HSMT-Flex
Manual Weld Scanner
User's Manual

10-029230-01EN — Rev. 3
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.

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

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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

DLA	Dual Linear Array
EFUP	environment-friendly use period
NPT	National Pipe Thread
OD	outside diameter
OEM	Original Equipment Manufacturer
SLA	spring-loaded arms
UT	ultrasonic testing
WD	wire diameter

Important Information — Please Read Before Use

Intended Use

The HSMT+Flex is designed to perform nondestructive inspections on industrial and commercial materials.

WARNING

Do not use the HSMT+Flex 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 HSMT+Flex 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 HSMT+Flex, 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 HSMT+Flex 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.

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 HSMT+Flex 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: HSMT+Flex
Model: HSMT-Flex-MR/HSMT-Flex-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 provides instructions for assembling, installing, and operating the HSMT-Flex scanner. The HSMT-Flex scanner is a versatile pipe and plate scanner that can be used to inspect pipes with a diameter of 114 mm (4.5 in.) or greater.

The major characteristic of the scanner is its ability to bend in the center. This feature enables the scanner to fit on smaller pipes, and also brings the force of the spring-loaded arm in the radial direction of the pipes for better stability of the wedge and optimum data acquisition. For pipes smaller than 305 mm (12 in.) OD, optional pivoting probe holders can also be installed on the outside of the scanner.

The HSMT-Flex also has one slidable side frame. This feature enables probes to be mounted on the outside of the scanner, providing a configuration that is suitable for hard-to-reach places such as pipe-to-component welds.

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 HSMT-Flex scanner components. The scanner is shown in Figure 1-1 on page 25. A description of the components follows.

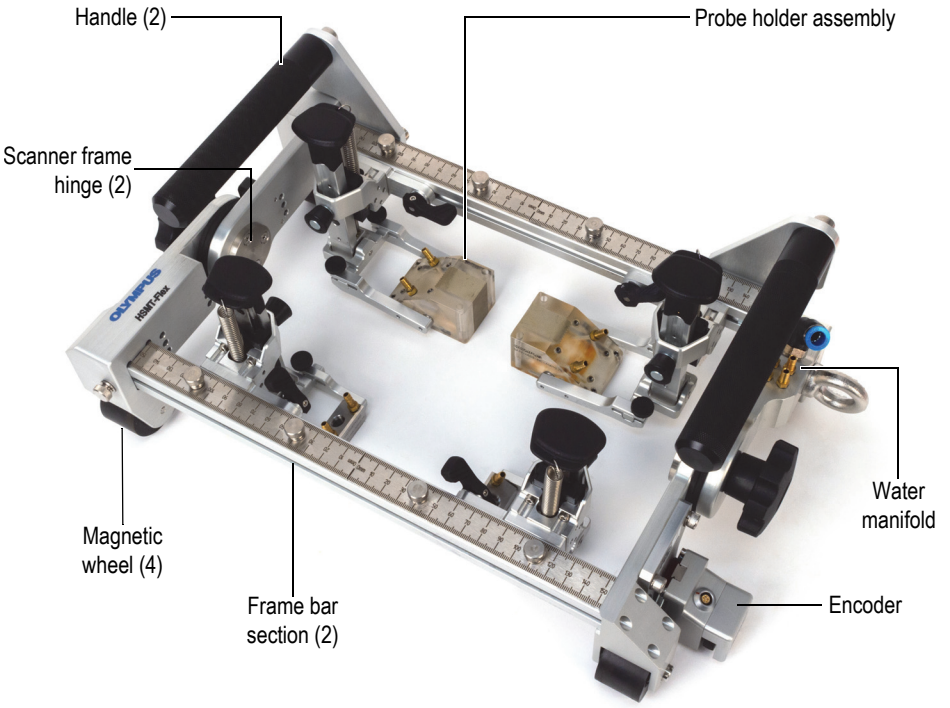

Figure 1-1 HSMT-Flex scanner

Frame

The rectangular scanner frame is manually moved across an inspection surface by an operator. Two handles are provided to control the scanner. Four magnetic wheels—one at each corner—provide a stable inspection movement.

An adjustable hinge changes the angle between the frame bar sections to enable scanning on surfaces with a smaller radius of curvature (Figure 1-2 on page 26).

