



# ChainSCANNER

## Chain-Link Mounted Scanner

### User's Manual

DMTA069-01EN — Rev. D  
March 2017

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

Olympus Scientific Solutions Americas, 48 Woerd Avenue, Waltham, MA 02453, USA

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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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## List of Abbreviations

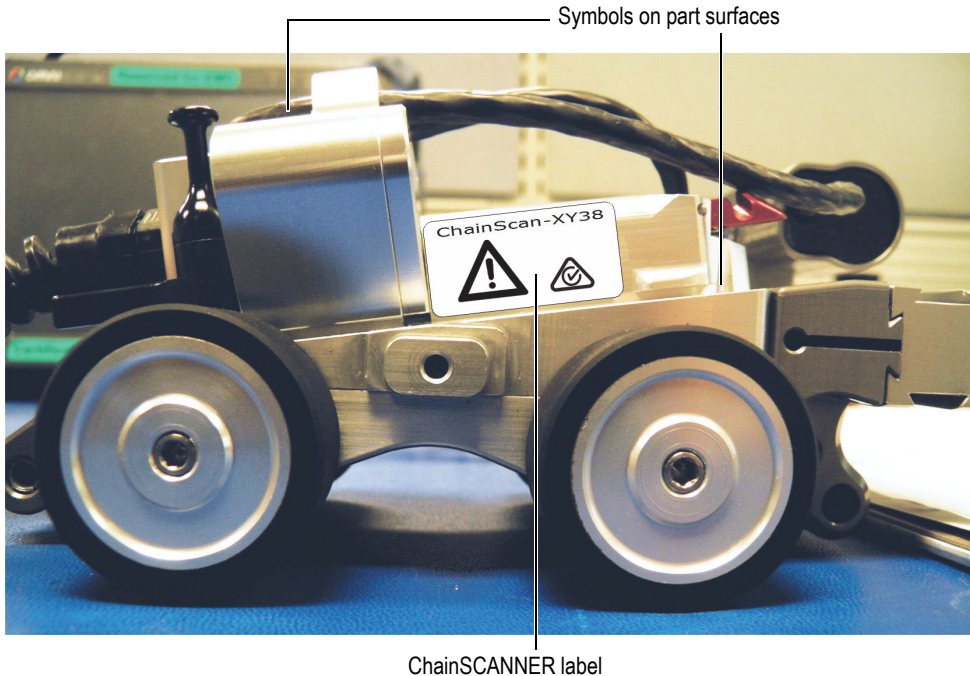
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CE	Communauté Européenne (European Community)
N/A	not applicable
OD	outside diameter
P/N	part number
TOFD	time-of-flight diffraction
WEEE	Waste Electrical and Electronic Equipment



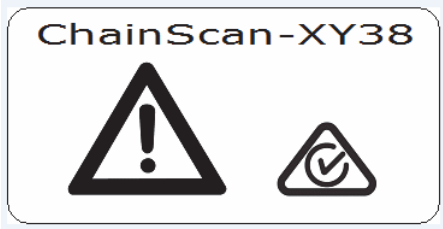





## Labels and Symbols

Marking locations on the instrument are shown in Figure i-1 on page 1. If any or all of the labels or symbols are missing or illegible, please contact Olympus. The descriptions of the symbols are provided in Table 1 on page 2.



**Figure i-1 Marking locations**

Table 1 Symbols

Rating plate label:	
Symbols on rating label and in markings on scanner	
	The CE marking is a declaration that this product conforms to all the applicable directives of the European Community. See the <i>Declaration of Conformity</i> for details. Contact your Olympus representative for more information.
	The WEEE symbol indicates that the product must not be disposed of as unsorted municipal waste, but should be collected separately.
	The warning symbol indicates that the user must read the user's manual in order to find out the nature of the potential hazards and any actions to avoid them.
	The 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.
	The direct current symbol.
S/N	The serial number.

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## Important Information — Please Read Before Use

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### Intended Use

The ChainSCANNER is designed to perform nondestructive inspections on industrial and commercial cylindrical parts. The ChainSCANNER is a manual scanner for outside pipe diameters ranging from 45 mm to 965 mm (1.75 in. to 38 in.). The ChainSCANNER allows encoding on the two axes—the x-axis encoder and the y-axis encoder.



#### **WARNING**

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

---

### Instruction Manual

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

Keep this instruction manual in a safe, accessible location.

---

**IMPORTANT**

The images in this manual may not be identical to your instrument model and connector type. However, the operating principles remain the same.

---

## Instrument Compatibility

The ChainSCANNER is compatible with the Olympus ancillary equipment listed in Table 2 on page 4.

**Table 2 Ancillary equipment**

Marketing number	Part number	Description
OMNI-A2-ADP20	U8775201	Scanner interface adaptor to connect scanners encoder cables with DE-15 connector to OmniScan MX2 with LEMO connector scanner interface.
OMNI-A-ADP27	U8780329	Scanner interface adaptor to connect scanners encoder cables with LEMO connector to OmniScan MX with DE-15 connector scanner interface.
C1-LF-BXM-0.3M	U8769010	0.3 m long adaptor LEMO female to Bendix male linking LEMO encoder cable to TomoScan FOCUS LT.
C1-DE15F-BXM-0.30M	U8767107	0.3 m long adaptor DE-15 female to Bendix male linking DE-15 encoder cable to FOCUS LT.
OmniScan PA or FOCUS LT	—	Many OmniScan and FOCUS LT instrument models can be used. <sup>a</sup>

a. Encoder cable adaptor may be required (see Table 8 on page 68).



**CAUTION**

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

---

## Presence of Visual Interferences or Phantom Spots

**IMPORTANT**

In a situation of physical proximity of powerful electromagnetic radiators, visual interferences or phantom spots may be present. These interferences are temporary and their persistence is not permanent in comparison with physical features of the inspected part.

---

## Safety Symbols

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



General warning symbol

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



High voltage warning symbol

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

## Safety Signal Words

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



### **DANGER**

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



### **WARNING**

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



### **CAUTION**

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

## Note Signal Words

The following symbols could appear in the documentation of the instrument:

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

## Warnings

**WARNING**

### General Warnings

- Carefully read the instructions contained in this instruction manual prior to turning on the instrument.
- Keep this instruction manual in a safe place for further reference.
- Follow the installation and operation procedures.
- It is imperative to respect the safety warnings on the instrument and in this instruction manual.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment could be impaired.
- Do not install substitute parts or perform any unauthorized modification to the instrument.
- Service instructions, when applicable, are for trained service personnel. To avoid the risk of electric shock, do not perform any work on the instrument unless

qualified to do so. For any problem or question regarding this instrument, contact Olympus or an authorized Olympus representative.

- Do not touch the connectors directly by hand. Otherwise, a malfunction or electric shock may result.
- Do not allow metallic or foreign objects to enter the device through connectors or any other openings. Otherwise, a malfunction or electric shock may result.

## CE (European Community)



This device complies with the requirements of both directive 2014/30/EU concerning electromagnetic compatibility and directive 2014/35/EU concerning low voltage. The CE marking indicates compliance with the above directives.

## WEEE Directive



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

## 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 ChainSCANNER has been tested and found to comply with the limits for an industrial device in accordance with the specifications of the EMC directive.

## Warranty Information

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

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

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

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

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

## Technical Support

Olympus is firmly committed to providing the highest level of customer service and product support. If you experience any difficulties when using our product, or if it fails to operate as described in the documentation, first consult the user's manual, and then, if you are still in need of assistance, contact our After-Sales Service. To locate the nearest service center, visit the Service Centers page at: <http://www.olympus-ims.com>.



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# Introduction

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This manual provides instructions for assembling, installing, and operating the ChainSCANNER. The ChainSCANNER is a manual pipe inspection scanner for outside pipe diameters ranging from 45 mm to 965 mm (1.75 in. to 38 in.). The ChainSCANNER allows encoding the position on the two axes.

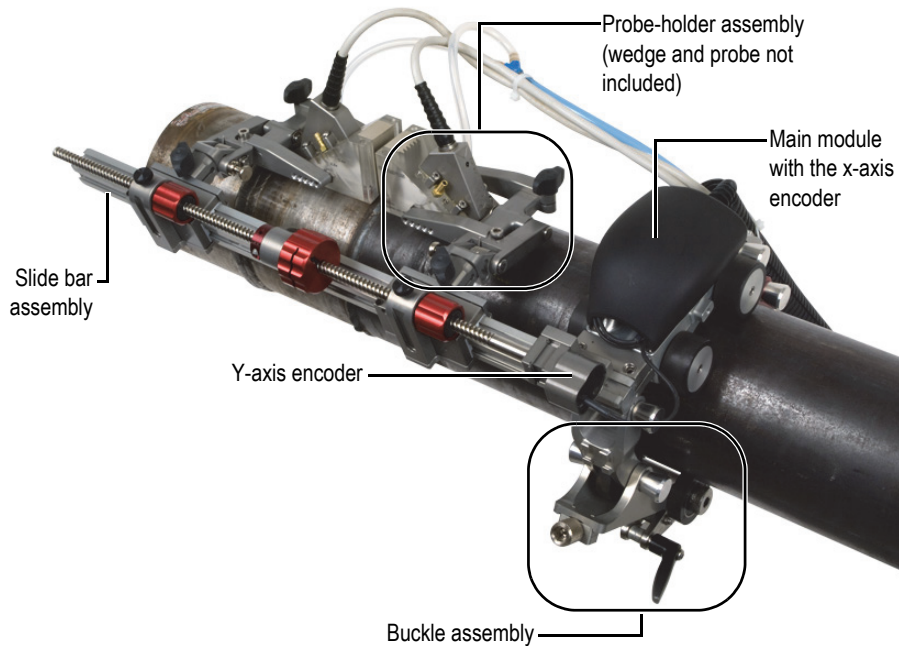
This manual is organized to allow a progressive understanding of the scanner's different functions. Each section, however, is complete in itself. This manual is therefore a useful reference.





# 1. Overview

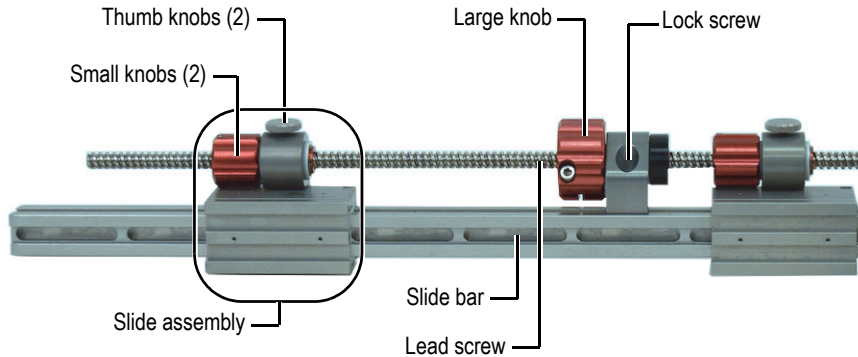
This chapter provides an overview of the ChainSCANNER components in the standard configuration. The scanner is shown in Figure 1-1 on page 13. A description of each component follows.



**Figure 1-1 The ChainSCANNER main components**

## 1.1 Slide Bar Assembly

The slide bar holds most of the components of the ChainSCANNER, and permits easy and precise positioning of the probe-holder assemblies (see Figure 1-2 on page 14).

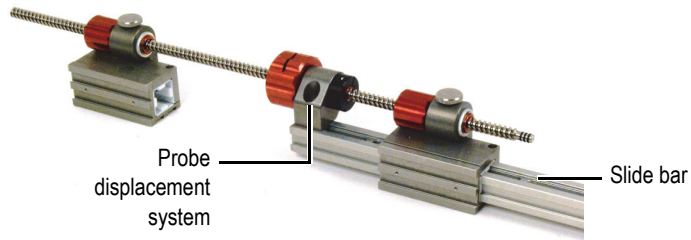


**Figure 1-2 The slide bar assembly**

The slide bar assembly can hold a pair of probe holders. These can be either conventional ultrasonic transducers or phased array probes.

## 1.2 Probe Displacement System

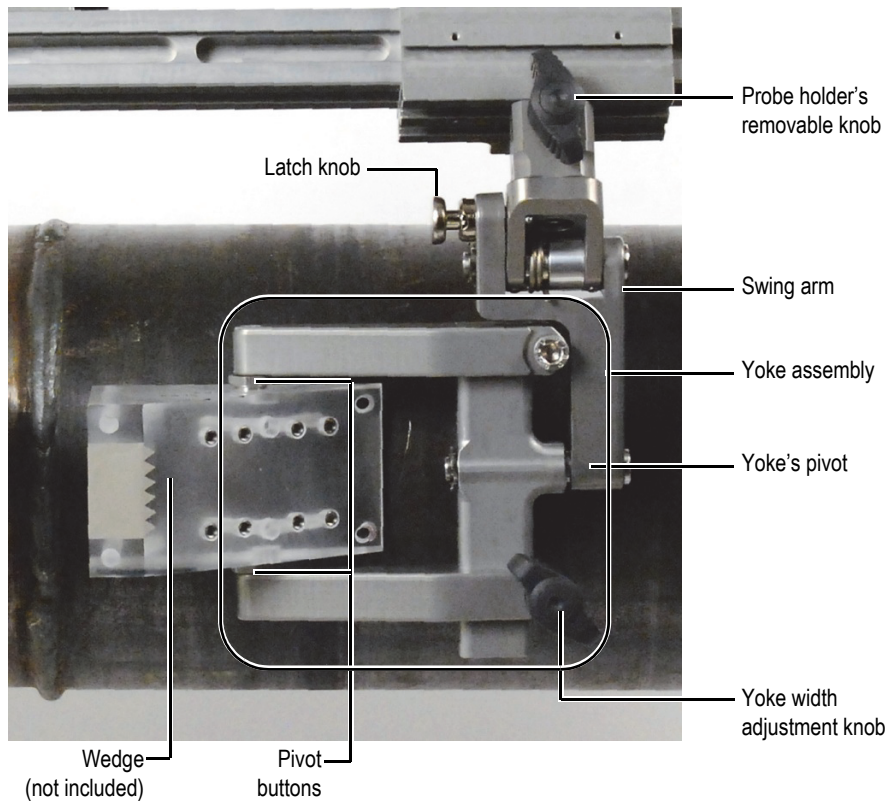
The probe displacement system offers a convenient way to adjust the distance between the probes and to center the pair of probes over the surface to be inspected by using a convenient lead screw system. However, it is not required, and the probe holders can be attached directly to the dovetail groove of the slide bar (see Figure 1-3 on page 15).



**Figure 1-3 The probe displacement system**

### **1.3 Probe-Holder Assembly**

The probe-holder assembly is designed to hold a wedge-probe assembly and to ensure contact between the wedge and the surface (see Figure 1-4 on page 16).



**Figure 1-4 The probe-holder assembly parts**

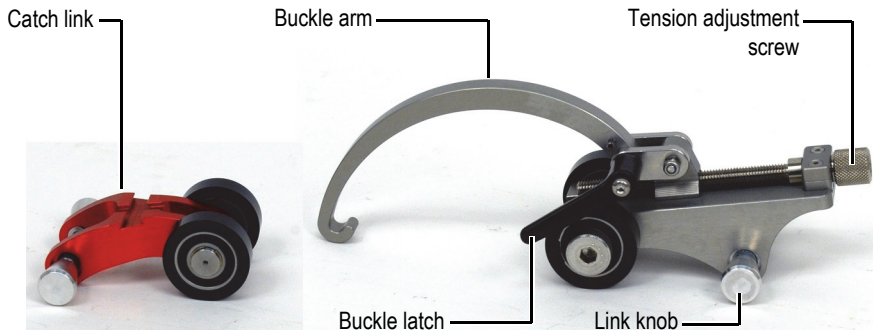
The pair of pivot buttons must be changed to match the size of the wedge pivot holes. Phased array wedges require 8 mm (0.312 in.) pivot buttons. Pulse-echo and TOFD wedges require 5 mm (0.204 in.) pivot buttons.

The length of the yoke arms can also be changed to suit the length of the wedge (see “To change the yoke arms” on page 33).

