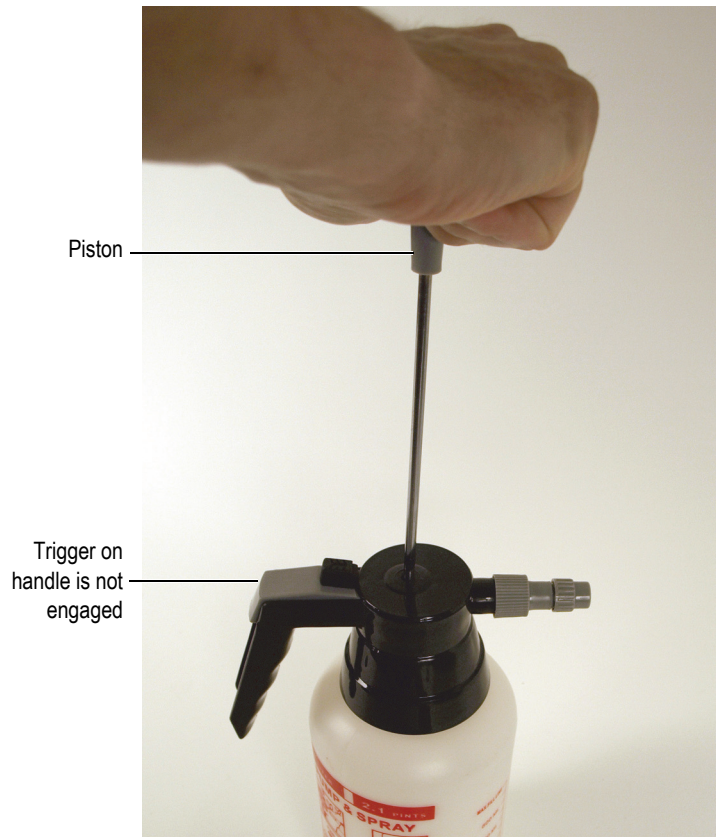


Figure 3-4 Manual pump piston

5. Turn the RollerFORM probe-cable side up, so that the acoustic wheel is at an angle, and the OUT valve is at the highest possible position. This allows all the air, and the air bubbles that may form, to be released from inside the acoustic wheel.
6. While the acoustic wheel is filling with liquid, lightly tap and shake the acoustic wheel to remove all air bubbles. Take special care to remove the bubbles that are adhering to the interior surface of the liquid chamber. If left in place, these bubbles may interfere with the propagation of ultrasound waves.

When the bubbles are freed inside the liquid chamber, they should migrate toward the OUT valve, and then exit the valve.

7. Keep filling the acoustic wheel until a little liquid flows out of the OUT valve, and then close the OUT valve, and then immediately close the feeding tube valve on the pump.

IMPORTANT

When the liquid chamber is filled with noncorrosive glycol, follow all pertaining safety and environmental measures, and take special care to thoroughly clean any glycol that may spill on the acoustic wheel, on other parts of the scanner, or on any other surface.

8. Remove the remaining air bubbles. See “Removing Air Bubbles from the Liquid Chamber” on page 52.

NOTE

The acoustic wheel’s liquid chamber is properly filled when the RollerFORM is sitting on a flat surface without any downward pressure applied on the handle and a gap measuring 2 mm to 3 mm (0.08 in. to 0.12 in.) remains between the black acoustic wheel flanges and the surface to inspect (Figure 3-5 on page 51 and Figure 3-6 on page 51). If the gap is larger, remove some glycol or water by opening the OUT valve and letting some liquid out of the liquid chamber. Then, measure the gap again. Repeat this operation until the gap between the black acoustic wheel flanges and the surface to inspect is between 2 mm and 3 mm (0.08 in. to 0.12 in.).

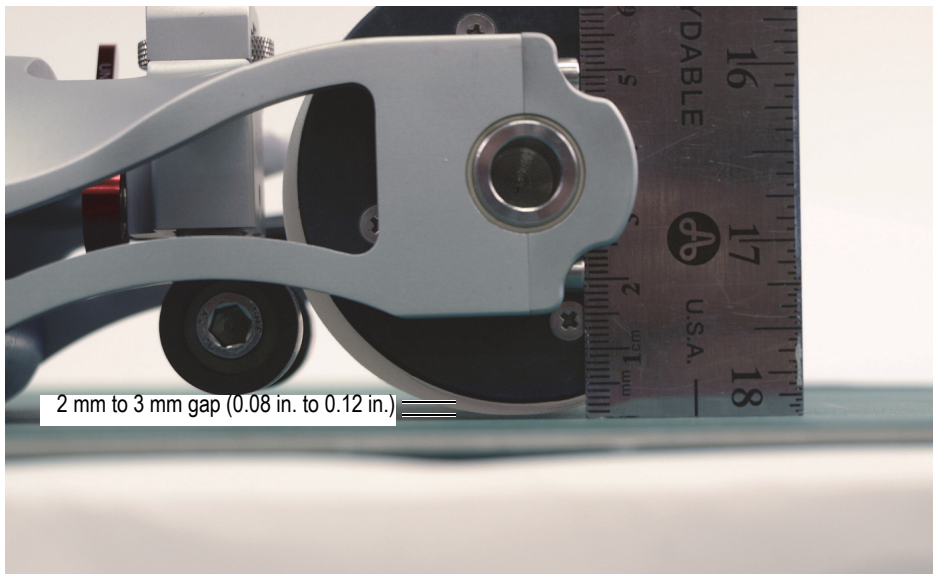


Figure 3-5 Acoustic wheel flange and surface gap (RollerFORM)

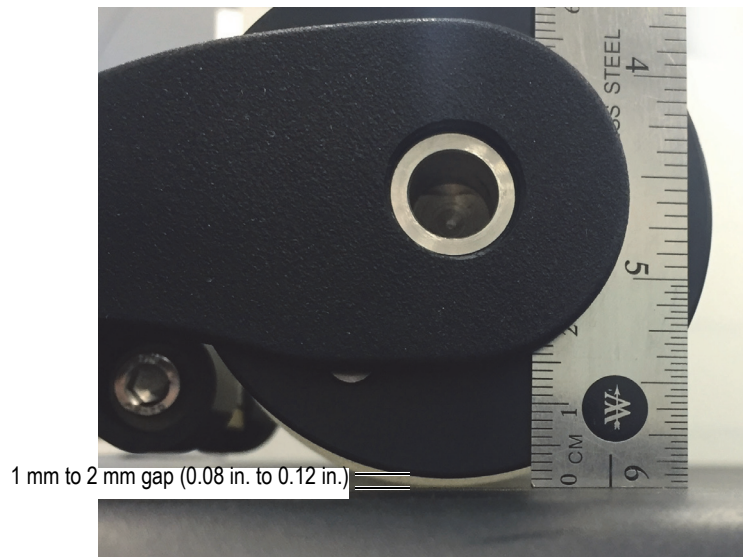


Figure 3-6 Acoustic wheel flange and surface gap (RollerFORM XL)

3.2 Removing Air Bubbles from the Liquid Chamber

If one or more bubbles appears in the liquid chamber during inspection, the RollerFORM's acoustic wheel is equipped with a trap that conceals bubbles. The bubble trap is located in the flange on the probe-cable side.

IMPORTANT

When scanning a surface with the RollerFORM held upside down, it is mandatory to remove all air bubbles from the liquid chamber. Any free bubbles will gather together in the upper part of the chamber between the probe elements and the surface to inspect, which will interfere with the propagation of ultrasound waves, thus preventing proper operation of the probe.

To remove air bubbles from the liquid chamber

1. Tap and shake the acoustic wheel to gather together the air bubbles. Take special care to remove the bubbles that are adhering to the interior surface of the liquid chamber. If left in place, these bubbles may interfere with the propagation of ultrasound waves.
2. Turn the RollerFORM probe-cable side up, so that the acoustic wheel is at an angle, and the OUT valve is at the highest possible position, and then tap the acoustic wheel, so the bubbles disappear from view in the translucent part of the acoustic wheel.
3. Lightly squeeze the acoustic wheel, open the OUT valve to let the remaining air out, and then close it as soon as a little glycol or water flows out. Maintain the pressure on the tire until the OUT valve has been closed.
4. Put the RollerFORM back to the upright position and look for the presence of bubbles.

Repeat steps 1 to 4 as many times as necessary to remove all bubbles from the liquid chamber.

5. Make sure that the acoustic wheel's liquid chamber is properly filled. With the RollerFORM sitting on a flat surface and without any downward pressure applied on the handle, verify that a gap measuring 2 mm to 3 mm (0.08 in. to 0.12 in.) remains between the black acoustic wheel flanges and the surface to inspect (Figure 3-5 on page 51).

6. Fill the acoustic wheel with glycol or water if needed. For more information, see “Filling the Acoustic Wheel’s Liquid Chamber” on page 43.

TIP

The RollerFORM’s bubble trap can be used to conceal bubbles during an inspection. Turn the scanner on its side so that the flange with the liquid-control valves is at the highest possible position, allowing the bubbles to float up into the trap. Gently return the RollerFORM to the horizontal position; the bubbles will stay trapped if they are not too large. If this doesn’t work, then the acoustic wheel will have to be refilled (see “Filling the Acoustic Wheel’s Liquid Chamber” on page 43).

4. Preparing for an Inspection

Before performing an inspection, the RollerFORM and the surface to inspect must both be properly prepared.

To prepare for an inspection

1. Apply water couplant to the RollerFORM's acoustic wheel and to the surface to inspect.
For more information, see "Applying Water to the Acoustic Wheel and the Surface to Inspect" on page 55.
2. Optimize the phased array signal.
For more information, see "Optimizing the Phased Array Signal" on page 56.
3. Adjust the middle wheel on the RollerFORM.
For more information, see "Adjusting the Middle Wheel" on page 58.
4. Prepare the surface to inspect.
For more information, see "Tracing the Scan Guide Lines on the Surface to Inspect" on page 65.

4.1 Applying Water to the Acoustic Wheel and the Surface to Inspect

Although the RollerFORM's acoustic wheel is equipped with a liquid chamber, prior to inspection, a minimal amount of water couplant must be applied to both the acoustic wheel and the surface to inspect.

To apply water couplant before performing the inspection

1. Using the manual pump provided with the RollerFORM, apply a mist of water to the surface to inspect and to the acoustic wheel.

For more information, see “Manual Pump” on page 29.

2. Roll the RollerFORM back and forth a few times to uniformly wet the acoustic wheel.
3. Slightly rub the outside surface of the tire to help improve its wettability performance.

4.2 Optimizing the Phased Array Signal

To optimize the phased array signal, you need to adjust the angle of the RollerFORM's probe relatively to the surface to inspect.

To optimize the phased array signal

1. Apply water couplant to the surface to be used for signal optimization and to the acoustic wheel of the RollerFORM.
2. Using the handle, apply sufficient downward pressure on the RollerFORM.
3. Loosen the angle-adjustment knob on the acoustic wheel's mount on the probe-cable side (Figure 4-1 on page 57).

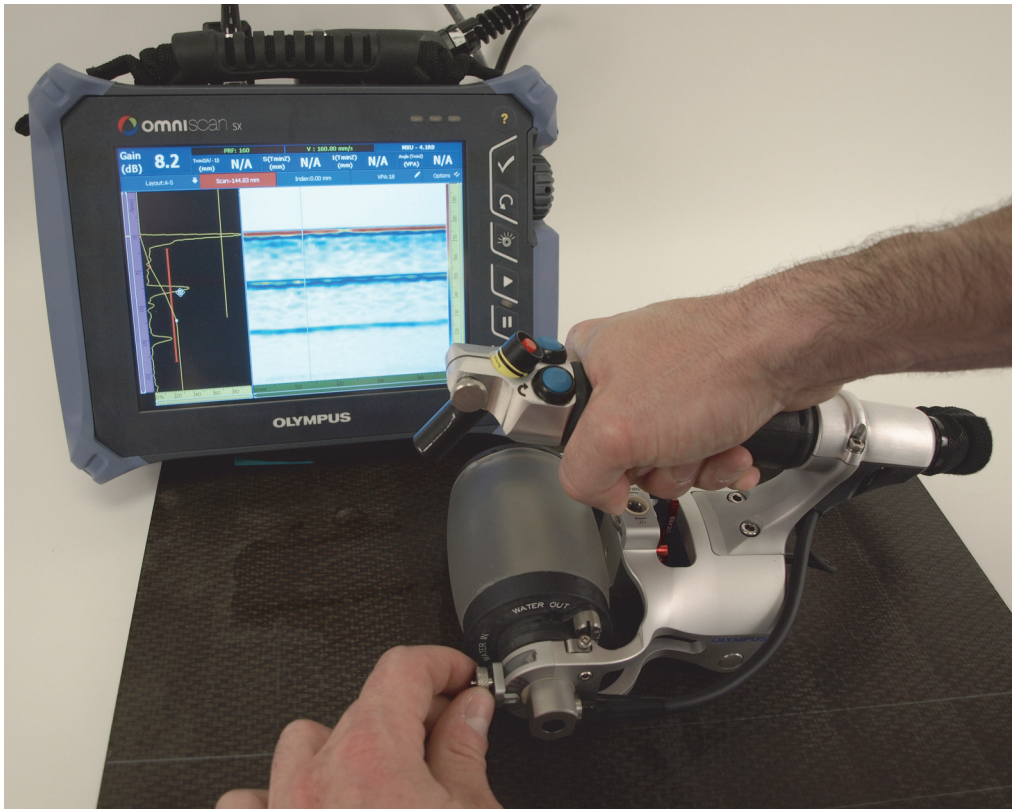


Figure 4-1 Adjusting the probe angle to optimize the signal



CAUTION

To rotate the probe-axe, always use the dedicated angle adjustment knob and never use the probe cable. Using the probe cable could lead in probe cable damage.

4. Moving the knob up and down, adjust the angle of the probe so that the signal appearing on the instrument's display is at its peak value.

4.3 Adjusting the Middle Wheel

Depending on the characteristics of the surface to inspect and the scan direction, the middle wheel is set in a different position.

When inspecting flat surfaces or convex surfaces in the circumferential direction, and the acoustic wheel and the rear roller are laying flat on the surface to inspect, the RollerFORM's middle wheel must be completely retracted so as not to touch the surface.

However, when scanning a pipe with a diameter of less than 635 mm (25 in.) in the circumferential direction, the middle wheel must be removed.

The middle wheel is to be lowered and adjusted when the part doesn't allow to get the two acoustic wheel flanges in contact with the surface. The middle wheel adds stability when inspecting parts with the following types of surfaces:

- Convex surface (for an axial [longitudinal] scan)
- Narrow surface

For more information, see the following sections:

- "Retracting the Middle Wheel" on page 58
- "Removing the Middle Wheel" on page 60
- "Adjusting the Middle Wheel for Convex Surface Axial or Edge Scans" on page 61.

4.3.1 Retracting the Middle Wheel

When inspecting flat surfaces or curved convex surfaces with a diameter of more than 635 mm (25 in.) in the circumferential direction, and the acoustic wheel and the rear roller are laying flat on the surface to inspect, the RollerFORM's middle wheel must not touch the surface. The middle wheel must be completely retracted and locked.

To retract and lock the middle wheel

1. Unlock the middle wheel by positioning the locking lever in the UNLOCKED position (Figure 4-2 on page 59).



Figure 4-2 Unlocking the middle wheel

2. Turn the vertical adjustment knob clockwise to move the wheel up to the highest position.
3. Lock the middle wheel's position by moving the locking lever to the LOCKED position (Figure 4-3 on page 60).

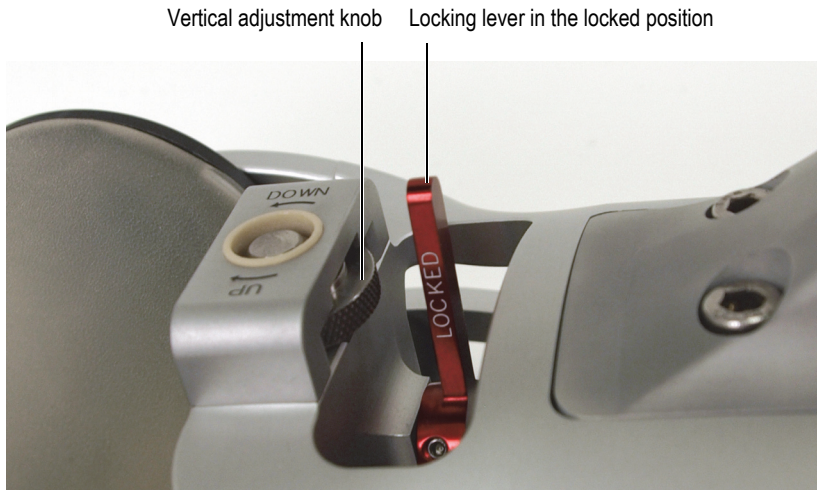


Figure 4-3 Locking the middle wheel

4.3.2 Removing the Middle Wheel

When inspecting pipes with a diameter of less than 635 mm (25 in.) and scanning along the circumferential direction, the middle wheel must be removed from the scanner to prevent it from touching the surface.

To remove the middle wheel

1. Unlock the middle wheel by positioning the locking lever in the UNLOCKED position (Figure 4-4 on page 61).



Figure 4-4 Unlocking the middle wheel

2. Turn the vertical adjustment knob counterclockwise until the middle wheel disengages completely from the vertical adjustment knob screw.

4.3.3 Adjusting the Middle Wheel for Convex Surface Axial or Edge Scans

When adjusting the RollerFORM's middle wheel for scanning on a convex surface (for an axial [longitudinal] scan), special care must be taken to ensure that both of the middle wheel's rollers make contact with the surface to inspect.

The RollerFORM's middle wheel can also be adjusted specifically for narrow surfaces. Special care must be taken to ensure that both of the middle wheel's rollers or the skid plate make contact with the surface to inspect. The middle wheel can also be used to inspect the edge of a part. When doing so, make sure that at least one flange, the two rollers of the middle wheel, and the back roller are in contact with the part.

To adjust the middle wheel

1. Apply water couplant to the surface and to the RollerFORM scanner's acoustic wheel.
2. Unlock the middle wheel by positioning the locking lever in the UNLOCKED position (Figure 4-5 on page 62).