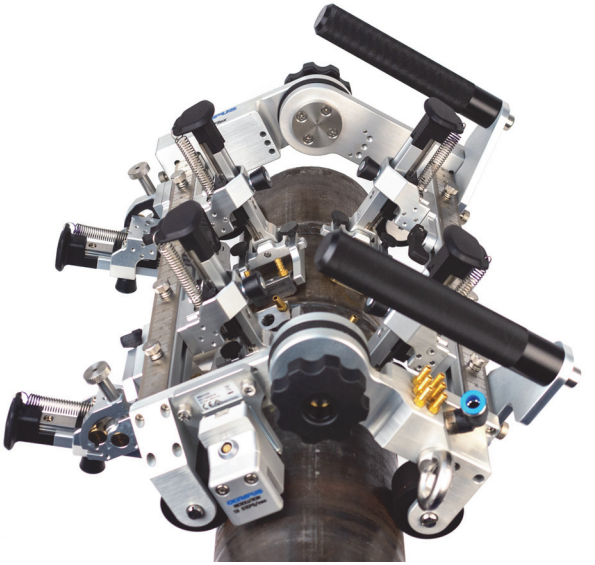

Figure 1-2 Adjustable angle frame

The two frame bar sections can hold up to a total of eight probes. These can be either conventional ultrasonic transducers or phased array probes. On smaller pipes, if more than four probes are to be used, a special pivoting bracket is required (Figure 1-8 on page 30).

An attachment ring is provided to attach a safety line or an umbilical cable. It is located at the water manifold corner.

Wheels

The wheels are magnetized with polyurethane rolling surface to allow a smooth and steady movement over rough surfaces (Figure 1-3 on page 27).

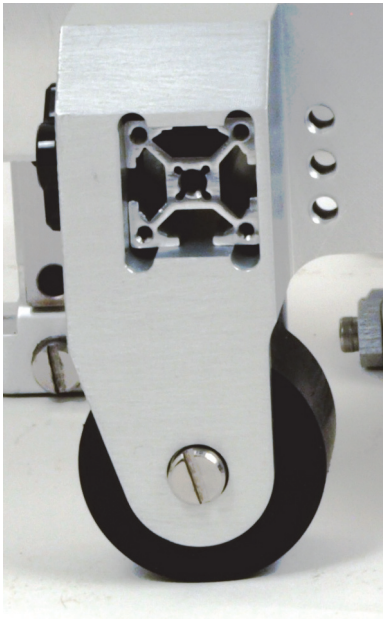

Figure 1-3 Magnetized wheel

WARNING

To avoid injury, be careful when handling the magnetic wheels; the magnetic pull of the wheels is strong and could cause harm such as a pinched finger—for example, between two wheels, or between a wheel and a steel surface.

Encoder

A wheel encoder measures the scanner displacement, to determine the position on the scan axis (Figure 1-4 on page 28).

The encoder is waterproof and comes with a cable. The encoder is compatible with the OmniScan SX, MX2, X3, and FOCUS PX as well as with the OmniScan MX and the TomoScan FOCUS LT with the use of an adaptor (Table 12 on page 89). The encoder is also spring-loaded to ensure that it remains in contact with the inspection surface, with adequate pressure for different pipe diameters.

The HSMT-Flex scanner offers a total of six possible locations for the encoder on the frame (see “Changing the Encoder Location” on page 40).

Figure 1-4 Encoder for measuring scanner position on the surface

Water manifold

Six outlets branch out from one main water intake to supply the wedges (Figure 1-5 on page 28).

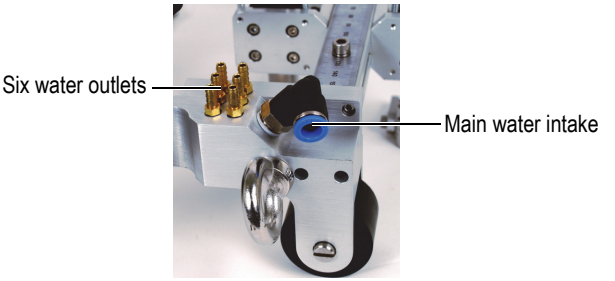

Figure 1-5 Water manifold

Rulers for probe position

Rulers are provided on top of the scanner frame bar sections to help accurately position the probe or transducer holders (Figure 1-6 on page 29).

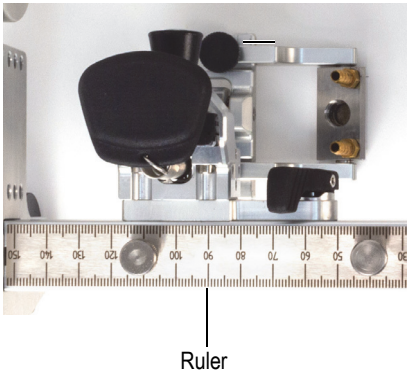

Figure 1-6 Ruler to help position the probe or transducer holders

Frame bar sections

The frame bar sections between the wheels can be replaced with sections of a different length, depending on the physical constraints and probe-configuration requirements (Figure 1-7 on page 29).