## **1.4 Buckle Assembly**

The purpose of the buckle assembly is to attach the ChainSCANNER and to adjust the tension around the pipe (see Figure 1-5 on page 17). For extra-small

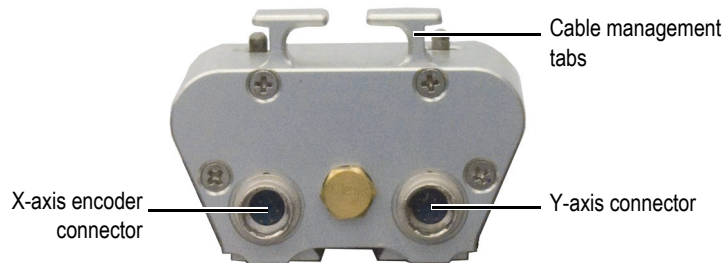
pipe outside diameters (OD), the catch link can be removed and the buckle arm hooked directly onto the rear attachment of the main module (see Figure 3-1 on page 50).



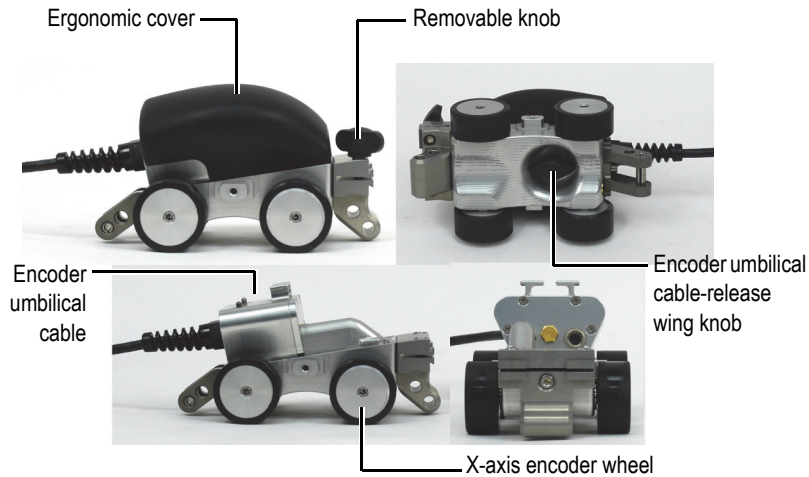
**Figure 1-5 The buckle assembly parts**

## 1.5 Main Module and Encoder Umbilical Cable

The main module of the ChainSCANNER offers an ergonomic grip to manipulate the scanner (see Figure 1-7 on page 18). The main module also holds an internal x-axis encoder and its connector. The umbilical encoder cable connects to the x-axis connector and provides the y-axis encoder connector (see Figure 1-6 on page 17).



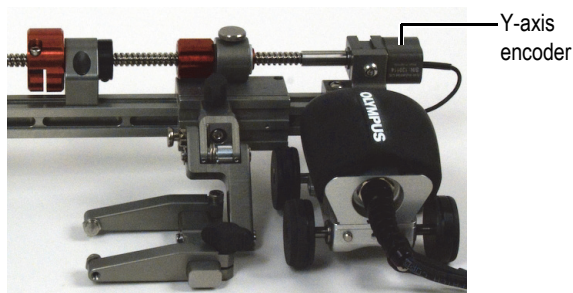
**Figure 1-6 The encoder umbilical cable**



**Figure 1-7 The main module components**

## 1.6 Y-Axis Encoder

The y-axis encoder measures the probe holders displacement on the lateral axis (see Figure 1-8 on page 18).



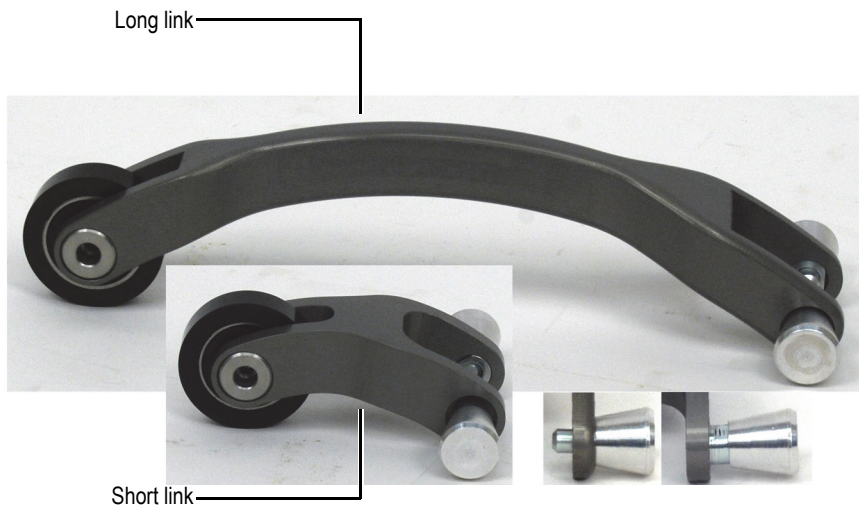
**Figure 1-8 The y-axis encoder location**

The y-axis encoder is waterproof, like the x-axis encoder.

## 1.7 Short and Long Links

Links can be added or removed to alter the chain length. This is accomplished by simply pulling out on the link knobs to retract the pins, which hold the links together. To facilitate the reassembly, the knobs can be latched open by pulling them out and rotating them slightly (see Figure 1-9 on page 19).

There are two link lengths for the ChainSCANNER — short links (P/N: CHAINSCAN-A-SLINK [U8775127]) and long links (P/N: CHAINSCAN-A-LGLINK [U8750042]). Consult Table 10 on page 72 or Table 11 on page 74 to find the adequate combination of links according to the outside diameter of the surface to be inspected.



**Figure 1-9 The short and long links**

### NOTE

The ChainSCANNER is not recommended for pipes larger than 965 mm (38 in.) OD, because on pipes above this diameter, the scanner tends to make ellipsoidal rotations, which makes it difficult to align the probes with the weld.





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## 2. ChainSCANNER Setup and Connection

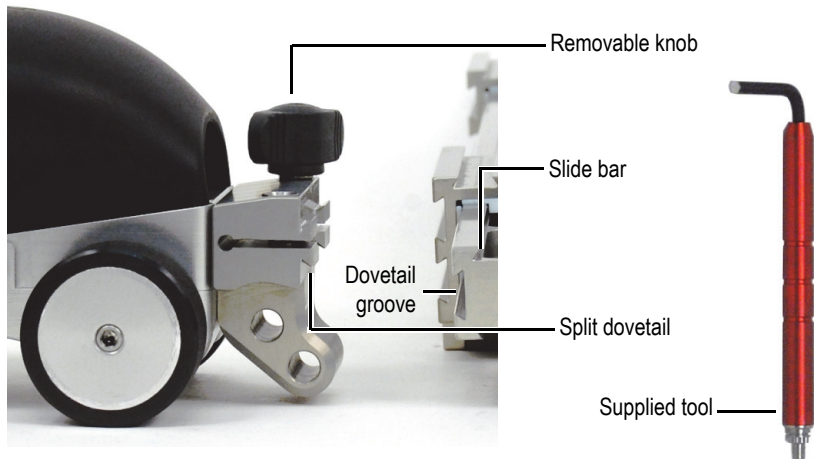
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The ChainSCANNER is designed so that part changes and adjustments can be easily carried out. This chapter provides procedures for the main module, chain links, probe holders, y-axis, umbilical cable, and optional parts kits.

### 2.1 Main Module Setup and Connection

This section gives the procedures used to configure the main module in order to use it as a component of the ChainSCANNER. To use the main module in the mouse scanner configuration, the optional mouse conversion kit is required, see “Optional Mouse Conversion Kit” on page 42.

## To couple the main module and the slide bar



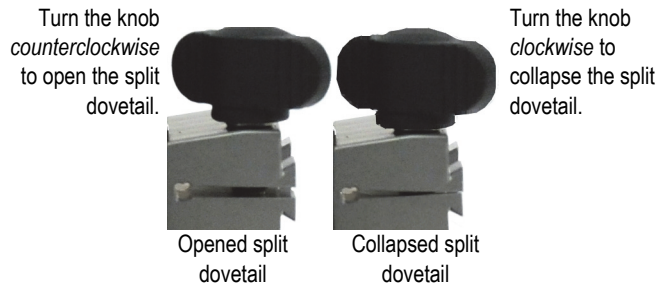
**Figure 2-1 Coupling the main module with the slide bar**

1. If there is enough room to manipulate the removable knob, use it to couple the main module to the slide bar. When there is not enough room, remove the knob (simply pull it out), and use the supplied tool (insert into the screws) (see Figure 2-1 on page 22).
2. Turn the removable knob, or the tool, clockwise to collapse the split dovetail. Do the same with the other screw.
3. Insert the collapsed split dovetail into the dovetail groove.
4. Turn the removable knob, or the tool, counterclockwise to secure the split dovetail into the dovetail groove.
5. Ensure that the two screws are secured.

**TIP**

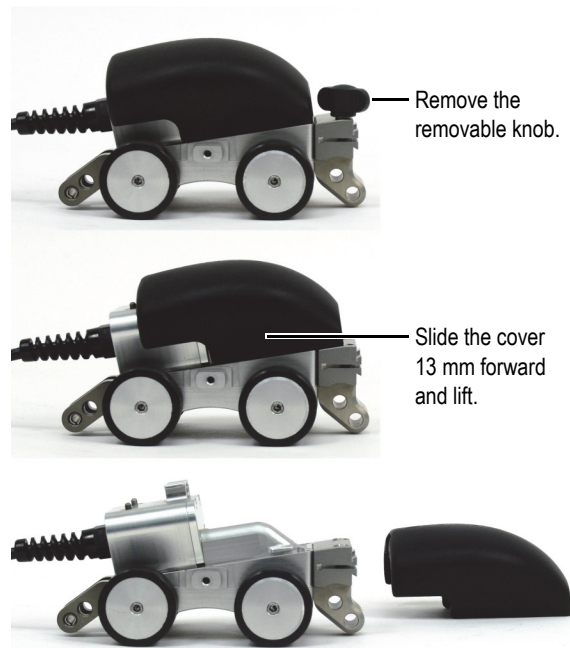
Using the split dovetail assembling mode is somewhat counterintuitive, since you have to turn *clockwise* to loosen the mounting (in fact, collapsing the split dovetail), and *counterclockwise* to secure the mount (in fact, opening the split dovetail).

Once the split dovetail is collapsed, it can be inserted anywhere along the dovetail groove (see Figure 2-2 on page 23).



**Figure 2-2 Collapsing and opening a split dovetail**

## To remove the ergonomic cover

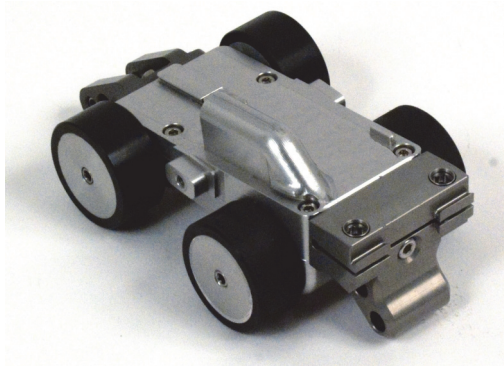


**Figure 2-3 Removing the ergonomic cover**

1. Pull out the removable knob if required (see Figure 2-3 on page 24).
2. Hold the metallic body of the main module.
3. Slide the cover forward approximately 13 mm (0.5 in.) and lift it straight up.
4. Reverse the operation to reinstall the ergonomic cover.

## To install or release the encoder umbilical cable

1. Remove the ergonomic cover (see “To remove the ergonomic cover” on page 24).
2. Locate the encoder umbilical cable-release wing knob under the main module (see Figure 1-7 on page 18).
3. Loosen the wing knob by turning it counterclockwise.
4. Remove the encoder umbilical cable (see Figure 2-4 on page 25).

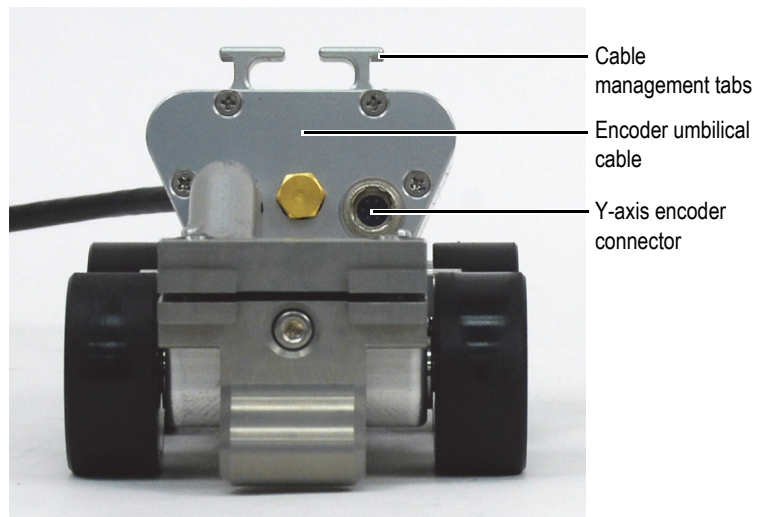


**Figure 2-4 The main module without the encoder umbilical cable**

5. Reverse the operation to install the encoder umbilical cable.

**To connect the y-axis encoder cable**

1. Remove the ergonomic cover (see “To remove the ergonomic cover” on page 24).



**Figure 2-5 The encoder connector and the cable management tabs.**

2. Connect the y-axis encoder cable to the encoder connector (see Figure 2-5 on page 25).
3. Use the cable management tabs and the ergonomic cover to conceal any excessive cable.

**CAUTION**

When reinstalling the ergonomic cover, take care to not pinch the encoder cables.

---

## 2.2 ChainSCANNER Setup

Refer to Table 10 on page 72 (inches) or Table 11 on page 74 (centimeters) to determine the correct combination of short and long links for a given pipe outside diameter, or for a given pipe circumference.

### To add or remove a link on the ChainSCANNER

1. Measure the outside diameter or the circumference of the pipe to be inspected.
2. Use Table 10 on page 72 (inches) or Table 11 on page 74 (centimeters) to find the correct link combination.

---

**IMPORTANT**

On bigger pipes, long links are required at the front and the rear of the main module. Failure to do so will result in insufficient pressure between the wheel and the pipe, which will generate encoder count lost and reduce stability.

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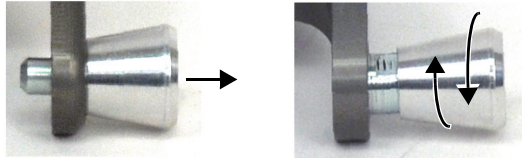
**NOTE**

Handles are supplied with the ChainSCANNER. Olympus recommends installing them at intervals along the chain in order to help rotate the scanner around the pipe. A short link with dovetails is required to mount a handle.

---

3. Determine the position of the buckle assembly along the pipe circumference according to the following:
-

- When the catch link is used, the buckle-catch link assembly can be placed at any convenient location along the circumference of the pipe.
  - When the catch link is not used (on a pipe with a curvature smaller radius, for example), hook the buckle directly to the rear attachment of the main module.
4. Using the link knobs, assemble the selected links together (see Figure 2-6 on page 27).