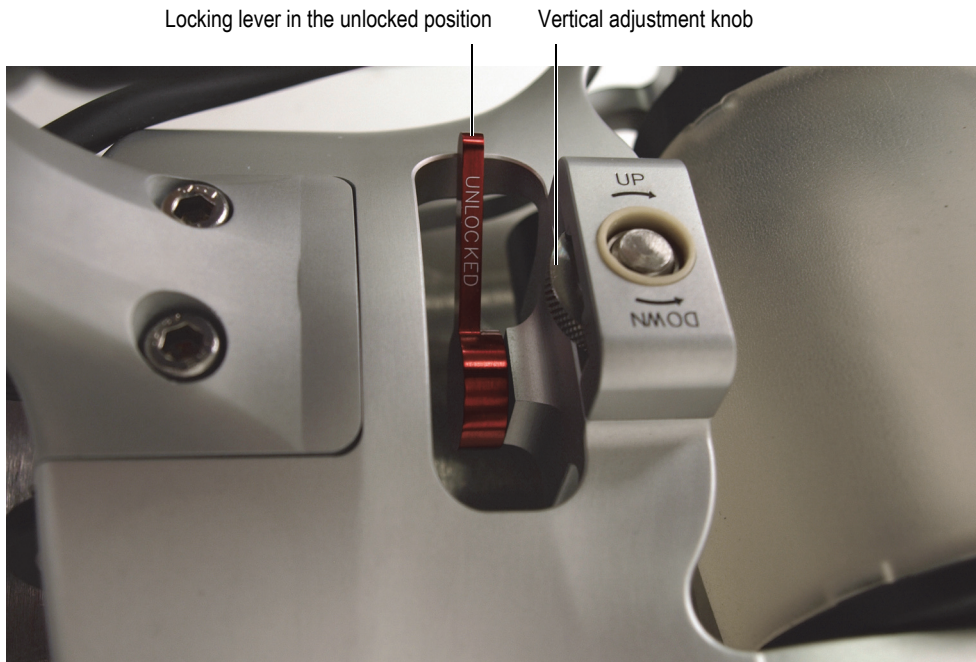
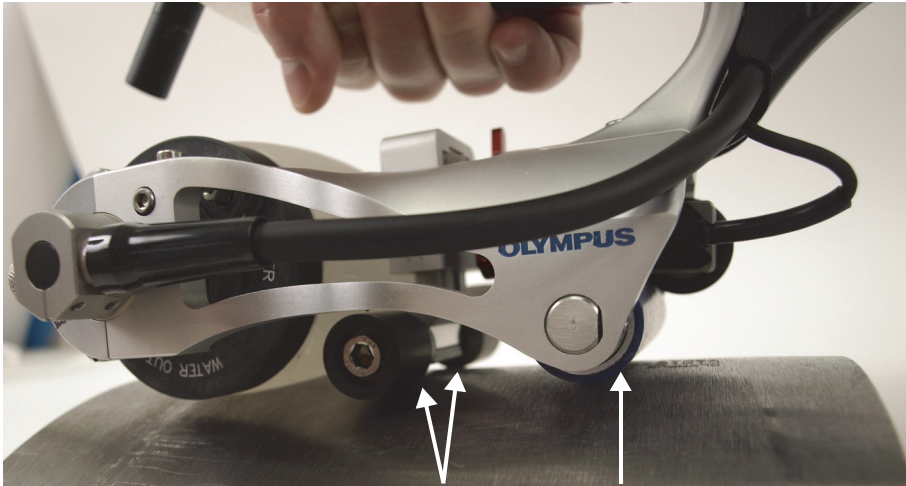


Figure 4-5 Unlocking the middle wheel

3. Turn the vertical adjustment knob clockwise to move the wheel up to the highest position.
4. Using the RollerFORM handle, apply sufficient downward pressure on the scanner until the wanted signal is obtained.
If the signal is lost while applying pressure, optimize the phased array signal by rotating the probe-axle (see "Optimizing the Phased Array Signal" on page 56).
5. While maintaining appropriate pressure on the RollerFORM, turn the vertical adjustment knob counterclockwise until the middle wheel's rollers come in contact with the surface.

NOTE

When inspecting a convex surface axially (longitudinally), both rollers of the middle wheel, and also the rear roller, must be in contact with the surface (Figure 4-6 on page 63).

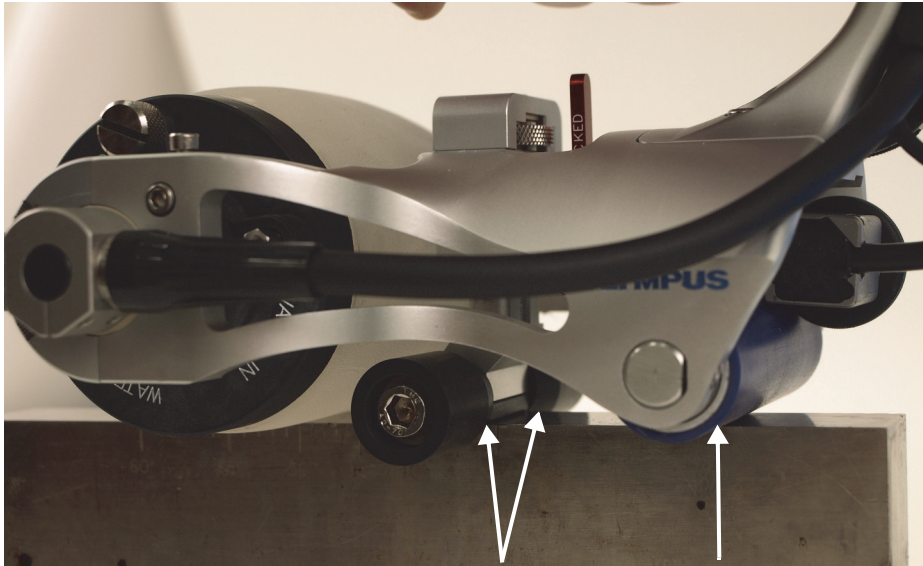


Both rollers of the middle wheel must be in contact with the convex surface, as well as the rear roller.

Figure 4-6 Keeping both rollers in contact with a convex surface

NOTE

When inspecting a narrow surface or the side of a part, both rollers or the skid plate of the middle wheel, and also the rear roller, must be in contact with the surface to inspect (Figure 4-7 on page 64).



Both rollers or skid plate of the middle wheel must be in contact with the narrow surface, and also the rear roller.

Figure 4-7 Keeping both rollers or the skid plate in contact with a narrow surface

6. Lock the middle wheel's position by moving the locking lever to the LOCKED position (Figure 4-8 on page 65).

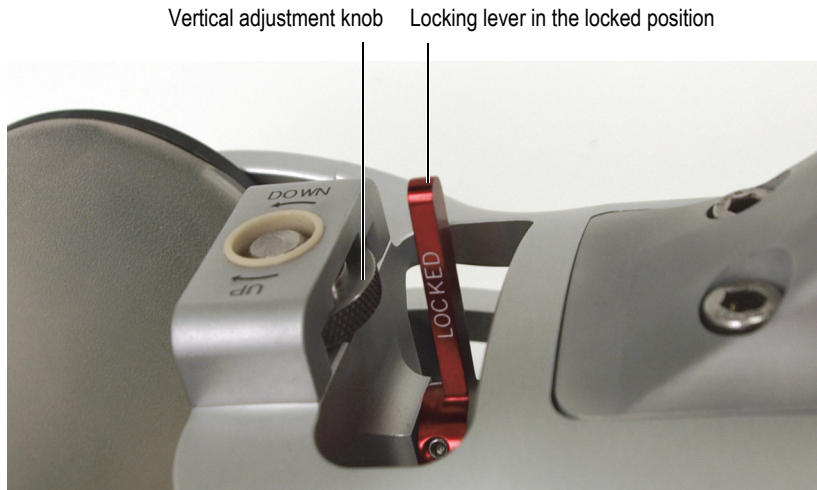


Figure 4-8 Locking the middle wheel

7. Optimize the phased array signal. See “Optimizing the Phased Array Signal” on page 56.

4.4 Tracing the Scan Guide Lines on the Surface to Inspect

Part of the preparation before commencing an inspection consists in drawing parallel guide lines on the surface.

These lines will be used as guides for the laser beam to enable you to move the RollerFORM along a straight path for each one-line scan pass. The index value, or the space between the lines, can be calculated so that the different one-line scans overlap or not.

The lines are more easily traced on a clean and dry surface.

TIP

To draw the lines on curved or complex surfaces, use a flexible ruler.

To trace the scan guide lines on the surface to inspect

1. Define the index value in the OmniScan SX, MX1, and MX2:
 - a) On the OmniScan instrument's menu, select Scan > Area > Index Res.
 - b) Click the Index Res. parameter.

The value displayed represents the beam's effective width.
 - c) Calculate the index value as follows:

Beam effective width (Index Res. parameter value) – overlap = Resolution

NOTE

An overlap value of zero results in no overlap between one-line scans.

- d) Select Scan > Encoder > Encoder 2 = Resolution.
 - e) In the Resolution box, enter the resolution value calculated in step 1.c.
2. Define the index value in the OmniScan X3:
 - a) Select Scan > Inspection > Edit Encoders > Index axis clicker.
 - b) The value in the Aperture box is the maximum beam width.
 - c) Remove the amount of overlap from the aperture value and enter this value in the Resolution box.
 - d) Validate that the overlap calculation fits the inspection requirements.
3. On the surface to inspect, draw parallel guide lines using the resolution value (Figure 4-9 on page 67).

IMPORTANT

Since the laser beam is located on the center of the probe, the first line is measured from the edge of the area to inspect, using half the resolution value. The other guide lines are measured using the full resolution value.

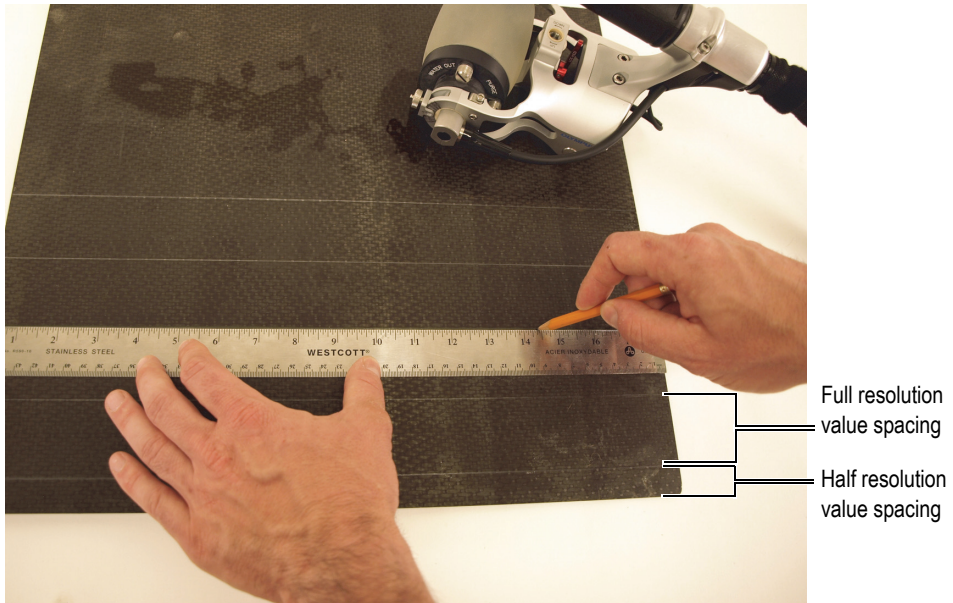


Figure 4-9 Drawing parallel lines on the surface to inspect

5. Performing an Inspection

You can use the RollerFORM scanner to perform inspections of flat or curved surfaces, with the RollerFORM held upright or upside down.



WARNING

Secure the RollerFORM to a lanyard whenever you are using it to scan in an upside-down position and/or at heights above ground level to prevent it from falling and causing physical harm or property damage.

Before performing an inspection, a number of procedures must have been completed:

- The RollerFORM and the instrument must be connected, and the instrument must be properly configured.
For more information, see “Setting Up the Instrument” on page 33.
- The RollerFORM’s acoustic wheel must be properly filled with glycol or water and the liquid chamber must be free of air bubbles.
For more information, see “Preparing the RollerFORM Liquid Chamber” on page 43.
- The following operations must also be performed:
 - Water couplant must be applied to the RollerFORM’s acoustic wheel and to the surface to inspect.
 - The phased array signal must be optimized.
 - The middle wheel of the RollerFORM must be adjusted to the type of surface to inspect.
 - The surface to inspect must be prepared.

For more information, see “Preparing for an Inspection” on page 55.

NOTE

For the approximate position of the probe's active aperture, use the engravings on top of the RollerFORM frame as a reference. These engravings indicate the position of the first and last probe elements on the probe-axle (Figure 5-1 on page 70).

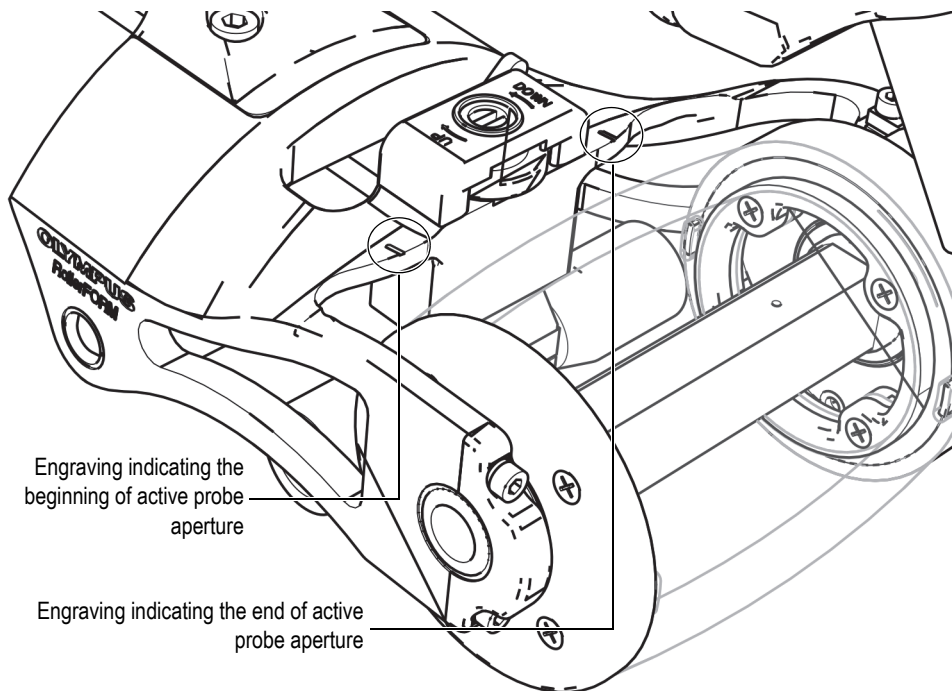


Figure 5-1 Engravings on top of RollerFORM frame

NOTE

The convention used to indicate the position of the first probe element in relation to the last element is represented by the direction of the arrow engraved on the probe-cable side of the probe-axle. The arrow points out from the acoustic wheel and

indicates the direction from the first to last element on the probe, meaning that the first element is on the right-hand side of the RollerFORM, and the last element on the left-hand side (Figure 5-2 on page 71).

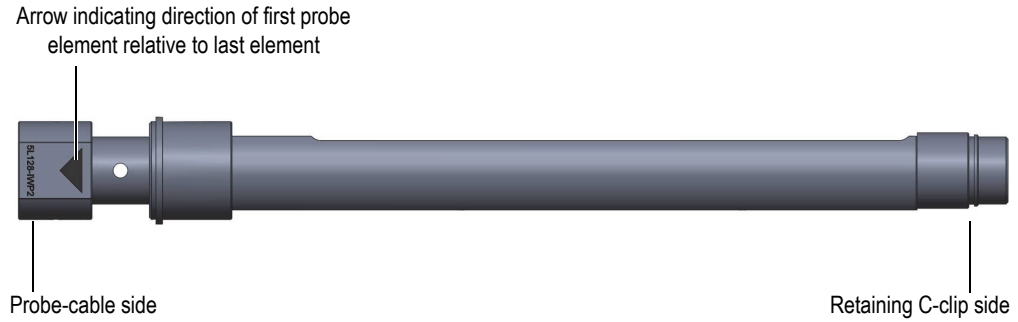


Figure 5-2 Arrow on the probe-axle indicating the direction from first to last element on the probe

NOTE

When the acoustic wheel's tire is kept filled with water for a long period of time, opaque spots may form, or the tire may even become entirely opaque. Even though it does not affect the ultrasound signal, a partially or completely opaque tire makes air bubble detection and removal difficult or impossible. Opacification of the tire surface does not occur when glycol is used to fill the liquid chamber. The tire's transparency can be easily restored. For more information, see "Preserving or Restoring the Tire's Transparency" on page 96.

To perform an inspection

1. Using the manual pump provided with the RollerFORM, apply a mist of water to the surface to inspect and to the acoustic wheel.
For more information, see "Manual Pump" on page 29.
2. Roll the RollerFORM back and forth a few times to uniformly wet the acoustic wheel.

3. On the top of the laser casing, press the red On/Off button to activate the laser (Figure 5-3 on page 72).



WARNING



Class 1 laser radiation. Avoid direct eye exposure to avoid injury.

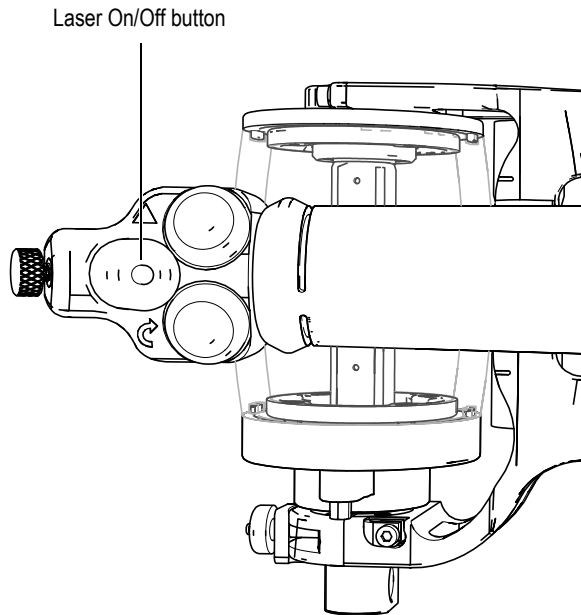


Figure 5-3 Laser On/Off button on top of the laser casing

4. Make sure the guiding laser beam is properly aligned. For more information, see “Adjusting the Angle of the Guiding Laser Beam” on page 122.
5. Position the RollerFORM in line with the first guide line drawn on the surface to inspect, at the edge of the area to be inspected (Figure 5-4 on page 73).

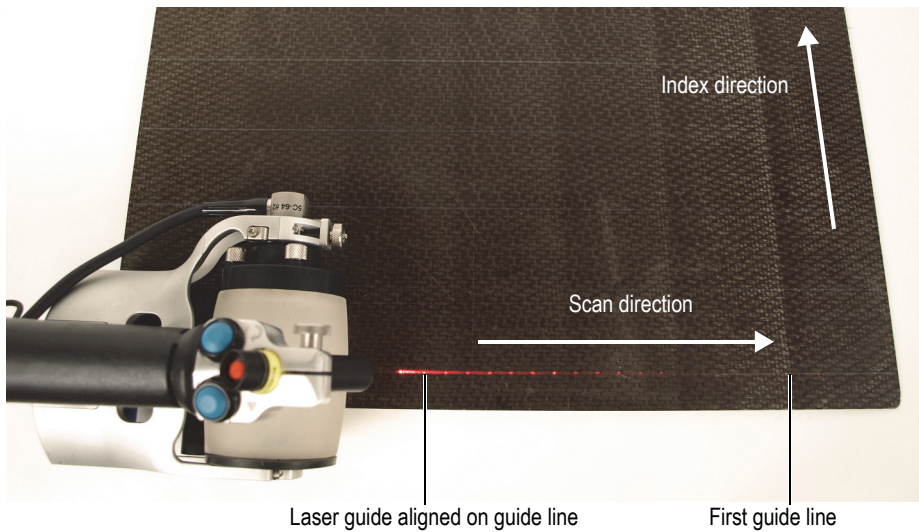


Figure 5-4 Positioning the RollerFORM on the first guide line

6. Make sure that the rear roller, the one on which the Mini-Wheel encoder is mounted, is resting stably on the surface to inspect.