Figure 1-7 Optional frame sections

Pivoting probe holder bracket

An optional pivoting bracket (part number: Q7750226) allows for using probe holders on the external side of the frame on a smaller radius of curvature (Figure 1-8 on page 30).

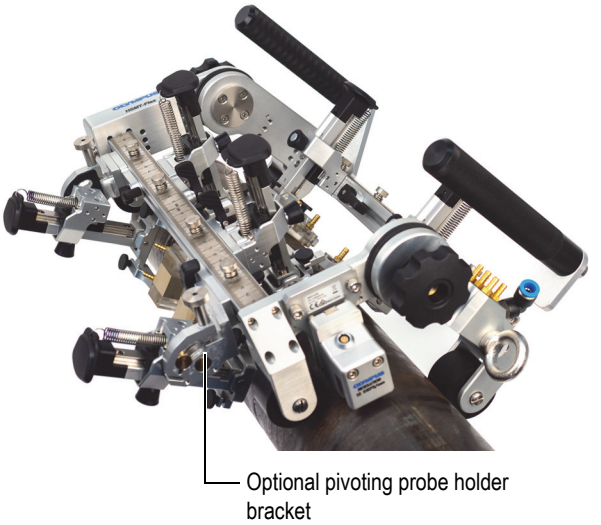

Figure 1-8 Using the scanner on a smaller radius of curvature.

Probe holder

The probe holders were developed to improve usability and data quality. All common adjustment operations can be done without using any tools, the pressure applied to the wedge can be easily changed, and the same yoke can be used to hold different wedge sizes.

The probe holder offers increased stiffness for precise and stable probe positioning. The probe holder components are illustrated in Figure 1-9 on page 31.

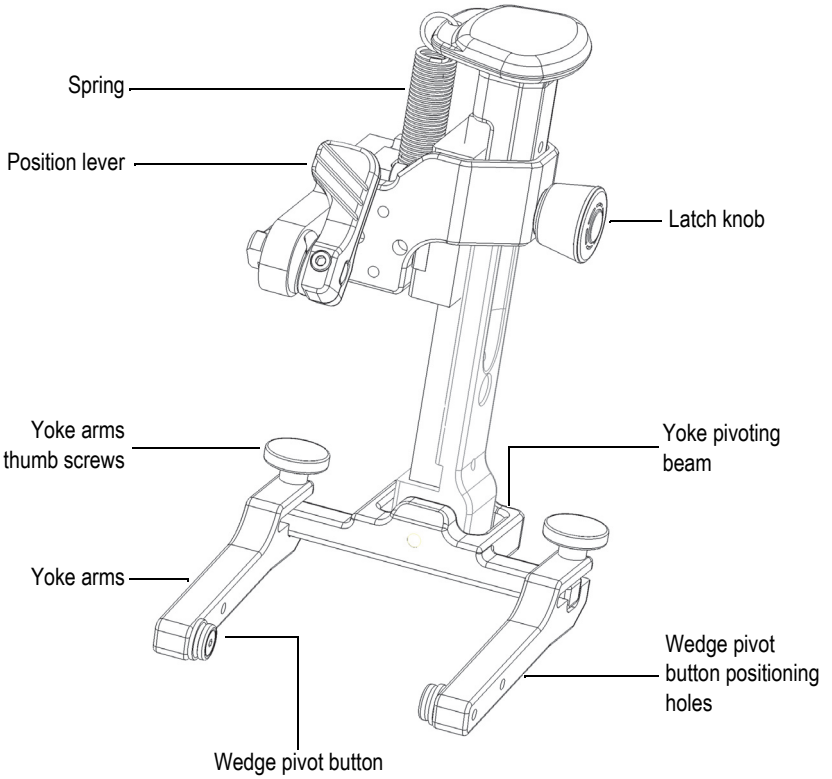

Figure 1-9 Probe holder components

Positioning lever

A quick action lever is used to loosen the probe holder so it can slide on the probe holder mounting rail or be removed from the frame altogether.

Springs

Three different sets of springs are provided with different spring rates, and they can quickly be changed to adjust the pressure between the wedge and the part for different configurations.