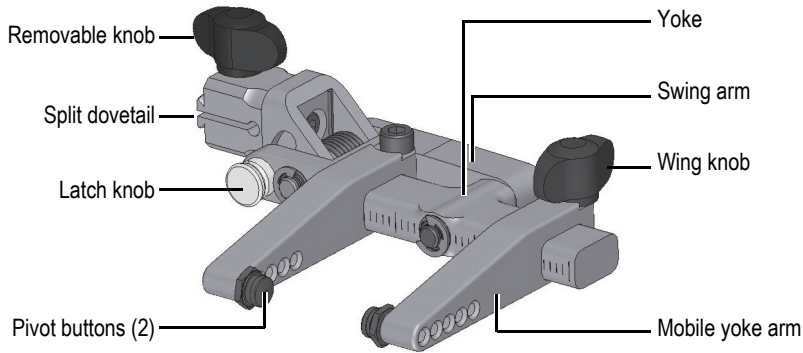
**Figure 2-6 Pull out and rotate slightly to latch the link knobs to the open position.**

5. Attach this link assembly to the front and rear attachments of the main module.

## 2.3 Probe Holders Adjustment and Maintenance

The ChainSCANNER can hold a pair of conventional UT probes or a pair of phased array probes. The probes are mounted on probe holders (see Figure 2-7 on page 28) that need the following types of adjustments:

- Latching or unlatching the probe holder (see page 28).
- Installing the wedge-probe assembly onto the probe holder (see page 29).
- Installing the probe holder onto the ChainSCANNER (see page 29).
- Installing or removing the y-axis slide assembly (see page 34).
- Using the y-axis adjustment (see page 32).
- Adjusting the distance between the probes (see page 31).



**Figure 2-7 Probe-holder assembly parts**

#### Removable knob

The removable knob mounted on the swing arm allows for a precise positioning of the probe holder along the slide assembly or the slide bar (see Figure 2-7 on page 28).

#### Swing arm

The swing arm holds the yoke and ensures a constant contact pressure between the probe-wedge assembly and the surface being inspected. A latch knob allows for releasing the spring pressure to ease the installation of a wedge-probe assembly (see Figure 2-7 on page 28).

#### Yoke

The yoke is the U-shaped part holding the wedge-probe assembly. Assembled to the swing arm with bearings, the yoke rotates to maintain the wedge parallel to the surface being inspected. The pivot buttons also allow the wedge to swivel (see Figure 2-7 on page 28).

### To latch the swing arm

- ◆ Lift the swing arm upward until the latch knob engages itself with a click. See Figure 2-7 on page 28 for the location of the latch knob.

### To unlatch the swing arm

1. Lift and hold the swing arm slightly to remove the spring force on the latch knob.



2. Pull out the latch knob and slowly release the swing arm. See Figure 2-7 on page 28 for the location of the latch knob.

---

**IMPORTANT**

For proper contact between the wedge and the part being inspected when performing an inspection, always make sure the swing arm is unlatched.

---

### To install the wedge-probe assembly to the probe holder

1. Ensure the yoke arms have the proper pivot buttons installed to fit the pivot holes in the wedge.
2. Loosen the wing knob one turn.
3. Slide the mobile yoke arm to accept the wedge-probe assembly so that the pivot buttons engage in the wedge holes.
4. Tighten the wing knob.

### To install the probe holder onto the ChainSCANNER

1. Collapse the split dovetail by rotating the removable knob clockwise.
2. Insert the probe holder assembly directly into the scanner's dovetail groove.

---

**TIP**

The probe holders can be installed either into the slide assembly upper or lower dovetail groove, or directly into the slide bar when the slide assembly is not needed.

---

3. Clamp the probe holder in place by rotating the removable knob counterclockwise (see Figure 2-9 on page 30).

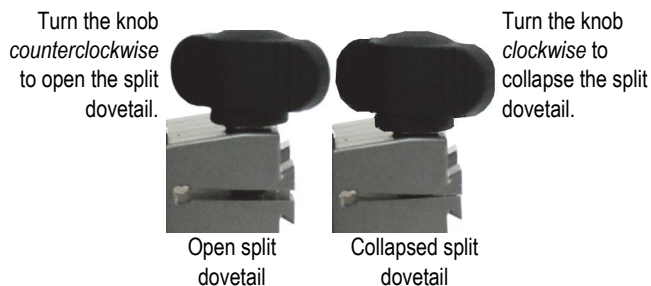
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**TIP**

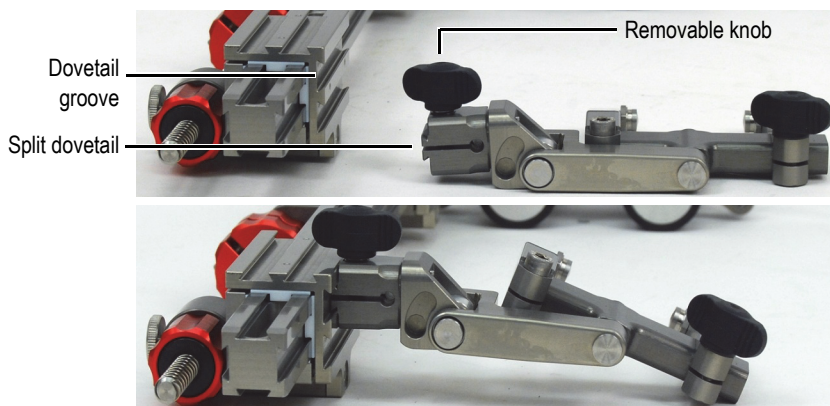
Using the split dovetail assembling mode is somewhat counterintuitive, since you have to turn *clockwise* to loosen the mount—in fact, collapsing the split dovetail—and *counterclockwise* to secure the mount—in fact, opening the split dovetail (see Figure 2-8 on page 30).

Once the split dovetail is collapsed, it can be inserted anywhere along the dovetail groove.

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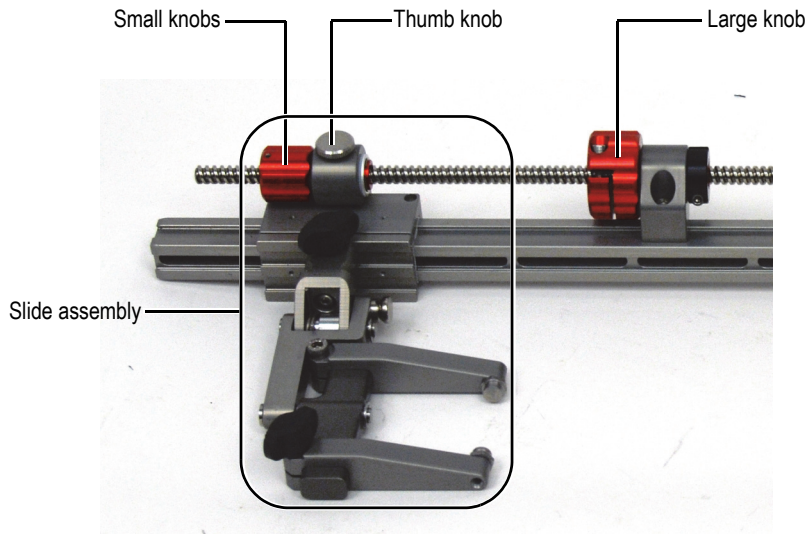


**Figure 2-8 Collapsing and opening a split dovetail**



**Figure 2-9 Installing a probe holder**

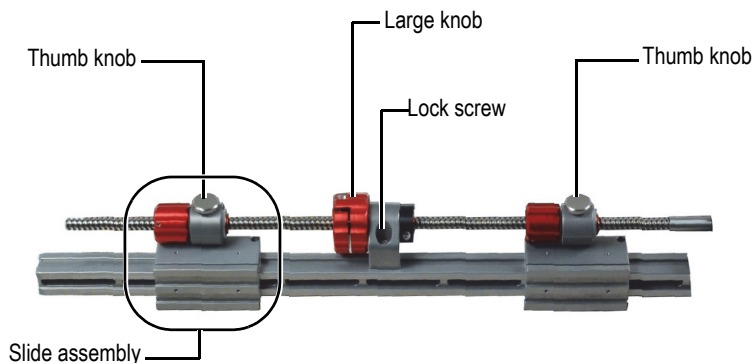
## To adjust the distance between the probes



**Figure 2-10 Adjusting the distance between the probes**

1. Loosen the thumb knob on the slide assembly that you wish to adjust (see Figure 2-10 on page 31).
2. Turn the small knob on the slide assembly while holding the large knob to prevent it from rotating.
3. Tighten the thumb knob.

## To move the probe holders together



**Figure 2-11 The slide bar assembly**

1. Ensure that the thumb-knobs, the lock screw, and the large knob are tight.
2. Attach the probe holders to the slide assembly (see “To install the probe holder onto the ChainSCANNER” on page 29).
3. Rotate the large knob to adjust the position of the pair of probes (see Figure 2-11 on page 32).

---

<b>TIP</b>
------------

In summary, the large red knob is used to move the two slide assemblies together, while each small red knob moves its respective slide assembly. Once the distance between the probes is set, you can then use the large red knob to maintain the probes aligned with the weld during the displacement of the scanner. This is especially useful on larger pipe diameters.

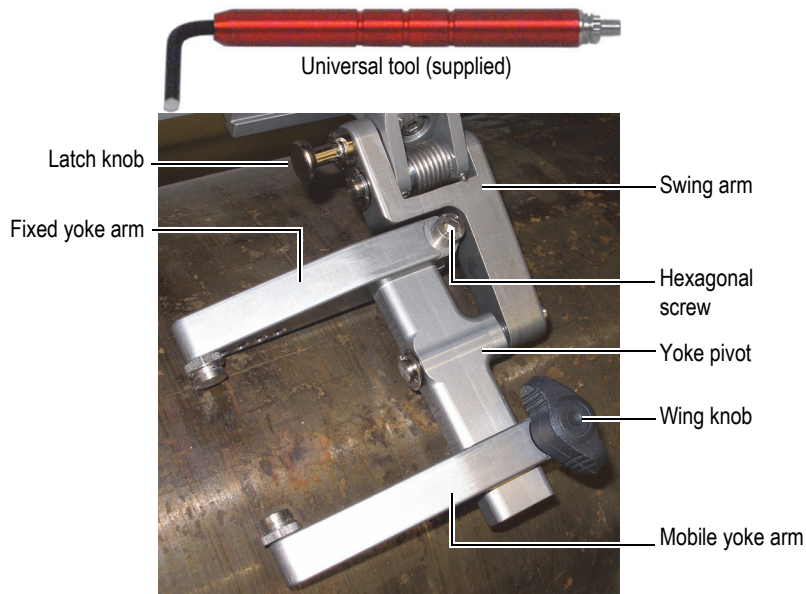
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## 2.4 Changing the Yoke Arm to Fit the Length of a Wedge

When necessary, the yoke arms can be changed to fit the length of different wedge-probe assemblies.

## To change the yoke arms

Refer to Figure 2-12 on page 33 for the identification of the parts.



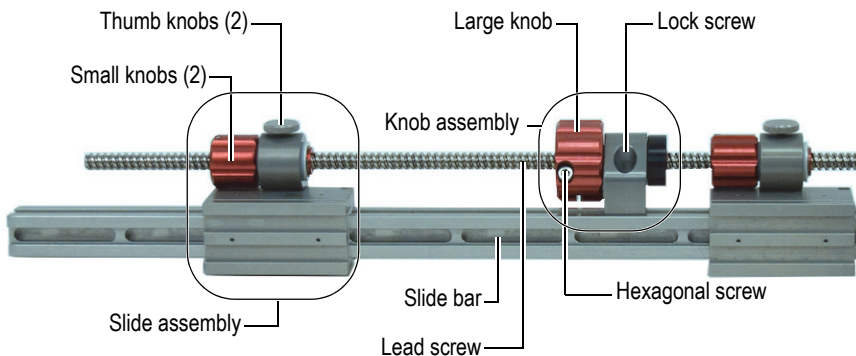
**Figure 2-12 Changing the yoke arms**

1. Use the latch knob to release the spring tension on the swing arm (see “To unlatch the swing arm” on page 28).
2. Use the supplied universal tool to loosen the hexagonal screw (see Figure 2-12 on page 33).
3. Slide out the fixed yoke arm.
4. Remove the wedge-probe assembly.
5. Install the new fixed yoke arm and tighten the hexagonal screw.
6. Loosen the wing knob to free the mobile yoke arm
7. Remove the mobile yoke arm.
8. Install the wedge-probe assembly (see “To install the wedge-probe assembly to the probe holder” on page 29).
9. Install the new mobile yoke arm and tighten the wing knob.
10. Ensure that the wedge-probe assembly is centered with the yoke pivot.

## 2.5 Slide Bar, Lead Screw, and Y-Axis Adjustment

### To replace the slide bar and the lead screw

1. If an encoder assembly is present, remove it (see “To remove the y-axis encoder” on page 35).
2. Loosen the hexagonal screw on the large knob two turns.
3. Loosen the lock screw.

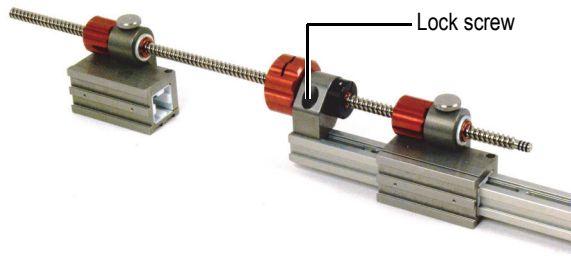


**Figure 2-13 Replacing the slide bar and the lead screw**

4. Ensure that the thumb knobs are tight and rotate the lead screw to remove it from the assembly.
5. Remove the knob assembly and the slide assemblies from the slide bar.
6. Slide the knob assembly and the slide assemblies onto the new slide bar.
7. Position the knob assembly where desired and tighten the lock screw.
8. Thread the new lead screw into the small knob(s) to the desired position and tighten the screw on the large knob.
9. If required, reinstall the encoder assembly (see Figure 2-13 on page 34).

### To removing the y-axis assembly

1. Loosen the lock screw with a hexagonal key (see Figure 2-14 on page 35).



**Figure 2-14 Installing or removing the y-axis slide assembly**

2. Remove the y-axis slide assembly from the slide bar by sliding it out.

#### **To install the y-axis assembly**

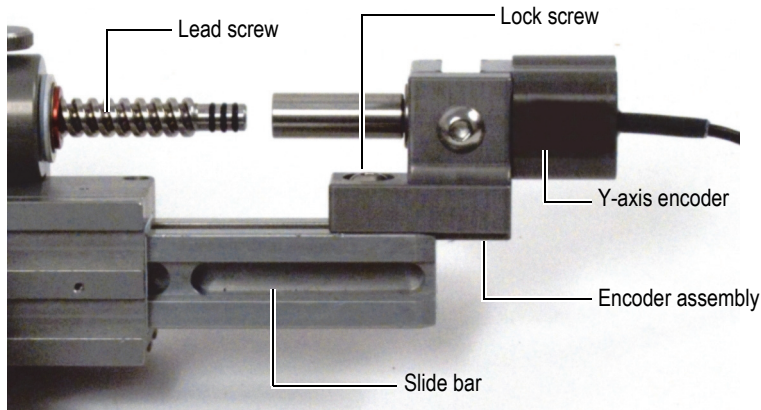
1. Install the y-axis slide assembly on the slide bar by sliding it in.
2. Tighten the lock screw with a hexagonal key (see Figure 2-14 on page 35).

## **2.6 Y-Axis Encoder Removal and Installation**

The ChainSCANNER comes equipped with a y-axis encoder. If required, the y-axis encoder can be removed or installed.

#### **To remove the y-axis encoder**

1. To remove, loosen the lock screw.
2. Slide the y-axis encoder assembly out of the slide bar and off the lead screw. Expect some resistance because the coupling between the lead screw and the encoder is strong (see Figure 2-15 on page 36).



**Figure 2-15 Installing or removing the y-axis encoder**

### **To install the y-axis encoder**

1. Slide the y-axis encoder assembly in the slide bar and onto the lead screw. Expect some resistance because the coupling between the lead screw and the encoder is strong (see Figure 2-15 on page 36).
2. Tighten the lock screw.

## **2.7 Umbilical Sheath Strain Relief Assembly**

The umbilical cable must be attached to the ChainSCANNER.