NOTE

When scanning the side of a part, Evident recommends adjusting the middle wheel properly for the first and last scans. For more information, see “Adjusting the Middle Wheel for Convex Surface Axial or Edge Scans” on page 61.

7. Apply sufficient downward pressure on the RollerFORM to make sure the signal is optimal.
8. Press the Start Acquisition button located on top of the RollerFORM’s handle (Figure 5-5 on page 74).

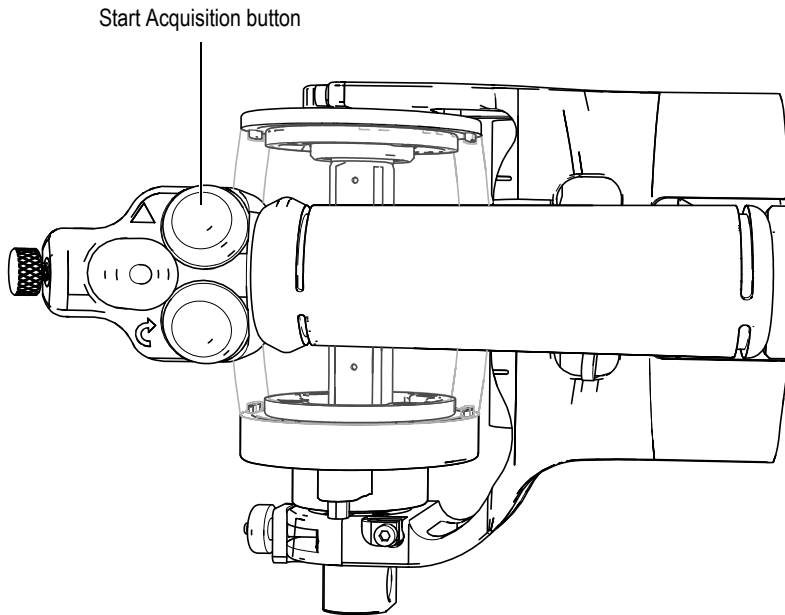


Figure 5-5 Start Acquisition button location

9. Roll the RollerFORM on top of the guide line, making sure the guiding laser beam is perfectly aligned with the drawn guide line for the entire duration of the scan pass.
10. At the end of the area to inspect, immobilize and lift the RollerFORM, making sure that the wheel on the Mini-Wheel encoder does not turn.

NOTE

On the RollerFORM, the first element of the probe is located on the right-hand side of the scanner, when you are holding it with the acoustic wheel furthest away from you. Series of scans must always be performed with the laser guide aligned to the drawn guide lines, and from right to left. Thus, indexing is done by moving the scanner to the next guide line on the left.

11. Return the RollerFORM to the start of the area to inspect, positioning it over the next guide line to the left. Using the laser beam, align the RollerFORM precisely with this guide line (Figure 5-6 on page 75).

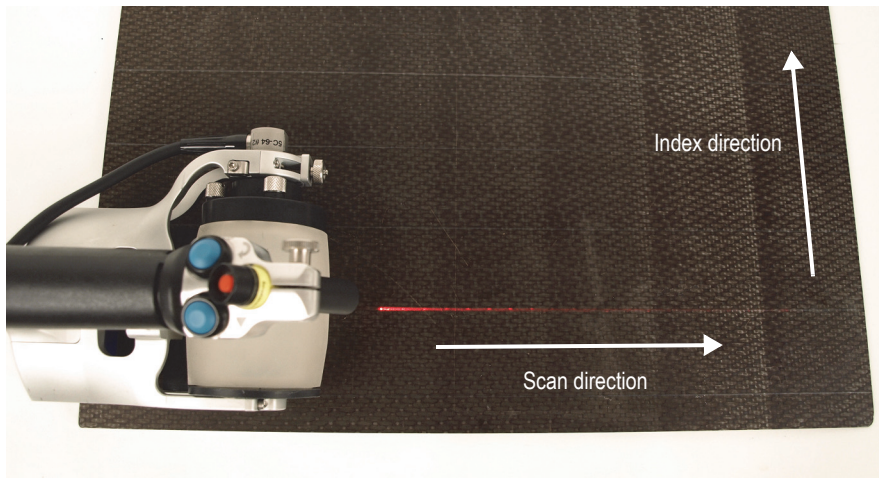


Figure 5-6 Positioning the RollerFORM on the next guide line

12. Lower the RollerFORM so that it comes in contact with the surface, making sure that the wheel on the encoder does not move.
13. Press the Indexer Clicker on top of the RollerFORM's handle (Figure 5-7 on page 76).

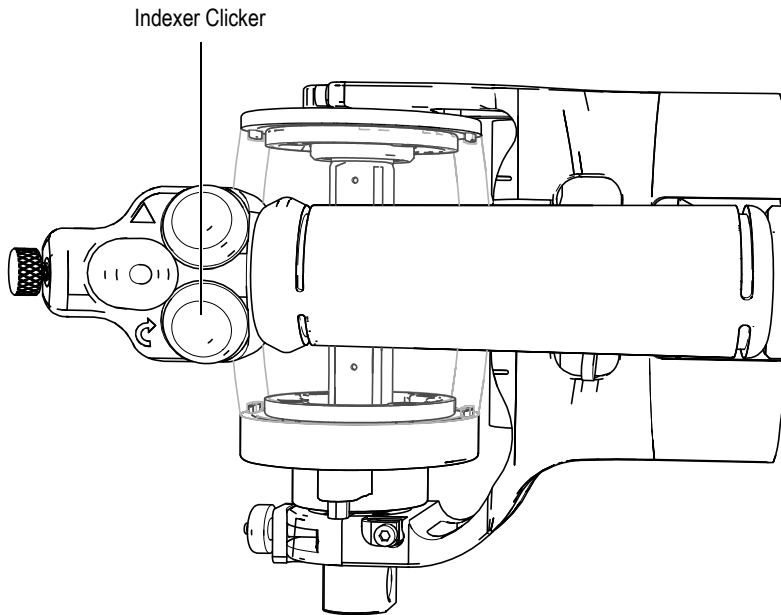


Figure 5-7 Indexer Clicker location

14. Roll the RollerFORM on top of the guide line, making sure the guiding laser beam is perfectly aligned with the drawn guide line for the duration of the scan pass.
15. Repeat steps 11 to 14, until the entire area has been inspected.
16. At the end of the last guide line on the surface being inspected, immobilize the RollerFORM.
17. Pause the instrument that is connected to the RollerFORM.
18. Save the data acquired by the instrument.
19. On the top of the laser casing, press the red On/Off button to deactivate the laser (Figure 5-3 on page 72).

6. Maintenance

The RollerFORM scanner is designed to require minimal maintenance and servicing.

The following maintenance tasks can be performed:

- Periodic cleaning of contaminants from the acoustic wheel's liquid chamber
- Removing air bubbles from the acoustic wheel before performing inspections
- Filling the acoustic wheel or adding liquid as needed
- Restoring the tire's transparency
- Changing the acoustic wheel tire when it shows signs of wear
- Changing the Mini-Wheel encoder's position on the RollerFORM
- Changing the laser batteries
- Adjusting the angle of the laser beam guide

6.1 Removing the Acoustic Wheel from the RollerFORM Scanner

The RollerFORM's acoustic wheel must be removed prior to cleaning the liquid chamber, replacing the tire, or replacing the phased array probe.

To remove the acoustic wheel from the RollerFORM scanner

1. Remove the probe angle-adjustment knob, the spring-lock washer, and the angle cursor from the angle adjustment arm on the RollerFORM (Figure 6-1 on page 78).

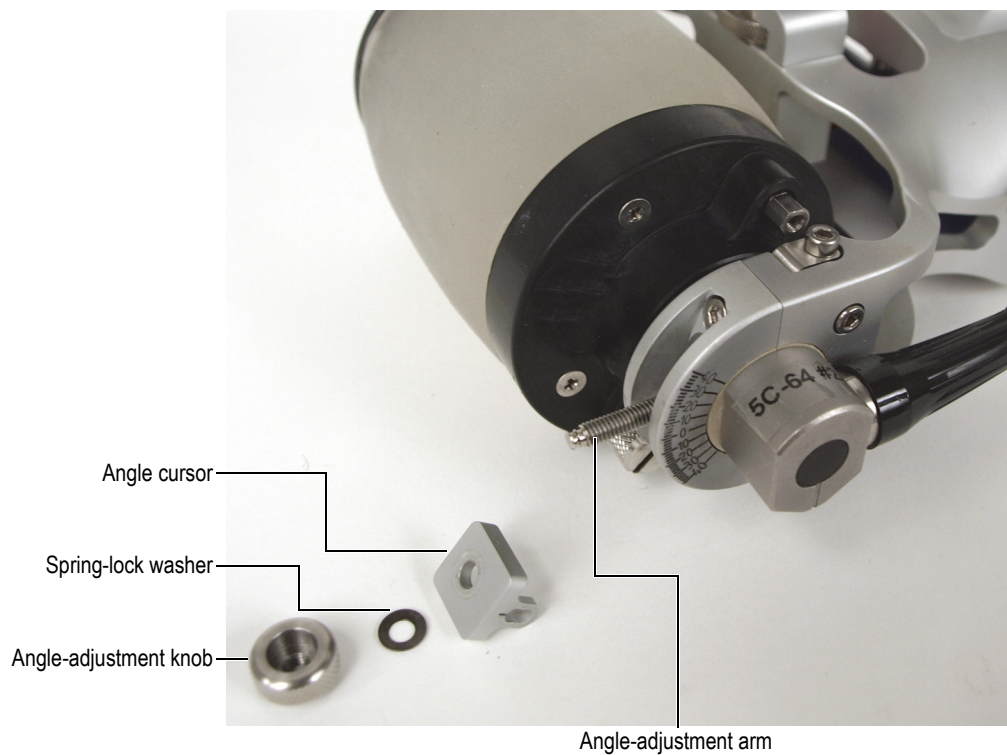


Figure 6-1 Removing the probe angle-adjustment components

2. Using the hexagonal key provided with the RollerFORM, remove the four screws and the two brackets from the frame of the RollerFORM (Figure 6-2 on page 79). The four retaining screws on the brackets are equipped with lock washers.

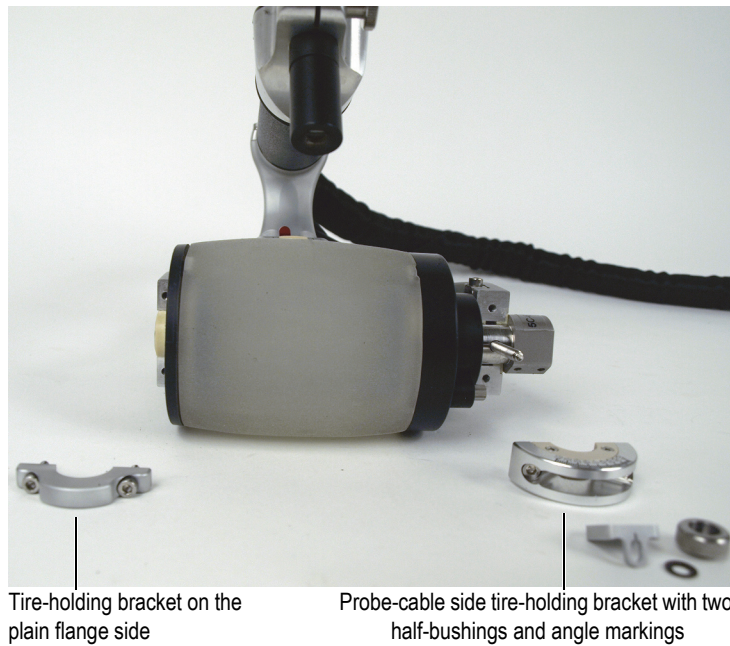
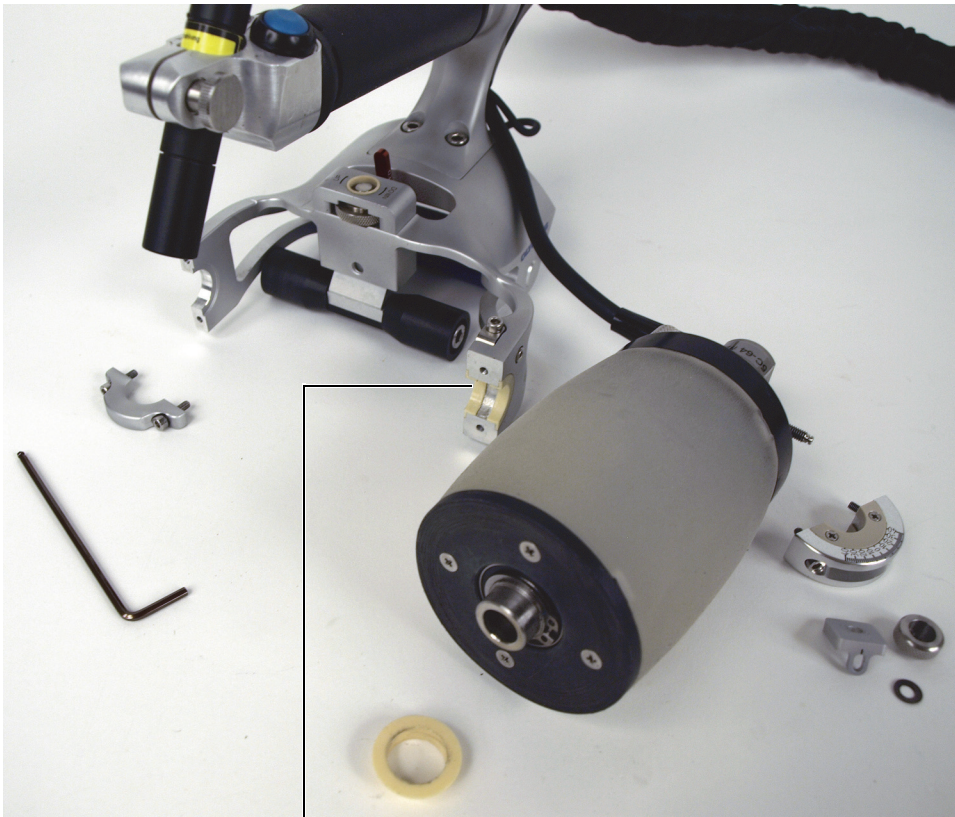


Figure 6-2 Removing the acoustic wheel's holding brackets

3. Remove the acoustic wheel from the RollerFORM frame, taking care not to pull or pinch the probe cable (Figure 6-3 on page 80).



Seat for the acoustic wheel (probe-cable side) with two half-bushings (XL models do not have bushings.)

Figure 6-3 Removing the acoustic wheel

6.2 Emptying the Acoustic Wheel's Liquid Chamber

The liquid chamber of the RollerFORM's acoustic wheel needs to be emptied before changing the tire, before replacing the phased array probe, or before cleaning it of contaminants, such as algae and mold deposits, that can form in water after a period of time.

**CAUTION**

When manipulating noncorrosive glycol while operating the RollerFORM, the safety measures found in the product's MSDS must be applied. For more information, see "Safety" on page 10.

IMPORTANT

When the liquid chamber of the RollerFORM is filled with water, Evident recommends that the water in the chamber be changed at least once a week, and that it be emptied when it will not be used for 48 hours or more. Evident highly recommends filling the liquid chamber with distilled or deionized water. Failure to follow these instructions will lead to algae formation, which requires more rigorous maintenance. When the chamber is filled with noncorrosive glycol, it does not need to be emptied periodically.

To empty the acoustic wheel's liquid chamber

1. Open the OUT valve by unscrewing it one-and-a-half turns (Figure 6-4 on page 82).

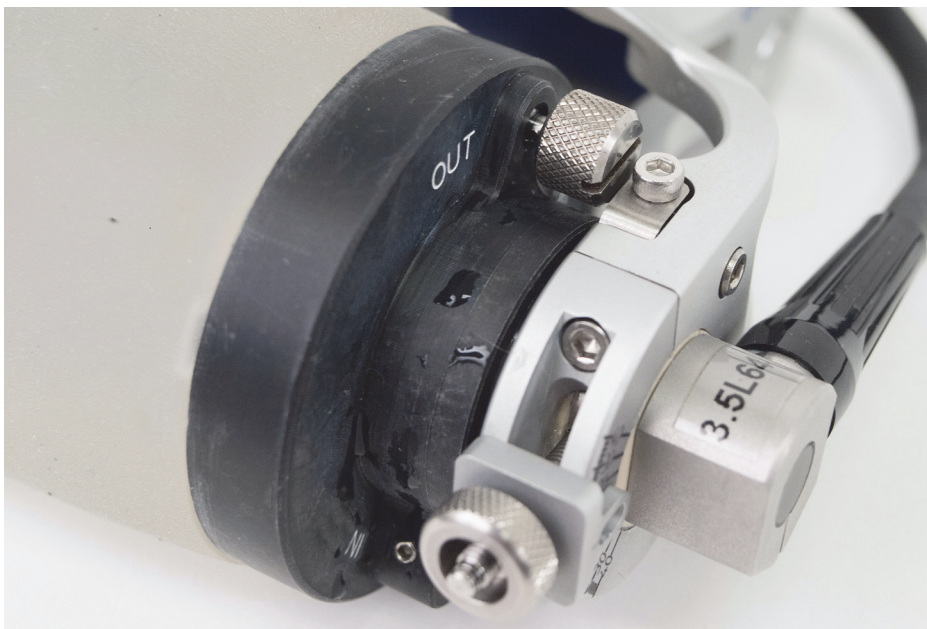


Figure 6-4 Location of the OUT valve

2. Gently and repeatedly squeeze the tire until all the liquid is drained out (Figure 6-5 on page 83).



Figure 6-5 Emptying the liquid chamber

6.3 Changing the Probe-Axle

The phased array probe of the RollerFORM is integrated to the acoustic wheel's axle.

To change the probe, the acoustic wheel must first be removed from its mount on the RollerFORM frame, and then the water must be drained from the acoustic wheel.

6.3.1 Removing the Probe-Axle from the Acoustic Wheel

The probe-axle must be removed from the RollerFORM's acoustic wheel prior to cleaning the liquid chamber, replacing the tire, or when changing the probe.

Before removing the probe from the RollerFORM's acoustic wheel, the wheel must have been removed from the scanner and drained of the liquid it contains. The necessary procedures are contained in the following sections:

- "Removing the Acoustic Wheel from the RollerFORM Scanner" on page 77
- "Emptying the Acoustic Wheel's Liquid Chamber" on page 80

To remove the probe-axe from the acoustic wheel

1. Remove the bushing from the end of the probe-axe on the side of the acoustic wheel that is opposite to the probe cable (Figure 6-6 on page 84) (non-XL models only).