Latch knob

The latch system is used to hold the probe in a raised position to ease any manipulation of the wedge.

Yoke arm thumb screw

Used to quickly loosen a yoke arm to remove or install a probe. Can also be used to set the yoke for different wedge widths.

Wedge pivot buttons

There are two models of wedge pivot buttons. A 8 mm diameter set for phased array probes and a 5 mm diameter set for TOFD or UT transducers as well as DLA probes.

Wedge button positioning holes

If there is enough room, the wedge pivot button can be positioned closer to the yoke pivoting beam for more stability of the probe during the inspection.

Yoke arms

Two different yoke arm lengths are provided with the HSMT-Flex scanner. A longer one for phased array probes and a shorter one for TOFD or UT transducers (Figure 1-10 on page 32, Figure 1-11 on page 33, Figure 1-12 on page 33, and Figure 1-13 on page 34). For yoke dimensions, see “Specifications” on page 87.

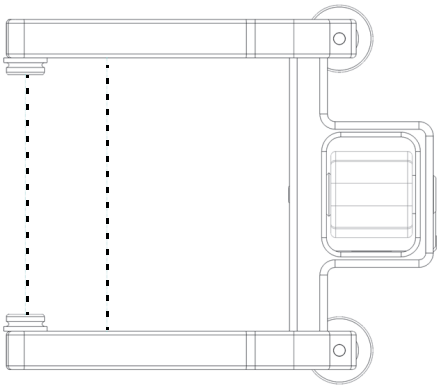

Figure 1-10 Long yoke with maximum (40 mm) wedge width setting

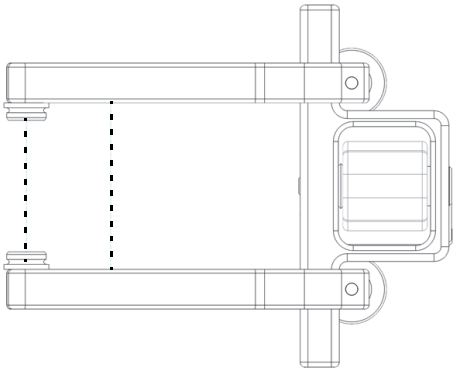

Figure 1-11 Long yoke with minimum (31.75 mm) wedge width setting

NOTE

The long yoke has a two-button position as shown by the dotted lines.

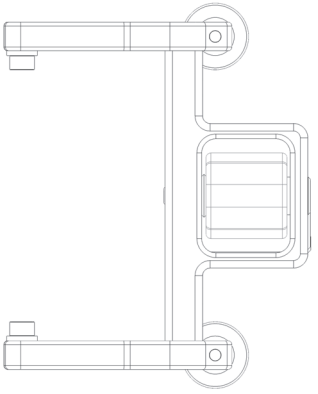

Figure 1-12 Short yoke with maximum (40 mm) wedge width setting

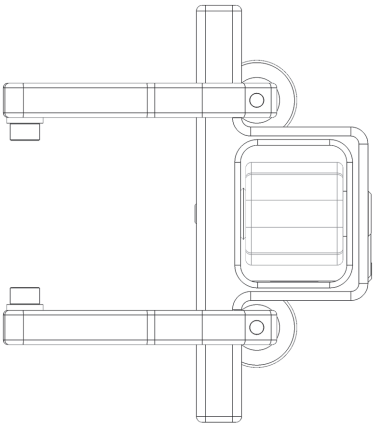

Figure 1-13 Short yoke with minimum (31.75 mm) wedge width setting

IMPORTANT

It is important to ensure that both yoke arms are properly aligned with the center of the yoke pivoting beam. Having unaligned yoke arms could result in the probe flipping during the inspection, compromising data acquisition. For correct and incorrect alignment examples, see Figure 1-14 on page 34 and Figure 1-15 on page 35 respectively.

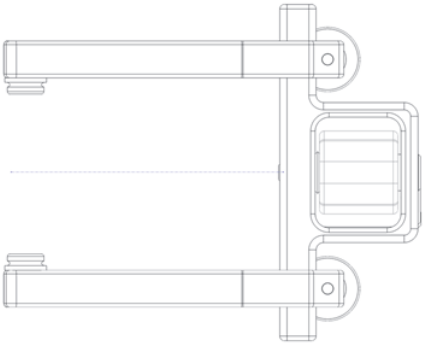

Figure 1-14 Correct alignment of the yoke arms

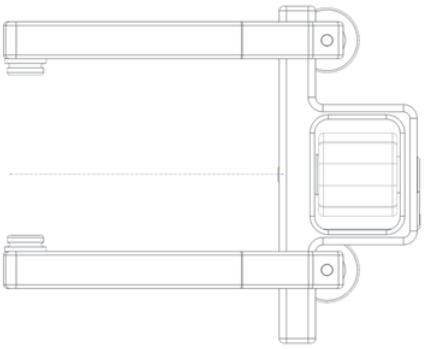

Figure 1-15 Incorrect alignment of the yoke arms

2. Scanner Assembly and Setup

The HSMT-Flex scanner is designed so that part changes and adjustments can be easily carried out. Examples of such changes and adjustments are:

- Changing the frame angle (see "Changing the Frame Angle" on page 37).
- Replacing a conventional ultrasonic transducer or phased array ultrasonic probe—and/or wedge—if the inspection application has changed, or in case of equipment malfunctions (see "Installing a Probe Holder on the Scanner" on page 43).
- Replacing wheels (see "Replacing Wheels" on page 61).
- Changing the frame sections (see "Changing the Frame Bar Sections" on page 57).
- Changing the encoder position on the frame (see "Changing the Encoder Location" on page 40).

2.1 Changing the Frame Angle

The frame angle—and consequently, the probe orientation on the surface being inspected—is changed by using the frame hinges and the angle scale.

To change the frame angle

1. Loosen the knobs on the two frame hinges (Figure 2-1 on page 38).

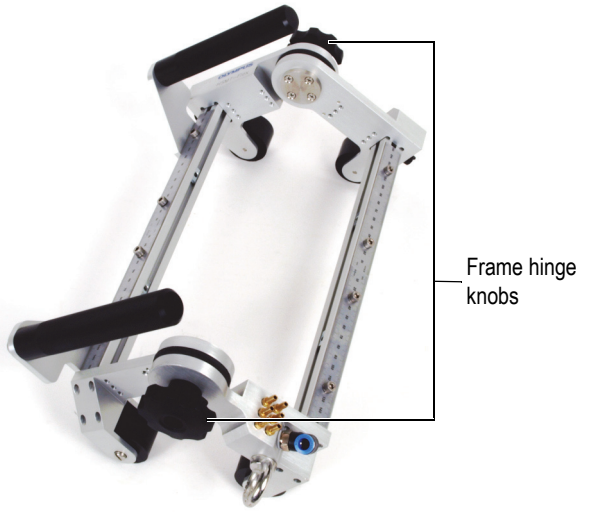

Figure 2-1 Frame angle adjustment

2. Set the desired angle using the scale (Figure 2-2 on page 38).

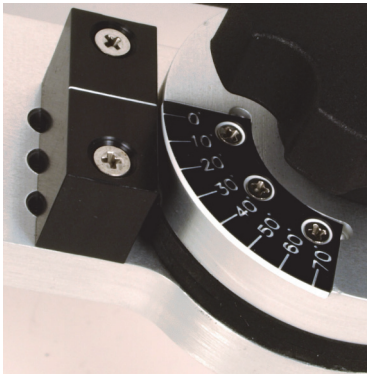

Figure 2-2 Angle scale

3. Tighten the two frame hinge knobs.

4. Install the scanner on the surface to be inspected. The yokes must be perpendicular to the probe holder to ensure an accurate reading (Figure 2-3 on page 39).

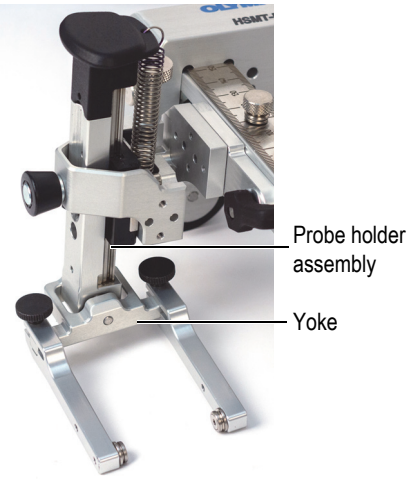

Figure 2-3 Yokes perpendicular to the probe holder

5. When using the HSMT-Flex scanner on smaller pipes, verify that the yokes are not in contact with each other (Figure 2-4 on page 39).