### **To assemble the umbilical cable sheath**

1. Slide the annular part of the strain relief over the cable sheath, as shown in Figure 2-16 on page 37.





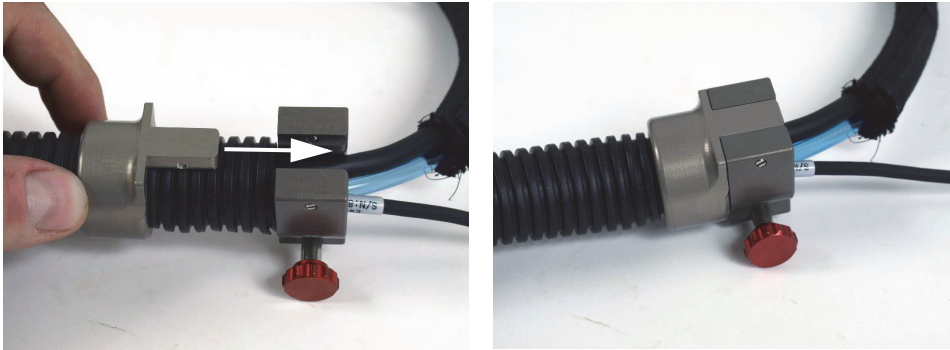
**Figure 2-16 Sliding annular part of the relief connector over the cable sheath**

2. Split the cable sheath over a short portion (see Figure 2-17 on page 37).
3. Insert the threaded portion of the strain relief into the internal section of the cable sheath (see Figure 2-17 on page 37).



**Figure 2-17 Inserting the threaded portion of the strain relief into the cable sheath**

4. Put the cable sheath sections back together.
5. Align and assemble the threaded and annular parts of the strain relief (see Figure 2-18 on page 38).



**Figure 2-18 Assembling the strain relief connector**

6. Connect the LEMO connector of the umbilical cable to the main module of the ChainSCANNER (see Figure 2-19 on page 38).



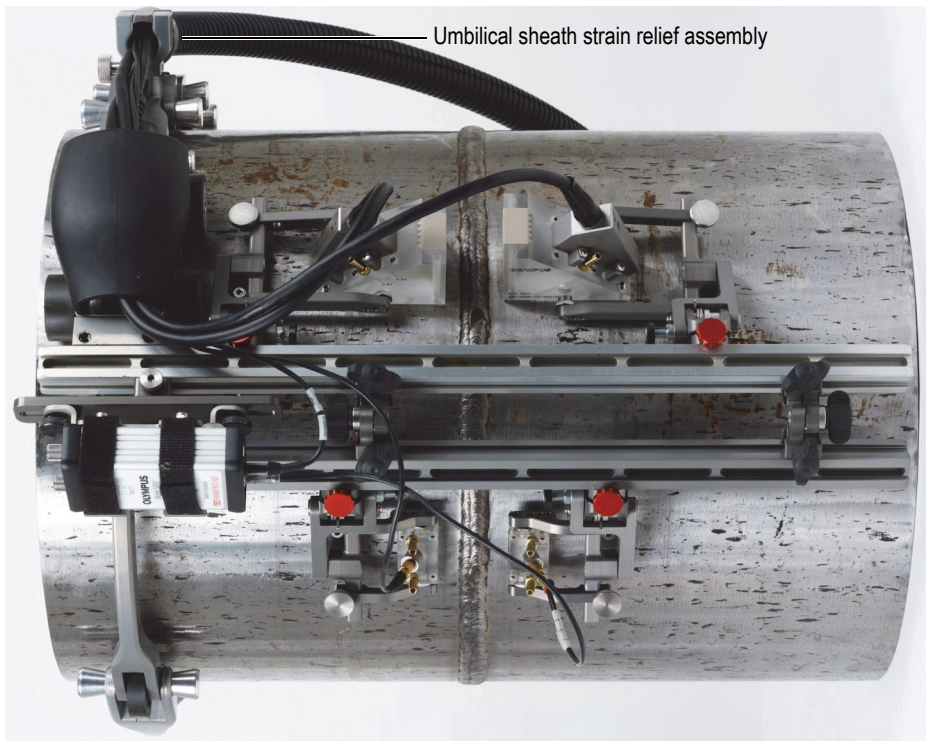
**Figure 2-19 Connecting the umbilical cable to the ChainSCANNER's main module**

7. Attach the umbilical cable to the ChainSCANNER using the thumb screw (see Figure 2-20 on page 39).



**Figure 2-20 Attaching the umbilical cable to the ChainSCANNER**

The procedure is now complete (see Figure 2-21 on page 40).



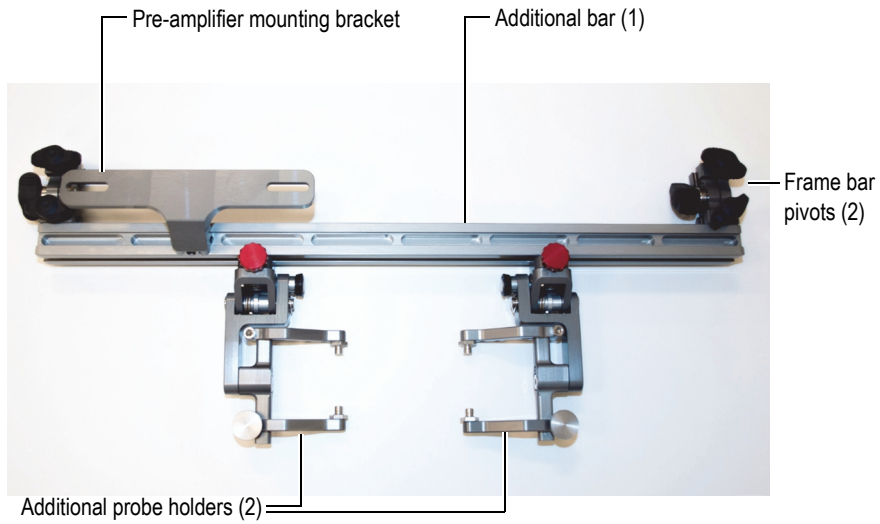
**Figure 2-21 The ChainSCANNER with four-probe kit installed**

## 2.8 Optional Four-Probe Kit

The optional four-probe kit (P/N: CHAINSCAN-A-4PROBE [U8775128]) allows the use of four probes on large pipes. The four-probe assembly adapts to the pipe circumference through the pivots of the additional frame bar pivots (see Figure 2-22 on page 41).

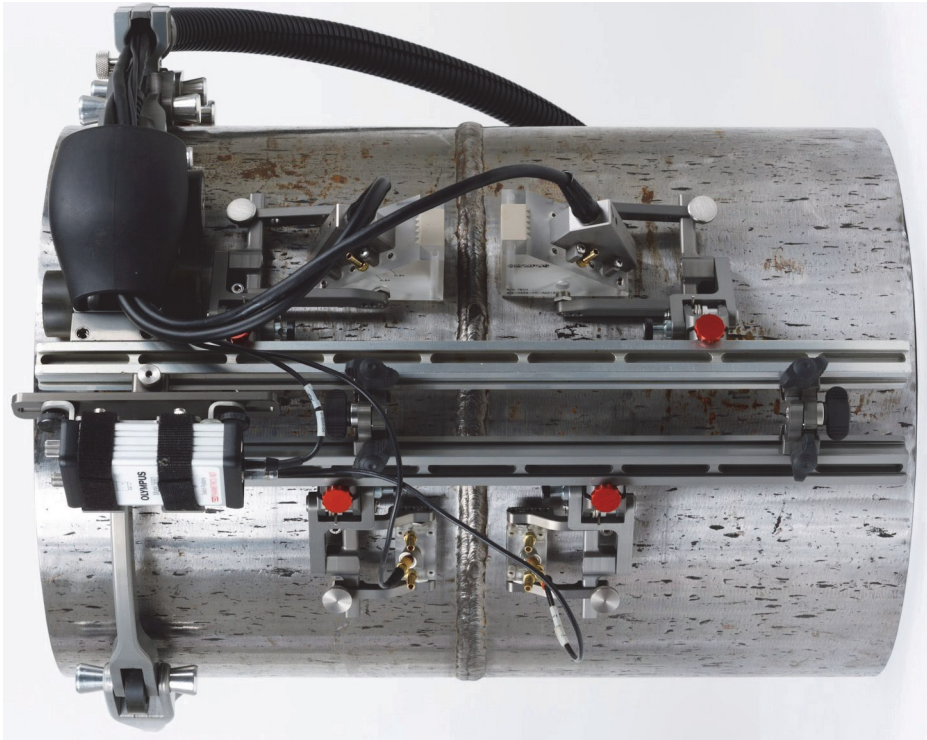
The optional four-probe kit includes the following:

- An additional bar
- A pair of frame bar pivots to adapt to pipe curvature
- A pair of probe holders for TOFD or pulse/echo probes
- A bracket for pre-amplifier mounting



**Figure 2-22 The optional four-probe kit**

For an example of the ChainSCANNER, four-probe configuration, see Figure 2-23 on page 42).



**Figure 2-23 The ChainSCANNER, four-probe configuration**

## **2.9 Optional Mouse Conversion Kit**

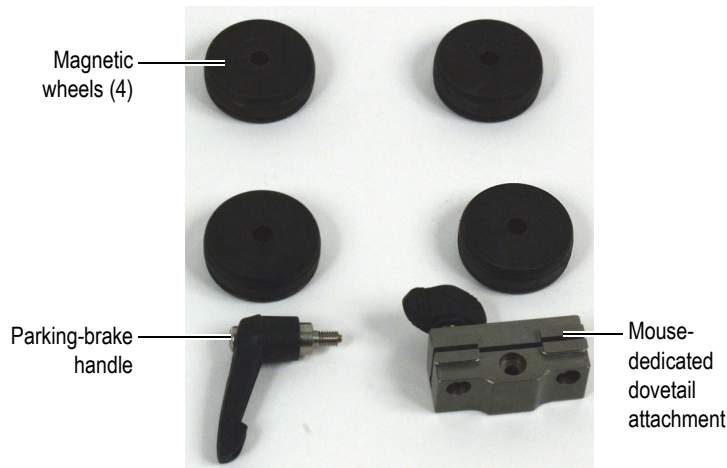
The main module of the ChainSCANNER can be used as a mouse scanner, that is to say, without the chain components. This option allows the scanner to be held against a ferromagnetic surface by a set of magnetic wheels instead of by the chain component. This configuration is used for pipe inspections of 965 mm (38 in.) OD up to flat surface as well as longitudinal weld inspections of large diameter pipes.

The mouse conversion kit (P/N: CHAINSCAN-A-MOUSE [U8750037]) includes the following (see Figure 2-24 on page 43):

- Four magnetic wheels
- A parking-brake handle



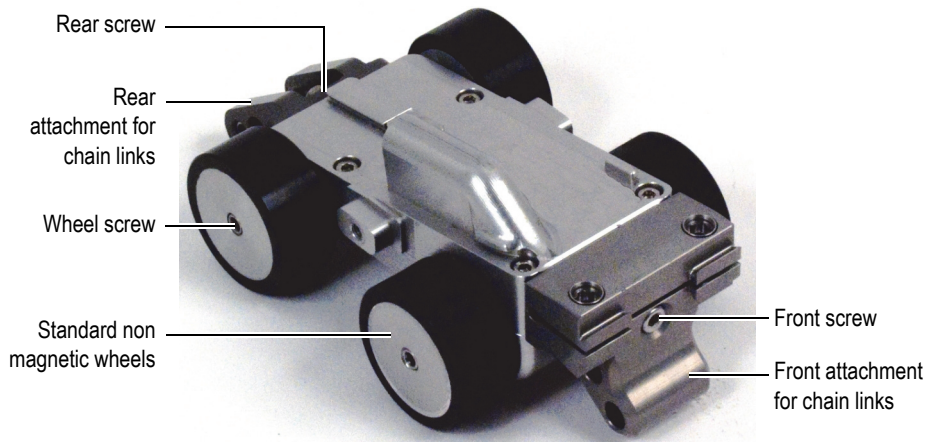
- A mouse-dedicated dovetail attachment



**Figure 2-24 The optional mouse conversion kit**

### **To install the optional mouse conversion kit**

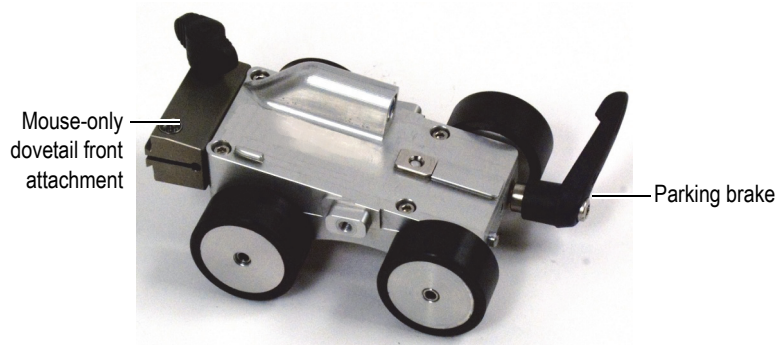
1. Remove the buckle assembly and chain links, if any, attached to the scanner.
2. Remove the main module assembly from the slide bar (see “To couple the main module and the slide bar” on page 22).
3. For an easier manipulation, remove the encoder umbilical cable from the main module (see “To install or release the encoder umbilical cable” on page 24).



**Figure 2-25 The main module equipped with the chain attachment**

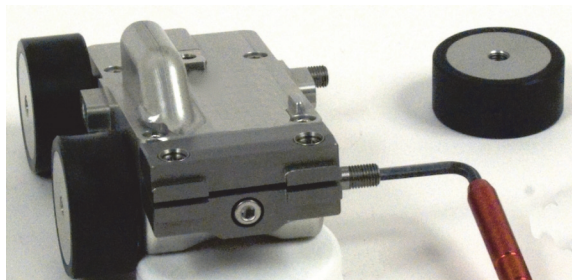
4. Use a hexagonal key or the supplied universal tool to unscrew the front screw securing the mouse front attachment for chain links (see Figure 2-25 on page 44).
  5. Use a hexagonal key or the provided universal tool to unscrew the rear screw securing the mouse rear attachment for chain links.
  6. Use a hexagonal key or the supplied universal tool to install the mouse-dedicated dovetail attachment for the mouse scanner (see Figure 2-26 on page 45).
  7. Use a hexagonal key or the supplied universal tool to install the parking brake.
- The newer version of the main module comes already equipped with an integrated break system. If your main modules is thus equipped, skip this step.





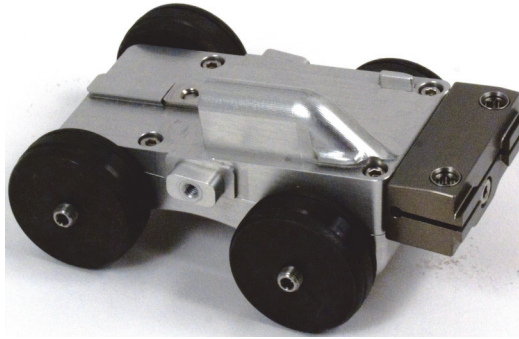
**Figure 2-26 Mouse-dedicated dovetail front attachment and parking brake**

8. To remove wheels, hold one of the wheel with your hand, and use a hexagonal key or the supplied universal tool to unscrew the opposite wheel screw (see Figure 2-27 on page 45).



**Figure 2-27 Using the supplied universal tool to install the magnetic wheels**

9. Install the magnetic wheels using the hexagonal key or the supplied universal tool to secure it in place (see Figure 2-28 on page 46).
10. Reverse the procedure to transform the mouse scanner back into the ChainSCANNER configuration.



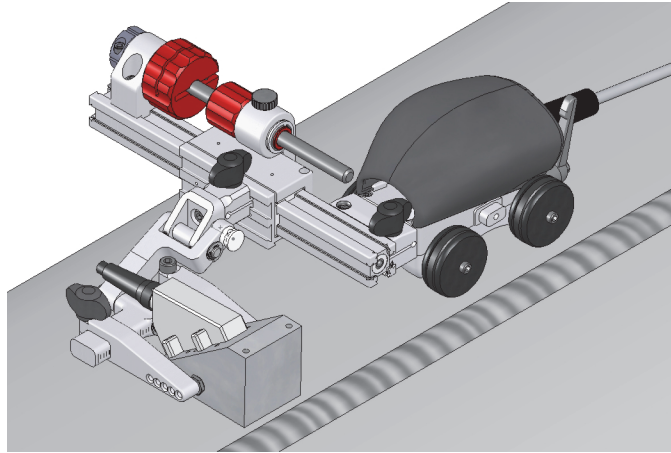
**Figure 2-28 Magnetic wheels to hold the mouse scanner on ferromagnetic surface**

## **2.10 Optional 20-Centimeter Bar and Lead Screw Kit**

The 20-centimeter bar and lead-screw kit (P/N: CHAINSCAN-A-SBAR [U8775129]) allows for a very compact configuration of the scanner. It can be used with the mouse conversion kit (P/N: CHAINSCAN-A-MOUSE [U8750037]) as shown in Figure 2-29 on page 47, as well as a with the chain assembly (see Figure 2-30 on page 48). These configurations are convenient when minimum encumbrance is required.