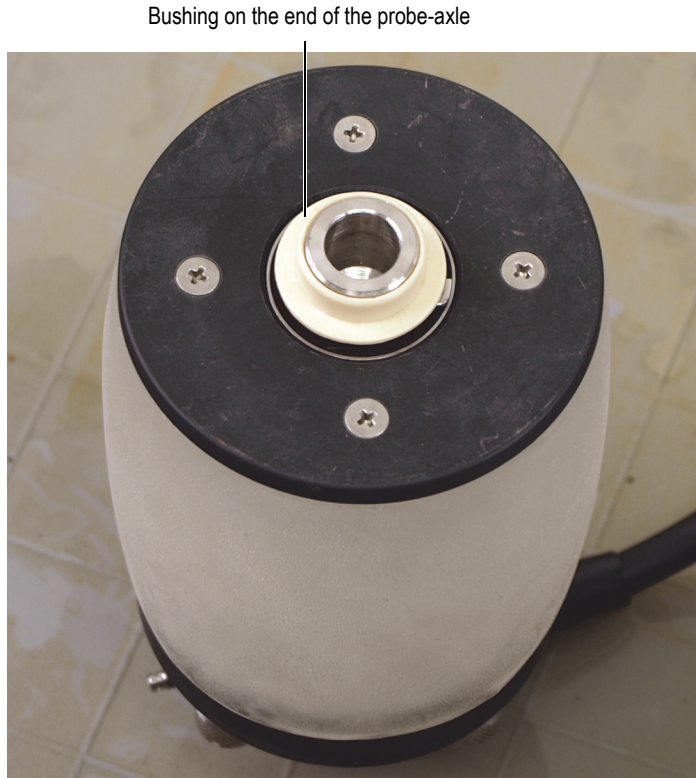


Figure 6-6 Removing the bushing from end of the probe-axe (non-XL models)



CAUTION

Be careful not to damage the bearing seal underneath the C-clip with the pliers tips.

2. Using the supplied retaining C-clip pliers, carefully remove the external retaining C-clip (Figure 6-7 on page 85).

NOTE

Make sure not to overbend the C-clip as it will deform and will have to be replaced.



Figure 6-7 Removing the external retaining C-clip from the end of the probe-axle

3. From the side of the acoustic wheel opposite to the probe cable, gently push the probe-axle out of the wheel (Figure 6-8 on page 86).



Figure 6-8 Pushing the probe-axle out of the acoustic wheel

6.3.2 Installing the Probe-Axle in the Acoustic Wheel

When installing the probe-axle in the RollerFORM's acoustic wheel, take great care not to damage the probe elements.

To install the probe-axle in the acoustic wheel

1. Insert the axle containing the probe inside the acoustic wheel through the flange with liquid-control valves (Figure 6-9 on page 87).
Carefully thread the axle-end through to the flange on the opposite side of the acoustic wheel, and insert it into the hole.

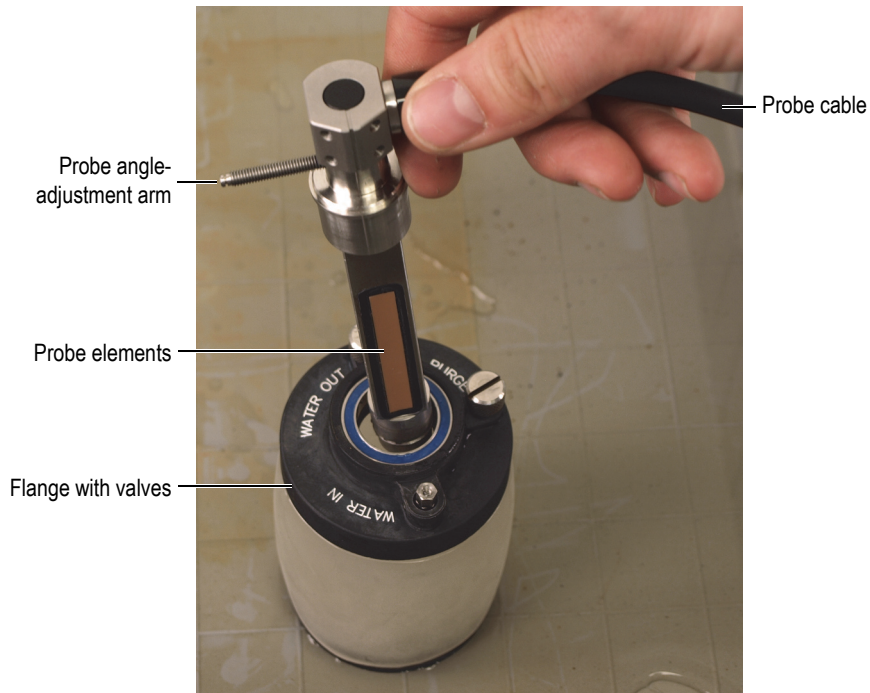


Figure 6-9 Inserting the probe-axle inside the acoustic wheel



CAUTION

Be careful not to damage the bearing seal underneath the C-clip with the pliers tips.

2. Holding the acoustic wheel vertically (probe-cable side down), use the supplied retaining C-clip pliers to carefully install the external retaining C-clip on the shoulder above the groove on the end of the probe-axle (Figure 6-10 on page 88).

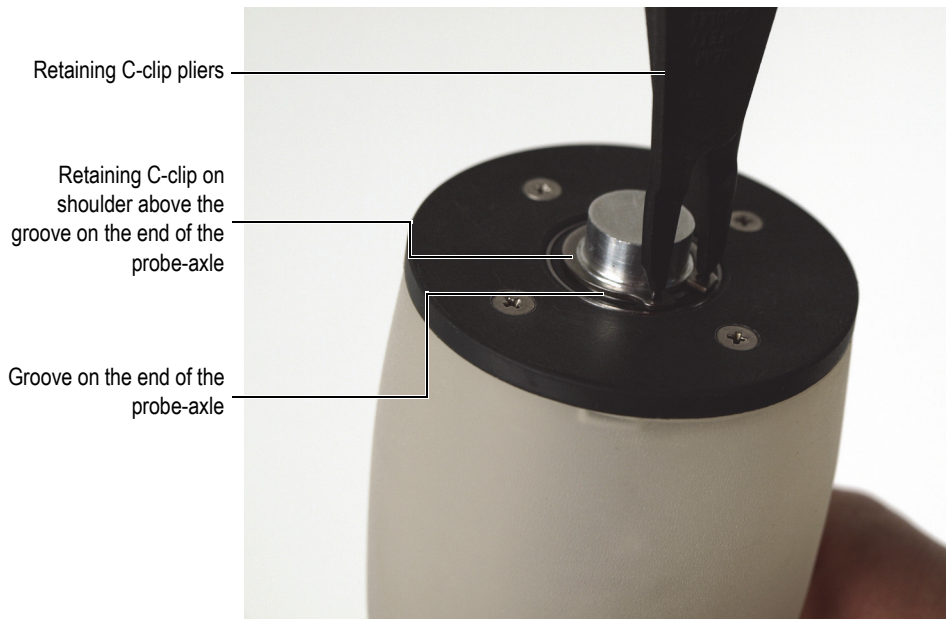


Figure 6-10 Installing the external retaining C-clip on the probe-axle end

3. Still holding the acoustic wheel vertically, rest it on a hard and flat surface (probe-cable side down), and then use the C-clip installation tool to gently push down on the C-clip to ensure that it is properly seated in the groove (Figure 6-11 on page 89).

You should hear a clicking sound when the C-clip enters the groove.

NOTE

The C-clip installation tool is included with the RollerFORM, and is a sleeve with a hollow center that goes around the end of the probe-axle, used to apply down force directly on the c-clip to push it in place in the groove.

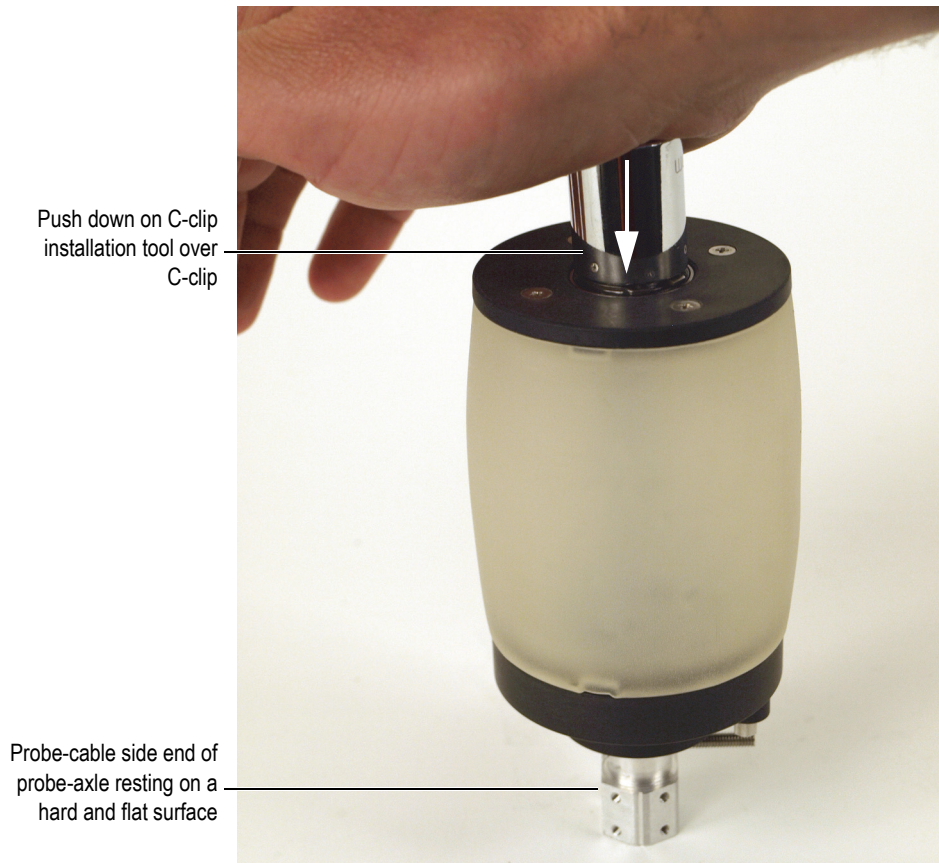
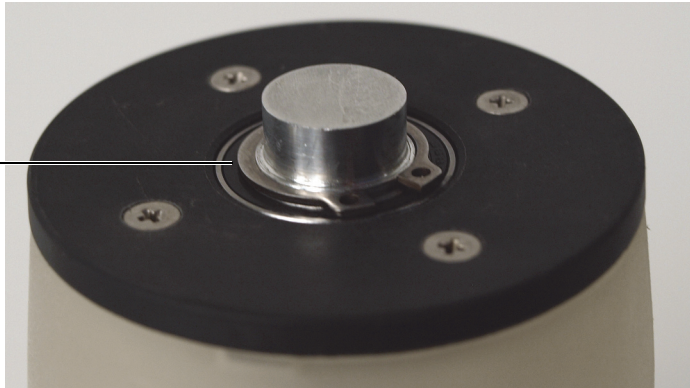


Figure 6-11 Pushing the C-clip in the groove on the probe-axle end with the C-clip installation tool

Make sure that the retaining C-clip is properly seated in the groove on the axle-end (Figure 6-12 on page 90). When the C-clip is deformed or does not stay well seated, replace it with a new one.

C-clip on shoulder on
probe-axe end



C-clip in groove on
probe-axe end

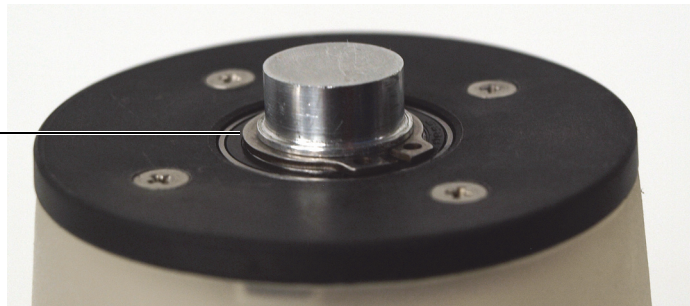


Figure 6-12 Pushing the C-clip in the groove on the probe-axe end with the C-clip installation tool

4. If needed, insert the probe cable inside the RollerFORM's cable sheath.

NOTE

To ensure that the acoustic wheel containing the probe-axe can be easily mounted on the RollerFORM, make sure that the probe cable extends from the rear end of the RollerFORM handle by a length of approximately 25 cm (10 in.) or 28 cm (11 in.) for the RollerFORM XL, which is about 1 cm (0.40 in.) longer than the total length of the handle (Figure 6-13 on page 91).

Length of 25 cm (10 in.) of probe cable
extending from rear end of scanner handle



Figure 6-13 Probe cable extending from the front to the rear end of the RollerFORM handle

5. Install the acoustic wheel on the RollerFORM.
For more information, see “Installing the Acoustic Wheel on the RollerFORM Scanner” on page 108.

6.4 Cleaning the Liquid Chamber

When the liquid chamber of the RollerFORM’s acoustic wheel is filled with water, it must be periodically cleaned of contaminants, such as algae, dirt, or mold, that may accumulate over time.

NOTE

When the chamber is filled with noncorrosive glycol, it does not need to be cleaned periodically.

When changing the liquid inside the chamber from glycol to water, the inside of the chamber must be cleaned to remove all traces of glycol before filling it with water.

Before the acoustic wheel can be cleaned, it must be removed from the RollerFORM and emptied of liquid, and the probe must be removed. The necessary procedures are contained in the following sections:

- “Emptying the Acoustic Wheel’s Liquid Chamber” on page 80
- “Removing the Acoustic Wheel from the RollerFORM Scanner” on page 77
- “Removing the Probe-Axle from the Acoustic Wheel” on page 83

To clean the acoustic wheel’s liquid chamber

1. Remove the four external retaining screws from the plain flange of the acoustic wheel, which is opposite to the probe-cable side flange (Figure 6-14 on page 93).

NOTE

When removing the screws from the plain flange, be careful not to lose the screw gaskets.

Plain flange external retaining screw with gasket

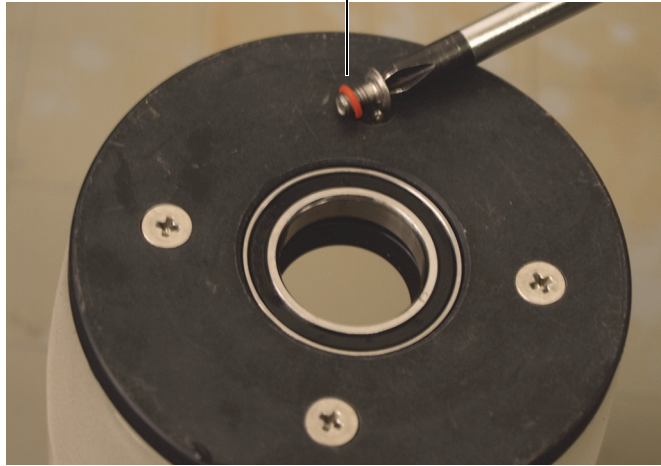


Figure 6-14 Removing the acoustic wheel flange's external retaining screws

2. Remove the acoustic wheel's plain flange (Figure 6-15 on page 94).



Figure 6-15 Removing the acoustic wheel plain flange

3. Using mild soap and a soft cloth, thoroughly scrub the inner surface of the liquid chamber clean, removing all deposits, particles, and viscous substance.
4. After you have finished cleaning the liquid chamber, rinse it thoroughly with fresh water to remove any remaining deposits and particles, and then dry the tire completely.
5. Install the flange by aligning the holes on the stainless steel ring to the holes on the flange (Figure 6-16 on page 95).



Figure 6-16 Installing the plain flange

6. Install the four screws and their gaskets on the flange, and, using a cross pattern, tighten the four screws, first lightly, and then tightly.
7. Install the probe inside the acoustic wheel. For more information, see “Installing the Probe-Axle in the Acoustic Wheel” on page 86.
8. Install the acoustic wheel on the RollerFORM. For more information, see “Installing the Acoustic Wheel on the RollerFORM Scanner” on page 108.
9. Fill the liquid chamber. For more information, see “Filling the Acoustic Wheel’s Liquid Chamber” on page 43.

6.5 Preserving or Restoring the Tire's Transparency

The acoustic wheel's tire on the RollerFORM can partially or completely lose its transparency when it is in contact with water for a long period of time.

IMPORTANT

The tire keeps its acoustic properties even if it loses its transparency on the inside and/or outside surface.

Because the liquid chamber may be filled with water for long periods, opacification usually occurs on the inside surface of the tire. If the outside surface of the tire remains in contact with water for a long period of time, opacification may also occur there.

The tire's opacification may first appear as more opaque or white spots on the surface that has been in prolonged contact with water.

Depending on the severity and extent of the tire's opacification, visually detecting air bubbles or deposits inside the liquid chamber may become difficult or even impossible.

The tire's transparency can be preserved by following a weekly procedure when the chamber is filled with water, or by replacing water by noncorrosive glycol. For more information, see the following sections:

- "Preserving the Tire's Transparency" on page 96.
- "Choosing a Liquid to Fill the Chamber" on page 43.

If the tire's inside and/or outside surface has opacified, its transparency can easily be restored. For more information, see "Preserving or Restoring the Tire's Transparency" on page 96.

6.5.1 Preserving the Tire's Transparency

To preserve the tire's transparency when the acoustic wheel's liquid chamber is filled with water, Evident recommends leaving the liquid chamber to dry for two consecutive days per week. Follow the instructions regarding emptying (see "Emptying the Acoustic Wheel's Liquid Chamber" on page 80) and filling (see "Filling the Acoustic Wheel's Liquid Chamber" on page 43) the water chamber.

When the tire has become partially or totally opaque, its transparency can be restored by removing the acoustic wheel from the scanner, removing the water from the liquid chamber, removing the plain flange, cleaning and drying the inside of the tire, and then letting the tire dry for 48 hours or more.

Before the tire's transparency can be restored, the acoustic wheel must be removed from the RollerFORM and emptied of liquid, and the probe must be removed. The necessary procedures are contained in the following sections:

- “Emptying the Acoustic Wheel’s Liquid Chamber” on page 80
- “Removing the Acoustic Wheel from the RollerFORM Scanner” on page 77
- “Removing the Probe-Axle from the Acoustic Wheel” on page 83

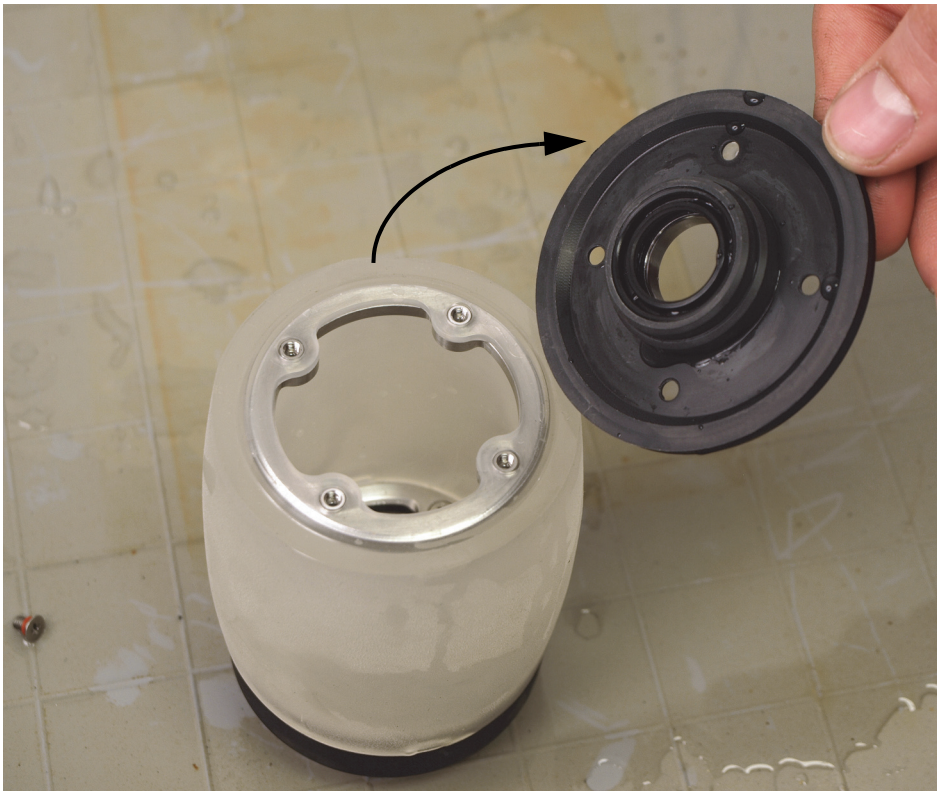


Figure 6-17 Removing the acoustic wheel plain flange

6.5.2 Restoring the Tire's Transparency

To restore the tire's transparency

1. Clean and wipe dry the inside of the acoustic wheel's tire.
For more information, see "Cleaning the Liquid Chamber" on page 91.
2. Leave the liquid chamber to dry for 48 hours with the plain flange removed.