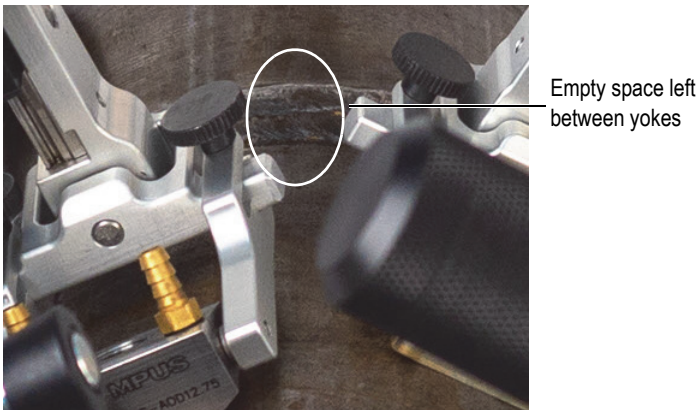

Figure 2-4 Yokes must not be in contact with each other

6. Use the optional pivoting probe holder bracket (part number: Q7750226) when the configuration of the HSMT-Flex scanner requires probe holders outside the frame, on pipe diameters smaller than 305 mm (12 in.) (Figure 2-5 on page 40). To rotate the pivoting probe holder, loosen the thumb screw on the top of the rotating bracket and pivot the probe holder until the yoke is perpendicular with the probe holder. The pivoting bracket features predefined angle positions separated by lobes. Make sure to unscrew the thumb screw enough to enable a smooth rotation.

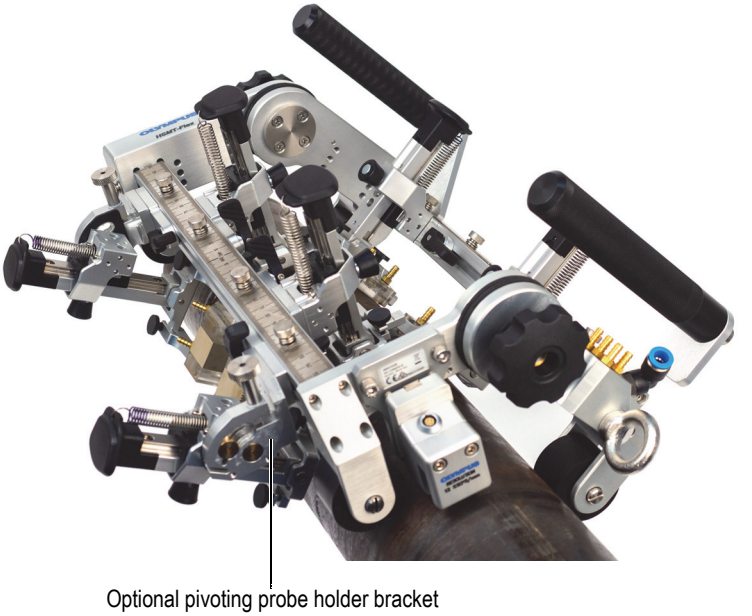

Figure 2-5 Optional pivoting probe holder bracket

2.2 Changing the Encoder Location

There are six possible locations for mounting the encoder: two locations are provided on the outside of the frame, near two of the corners; four other locations are provided on the inside of the frame, near the corners (Figure 2-6 on page 41). Use a hexagonal key to install or remove the encoder.

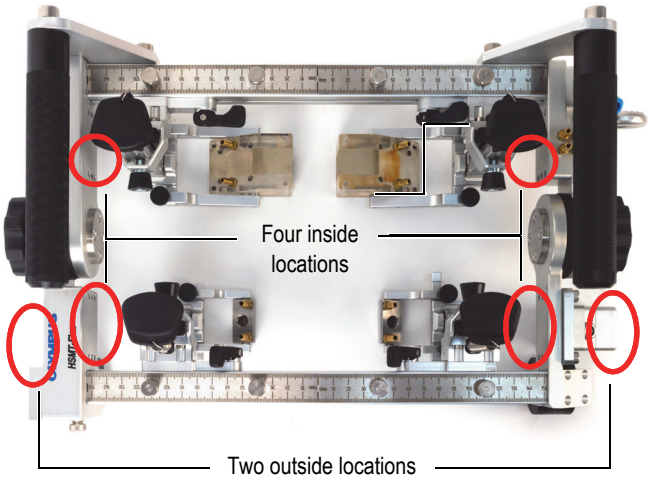

Figure 2-6 Encoder mounting locations

2.3 Attaching the Umbilical Cable

The umbilical cable can be attached to the HSMT-Flex using the umbilical bracket (Figure 2-7 on page 42).