The 20-centimeter bar and lead-screw kit includes the following:

- One 20 cm (8 in.) slide bar
- One 20 cm (8 in.) lead screw



**Figure 2-29 The 20-centimeter bar and lead screw option—mouse scanner**

The 20-centimeter bar holds one probe holder. The probe holder can be attached directly into the dovetail groove of the 20 cm slide bar, or into one of the two dovetail grooves of the y-axis adjustment assembly.

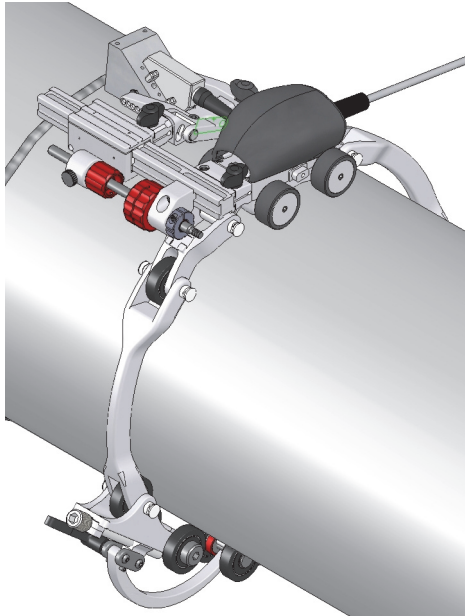
To use the y-axis adjustment on the 20 cm slide bar, retrieve the large red knob assembly and one of the two small red knob assemblies from the ChainSCANNER standard configuration (see “To replace the slide bar and the lead screw” on page 34) and use the 20 cm lead screw instead of the standard lead screw.

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<b>NOTE</b>
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The 20 cm lead screw cannot be used with the y-axis encoder.

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**Figure 2-30 The 20-centimeter bar and lead-screw option—ChainSCANNER**

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## 3. Preparing the ChainSCANNER for an Inspection

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Several connections and adjustments must be made to prepare the ChainSCANNER for an inspection.

### To prepare the ChainSCANNER for an inspection

1. Set up the main module (see “Main Module Setup and Connection” on page 21)
2. Set up the chain (see “ChainSCANNER Setup” on page 26)
3. Position the ChainSCANNER on the pipe to be inspected.
4. Hook the buckle arm either on the catch link, or on the main module rear attachment, depending on the pipe outside diameter (see “To add or remove a link on the ChainSCANNER” on page 26).
5. Adjust the tension of the ChainSCANNER by turning the adjustment screw (see Figure 3-1 on page 50).
6. Engage the buckle latch to close the ChainSCANNER around the pipe.



#### **CAUTION**

Extreme over-tensioning can reduce the life of the buckle components.

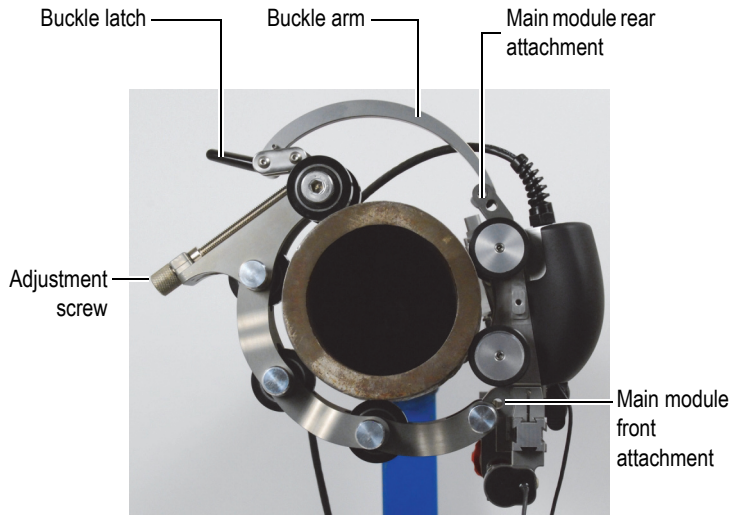
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#### **CAUTION**

When the inspection is finished, release the tension on the ChainSCANNER to avoid flattening of the rubber wheels.

---



**Figure 3-1 Closing the chain around the pipe**

7. When preparing the ChainSCANNER for larger diameter pipes, the scanner's position must be adjusted, to avoid helicoidal movement as much as possible. Otherwise, go directly to step 8.

For larger diameter pipes, adjust the scanner's position. Do the following:

- a) Measure the distance between the side of the wheel of the module and the weld (for example, 100 mm).
- b) Rotate the module 180° around the pipe.
- c) Measure again the distance between the side of the wheel of the module and the weld (for example, 120 mm).
- d) Unlatch the chain mechanism while keeping pressure on the latch, to make sure that the ChainSCANNER stays at its current position.
- e) Move the module to position it at the same distance to the weld as measured in step 7.a (as per this example, we would move the module 20 mm toward the weld).
- f) Latch the chain mechanism.
- g) Return the ChainSCANNER to its original position (180°).
- h) Repeat steps 7.a to 7.g until the position is repeatable within an acceptable range.

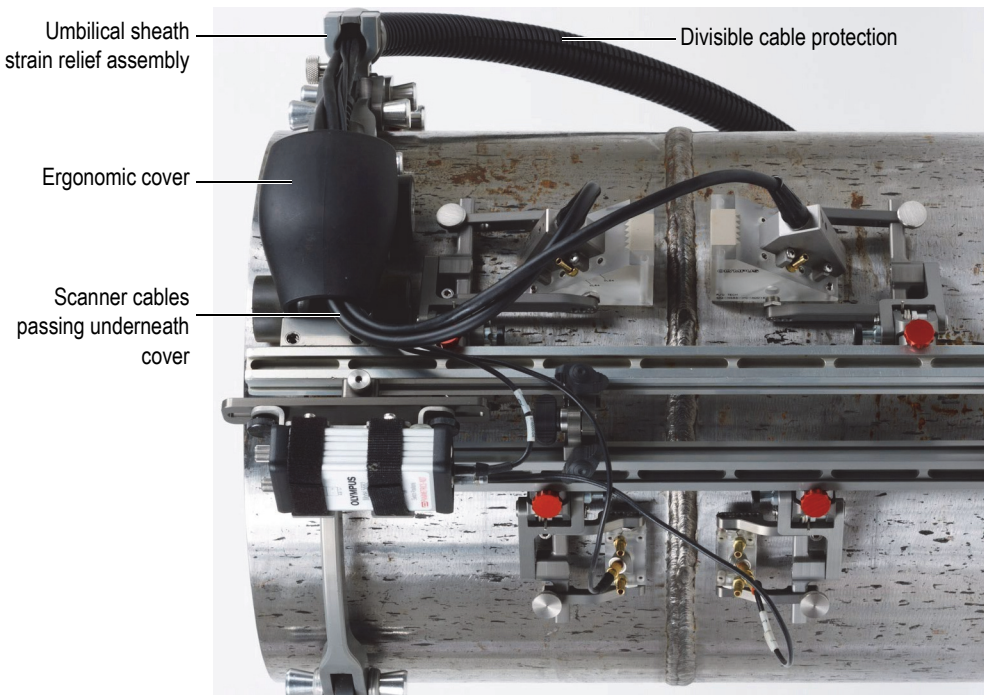
8. Adjust the probe or transducer position (see “To adjust the distance between the probes” on page 31).
9. Connect the appropriate cables and tubes to the probes and wedge.
10. Pass the probe cables and irrigation tubes under the module’s black ergonomic cover (see Figure 3-2 on page 51).

---

**IMPORTANT**

Failure to pass the cables and tubes underneath the module’s ergonomic cover can result in lack of pressure between the wedge and the part being inspected.

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**Figure 3-2 Cables passing underneath the module’s ergonomic cover  
(model equipped with Four-Probe kit shown)**

11. Cover the cables and tubes with the supplied divisible cable protection.

12. Attach the divisible cable protection to the chain to avoid excessive stress on the cables and tubes connections (see “Umbilical Sheath Strain Relief Assembly” on page 36).



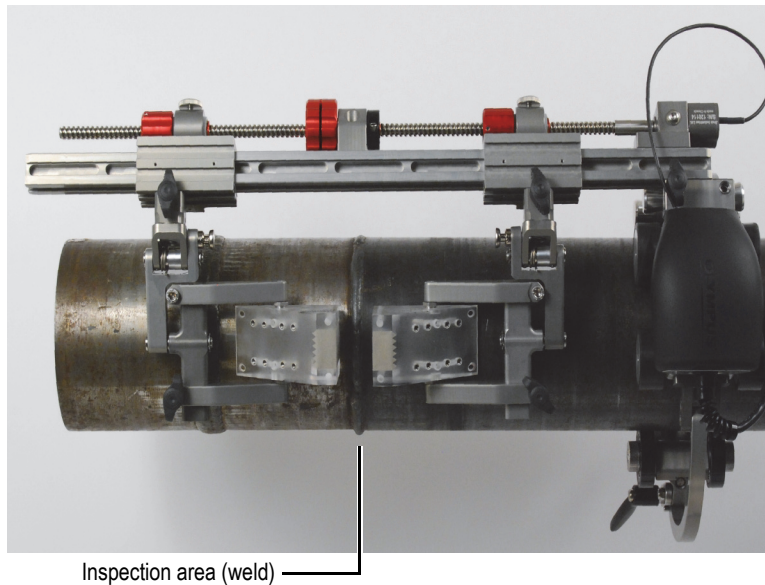
## 4. Operating the ChainSCANNER

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The ChainSCANNER is designed to be used manually. It is simple to operate.

### To operate the ChainSCANNER

1. Fasten the scanner around the pipe to be inspected (see “To prepare the ChainSCANNER for an inspection” on page 49).
2. Center the inspection area between the probes (see “To move the probe holders together” on page 32 and Figure 4-1 on page 53).



**Figure 4-1 Center the inspection area between the probes**

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**IMPORTANT**

All wedge-probe assemblies must be correctly positioned on the surface being inspected.

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**IMPORTANT**

All carbide wear-pins should be flush with the wedge surface (see Appendix B, “Wedge-Probe Assembly Maintenance” on page 77).

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**IMPORTANT**

For proper contact between the wedge and the part being inspected when performing an inspection, always make sure that the swing arm is unlatched.

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3. Simply push or pull the scanner in the desired inspection direction.

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## 5. Maintenance

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This chapter deals with the basic maintenance that an operator can apply to the ChainSCANNER. The maintenance operations explained as follows helps keep the product in good physical and working condition. Due to its design, the ChainSCANNER requires only a minimum of maintenance. This chapter covers preventive maintenance and unit cleaning.

### 5.1 Preventive Maintenance

The ChainSCANNER does not require preventive maintenance. Only a regular inspection of the product is recommended to ensure that the ChainSCANNER functions correctly.

### 5.2 Unit Cleaning

The ChainSCANNER external surfaces can be cleaned when needed. This section provides the procedure for the appropriate cleaning of the product.

#### To clean the unit

1. Ensure the unit is turned off by removing the source of power.
2. Disconnect all cables.
3. To bring the instrument back to its original finish, clean the housing with a soft cloth.
4. To remove persistent stains, use a damp cloth with a soft, soapy solution. Do not use abrasive products or powerful solvents that could damage the finish.
5. Wait until the instrument dries completely before connecting the cables.



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## 6. Spare Parts and Optional Kits

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The ChainSCANNER features numerous parts, components, and accessories. Individual spare parts and parts kits are listed in tables.

### 6.1 Spare Parts

An exploded view and a list of spare parts for the ChainSCANNER are provided in Figure 6-1 on page 58 and Table 3 on page 58 for the frame and chain, and in Figure 6-2 on page 61 and Table 4 on page 62 for the cart.

**Note:** Items 33–38 are for legacy (old) encoders with serial numbers 128982 and lower. Item 11 is the new encoder; serial numbers 128983 and higher.

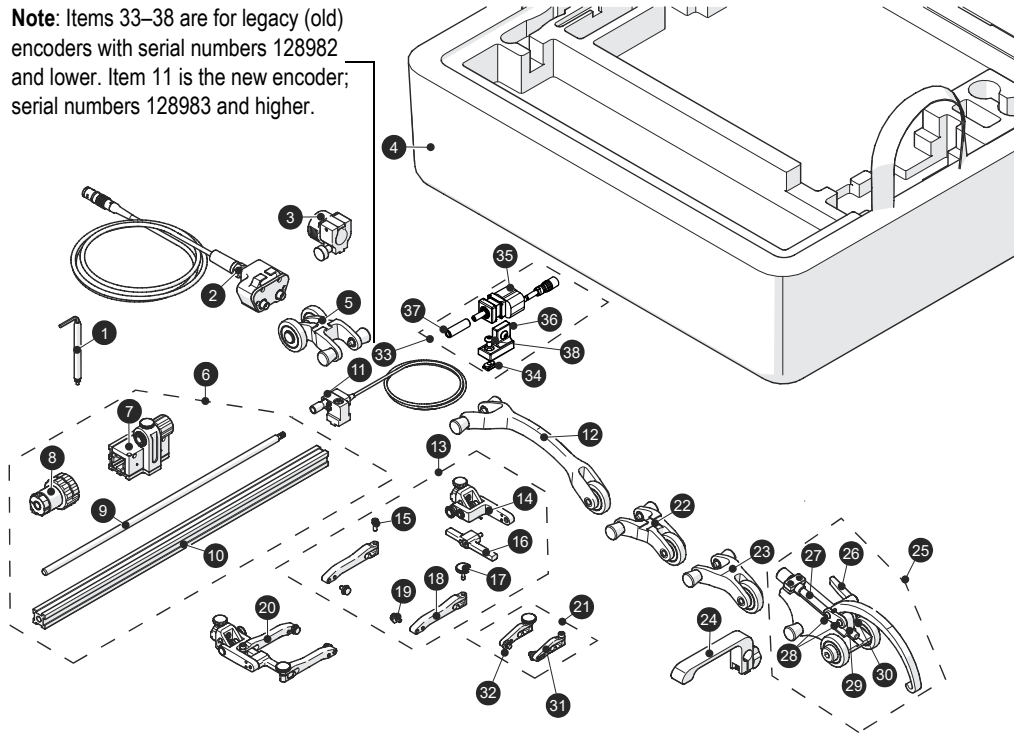


Figure 6-1 ChainSCANNER frame and chain — exploded view

Table 3 ChainSCANNER spare parts — frame and chain

Drawing item	Part number	Marketing number	Description
N/A	U8750041	CHAINSCAN-XY38	ChainSCANNER-XY38: Hand scanner for pipe inspection with encoded x-axis and y-axis for pipe outside diameters from 45 mm to 965 mm (1.75 in. to 38 in.). Includes two spring-loaded arms, two yokes for TOFD/PE UT probes, two yokes for phased array probes, 5 m encoder cable for OmniScan, 5 m divisible cable protection, irrigation tubes, and fittings. Probes and wedges are not included.
1	U8775130	CHAINSCAN-A-TOOL	ChainSCANNER universal tool

**Table 3 ChainSCANNER spare parts — frame and chain (*continued*)**

Drawing item	Part number	Marketing number	Description
2	U8775162	CHAINSCAN-A-CABLE01	ChainSCANNER encoder cable with plastic cover handle (P/N: U8150425). Cable is 5 m long with a LEMO connector compatible with OmniScan MX2 and SX.
3	U8150357	CHAINSCAN-SP-CABLECLAMP	Clamp, PMA flex cable
4	Q8301078	N/A	Case for ChainSCANNER
5	U8150587	N/A	ChainSCANNER catch link
6	Q8301079	N/A	Manual y-axis adjuster assembly
7	U8909359	N/A	Slide assembly with small knob
8	U8775206	CHAINSCAN-A-MAINKNOB	Main large red knob for y-axis indexation on ChainSCANNER. Features mounting holes for crank handle installation.
9	U8775146	CHAINSCAN-A-LSCREW38	ChainSCANNER 38 cm lead screw to be used on the XY option with the longitudinal “Y” encoder
10	U8830732	CHAINSCAN-A-FBAR450	Probe-holder bar, 450 mm dovetail slide
11	Q8301081	N/A	New encoder assembly for longitudinal “Y” axis, with magnetic dovetail mount. Resolution: 1440 counts/revolution <b>NOTE:</b> This item is for encoders with serial numbers 128983 and higher. For serial numbers 128982 and lower, see legacy (old) encoder items 33–38.
12	U8750042	CHAINSCAN-A-LGLINK	ChainSCANNER long link. Required on pipes with OD greater than 244 mm (9.6 in.)
13	U8830730	CHAINSCAN-A-PH-LEFT	Probe holder assembly, wide (left)
14	Q8301080	N/A	Probe holder subassembly, fixed joint
15	Q8300568	N/A	Screw, SHCS, M4-0.7 × 10 mm, stainless steel
16	Q8301041	N/A	Bar for wide yoke
17	Q7750010	N/A	Single thumb screw for probe holder arm
	U8831554	N/A	Package of 4 thumb screws for probe holder arm
18	Q8300578	N/A	Long arm for wide probe holder (flat contact)
19	U8775198	CHAINSCAN-A-BUTTON-8MM	8 mm diameter button for ChainSCANNER arm.
17+18+19	U8775261	CHAINSCAN-A-ARM-LPA	Large, 63.5 mm long arm set for ChainSCANNER with 8 mm buttons for PA probe. <b>IMPORTANT NOTE:</b> Will fit on original thicker rear member with 17.8 mm × 10.6 mm cross section.