After the tire's transparency has been restored, the acoustic wheel can be reassembled and put back in place on the RollerFORM (see "Installing the Probe-Axle in the Acoustic Wheel" on page 86 and "Filling the Acoustic Wheel's Liquid Chamber" on page 43).

6.6 Changing the Tire

The RollerFORM's acoustic wheel tire must be changed when it is worn out.

Before the tire can be changed, the acoustic wheel must be removed from the scanner, the liquid must be emptied from the chamber, and the probe-axle must be removed. The necessary procedures are contained in the following sections:

- "Emptying the Acoustic Wheel's Liquid Chamber" on page 80
- "Removing the Acoustic Wheel from the RollerFORM Scanner" on page 77
- "Removing the Probe-Axle from the Acoustic Wheel" on page 83

The tire and the flanges that constitute the liquid chamber are held together by two stainless steel rings. One of the two rings contains captive screws. This ring fixes the flange with the valves to the tire. The captive retaining screws of this ring are accessed from the inside of the acoustic wheel (Figure 6-18 on page 98).

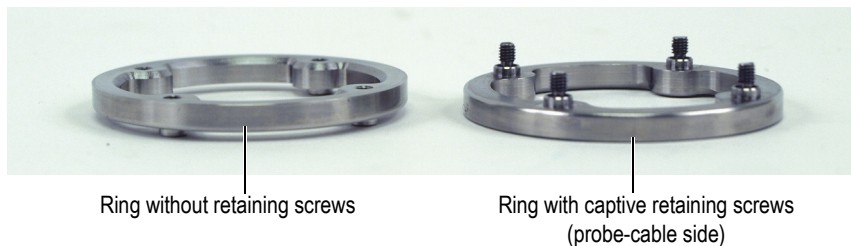


Figure 6-18 Stainless steel rings that hold the flanges to the tire

NOTE

Before changing the tire, make sure that the inside and outside surfaces of the new tire are clean. Even dust, minute particles, stains, or deposits present on the surfaces can generate acoustic interference. The tire's surfaces can be cleaned using mild soap and a soft cloth. For more information, see "Cleaning the Liquid Chamber" on page 91.

To change the tire

1. Remove the four external retaining screws on the acoustic wheel's plain flange (Figure 6-19 on page 99).

NOTE

When removing the screws from the plain flange, take care not to lose the screw gaskets.

Flange's external retaining screw with gasket

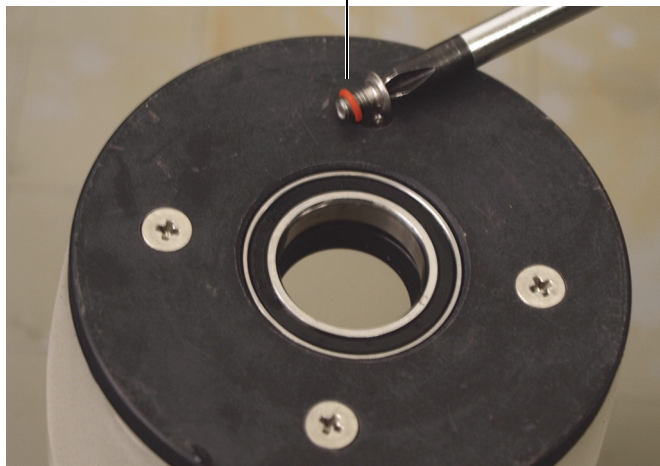


Figure 6-19 Removing the plain flange's external retaining screws

2. Remove the plain flange (Figure 6-20 on page 100).

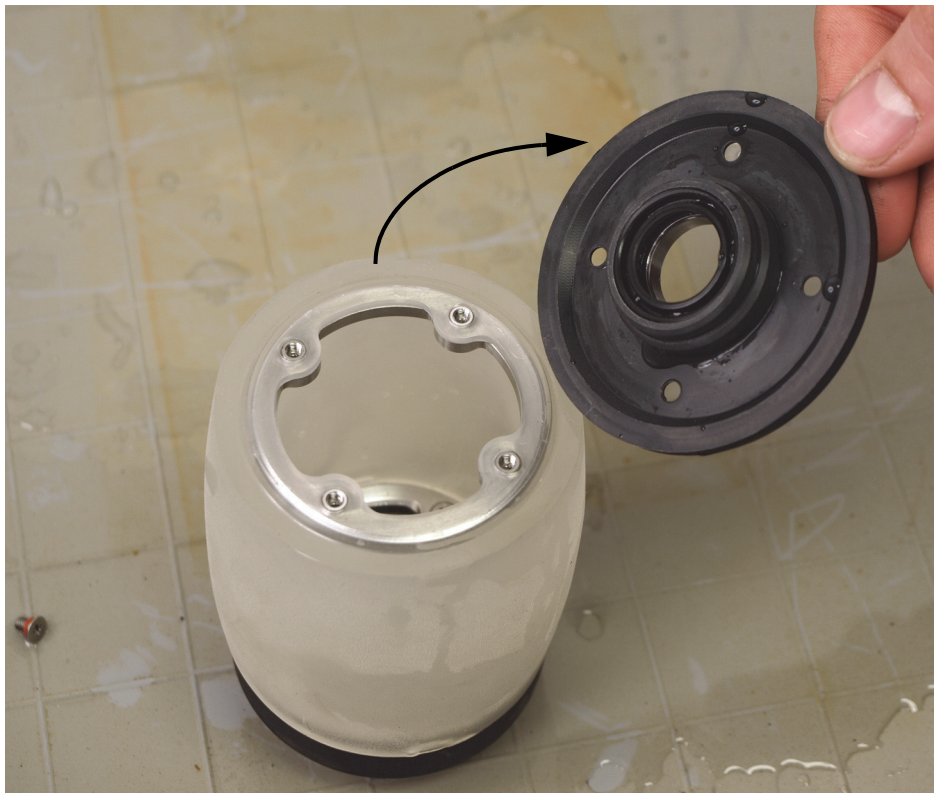


Figure 6-20 Removing the acoustic wheel plain flange

3. The four captive retaining screws of the ring that holds the flange with the liquid-control valves are accessed from inside the liquid chamber. Loosen these retaining screws (Figure 6-21 on page 101).

NOTE

Do not remove the four screws on the outside of the flange on the probe-cable side. These screws are covered with a sticker and are never to be removed from this flange.

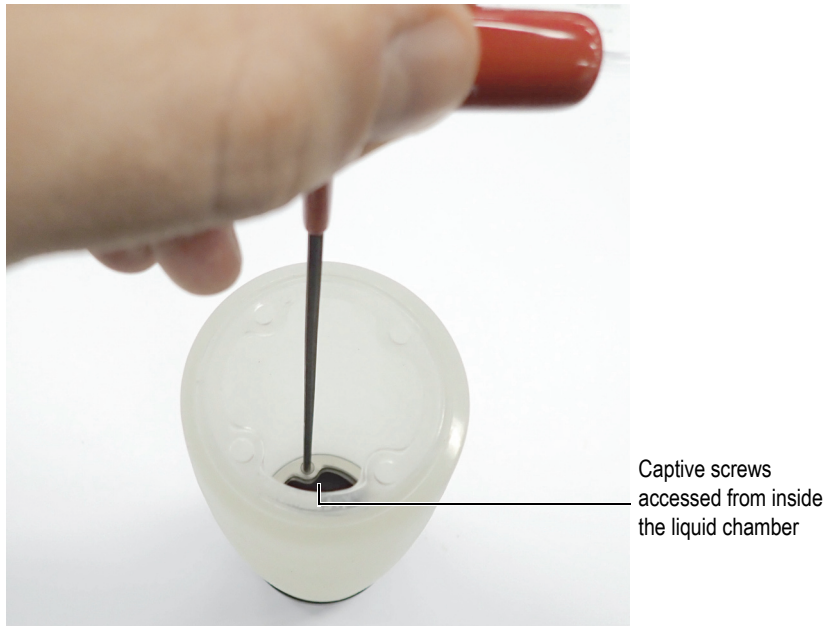
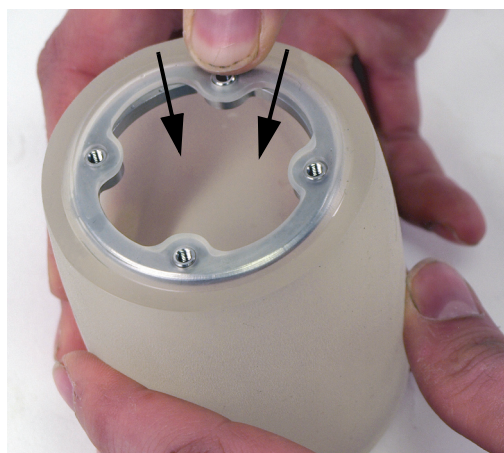


Figure 6-21 Accessing the captive screws of the flange with the liquid-control valves from inside the liquid chamber

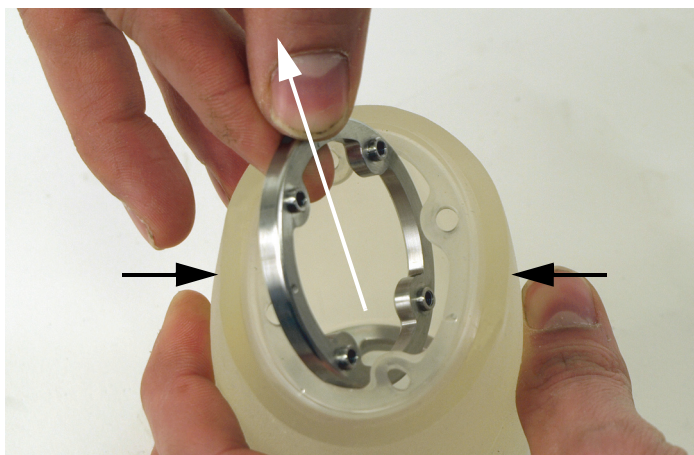
4. Remove the flange that contains the liquid-control valves.
5. Remove the stainless steel rings from inside the tire. Do the following:
 - a) Push the tire lip inward to move the ring out of its retaining groove (Figure 6-22 on page 102).



Pushing the tire lip and
the ring inward

Figure 6-22 Pushing a ring out of its retaining groove

- b) Turn the freed stainless steel ring at a 90-degree angle inside the tire, to align it parallel to the tire's axis inside the tire (Figure 6-23 on page 102).



Squeezing the tire to
widen the opening
and pulling out the
ring

Figure 6-23 Removing a ring out of the tire

- c) Squeeze the tire to widen the opening, making enough room to remove the stainless steel ring without wearing or tearing the tire lip, and then, while maintaining a large enough opening, pull out the stainless steel ring.
 - d) Remove the other stainless steel ring by repeating steps 5.a to 5.c.
6. Insert the stainless steel rings inside the new tire. Do the following:

NOTE

The stainless steel ring with the captive screws can be inserted in either of the tire grooves.

- a) Squeeze the tire on one side to widen the opening, making enough room to insert the stainless steel ring without wearing or tearing the tire lip, and then, while maintaining a large enough opening, insert the stainless steel ring (Figure 6-24 on page 103).

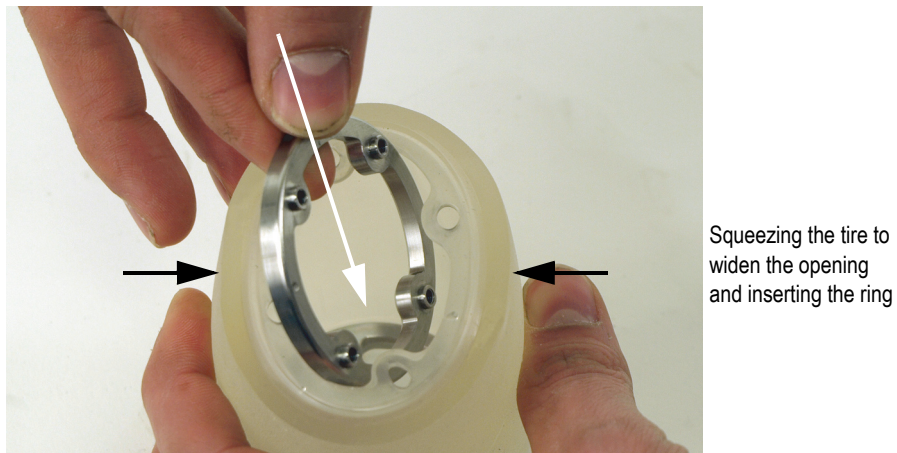


Figure 6-24 Inserting a ring in the tire

- b) Turn the stainless steel ring inside the tire, to align it perpendicularly to the tire's axis, making sure that the screw-hole posts are pointing up toward the opening.
- c) Carefully align the four posts with the four holes in the tire lip.
- d) Install the stainless steel ring in the retaining groove, carefully inserting the posts in the holes on the tire lip (Figure 6-25 on page 104).

Carefully aligning and inserting the posts in the holes of the tire lip

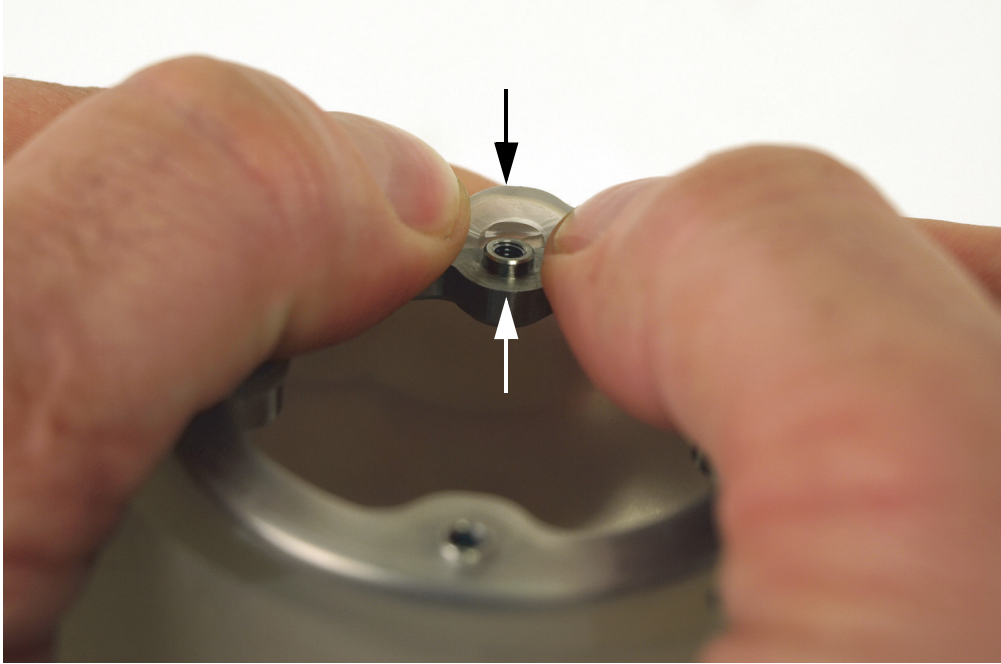


Figure 6-25 Installing a ring in its retaining groove in the tire

- e)* Insert the other stainless steel ring by repeating steps 6.a to 6.d.
- 7. Install the flange that contains the liquid-control valves. Do the following:
 - a)* Align the captive screws on the stainless steel ring to the holes on the flange (Figure 6-26 on page 105).



Figure 6-26 Installing the flange with the liquid-control valves

- b)* Inside the liquid chamber, using a cross pattern, tighten the four captive screws on the stainless steel ring, first lightly, and then tightly (Figure 6-27 on page 106).

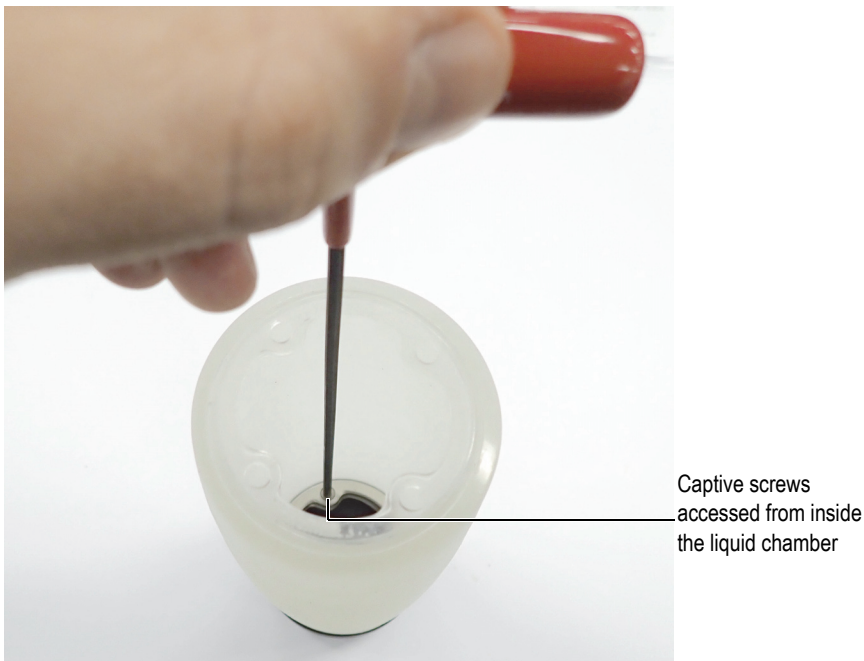


Figure 6-27 Tightening the captive screws of the flange that contains the liquid-control valves from inside the liquid chamber

8. Make sure that the acoustic wheel's interior is clean of particles, dirt, deposits, or spots. If necessary, clean it. For more information, see "Cleaning the Liquid Chamber" on page 91.
9. Install the plain flange:
 - a) Install the flange by aligning the holes on the stainless steel ring to the holes on the flange (Figure 6-28 on page 107).



Figure 6-28 Installing the plain flange

- b) Install the four screws and their gaskets in the plain flange, and then, using a cross pattern, tighten the screws, first lightly, and then tightly (Figure 6-29 on page 108).