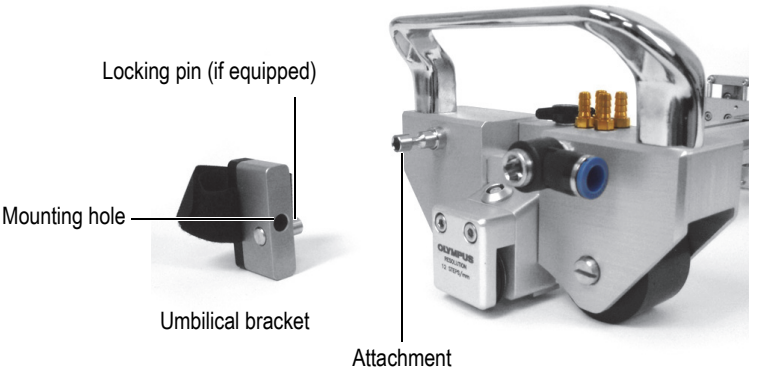

Figure 2-7 Umbilical-cable attachment and bracket

To attach the umbilical cable

1. Press the locking pin on the umbilical bracket, slide the mounting hole over the attachment on the HSMT-Flex, and then release the pin (Figure 2-8 on page 42).

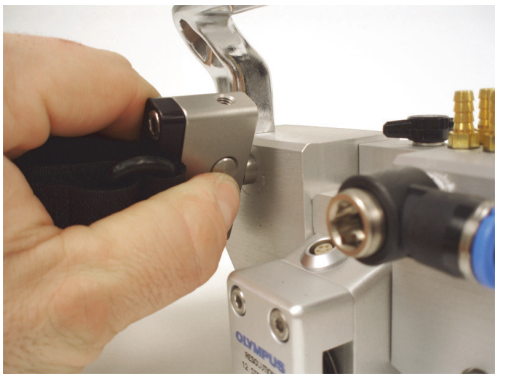

Figure 2-8 Umbilical-cable attachment

2. Loosen the strap, wrap it around the umbilical cable, then reinsert the strap into the buckle and tighten it (Figure 2-9 on page 43).

Figure 2-9 Loosened strap (*left*) and tightened strap (*right*)

2.4 Installing a Probe Holder on the Scanner

To install a probe holder on the scanner

1. Using the position lever, align the position of the cam pin so that the flat edges are aligned horizontally (Figure 2-10 on page 43).

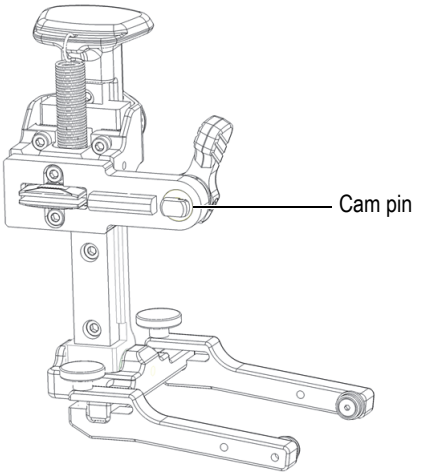

Figure 2-10 Horizontally aligned flat edges

2. Align the probe holder with the rail slot, ensuring that both are parallel to each other (Figure 2-11 on page 44).

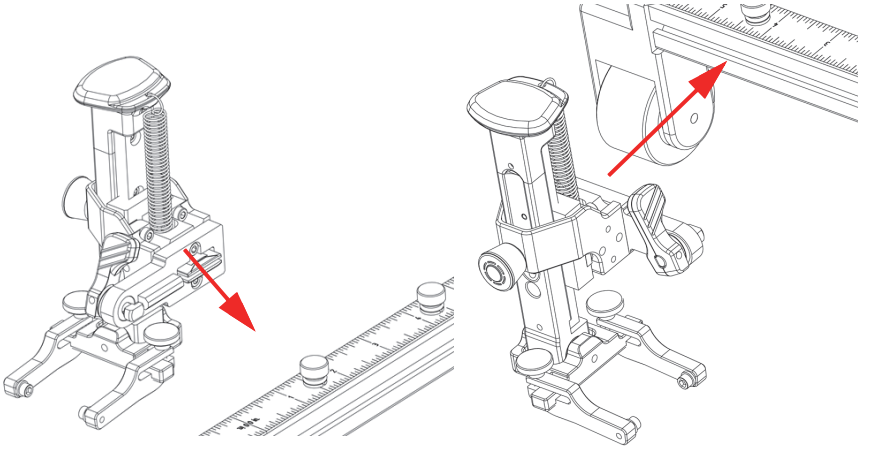

Figure 2-11 Probe holder alignment with the rail slot

3. Firmly press the probe holder into the rail slot, making sure that the cam pin stays aligned horizontally (Figure 2-12 on page 44).