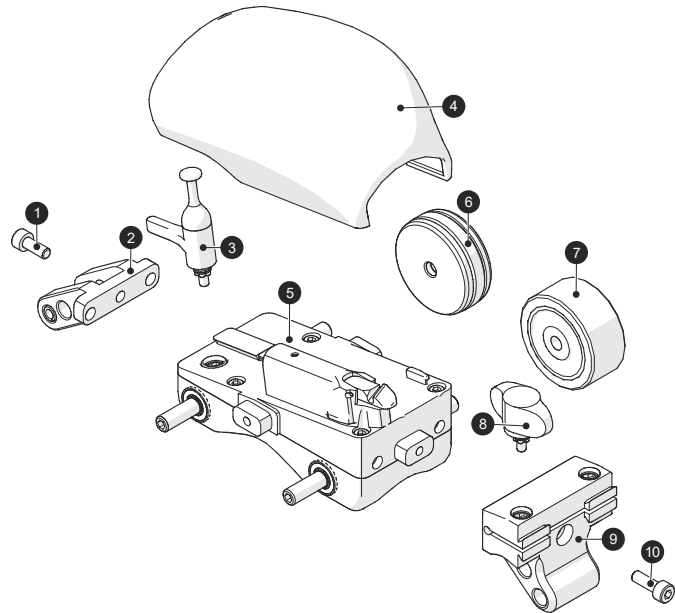
**Table 3 ChainSCANNER spare parts — frame and chain (*continued*)**

Drawing item	Part number	Marketing number	Description
17+18+19	U8775262	CHAINSCAN-A-ARM-SPA	Slim, 63.5 mm long arm sets for ChainSCANNER with 8 mm buttons for PA probe. <b>IMPORTANT NOTE:</b> Will fit on newer slim rear member with 17.8 mm × 10.6 mm cross section.
20	U8830731	CHAINSCAN-A-PH-RIGHT	Probe holder assembly, wide (right)
21	U8775264	CHAINSCAN-A-ARM-SUT	Slim, 27.9 mm arm set (short) for ChainSCANNER with 5 mm buttons for UT probe. <b>IMPORTANT NOTE:</b> Will fit on newer slim rear member with 8.7 mm × 6.5 mm cross section. Includes item 32 (Q7750009)
17+31+32	U8775263	CHAINSCAN-A-ARM-LUT	Large, 27.9 mm long arm sets for ChainSCANNER with 5 mm buttons for UT probe. <b>IMPORTANT NOTE:</b> Will fit on original thicker rear member with 17.8 mm × 10.6 mm cross section.
17+31+32	U8775294	CHAINSCAN-A-PH-UT-LEFT	One UT probe holder compatible with ChainSCANNER (left sided). Can accommodate up to 45 mm wide wedge. Fork arms are 37 mm long and have 5 mm diameter buttons.
22	U8150457	CHAINSCAN-SP-SHORTLINKDOVETAIL	ChainSCANNER short link dove tail
23	U8775127	CHAINSCAN-A-SLINK	ChainSCANNER short link. Required on pipes with OD less than 244 mm (9.6 in.)
24	U8775259	CHAINSCAN-A-HANDLE	Handle for ChainSCANNER. To be mounted on dovetail links or frame bar
25	U8775276	N/A	Buckle assembly
26	Q8300131	N/A	ChainSCANNER modified adjustment handle EA164
27	Q1500157	N/A	Adjustment screw for buckle
28	Q8300132	N/A	M4-0.7 × 25 mm stainless steel BHCS screw
29	Q1500158	N/A	Buckle bracket
30	U8909924	N/A	Nut for buckle bracket
31	U8775199	CHAINSCAN-A-BUTTON-5MM	5 mm diameter button for short arm item 21 (U8775264)
32	Q7750009	N/A	Single, short arm (flat contact) [see description of item 21 (U8775264)]



**Table 3 ChainSCANNER spare parts — frame and chain (*continued*)**

Drawing item	Part number	Marketing number	Description
33	U8775145	CHAINSCAN-SP-ENC	Legacy (old) encoder assembly for longitudinal “Y” axis. Resolution: 1024 counts/revolution <b>NOTE:</b> Only for encoder serial numbers 128982 and lower.
34	U8909912	CHAINSCAN-SP-NUTDOVETAIL	Dovetail nut for legacy encoder serial numbers 128982 and lower
35	U8830489	N/A	“Y” encoder (no base) for legacy encoder serial numbers 128982 and lower
36	U8150449	CHAINSCAN-SP-BRACKETENC MOUNT	Mounting bracket for legacy encoder serial numbers 128982 and lower
37	U8150448	CHAINSCAN-SP-COUPLINGENC	Coupling for legacy encoder serial numbers 128982 and lower
38	U8150450	N/A	Screw, BHCS M5-0.8 × 8 mm stainless steel, for legacy encoder serial numbers 128982 and lower



**Figure 6-2 ChainSCANNER cart — exploded view**


**Table 4 ChainSCANNER spare parts — cart**

Drawing item	Part number	Marketing number	Description
N/A	U8831574	CHAINSCAN-SP-FULLCART	ChainSCANNER main cart replacement assembly. Includes X encoder, cart module, shafts, 4 × plastic wheels, front and back mounting plates. Does not include encoder module and cable (P/N: U8775162).
1	Q8300568	N/A	Screw for tail kit, SHCS, M4-0.7 × 10 mm, stainless steel
2	U8831177	N/A	ChainSCANNER tail
3	Q8301073	N/A	Removable knob, fixed handle
4	U8150425	CHAINSCAN-SP-BUGGYCOVER	Plastic buggy cover for ChainSCANNER
5	U8775224	CHAINSCAN-SP-CART	ChainSCANNER main cart replacement module. Includes X encoder, cart module and shafts. <b>NOTE:</b> The encoder inside the cart is not available as an individual part.
6	U8779383	CHAINSCAN-A-MWHEEL	Magnetic wheel for ChainSCANNER
7	U8775189	CHAINSCAN-A-PWHEEL	Plastic wheel for ChainSCANNER
8	U8775167	CHAINSCAN-A-KNOB	Removable thumb screw for ChainSCANNER
9	Q8301075	N/A	ChainSCANNER nose kit
10	Q8301076	N/A	Screw for nose kit, SHCS, M4-0.7 × 12 mm, stainless steel

## 6.2 Optional Kits and Parts

Table 5 on page 62 lists optional kits and parts that are available to adapt the ChainSCANNER for diverse inspection needs.





**Table 5 ChainSCANNER optional kits and parts**

Part or kit image	Part number	Marketing number	Description
	U8775205	CHAINSCAN-A-CRANK	Crank handle for y-axis indexation on ChainSCANNERs. <b>NOTE:</b> Will only fit if the main red knob of the ChainSCANNER has the mounting holes. If not, a knob (P/N: CHAINSCAN-A-MAINKNOB [U8775206]) must also be ordered.

**Table 5 ChainSCANNER optional kits and parts (continued)**

Part or kit image	Part number	Marketing number	Description
	U8779370	CHAINSCAN-SP-BASIC	Basic spare parts kit for the ChainSCANNER including: Lead screw and lever for buckle, wedge pivot buttons, dovetail nuts, specific tool, plastic wheel, and various types of screws, including wing screws.
	U8909207	N/A	ChainSCANNER basic hardware, maintenance
	U8130022	CHAINSCAN-SP-PMASCREW	Thumb screw and dovetail nut kit for ChainSCANNER PMA flex umbilical attachment.
	U8775210	CHAINSCAN-A-STABILIZER	ChainSCANNER arm stabilizer kit. Includes a magnetic wheel block and the holder to mount on the scanner arm.
	U8775128	CHAINSCAN-A-4PROBE	Extra part package to allow inspection using 4 probes on the ChainSCANNER. Includes: 2 side frame arms, one 450 mm bar, 2 magnetic wheels, 2 handles, and 2 TOFD yokes.
	U8750037	CHAINSCAN-A-MOUSE	Extra part package to allow the ChainSCANNER to be used as a mouse scanner with magnetic wheels holding system (instead of chain links). Includes front attachment part, brake handle, and 4 magnetic wheels.
	U8775129	CHAINSCAN-A-SBAR	20 cm long probe holder bar and screw kit
	U8775161	CHAINSCAN-A-FBAR550	ChainSCANNER 550 mm long frame bar
	U8775178	CHAINSCAN-A-YCABLE1M	Extension cable for ChainSCANNER Y encoder, 1 m long.

**Table 5 ChainSCANNER optional kits and parts (continued)**

Part or kit image	Part number	Marketing number	Description
	U8775190	CHAINSCAN-A-TRANSVERS	Bracket to pivot a ChainSCANNER yoke from 0° to 90°
	U8775196	CHAINSCAN-A-SWNOSE	Swivel nose to be installed on the front of a ChainSCANNER. Suitable for holding one probe holder bar and allowing rotation along the long axis of the bar.
	U8775197	CHAINSCAN-A-FBAR100	10 cm long probe holder bar for ChainSCANNER.
	U8775200	CHAINSCAN-A-ARM-LD8MM	Large dropped arm sets for ChainSCANNER with 8 mm buttons.
N/A	U8780008	CFU03	Electric water pump with flow control valve and power supply (100 VAC to 240 VAC input to 24 VDC output). Includes the following tubes and fittings: <ul style="list-style-type: none"> <li>• 3.3 m (10 ft) long, 9.5 mm (3/8 in.) ID tube for pump inlet with filter and check valve</li> <li>• 3.3 m (10 ft) long, 5 mm (3/16 in.) ID tube and Y adaptor for pump outlet</li> </ul>
N/A	U8775153	WTR-SPRAYER-4L	Portable manual couplant feed unit. Manual water pump used to supply couplant to wedges during automated inspection. Includes: reservoir capacity of 4 L, flow valve, irrigation tube (8 mm OD, 5 mm ID) and sling for transportation.
N/A	U8775001	WTR-SPRAYER-8L	Portable manual couplant feed unit. Manual water pump used to supply couplant to wedges during automated inspection. Includes: reservoir capacity of 8 L, flow valve, irrigation tube (8 mm OD, 5 mm ID) and sling for transportation.
N/A	U8120042	TRPP-5810	Ultrasonic pulser and preamplifier dedicated for TOFD applications. Can support one or two pairs of TOFD probes. It features 200 V, 40 dB gain, 12 VDC input operation. 500 kHz to 30 MHz bandwidth. Kit includes: 5 m power supply cable (120 VAC to 240 VAC input to 12 VDC output), and hard carrying case.

**Table 5 ChainSCANNER optional kits and parts (continued)**

Part or kit image	Part number	Marketing number	Description
N/A	U8775114	TRPP-5810-INST	Ultrasonic pulser and preamplifier kit dedicated for TOFD applications. Can support one or two pairs of TOFD probes. It features 200 V, 40 dB gain, 12 VDC input operation and 500 kHz to 30 MHz bandwidth. Kit includes: 5 m power supply cable linking to OmniScan, 5 m power supply cable (120 VAC to 240 VAC input to 12 VDC output), 4 × 0.6 m UT cables with LEMO-00 to Microdot connectors for probes, 4 × 5 m UT cables with LEMO-00 to LEMO-00 connectors to connect to instrument, brackets to attach TRPP 5810 to HSMT type scanners, and hard carrying case.
N/A	U8775201	OMNI-A2-ADP20	Scanner interface adaptor to connect scanner encoder cables with DE15 connector to OmniScan MX2 with LEMO connector scanner interface.
N/A	U8780329	OMNI-A-ADP27	Scanner interface adaptor to connect scanner encoder cables with LEMO connector to OmniScan MX with DE15 connector scanner interface.
N/A	U8769010	C1-LF-BXM-0.3M	0.3 m (12 in.) long adapter, LEMO female to Bendix male, linking LEMO encoder cable to FOCUS LT.
N/A	U8767107	C1-DE15F-BXM-0.30M	305 mm (12 in.) long adapter, DE-15 female to Bendix male, linking DE-15 encoder cable to FOCUS LT.



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## 7. ChainSCANNER Specifications

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This chapter contains the specifications for the ChainSCANNER.

### 7.1 General and Operating Environment Specifications

**Table 6 General specifications**

Parameter	Value
Pipe range outside diameter	45 mm (1.75 in.) to 965 mm (38 in.)
Main module dimension	7.5 cm × 8.4 cm × 11.4 cm (2.95 in. × 3.30 in. × 4.50 in.)
Weight	960 g (2.1 lb) (Main module only)
X-axis encoder	Resolution: 19.2 steps/mm ±0.15 steps/mm quadrature decode Power: 5 VDC 100 mA Frequency: 0–2 kHz (for a maximum displacement velocity per second of 10 cm [4 in.] )
Y-axis encoder	Resolution: 226.8 steps/mm ±0.15 steps/mm quadrature decode Power: 5 VDC 25 mA Frequency: 0–25 kHz (for a maximum displacement velocity per second of 10 cm [4 in.] )

**Table 7 Operating environment specifications**

Parameter	Value
Operating temperature	5 °C to 50 °C (41 °F to 122 °F)
Storage temperature	–30 °C to 60 °C (–22 °F to 140 °F)
Relative humidity (RH)	Max. 80 % RH noncondensing
Wet location	Yes
Altitude	Up to 2000 m
Outdoor use	Yes
Pollution level	1
IP rating	Waterproof (designed to meet IP67)

## 7.2 Connector Reference

ChainSCANNERS sold after July 2013 come standard with the LEMO connector which is compatible with the OmniScan MX2 and SX instruments. For use with a different instrument, an optional adaptor is required (see Table 8 on page 68).

**Table 8 Required encoder cable adaptor**

Scanner connector	Instrument			
	OmniScan MX	OmniScan MX2	OmniScan SX	TomoScan FOCUS LT
LEMO (from July 2013 onward)	Omni-A-ADP27 [U8780329]	—	—	C1-LF-BXM-0.3M [U8769010]
DE15 (Prior to July 2013)	—	Omni-A2-ADP20 [U8775201]	Omni-A2-ADP20 [U8775201]	C1-DE15F-BXM-0.30M [U8767107]

Figure 7-1 on page 69 and Table 9 on page 69 contain the pinout for the LEMO connector used on the OmniScan MX2 model.