Flange's external retaining screw with gasket

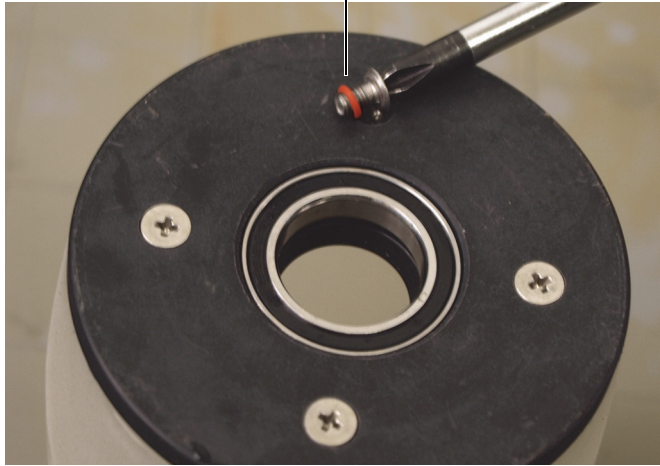


Figure 6-29 Installing the plain flange's external retaining screws

10. Install the probe inside the acoustic wheel. For more information, see “Installing the Probe-Axle in the Acoustic Wheel” on page 86.
11. Install the acoustic wheel on the RollerFORM. For more information, see “Installing the Acoustic Wheel on the RollerFORM Scanner” on page 108.
12. Fill the liquid chamber. For more information, see “Filling the Acoustic Wheel’s Liquid Chamber” on page 43.

6.7 Installing the Acoustic Wheel on the RollerFORM Scanner

After the maintenance procedures on the RollerFORM’s acoustic wheel have been performed, the wheel is ready to be installed on the scanner.

To install the acoustic wheel on the RollerFORM scanner

1. Install the probe inside the acoustic wheel. For more information, see “Installing the Probe-Axle in the Acoustic Wheel” on page 86.
2. Install the bushing on the end of the probe-axle (Figure 6-30 on page 109).

Bushing on the end of the probe-axle



Figure 6-30 Installing the bushing on the end of the probe-axle (non-XL model)

3. Install the acoustic wheel in the seats on the RollerFORM frame. Take care to insert it with the probe cable on the side of the alternate encoder holder (Figure 6-31 on page 110).

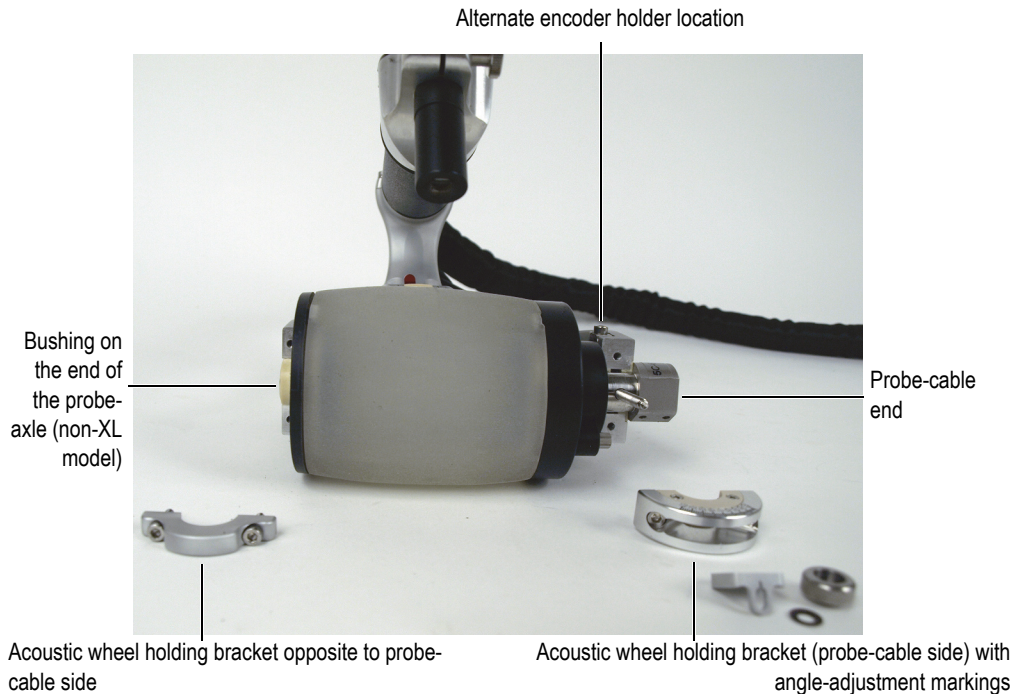


Figure 6-31 Installing the acoustic wheel holding brackets

4. Install the acoustic wheel holding bracket with the angle-adjustment markings on the side of the frame with the alternate encoder mount, making sure that the angle markings face outward, and then install and tighten the two screws with the hexagonal key supplied with the RollerFORM. The screws are equipped with lock washers.
5. Install the acoustic wheel holding bracket on the side opposite to the probe cable, and then install and tighten the two screws with the hexagonal key. The screws are equipped with lock washers.
6. Install the angle cursor, the spring-lock washer, and the angle-adjustment knob on the angle-adjustment arm, which is on the probe-cable side of the RollerFORM (Figure 6-32 on page 111).

The angle-adjustment knob is equipped with a lock washer that generates more resistance when the knob is partially screwed onto the angle-adjustment arm.

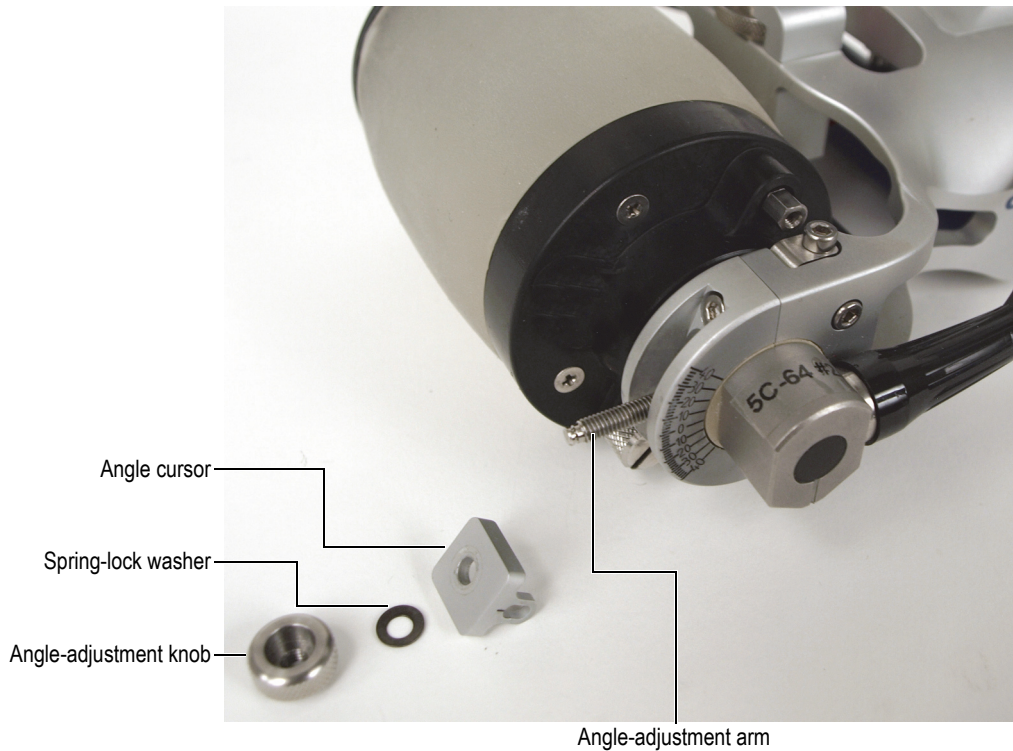


Figure 6-32 Installing the probe's angle-adjustment components

6.8 Installing the Mini-Wheel Encoder on the Acoustic Wheel

The RollerFORM scanner's Mini-Wheel encoder's primary location is on the rear roller, which is located underside and at the rear of the scanner. If required, the alternate encoder holder can be used to relocate the encoder onto the acoustic wheel.

Installing the Mini-Wheel encoder at the alternate encoder position can help avoid dead zones at the start or end of plates. However, mounting the encoder in this position results in a less stable ultrasonic signal, because the back wheel may not stay in contact at all times with the part being inspected.

The alternate encoder position is not recommended for inspecting narrow parts, or for inspecting pipes axially (longitudinally), because the resolution of the encoder changes if the tire compression varies.

To relocate the Mini-Wheel encoder on the alternate encoder holder

1. Using the hexagonal key, loosen the rear roller's retaining screw (Figure 6-33 on page 112).



Figure 6-33 Loosening the rear roller's retaining screw

2. Gently apply pressure to the rear roller's axle on the end opposite the retaining screw to free it from its seat in the RollerFORM frame (Figure 6-34 on page 113).

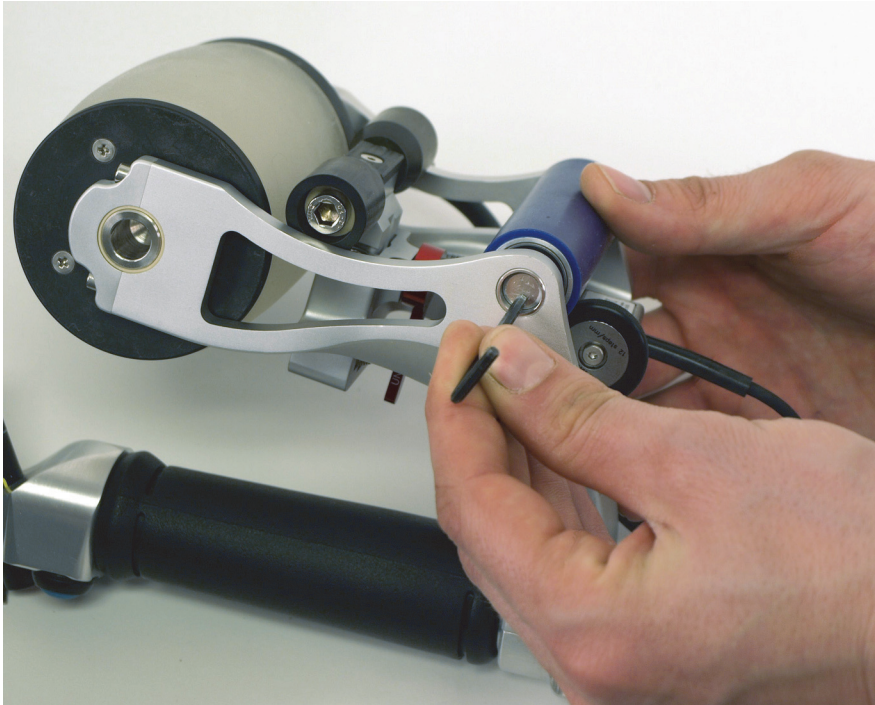


Figure 6-34 Pushing loose the rear roller's axle from its seat

3. Slide the rear roller axle out of the RollerFORM frame (Figure 6-35 on page 114).

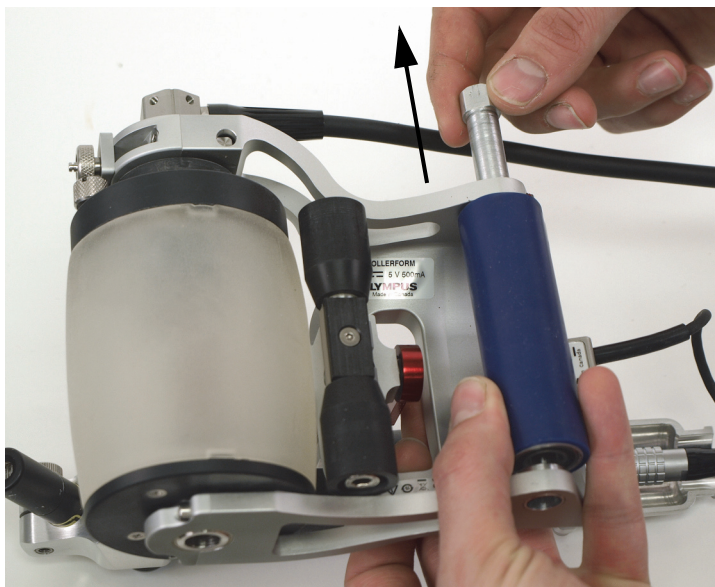


Figure 6-35 Sliding out the rear roller's axle

4. Loosen the Mini-Wheel encoder retaining screw (Figure 6-36 on page 115).

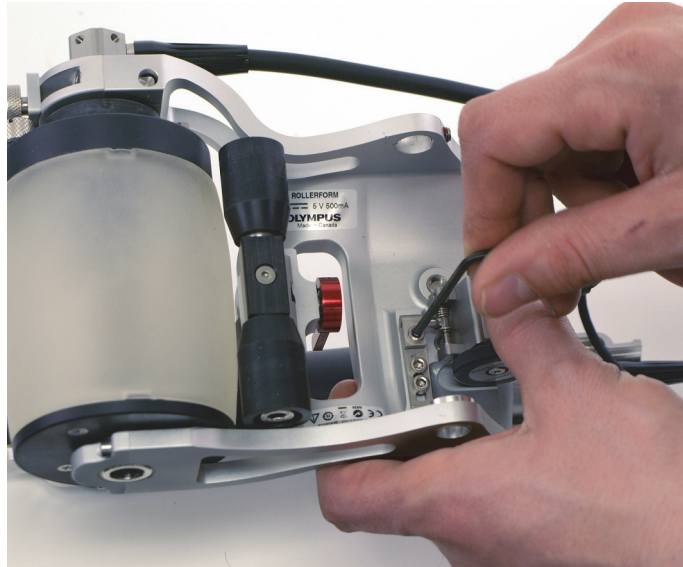


Figure 6-36 Loosening the encoder retaining screw

5. Remove the Mini-Wheel encoder (Figure 6-37 on page 116).

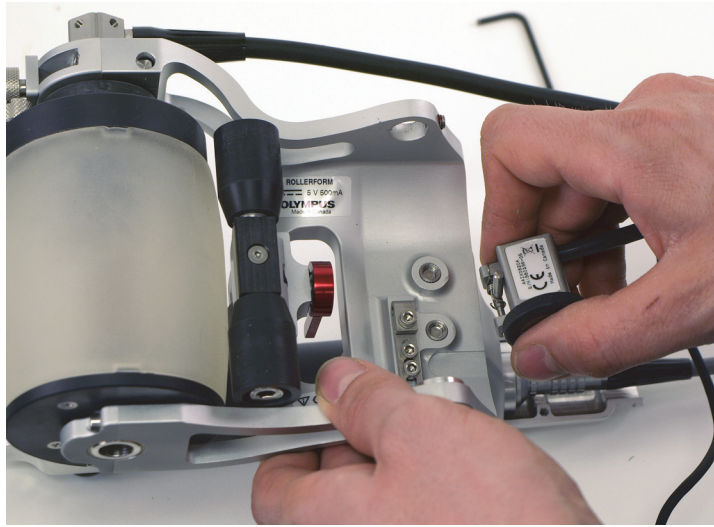


Figure 6-37 Removing the Mini-Wheel encoder



CAUTION

To prevent bending the primary encoder holder bracket, do not overtighten the encoder retaining screw. A bent bracket renders it difficult to install the encoder on the primary holder.

6. With the encoder removed, tighten the encoder retaining screw into the RollerFORM frame.
 7. Install the rear roller. Do the following:
 - a) Position the rear roller in place inside the RollerFORM frame.
 - b) Insert the tip of the rear roller's axle into the entry/exit hole equipped with a retaining screw.
 - c) Then, thread the axle through the rear roller until it enters the axle seat on the other side of the RollerFORM frame.

Make sure that the flat bevel of the axle end is facing the rear roller retaining screw (Figure 6-38 on page 117).
-

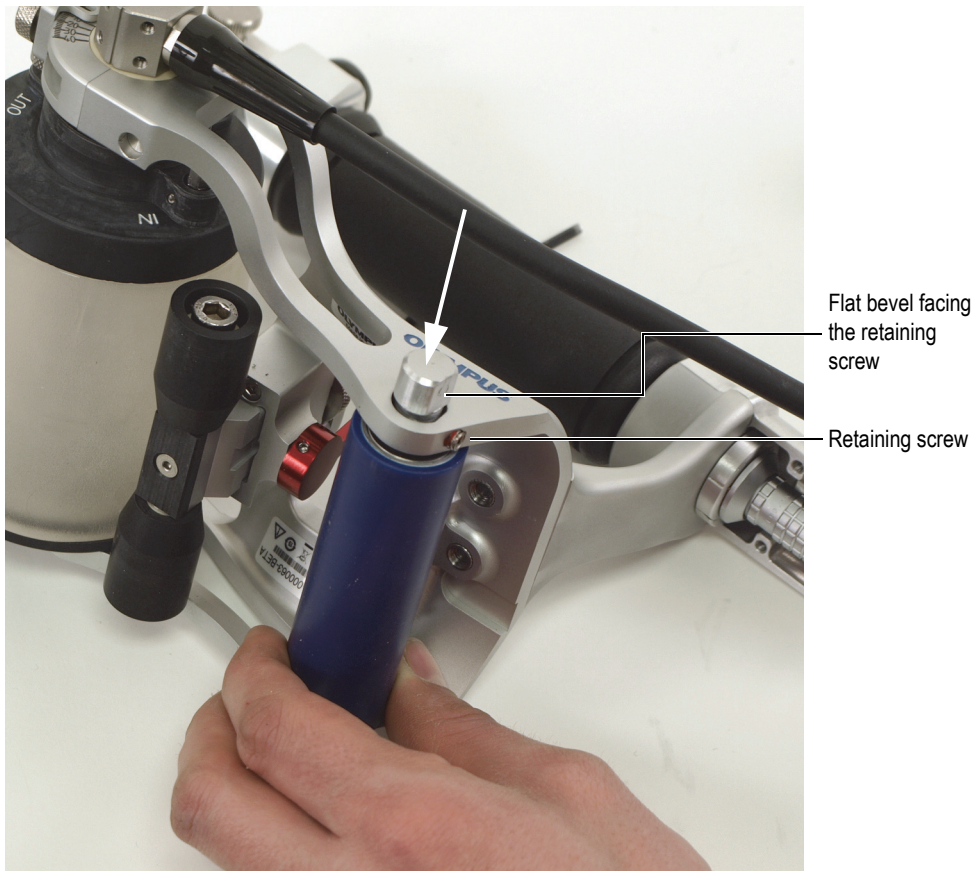


Figure 6-38 Aligning the rear roller's axle-end flat bevel with the retaining screw

- d)* Tighten the rear roller retaining screw.
- 8. For the non-XL model only, loosen the retaining screw of the alternate encoder holder, which is located on the acoustic wheel mount on the side of the probe cable (Figure 6-39 on page 118).