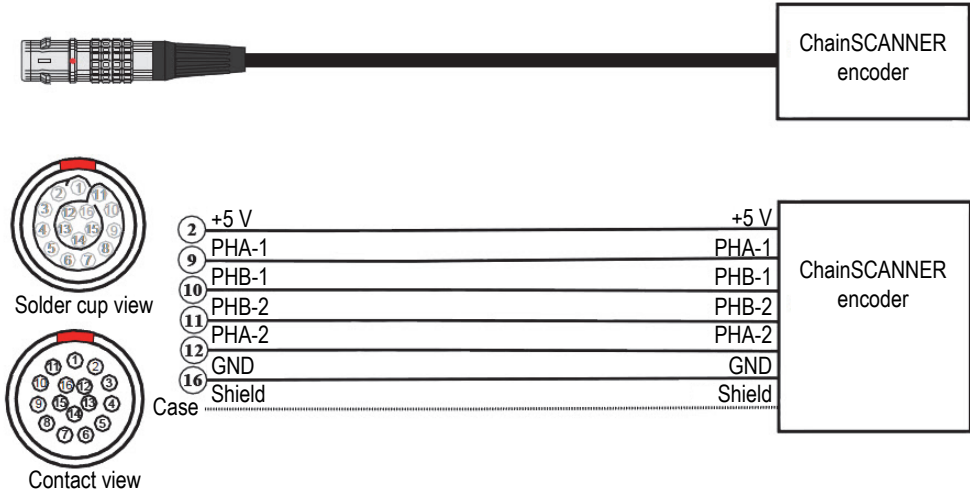


Figure 7-1 LEMO connector pinout diagram

Table 9 OmniScan MX2 pinout for the scanner interface LEMO connector

Pin	Signal	Description
2	+5 V	External power supply
9	PhA axis 1	Encoder 1: phase A
10	PhB axis 1	Encoder 1: phase B
11	PhB axis 2	Encoder 2: phase B
12	PhA axis 2	Encoder 2: phase A
16	GND	Ground
Case	Shield	Ground earthing



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# Appendix A: ChainSCANNER Sizing Charts

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The following ChainSCANNER sizing tables are a reference to determine an appropriate number of links for a given pipe size. There is a metric chart and a U.S. Customary unit chart. Each cell in the chart shows a range of pipe outside diameters—pipe circumferences are between parenthesis. The number at the top of the column indicates how many short links are required while the number at the left of the row indicates how many long links are required.

**Table 10 ChainSCANNER sizing chart (inches)**

		Number of short links (Ordering number: ChainScan-A-SLink)				
		0	1	2	3	4
Number of long links (Ordering number: ChainScan-A-LgLink)	0	N/A	1.6–3.5 (5.1–11.0) <sup>a</sup>	3.4–4.4 (10.8–13.9)	4.3–5.3 (13.6–16.7)	5.2–6.2 (16.2–19.3)
	1	N/A	N/A	N/A	N/A	N/A
	2	N/A	N/A	9.6–9.9 (30.2–31.0)	9.8–10.6 (30.7–33.4)	10.5–11.4 (33.1–35.8)
	3	9.9–10.8 (31.2–33.8)	10.7–11.5 (33.6–36.1)	11.4–12.3 (35.9–38.5)	12.2–13.0 (38.2–40.9)	12.9–13.8 (40.6–43.4)
	4	12.3–13.1 (38.5–41.2)	13.0–13.9 (40.9–43.6)	13.8–14.6 (43.2–46.0)	14.5–15.4 (45.6–48.4)	15.3–16.2 (48.0–50.9)
	5	14.6–15.5 (45.9–48.7)	15.4–16.2 (48.2–51.0)	16.1–17.0 (50.6–53.5)	16.9–17.8 (53.1–55.9)	17.7–18.6 (55.5–58.4)
	6	16.9–17.9 (53.2–56.1)	17.7–18.6 (55.6–58.5)	18.5–19.4 (58.0–60.9)	19.3–20.2 (60.5–63.4)	20.0–21.0 (62.9–65.9)
	7	19.3–20.2 (60.6–63.5)	20.1–21.0 (63.0–66.0)	20.8–21.8 (65.5–68.4)	21.6–22.6 (67.9–70.9)	22.4–23.3 (70.4–73.3)
	8	21.7–22.6 (68.1–71.0)	22.4–23.4 (70.5–73.4)	23.2–24.2 (72.9–75.9)	24.0–24.9 (75.4–78.3)	24.8–25.7 (77.9–80.8)
	9	24.0–25.0 (75.5–78.4)	24.8–25.7 (77.9–80.9)	25.6–26.5 (80.4–83.3)	26.4–27.3 (82.9–85.8)	27.2–28.1 (85.3–88.3)
	10	26.4–27.3 (82.9–85.9)	27.2–28.1 (85.4–88.3)	28.0–28.9 (87.8–90.8)	28.7–29.7 (90.3–93.3)	29.5–30.5 (92.8–95.8)
	11	28.8–29.7 (90.4–93.4)	29.5–30.5 (92.8–95.8)	30.3–31.3 (95.3–98.3)	31.1–32.1 (97.8–100.8)	31.9–32.9 (100.2–103.3)
	12	31.1–32.1 (97.8–100.9)	31.9–32.9 (100.3–103.3)	32.7–33.7 (102.7–105.8)	33.5–34.5 (105.2–108.2)	34.3–35.3 (107.7–110.7)
	13	33.5–34.5 (105.3–108.3)	34.3–35.3 (107.7–110.8)	35.1–36.0 (110.2–113.2)	35.9–36.8 (112.7–115.7)	36.7–37.6 (115.2–118.2)
	14	35.9–36.9 (112.8–115.8)	36.7–37.6 (115.2–118.2)	37.5–38.4 (117.7–120.7)	38.3–39.2 (120.2–123.2)	39.0–40.0 (122.7–125.7)
	15	38.3–39.2 (120.2–123.3)	39.1–40.0 (122.7–125.7)	39.8–40.8 (125.2–128.2)	40.6–41.6 (127.7–130.7)	41.4–42.4 (130.2–133.2)
	16	40.7–41.6 (127.7–130.8)	41.4–42.4 (130.2–133.2)	42.2–43.2 (132.7–135.7)	43.0–44.0 (135.2–138.2)	43.8–44.8 (137.7–140.7)
	17	43.0–44.0 (135.2–138.2)	43.8–44.8 (137.6–140.7)	44.6–45.6 (140.1–143.2)	45.4–46.4 (142.7–145.7)	46.2–47.2 (145.1–148.2)
	18	45.4–46.4 (142.7–145.7)	46.2–47.2 (145.2–148.2)	47.0–48.0 (147.6–150.7)	47.8–48.8 (150.1–153.2)	48.6–49.6 (152.6–155.7)
	19	47.8–48.8 (150.2–153.2)	48.6–49.6 (152.6–155.7)	49.4–50.4 (155.1–158.2)	50.2–51.2 (157.6–160.7)	51.0–52.0 (160.1–163.2)
	20	50.2–51.2 (157.6–160.7)	51.0–51.9 (160.1–163.2)	51.8–52.7 (162.6–165.7)	52.6–53.5 (165.1–168.2)	53.4–54.3 (167.6–170.7)
	21	52.6–53.6 (165.2–168.2)	53.4–54.3 (167.6–170.7)	54.2–55.1 (170.1–173.2)	54.9–55.9 (172.6–175.7)	55.7–56.7 (175.1–178.2)
	22	54.9–55.9 (172.6–175.7)	55.7–56.7 (175.1–178.2)	56.5–57.5 (177.6–180.7)	57.3–58.3 (180.1–183.2)	58.1–59.1 (182.6–185.7)
	23	57.3–58.3 (180.1–183.2)	58.1–59.1 (182.6–185.7)	58.9–59.9 (185.1–188.2)	59.7–60.7 (187.6–190.7)	60.5–61.5 (190.1–193.2)
	24	59.7–60.7 (187.6–190.7)	60.5–61.5 (190.1–193.2)	61.3–62.3 (192.7–195.7)	62.1–63.1 (195.1–198.2)	62.9–63.9 (197.6–200.7)

- a. The first numbers represent the outside pipe diameter. The numbers between parenthesis represent the pipe circumference.

(continued from facing page)

		Number of short links (Ordering number: ChainScan-A-SLink)				
		5	6	7	8	9
Number of long links (Ordering number: ChainScan-A-LgLink)	0	6.1–7.0 (19.3–22.0)	7.0–7.8 (21.9–24.6)	7.8–8.7 (24.4–27.2)	8.6–9.5 (27.0–29.8)	9.4–10.3 (29.5–32.3)
	1	N/A	9.6–10.5 (30.1–32.9)	10.4–11.2 (32.6–35.3)	11.1–12.0 (35.0–37.8)	11.9–12.8 (37.5–40.3)
	2	11.3–12.2 (35.4–38.2)	12.0–12.9 (37.8–40.6)	12.8–13.7 (40.3–43.1)	13.6–14.5 (42.7–45.5)	14.4–15.3 (45.1–48.0)
	3	13.7–14.6 (43.0–45.8)	14.4–15.3 (45.4–48.2)	15.2–16.1 (47.8–50.7)	16.0–16.9 (50.3–53.1)	16.8–17.7 (52.7–55.6)
	4	16.1–17.0 (50.5–53.3)	16.8–17.8 (52.9–55.8)	17.6–18.5 (55.3–58.2)	18.4–19.3 (57.8–60.7)	19.2–20.1 (60.2–63.2)
	5	18.4–19.4 (57.9–60.8)	19.2–20.1 (60.4–63.3)	20.0–20.9 (62.8–65.7)	20.8–21.7 (65.3–68.2)	21.6–22.5 (67.7–70.7)
	6	20.8–21.7 (65.4–68.3)	21.6–22.5 (67.8–70.8)	22.4–23.3 (70.3–73.3)	23.2–24.1 (72.8–75.7)	23.9–24.9 (75.2–78.2)
	7	23.2–24.1 (72.9–75.8)	24.0–24.9 (75.3–78.3)	24.8–25.7 (77.8–80.7)	25.5–26.5 (80.3–83.2)	26.3–27.3 (82.7–85.7)
	8	25.6–26.5 (80.3–83.3)	26.4–27.3 (82.8–85.8)	27.1–28.1 (85.2–88.2)	27.9–28.9 (87.7–90.7)	28.7–29.7 (90.2–93.2)
	9	27.9–28.9 (87.8–90.8)	28.7–29.7 (90.2–93.3)	29.5–30.5 (92.7–95.7)	30.3–31.3 (95.2–98.2)	31.1–32.1 (97.7–100.7)
	10	30.3–31.3 (95.2–98.3)	31.1–32.1 (97.7–100.8)	31.9–32.9 (100.2–103.2)	32.7–33.6 (102.7–105.7)	33.5–34.4 (105.2–108.2)
	11	32.7–33.7 (102.7–105.7)	33.5–34.5 (105.2–108.2)	34.3–35.2 (107.7–110.7)	35.1–36.0 (110.2–113.2)	35.9–36.8 (112.7–115.7)
	12	35.1–36.0 (110.2–113.2)	35.9–36.8 (112.7–115.7)	36.7–37.6 (115.2–118.2)	37.5–38.4 (117.7–120.7)	38.3–39.2 (120.2–123.2)
	13	37.5–38.4 (117.7–120.7)	38.3–39.2 (120.2–123.2)	39.0–40.0 (122.7–125.7)	39.8–40.8 (125.2–128.2)	40.6–41.6 (127.7–130.7)
	14	39.8–40.8 (125.2–128.2)	40.6–41.6 (127.7–130.7)	41.4–42.4 (130.2–133.2)	42.2–43.2 (132.7–135.7)	43.0–44.0 (135.2–138.2)
	15	42.2–43.2 (132.7–135.7)	43.0–44.0 (135.2–138.2)	43.8–44.8 (137.7–140.7)	44.6–45.6 (140.2–143.2)	45.4–46.4 (142.6–145.7)
	16	44.6–45.6 (140.2–143.2)	45.4–46.4 (142.7–145.7)	46.2–47.2 (145.1–148.2)	47.0–48.0 (147.6–150.7)	47.8–48.8 (150.1–153.2)
	17	47.0–48.0 (147.6–150.7)	47.8–48.8 (150.1–153.2)	48.6–49.6 (152.6–155.7)	49.4–50.4 (155.1–158.2)	50.2–51.2 (157.6–160.7)
	18	49.4–50.4 (155.1–158.2)	50.2–51.2 (157.6–160.7)	51.0–52.0 (160.1–163.2)	51.8–52.7 (162.6–165.7)	52.6–53.5 (165.1–168.2)
	19	51.8–52.7 (162.6–165.7)	52.6–53.5 (165.1–168.2)	53.4–54.3 (167.6–170.7)	54.1–55.1 (170.1–173.2)	55.0–55.9 (172.6–175.7)
	20	54.2–55.1 (170.1–173.2)	54.9–55.9 (172.6–175.7)	55.7–56.7 (175.1–178.2)	56.5–57.5 (177.6–180.7)	57.3–58.3 (180.1–183.2)
	21	56.5–57.5 (177.6–180.7)	57.3–58.3 (180.1–183.2)	58.1–59.1 (182.6–185.7)	58.9–59.9 (185.1–188.2)	59.7–60.7 (187.6–190.7)
	22	58.9–59.9 (185.1–188.2)	59.7–60.7 (187.6–190.7)	60.5–61.5 (190.1–193.2)	61.3–62.3 (192.6–195.7)	62.1–63.1 (195.1–198.2)
	23	61.3–62.3 (192.7–195.7)	62.1–63.1 (195.1–198.2)	62.9–63.9 (197.6–200.7)	63.7–64.7 (200.1–203.2)	64.5–65.5 (202.6–205.8)
	24	63.7–64.7 (200.1–203.2)	64.5–65.5 (202.6–205.7)	65.3–66.3 (205.1–208.2)	66.1–67.1 (207.6–210.7)	66.9–67.9 (210.1–213.2)

Table 11 ChainSCANNER sizing chart (centimeters)