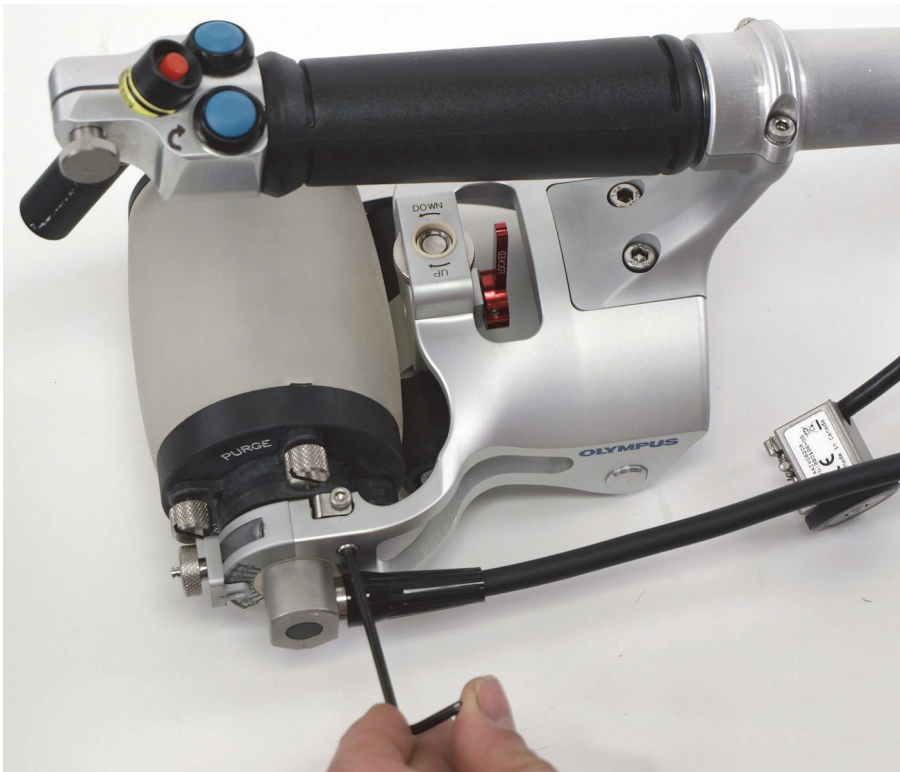


Figure 6-39 Loosening the screw of the alternate encoder holder

9. For the non-XL model only, remove the alternate encoder holder from its storage cavity (Figure 6-40 on page 119).

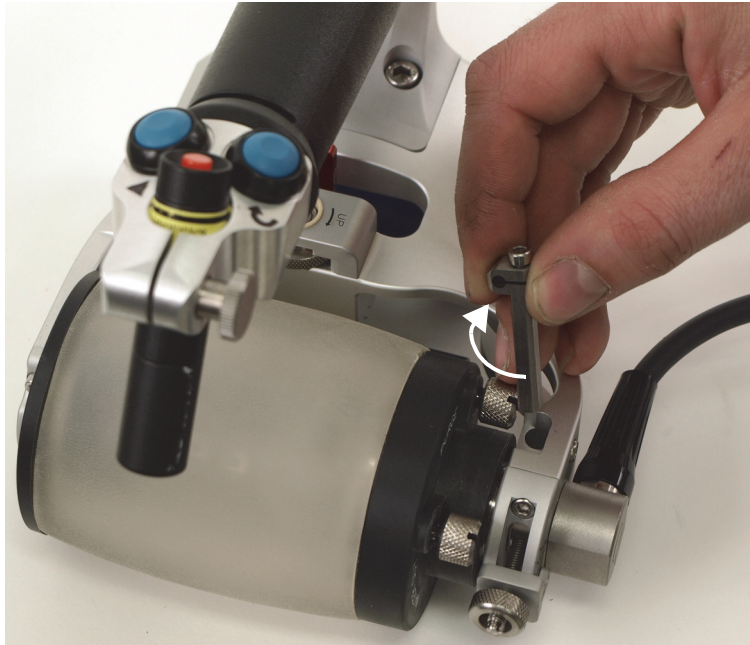


Figure 6-40 Removing and pivoting the alternate encoder holder 90°

NOTE

For the RollerFORM XL, the encoder holder cannot be stored in the scanner chassis. You can find the encoder holder in the RollerFORM XL spare part kit.

10. Insert the encoder holder in the cavity, so that the encoder retainer hole is aligned with the RollerFORM's movement, and then tighten the retaining screw that fixes the encoder holder to the acoustic wheel mount.
11. Install the Mini-Wheel encoder on the encoder holder (Figure 6-41 on page 120).

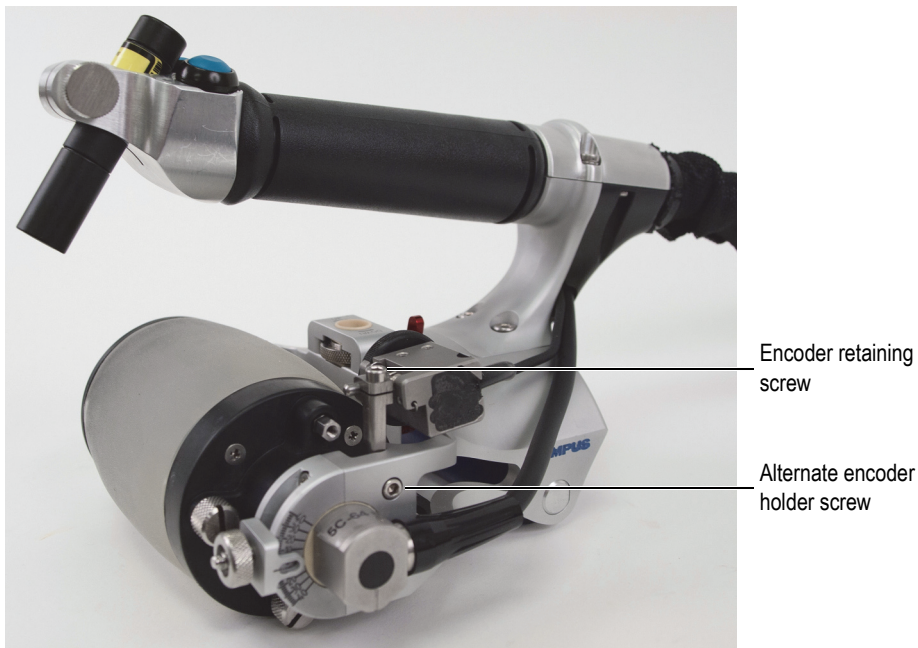


Figure 6-41 Mini-Wheel encoder installed on the alternate encoder holder

12. Tighten the screw that fixes the Mini-Wheel encoder to the alternate encoder holder.

TIP

Make sure that the tension in the Mini-Wheel encoder's spring is sufficient enough to ensure proper contact with the acoustic wheel at all times, without impairing the acoustic wheel's rotation.

IMPORTANT

When you relocate the Mini-Wheel encoder to the alternate encoder holder on the RollerFORM in order to perform axial (longitudinal) scans on convex surfaces, you must perform an encoder calibration. Please refer to the instrument user's manual.

6.9 Changing the Laser Batteries

If your RollerFORM is equipped with a battery-powered laser, the batteries must be changed periodically. The laser is located at the front of the RollerFORM handle.



WARNING



Class 1 laser radiation. Avoid direct eye exposure to avoid injury.

To change the laser batteries

1. Unscrew the battery casing cover. This is the part of the laser casing that houses the lens (Figure 6-42 on page 121).

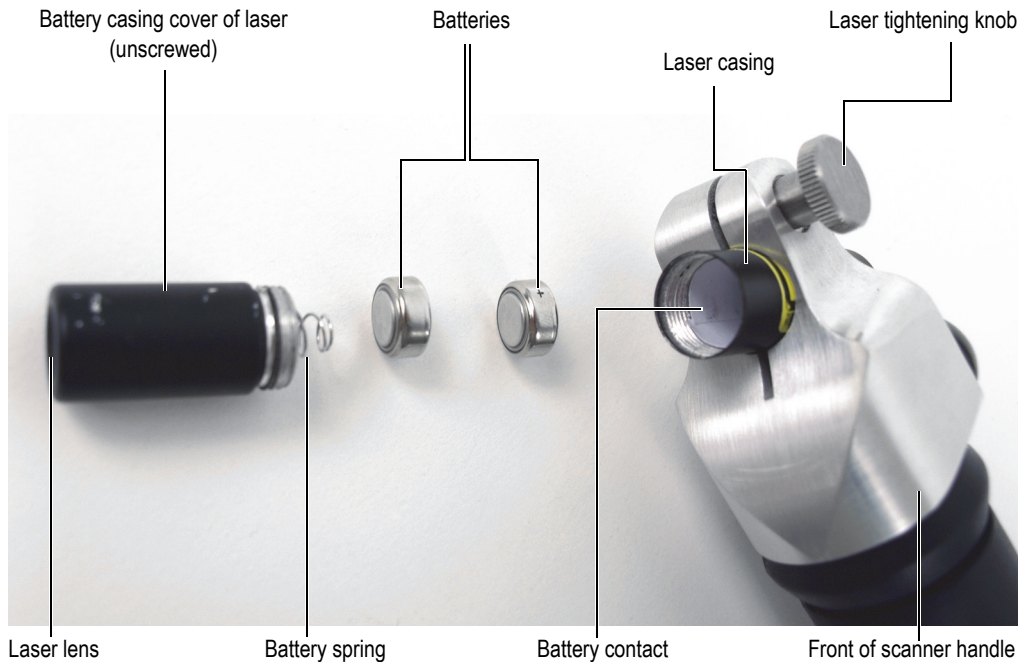


Figure 6-42 Changing the batteries in the laser

2. Remove the two 1.5 V ANSI/NEDA-1131SO/IEC-SR44 silver-oxide button cell batteries (No. 303/357).
3. Install two new batteries with the positive side (+) towards the contact, and the negative side (-) towards the spring in the battery casing cover.
4. Screw the battery casing cover in place.
5. Check the guiding laser beam alignment. For more information, see “Adjusting the Angle of the Guiding Laser Beam” on page 122.

6.10 Adjusting the Angle of the Guiding Laser Beam

The RollerFORM’s guiding laser beam alignment must be verified periodically and adjusted if required. If your RollerFORM is equipped with a battery-powered laser, the laser beam alignment must be verified each time the batteries have been changed.



WARNING



Class 1 laser radiation. Avoid direct eye exposure to avoid injury.

To adjust the laser beam angle

1. On a flat surface, draw two parallel guide lines, 500 mm (19.7 in.) in length and 50 mm (1.97 in.) apart (Figure 6-43 on page 123).

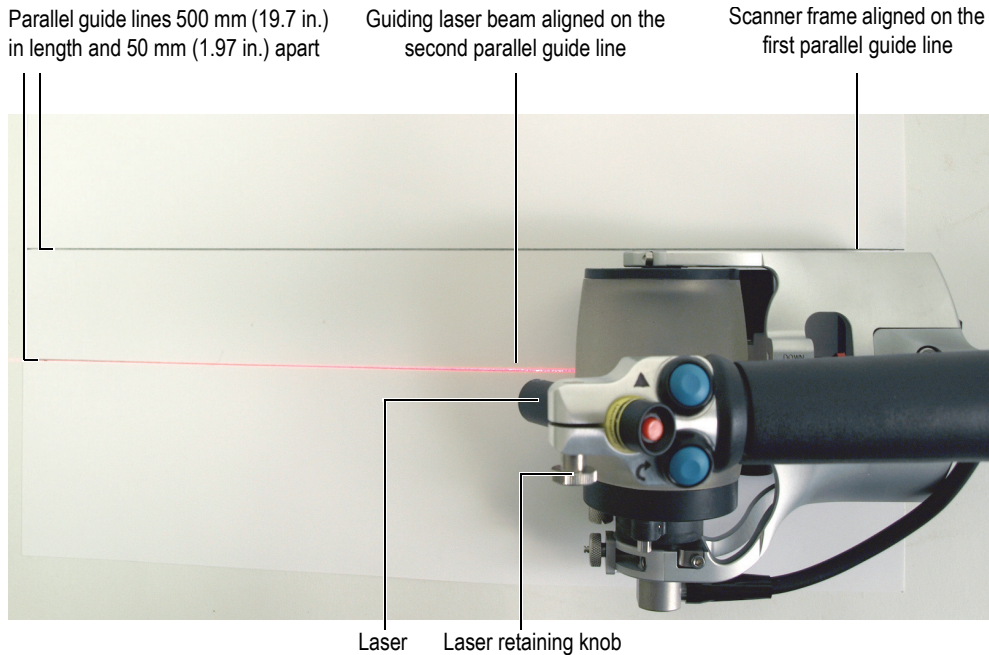


Figure 6-43 Aligning the guiding laser beam

2. With the laser beam pointing forward, align the flat, right side of RollerFORM's frame with one of the guide lines. Make sure that the other guide line is lined up with the center of the tire.
3. Slightly loosen the laser retaining knob, sufficiently enough to be able to rotate the laser.
4. Rotate the laser until the guide beam is perfectly aligned with the guide line located under the center of the tire.
5. Tighten the laser retaining knob.

7. Specifications

This chapter contains the specifications for the RollerFORM scanner.

7.1 General Specifications

Table 1 on page 125 provides the RollerFORM’s general specifications.

Table 1 General specifications

Description	Value—RollerFORM	Value—RollerFORM XL
Typical near surface resolution (3 mm × 3 mm [0.12 in. × 0.12 in.] delamination)	1 mm at 5 MHz, 1.5 mm at 3.5 MHz	
Position of repeat interface echo (in composite)	50 mm (1.97 in.)	
Minimum surface curvature (convex radius)	50 mm (1.97 in.)	
Dimensions (L × W × H)	235 mm × 145 mm × 150 mm (9.25 in. × 5.71 in. × 5.91 in.)	235 mm × 225 mm × 150 mm (9.25 in. × 8.86 in. × 5.91 in.)
Weight (without liquid)	1.5 kg (3.31 lb)	1.75 kg (3.85 lb)
Encoder voltage	5 V	
Encoder current	25 mA maximum	

7.2 Environment Specifications

Table 2 on page 126 provides the RollerFORM’s operating environment specifications.

Table 2 Operating environment specifications

Parameter	Value—RollerFORM	Value—RollerFORM XL
Operating temperature	5 °C to 45 °C (41 °F to 113 °F)	5 °C to 50 °C (41 °F to 122 °F)
Storage temperature	5 °C to 45 °C (41 °F to 113 °F)	5 °C to 60 °C (41 °F to 140 °F)
Wet location	Yes	
Altitude	Up to 2000 m	
Outdoor use	Yes	
Pollution level	1	
IP rating	Water resistant (IP54) Standard IEC 60259:2013	
High temperature operating	Standard MIL-STD 810G w/Change 1 Method 501.6 Procedure II, §4.5.3	
Low temperature operating	Standard MIL-STD 810G w/Change 1 Method 502.6 Procedure II, §4.5.3	
High temperature storage	Standard MIL-STD 810G w/Change 1 Method 501.6 Procedure I, §4.5.2	
Low temperature storage	Standard MIL-STD 810G w/Change 1 Method 502.2 Procedure I, §4.5.2	
Laser	Class 1: EN/IEC 60825-1:2014 and DIN EN 60825-1:2015-07;VDE 0837-1:2015-07 Beam shape: Line Laser type: Diode Wavelength: 650 nm Optical diode power: 5 mW Focus: 25 cm (Fixed) Divergence: 1 mrad Line Thickness: <1 mm @ 0.25 m	

7.3 Connector Reference

The RollerFORM comes standard with the LEMO connector that is compatible with the OmniScan MX2 and SX instruments. For use with a different instrument, an optional adaptor is required (Table 3 on page 127).

Table 3 Required encoder cable adaptor

Scanner connector	Instrument			
	OmniScan MX	OmniScan MX2	OmniScan SX	TomoScan FOCUS LT
LEMO	Omni-A-ADP27 [U8780329]	—	—	C1-LF-BXM-0.3M [U8769010]

Figure 7-1 on page 127 contains the pinout for the LEMO connectors used on the OmniScan MX2 and SX models. The EWIX1439 cable has a single LEMO 16-pin connector that connects to the instrument and splits into two LEMO connectors on the RollerFORM side: the LEMO 8-pin connector connects to the RollerFORM handle for the Start Acquisition button and the Indexer Clicker, and the LEMO 5-pin connector connects to the Mini-Wheel encoder.

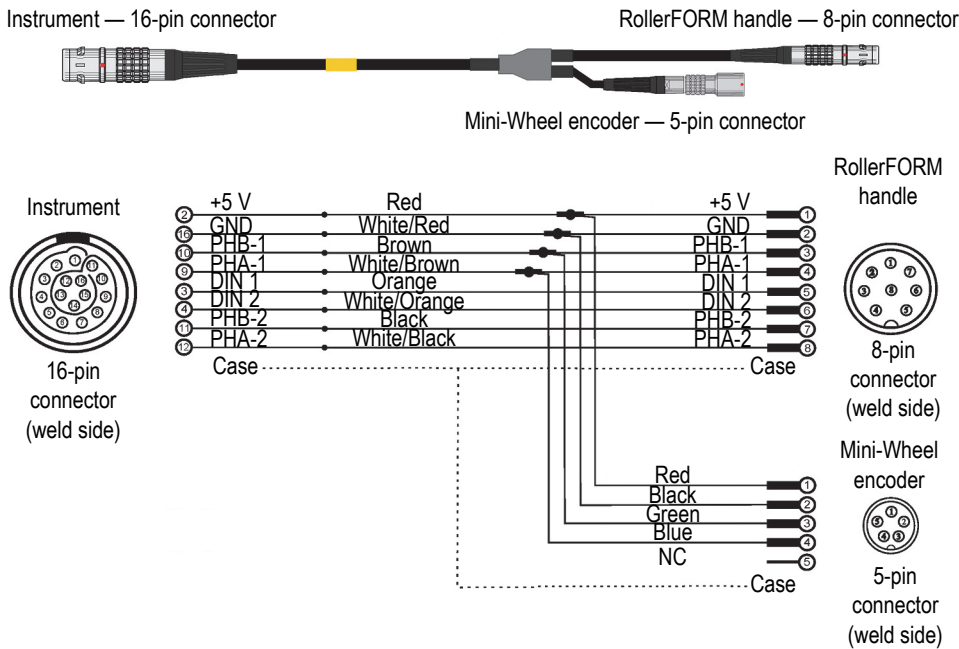


Figure 7-1 LEMO connector pinout diagram for EWIX1439 cable family

8. Spare Parts

The RollerFORM scanner comes with a kit of spare parts: P/N: ROLLERFORM-SP-BASIC (Q7750007)] and the RollerFORM XL scanner comes with a kit of spare parts: P/N: ROLLERFORMXL-SP-BASIC (Q8301900). Evident recommends acquiring a kit when spare parts are needed.

The RollerFORM scanner's acoustic wheel's flanges, handle, rear roller, and middle wheel also come in separate spare parts kits. Several parts of the scanner are also available individually upon request.

8.1 RollerFORM Spare Parts Kits

An exploded view and a list of the spare parts kits for the RollerFORM and RollerFORM XL and of the parts that are included in the different spare parts kits are provided in Figure 8-1 on page 130 and Table 4 on page 130 and in Figure 8-2 on page 133 and Table 5 on page 134.

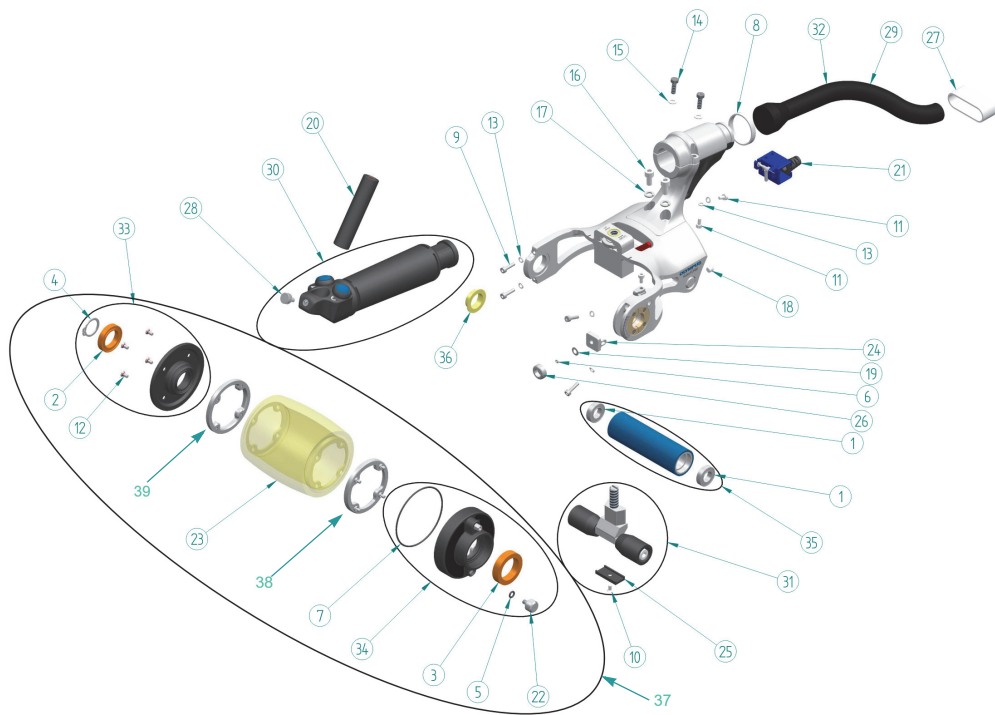


Figure 8-1 RollerFORM — Exploded view

Table 4 RollerFORM spare parts

Drawing number	Item number	Quantity (included in kit Q7750007)	Quantity on the scanner	Description
1	Q8300190	—	2	BEARING ID-10 MM, OD-19 MM, W-5 MM
2	Q8300191	—	1	SEALED BEARING ID-17 MM, OD-26 MM, W-5 MM
3	Q8300192	—	1	SEALED BEARING ID-22 MM, OD-31 MM, W-7 MM
4	Q8300193	5	1	STAINLESS EXTERNAL RETAINING RING 16 MM

Table 4 RollerFORM spare parts (*continued*)

Drawing number	Item number	Quantity (included in kit Q7750007)	Quantity on the scanner	Description
5	Q8300194	2	1	O-RING ID-4 MM, OD-7 MM, W-1.5 MM
6	Q8300223	2	1	O-RING ID-1.5 MM, OD-3.5 MM W-1 MM
7	Q8300221	2	1	O-RING ID-56 MM, OD-59 MM W-1.5 MM
8	Q8300225	10	1	CABLE TIE WRAP
9	Q8300195	4	4	M3 × 12 MM STAINLESS STEEL HEX HEAD SCREW
10	Q8300183	1	1	M3 × 6 MM STAINLESS STEEL HEX FLAT SCREW
11	U8779180	2	7	M3 × 6 MM STAINLESS STEEL HEX HEAD SCREW
12	Q8300196	10	8	M3 × 6 MM STAINLESS STEEL PHI FLAT SCREW WITH O-RING
13	U8905961	4	6	M3 STAINLESS STEEL LOCK WASHER
14	Q8300197	2	2	M4 × 12 MM STAINLESS STEEL HEX P-HEAD SCREW
15	U8902446	2	2	M4 STAINLESS STEEL SPRING WASHER
16	Q8300198	2	2	6 PENX M5 × 10 MM STAINLESS STEEL HEAD SCREW
17	U8900327	2	2	M5 STAINLESS STEEL SPRING WASHER
18	Q8300199	3	1	M5 × 5 MM STAINLESS STEEL HEX S-SET SCREW WITH NYLON TIP
19	Q8300200	1	1	4 MM METRIC BELLEVILLE STAINLESS STEEL DISC SPRING
20	Q7750006	—	1	LASER
21	Q7750003	—	1	ENCODER
22	Q8300202	1	1	WHEEL DRAINING SCREW
23	Q7750001	—	1	TIRE
24	Q8300203	1	1	SUPPORT PLATE ANGULAR SCREW

Table 4 RollerFORM spare parts (*continued*)

Drawing number	Item number	Quantity (included in kit Q7750007)	Quantity on the scanner	Description
25	Q8300204	1	1	CENTRAL SKID PLATE WHEEL PROBE
26	Q8300205	1	1	M4 PROBE NUT
27	U8906665	4	1	4 INCHES VELCRO CABLE
—	Q8300380	1	1	RETAINING RING ASSEMBLY TOOL
28	Q8300201	1	1	M4 THUMB SCREW WITH PLASTIC TIP
29	Q1500286	—	1	BLACK SPIRAL WRAP LENGTH-6.7 FEET DIA-3/4 INCHES (60BA5034)
30	Q8300189	—	1	HANDLE
31	Q8300188	—	1	ADJUSTABLE WHEELS
32	Q7750004	—	1	2.5 M CABLE
	Q7750005	—	1	5 M CABLE
	Q8300238	—	1	10 M CABLE
33	Q8300185	—	1	SMALL FLANGE ASSEMBLY
34	Q8300186	—	1	LARGE FLANGE ASSEMBLY
35	Q8300187	—	1	REAR ROLL ASSEMBLY
36	Q8300222	1	1	FLANGED BUSHING ID-15 MM, OD-17 MM, L-6 MM
37	Q8301488	—	1	WHEEL ASSEMBLY, PROBE NOT INCLUDED
38	Q8300834	—	1	FLANGE CHAMFER
39	Q8300833	—	1	FLANGE THREADED

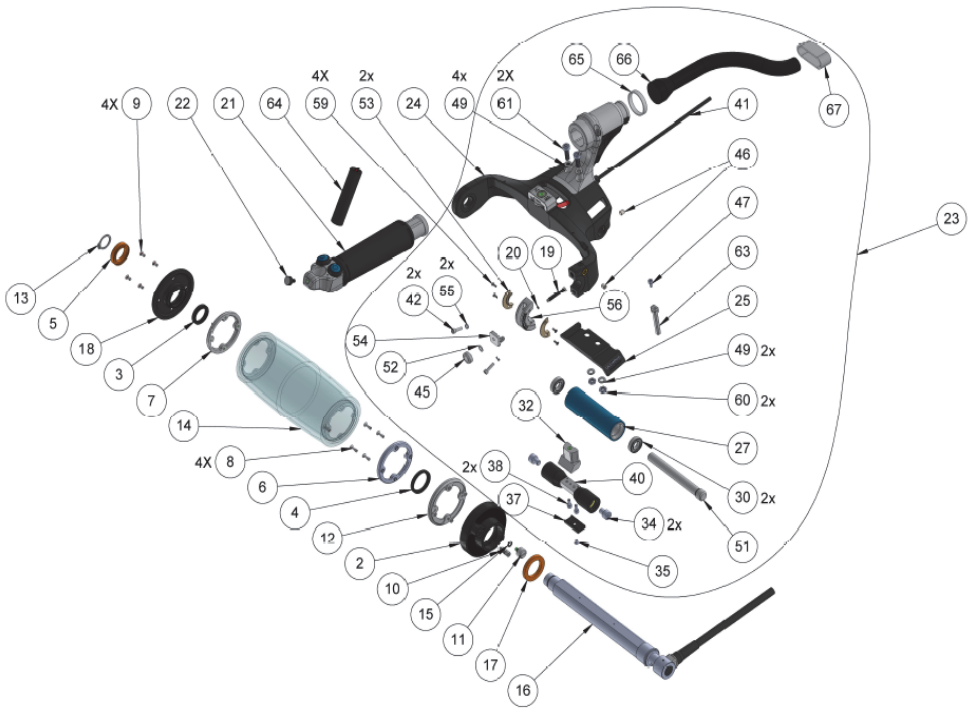


Figure 8-2 RollerFORM XL — Exploded view 1

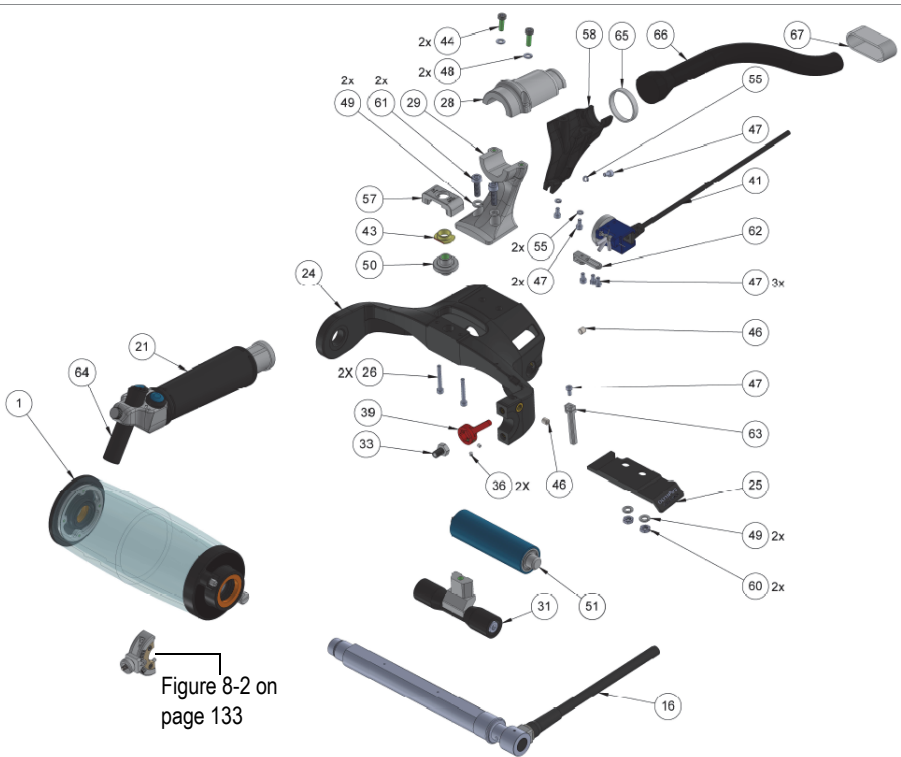


Figure 8-3 RollerFORM XL — Exploded view 2

Table 5 RollerFORM XL spare parts

Drawing number	Item number	Quantity (included in kit Q8301900)	Quantity on the scanner	Description
1	Q8301859	-	1	WHEEL ASSEMBLY
2	Q8301860	-	1	BIG FLANGE WHEEL PROBE
3	Q8301861	-	1	O-RING ID-17 MM, OD-24 MM, W-4 MM
4	Q1500996	-	1	GASKET LARGE FLANGE ASSEMBLY ID-22 MM, OD-29 MM, W-4 MM

Table 5 RollerFORM XL spare parts (continued)

Drawing number	Item number	Quantity (included in kit Q8301900)	Quantity on the scanner	Description
5	Q8300191	-	1	SEALED BEARING OD-26 MM, ID-17 MM W-5 MM
6	Q8300834	-	1	FLANGE CHAMFER WHEEL PROBE
7	Q8300833	-	1	FLANGE THREADED WHEEL PROBE
8	Q8301862	-	5	M3 × 0.5 × 10 MM CAPTIVE SCREW
9	Q8300196	10	8	M3 × 6 MM PHILIPS FLAT HEAD SCREW WITH O-RING
10	Q8300673	-	1	CHECK VALVE M3-MALE TO M3-FEMALE STAIN
11	Q8300202	1	1	WHEEL DRAINING SCREW
12	Q8301863	-	1	ANCHORING FLANGE WHEEL PROBE
13	Q8300193	5	1	16 MM EXTERNAL RETAINING RING
14	Q8301866	-	1	SOFT WHEEL
15	Q8300194	2	1	O-RING OD-7 MM, ID-4 MM, W-1.5 MM
16	Q8301899	-	1	PROBE 1L128-128 × 13-IWP2-P-5-OM
17	Q8300192	-	1	FULL CERAMIC SEALED BEARING ID-22 MM, OD-31 MM, W-7 MM
18	Q8301896	-	1	SMALL FLANGE WHEEL PROBE
19	Q8301892	-	1	THREADED PIN WHEEL PROBE ADJUSTMENT
20	Q8300223	2	1	VITON O-RING W-1 MM, ID-1.5 MM
21	Q7750002	-	1	SPARE HANDLE AND BUTTONS
22	Q8300201	-	1	M4 THUMB SCREW WITH PLASTIC TIP
23	Q8301867	-	1	FRAME ASSEMBLY
24	Q8301868	-	1	FRAME
25	Q8301869	-	1	PLATE NAME
26	Q8301870	-	2	M3 × 25 MM STAINLESS HEX SCREW
27	Q8301871	-	1	OVERMOLDED REAR WHEEL PROBE
28	Q8301872	-	1	HANDLE FIXTURE
29	Q8301873	-	1	7.5 DEG BRACKET HANDLE

Table 5 RollerFORM XL spare parts (*continued*)

Drawing number	Item number	Quantity (included in kit Q8301900)	Quantity on the scanner	Description
30	Q8300190	-	2	BEARING OD-19 MM, ID-10 MM, W-5 MM
31	Q8300188	-	1	ADJUSTABLE WHEELS
32	Q8301874	-	1	GUIDE BLOC
33	Q8301876	-	1	BOLT WITH INSERT
34	Q8301878	-	2	M6 × 8 MM STAINLESS HEX SCREW
35	Q8300183	1	1	M3 × 6 MM HEX FLAT HEAD STAINLESS STEEL SCREW
36	U8908545	-	2	M3 × 3 MM STAINLESS STEEL HEX SCREW
37	Q8300204	1	1	SKID PLATE
38	U8907070	-	2	M3 × 8 MM STAINLESS HEX HEAD SCREW
39	Q8301879	-	1	LEVER CONICAL WHEEL PROBE
40	Q8301880	-	1	SHAFT CONICAL WHEEL PROBE
41	Q8301881	-	1	ENCODER MINI LEMO
42	Q8300195	4	2	M3 × 12 MM INOX HEX HEAD SCREW
43	Q8301882	-	1	MODIFIED BUSHING
44	Q8300197	2	2	M4 × 12 MM HEXAGONAL LOW HEAD STAINLESS STEEL SCREW
45	Q8300205	1	1	M4 MODIFIED NUT
46	Q8300199	3	2	M5 × 5 MM THREAD-LOCKING STAINLESS STEEL SET SCREW
47	U8779180	3	7	M3 × 6 MM HEX SCREW
48	U8902446	2	2	M4 STAINLESS STEEL SPRING WASHER
49	U8900327	2	4	BUTTERFLY SCREW WASHER
50	Q8301883	-	1	M8 ADJUSTMENT NUT WHEEL PROBE
51	Q8301833	-	1	REAR WHEEL SHAFT FOR WHEEL PROBE

Table 5 RollerFORM XL spare parts (continued)

Drawing number	Item number	Quantity (included in kit Q8301900)	Quantity on the scanner	Description
52	Q8300200	1	1	4 MM METRIC BELLEVILLE STAINLESS STEEL DISC SPRING
53	Q8301884	-	2	FLANGED BUSHING ID-598 OD-668 L-160
54	Q8300203	1	1	PROBE ANGLE INDICATOR
55	U8905961	4	5	M3 SPRING WASHER
56	Q8301885	-	1	PROBE BRACKET-LG
57	Q8301886	-	1	NUT CAP WHEEL PROBE
58	Q8301897	-	1	HOUSING CABLE
59	U8831658	-	4	M2 × 6 MM PHILIPS FLAT HEAD STAINLESS STEEL SCREW
60	Q8301887	2	2	M5 × 0.8 × 2.7 STAINLESS STEEL THIN HEX NUT
61	Q8301888	2	2	M5 × 0.8 × 16 MM STAINLESS STEEL SOCKET HEAD HEX SCREW
62	Q8301898	-	1	SLOTTED BRACKET
63	Q8301889	1	1	ENCODER ADAPTER FRONT
64	Q8301890	-	1	POSITIONING LASER IN-LINE METAL HOUSING
65	Q8300225	10	1	IN-LINE CABLE TIE WRAP
66	Q8301891	-	1	3/4 INCH PROTECTIVE WRAP
67	U8906665	4	1	4 INCHES VELCRO CABLE

8.2 Manual Pump Spare Parts Kit

A manual pump spare parts kit (P/N: ROLLERFORM-A-PUMP [Q7790006]) is available for the RollerFORM. An exploded view and a list of the spare parts that are included in the manual pump spare parts kit are provided in Figure 8-4 on page 138 and Table 6 on page 138.

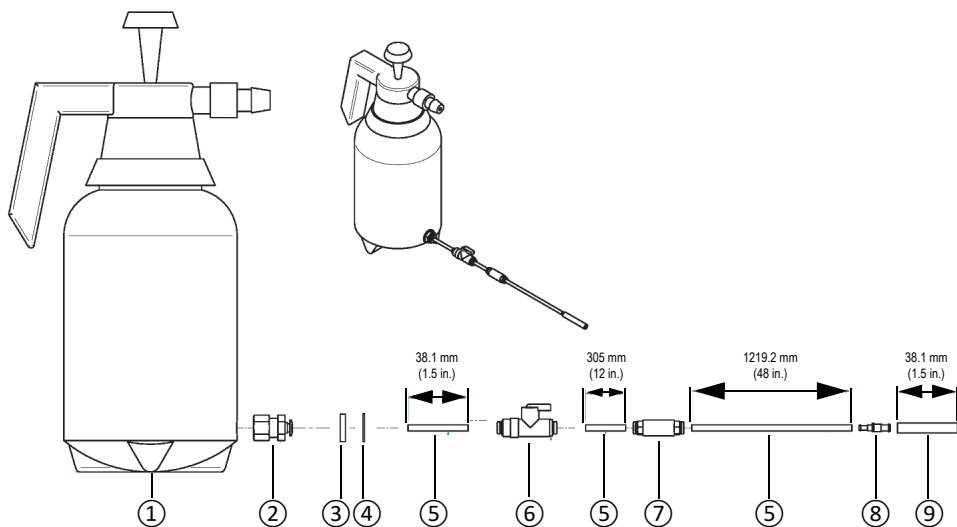


Figure 8-4 Manual pump spare parts (P/N: ROLLERFORM-A-PUMP [Q7790006])

Table 6 Manual pump spare parts

Drawing number	Item number	Quantity (included in kit ROLLERFORM -A-PUMP [Q7790006])	Description
1	Q1500133	1	BOTTLE
2	Q1500134	1	O-RING ID 7/16
3	Q1500132	1	WATER FILTER 4MM PUSH IN 5 MICRONS
4	Q8300217	1	SHIM INOX ID 12 MM, OD 18 MM, W 1 MM
5	U8831692	1	BLUE TUBE OD 4 MM
6	U8902322	1	BARBED REDUCER PU-3 @ PU-4
7	Q1500132	1	FILTER BULKHEAD QSSF-1/8-4-B
8	Q8300219	1	153483 VALVE QH-QS-4
9	U8900341	1	TRANSPARENT SILICONE TUBE ID 3 MM

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