		Number of short links (Ordering number: ChainScan-A-SLink)				
		0	1	2	3	4
Number of long links (Ordering number: ChainScan-A-LgLink)	0	N/A	4.1–8.9 (13.0–28.0 <sup>a</sup> )	8.8–11.2 (27.5–35.3)	11.0–13.5 (34.5–42.3)	13.1–15.6 (41.2–49.1)
	1	N/A	N/A	N/A	N/A	N/A
	2	N/A	N/A	24.5–25.1 (76.8–78.7)	24.8–27.0 (78.1–84.8)	26.7–28.9 (84.0–90.9)
	3	25.3–27.3 (79.3–85.8)	27.1–29.2 (85.3–91.8)	29.0–31.1 (91.1–97.8)	30.9–33.1 (97.0–103.9)	32.8–35.1 (103.1–110.1)
	4	31.2–33.3 (97.9–104.7)	33.0–35.3 (103.8–110.8)	35.0–37.2 (109.8–116.9)	36.9–39.1 (115.9–123.0)	38.8–41.1 (122.0–129.2)
	5	37.1–39.3 (116.5–123.6)	39.0–41.3 (122.5–129.6)	40.9–43.2 (128.6–135.8)	42.9–45.2 (134.8–142.0)	44.9–47.2 (140.9–148.3)
	6	43.0–45.4 (135.2–142.5)	45.0–47.3 (141.3–148.6)	46.9–49.3 (147.4–154.8)	48.9–51.3 (153.7–161.0)	50.9–53.2 (159.9–167.3)
	7	49.0–51.4 (154.0–161.3)	51.0–53.3 (160.1–167.5)	52.9–55.3 (166.3–173.7)	54.9–57.3 (172.5–180.0)	56.9–59.3 (178.8–186.2)
	8	55.0–57.4 (172.9–180.3)	57.0–59.4 (179.0–186.5)	59.0–61.3 (185.2–192.7)	61.0–63.3 (191.5–199.0)	62.9–65.3 (197.8–205.3)
	9	61.0–63.4 (191.7–199.2)	63.0–65.4 (197.8–205.4)	65.0–67.4 (204.1–211.7)	67.0–69.4 (210.4–217.9)	69.0–71.4 (216.7–224.3)
	10	67.0–69.5 (210.6–218.2)	69.0–71.4 (216.8–224.4)	71.0–73.4 (223.1–230.6)	73.0–75.4 (229.4–237.0)	75.0–77.4 (235.6–243.2)
	11	73.1–75.5 (229.6–237.1)	75.0–77.5 (235.7–243.3)	77.0–79.5 (242.0–249.7)	79.0–81.5 (248.3–256.0)	81.0–83.5 (254.6–262.3)
	12	79.1–81.5 (248.5–256.2)	81.1–83.5 (254.7–262.3)	83.1–85.5 (260.9–268.7)	85.1–87.5 (267.3–274.9)	87.1–89.5 (273.6–281.3)
	13	85.1–87.6 (267.5–275.1)	87.1–89.6 (273.6–281.4)	89.1–91.6 (280.0–287.6)	91.1–93.6 (286.3–294.0)	93.1–95.6 (292.6–300.3)
	14	91.2–93.6 (286.4–294.1)	93.2–95.6 (292.7–300.3)	95.1–97.6 (298.9–306.7)	97.2–99.6 (305.3–313.0)	99.2–101.6 (311.6–319.3)
	15	97.2–99.7 (305.4–313.2)	99.2–101.7 (311.6–319.3)	101.2–103.7 (317.9–325.7)	103.2–105.7 (324.3–332.0)	105.2–107.7 (330.6–338.4)
	16	103.3–105.7 (324.4–332.2)	105.2–107.7 (330.6–338.4)	107.3–109.7 (337.0–344.7)	109.3–111.7 (343.3–351.1)	111.3–113.8 (349.7–357.4)
	17	109.3–111.8 (343.4–351.1)	111.3–113.8 (349.6–357.4)	113.3–115.8 (355.9–363.7)	115.3–117.8 (362.3–370.1)	117.4–119.8 (368.7–376.4)
	18	115.4–117.8 (362.4–370.2)	117.4–119.8 (368.7–376.4)	119.3–121.8 (374.9–382.8)	121.4–123.9 (381.4–389.1)	123.4–125.9 (387.7–395.5)
	19	121.4–123.9 (381.5–389.2)	123.4–125.9 (387.7–395.5)	125.4–127.9 (394.1–401.8)	127.4–129.9 (400.4–408.2)	129.5–132.0 (406.7–414.6)
	20	127.5–130.0 (400.4–408.3)	129.5–131.9 (406.7–414.5)	131.5–134.0 (413.1–420.9)	133.5–136.0 (419.4–427.2)	135.5–138.0 (425.8–433.6)
	21	133.5–136.0 (419.5–427.3)	135.5–138.0 (425.8–433.6)	137.5–140.0 (432.1–439.9)	139.6–142.1 (438.4–446.3)	141.6–144.1 (444.8–452.6)
	22	139.6–142.1 (438.5–446.4)	141.6–144.1 (444.7–452.6)	143.6–146.1 (451.1–459.0)	145.6–148.1 (457.5–465.3)	147.6–150.2 (463.8–471.7)
	23	145.6–148.1 (457.6–465.4)	147.6–150.1 (463.7–471.6)	149.7–152.1 (470.2–478.0)	151.7–154.2 (476.5–484.4)	153.7–156.2 (482.8–490.7)
	24	151.7–154.2 (476.6–484.4)	153.7–156.2 (482.9–490.7)	155.8–158.2 (489.3–497.1)	157.7–160.2 (495.5–503.4)	159.7–162.3 (501.9–509.8)

- a. The first numbers represent the outside pipe diameter. The numbers between parenthesis represent the pipe circumference.

(continued from facing page)

		Number of short links (Ordering number: ChainScan-A-SLink)				
		5	6	7	8	9
Number of long links (Ordering number: ChainScan-A-LgLink)	0	15.6–17.8 (49.0–55.9)	17.7–19.9 (55.6–62.5)	19.8–22.0 (62.1–69.1)	21.8–24.1 (68.6–75.6)	23.9–26.1 (75.0–82.1)
	1	N/A	24.4–26.6 (76.5–83.5)	26.3–28.6 (82.7–89.7)	28.3–30.6 (89.0–96.1)	30.3–32.6 (95.1–102.3)
	2	28.7–30.9 (90.0–97.0)	30.6–32.8 (96.1–103.1)	32.6–34.8 (102.3–109.4)	34.5–36.8 (108.5–115.7)	36.5–38.8 (114.7–121.9)
	3	34.7–37.0 (109.1–116.3)	36.7–39.0 (115.3–122.5)	38.7–41.0 (121.5–128.7)	40.6–43.0 (127.7–135.0)	42.6–45.0 (133.9–141.3)
	4	40.8–43.1 (128.1–135.4)	42.8–45.1 (134.3–141.7)	44.7–47.1 (140.6–147.8)	46.7–49.1 (146.8–154.2)	48.7–51.1 (153.0–160.4)
	5	46.8–49.2 (147.1–154.4)	48.8–51.2 (153.4–160.7)	50.8–53.1 (159.6–167.0)	52.8–55.2 (165.8–173.3)	54.8–57.2 (172.1–179.6)
	6	52.9–55.2 (166.1–173.5)	54.8–57.2 (172.3–179.8)	56.8–59.2 (178.6–186.1)	58.8–61.2 (184.8–192.3)	60.8–63.2 (191.1–198.7)
	7	58.9–61.3 (185.1–192.5)	60.9–63.3 (191.3–198.8)	62.9–65.3 (197.6–205.1)	64.9–67.3 (203.8–211.4)	66.9–69.3 (210.1–217.7)
	8	64.9–67.3 (204.0–211.5)	66.9–69.3 (210.3–217.9)	68.9–71.3 (216.5–224.1)	70.9–73.4 (222.9–230.5)	72.9–75.4 (229.1–236.8)
	9	71.0–73.4 (223.0–230.5)	73.0–75.4 (229.2–236.9)	75.0–77.4 (235.6–243.1)	77.0–79.4 (241.8–249.5)	79.0–81.4 (248.2–255.8)
	10	77.0–79.4 (241.9–249.6)	79.0–81.5 (248.2–255.9)	81.0–83.5 (254.6–262.2)	83.0–85.5 (260.8–268.5)	85.0–87.5 (267.2–274.8)
	11	83.1–85.5 (260.9–268.6)	85.1–87.5 (267.3–274.9)	87.1–89.5 (273.5–281.3)	89.1–91.5 (279.9–287.5)	91.1–93.5 (286.2–293.9)
	12	89.1–91.6 (280.0–287.6)	91.1–93.6 (286.2–294.0)	93.1–95.6 (292.6–300.3)	95.1–97.6 (298.9–306.6)	97.2–99.6 (305.2–313.0)
	13	95.1–97.6 (298.9–306.7)	97.2–99.6 (305.3–313.0)	99.2–101.6 (311.6–319.3)	101.2–103.7 (317.9–325.7)	103.2–105.7 (324.3–332.0)
	14	101.2–103.7 (317.9–325.7)	103.2–105.7 (324.3–332.0)	105.2–107.7 (330.6–338.4)	107.3–109.7 (337.0–344.7)	109.3–111.7 (343.3–351.0)
	15	107.3–109.7 (337.0–344.7)	109.3–111.7 (343.3–351.0)	111.3–113.8 (349.6–357.4)	113.3–115.8 (356.0–363.7)	115.3–117.8 (362.3–370.1)
	16	113.3–115.8 (356.0–363.7)	115.3–117.8 (362.3–370.1)	117.4–119.8 (368.7–376.4)	119.4–121.9 (375.0–382.8)	121.4–123.9 (381.3–389.2)
	17	119.4–121.8 (375.0–382.8)	121.4–123.9 (381.4–389.2)	123.4–125.9 (387.7–395.5)	125.4–127.9 (394.0–401.9)	127.4–129.9 (400.4–408.2)
	18	125.4–127.9 (394.0–401.9)	127.4–129.9 (400.4–408.2)	129.5–132.0 (406.7–414.5)	131.5–134.0 (413.1–420.9)	133.5–136.0 (419.4–427.2)
	19	131.5–134.0 (413.1–420.9)	133.5–136.0 (419.4–427.2)	135.5–138.0 (425.8–433.6)	137.5–140.1 (432.1–440.0)	139.6–142.1 (438.5–446.3)
	20	137.5–140.0 (432.1–439.9)	139.6–142.0 (438.4–446.3)	141.6–144.1 (444.8–452.7)	143.6–146.1 (451.2–459.0)	145.6–148.1 (457.5–465.4)
	21	143.6–146.1 (451.1–459.0)	145.6–148.2 (457.5–465.4)	147.7–150.1 (463.9–471.7)	149.7–152.2 (470.2–478.0)	151.7–154.2 (476.6–484.5)
	22	149.7–152.2 (470.2–478.1)	151.7–154.2 (476.5–484.4)	153.7–156.2 (482.9–490.7)	155.7–158.2 (489.3–497.2)	157.8–160.3 (495.6–503.5)
	23	155.8–158.2 (489.4–497.1)	157.8–160.3 (495.6–503.5)	159.8–162.3 (501.9–509.8)	161.8–164.3 (508.3–516.2)	163.8–166.4 (514.6–522.7)
	24	161.8–164.3 (508.3–516.2)	163.8–166.3 (514.6–522.5)	165.8–168.3 (521.0–528.9)	167.8–170.4 (527.3–535.3)	169.9–172.4 (533.7–541.6)





---

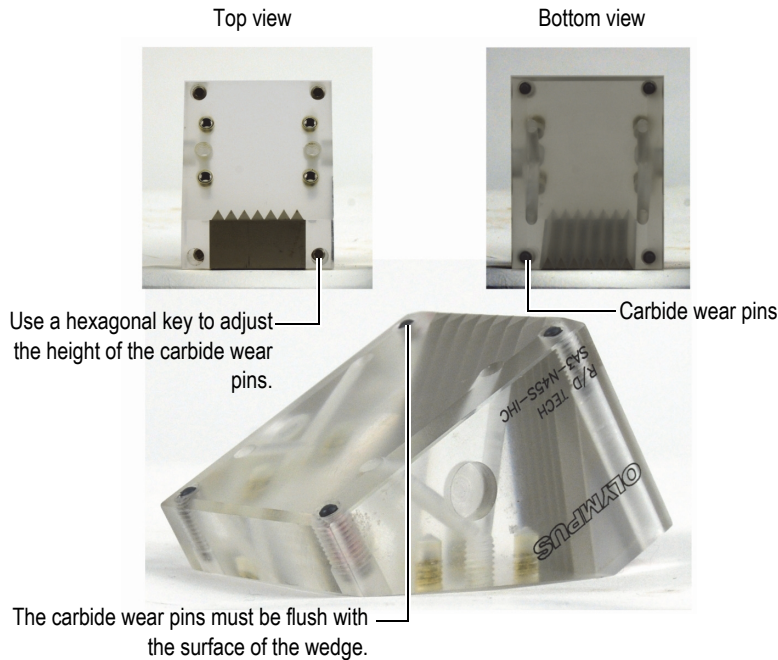
## Appendix B: Wedge-Probe Assembly Maintenance

---

The following procedures are not specific to the ChainSCANNER. They are nevertheless useful information to complete this manual.

### B.1 Adjustment of the Carbide Wear-Pins on Wedges

Wedges are designed to hold a transducer or a phased array probe in order to ensure an adequate ultrasonic diffusion through the surface being inspected, and to direct the couplant flow correctly. To limit wear to the wedge, carbide wear-pins can be inserted at each corner of the contact surface of the wedge (see Figure 7-2 on page 78).



**Figure 7-2 Adjusting the wedge's carbide wear pins**

### **To adjust the carbide wear-pins on a wedge**

1. Turn off the couplant flow.
2. Use a hexagonal key to adjust the height of the carbide wear pins on each installed wedge. Ensure that the top of each pin is flush to the surface of the wedge (see Figure 7-2 on page 78).

## **B.2 Replacing a Conventional Ultrasonic Transducer**

To replace a conventional ultrasonic transducer, the assembly holding the transducer must be removed and partially disassembled.

## To replace a conventional ultrasonic transducer

1. Turn off the couplant flow.
2. Disconnect the couplant tubes from the couplant source, or from the wedge.
3. Remove the scanner from the inspection surface.
4. Disconnect the transducer cable.
5. Lift the swing arm until the latch engages into its higher position (see “To latch the swing arm” on page 28).
6. Use the wing knob to release the probe arm that holds the yoke parts together (see Figure 7-3 on page 81).
7. Ensure that the transducer cable is disconnected, and then unscrew the transducer from the wedge.  
It is possible to unscrew the transducer without removing the wedge.
8. Screw the new transducer onto the wedge.

---

<b>NOTE</b>
-------------

Before installing a new transducer on the wedge, ensure that there is a sufficient amount of couplant between the transducer and the wedge.

---

9. Tighten the transducer on the wedge.
- 



<b>CAUTION</b>
----------------

Do not overtighten the transducer; overtightening might crack the wedge.

---

10. Reinstall the wedge in the yoke.
11. Lift the swing arm slightly.
12. Pull out the latch knob.
13. Release the swing arm slowly to its lower position (see “To unlatch the swing arm” on page 28).

## B.3 Replacing a Phased Array Probe

To replace a phased array ultrasonic probe, the probe assembly must be removed and partially disassembled.

### To replace a phased array probe

1. Turn off the couplant flow.
2. Disconnect the couplant tubes from the couplant source.
3. Disconnect the probe cable from the instrument.

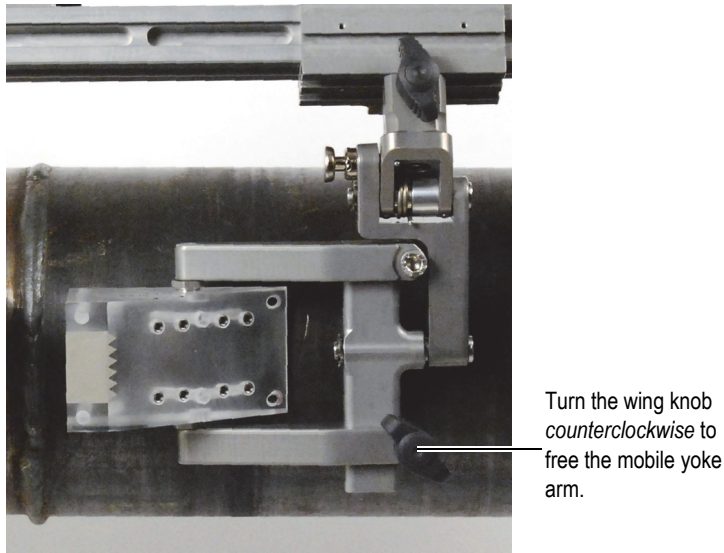


#### CAUTION

To prevent any damage to the Hypertronics connector pins, be sure to always install the protective cover when the probe cable is disconnected.

---

4. Remove the scanner from the inspection surface.
5. Lift the swing arm until the latch engages into its higher position (see “To latch the swing arm” on page 28).



**Figure 7-3 The wing knob holding the mobile yoke arm**

6. Use the wing knob to free the mobile yoke arm that holds the yoke parts together (see Figure 7-3 on page 81).
7. Using a cross-headed screwdriver, unscrew the screws that hold the probe on the wedge (either two or four screws, depending on the model), and then remove the probe.
8. Install the new probe onto the wedge.

---

<b>NOTE</b>
-------------

Before installing a new probe on the wedge, ensure that there is a sufficient amount of couplant between the probe and the wedge.

---

9. Tighten the screws that hold the probe on the wedge.



**CAUTION**

Do not overtighten the screws: overtightening might crack the wedge.

---

10. Reinstall the wedge-probe assembly on the yoke.
11. Lift the swing arm slightly.
12. Pull out the latch knob.
13. Release the swing arm slowly to its lower position (see “To unlatch the swing arm” on page 28).

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