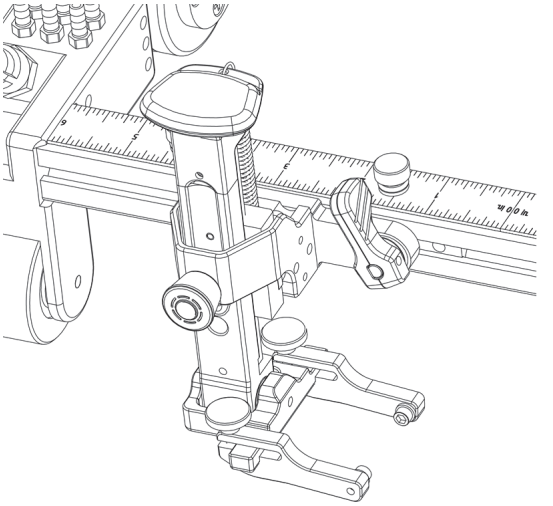

Figure 2-12 Probe holder inserted into the rail slot

4. Rotate the position lever clockwise to lock the probe holder into place (Figure 2-13 on page 45).

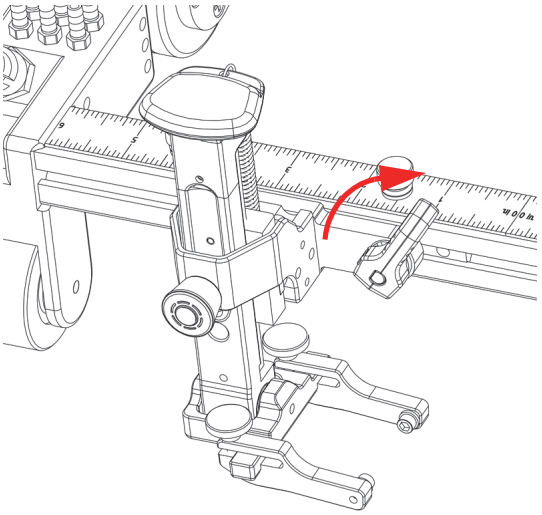

Figure 2-13 Probe holder secured into place

5. To remove the probe holder, unlock the position lever, and pull on the probe holder with a slight upward or downward motion until it comes out of the rail.

2.5 Sliding the Probe Holder

To slide the probe holder

1. Turn the position lever counterclockwise to unlock the probe holder (Figure 2-14 on page 46).

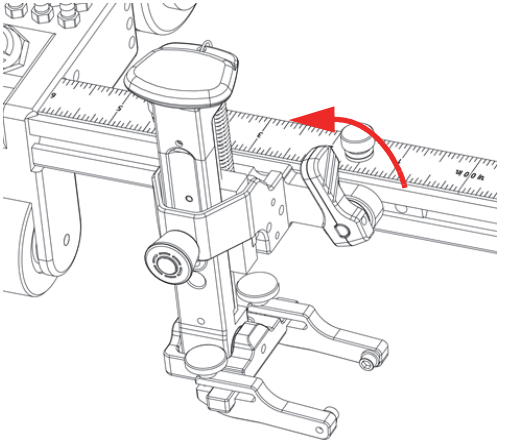

Figure 2-14 Position lever unlocked

2. Slide the probe holder to the desired position (Figure 2-15 on page 46).

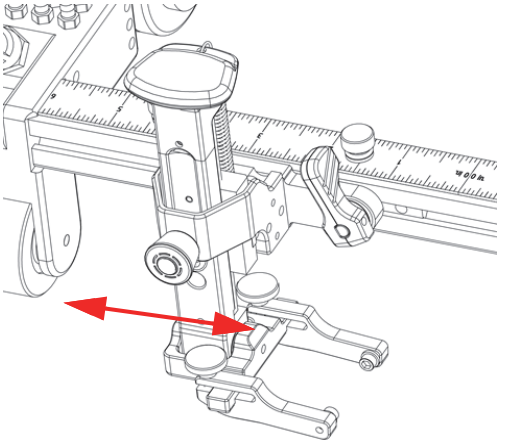

Figure 2-15 Sliding the probe holder

CAUTION

Risk of product damage. Do not over-tighten the position lever or breakage may occur.

3. Turn the position lever clockwise to lock the probe holder into place (Figure 2-16 on page 47).

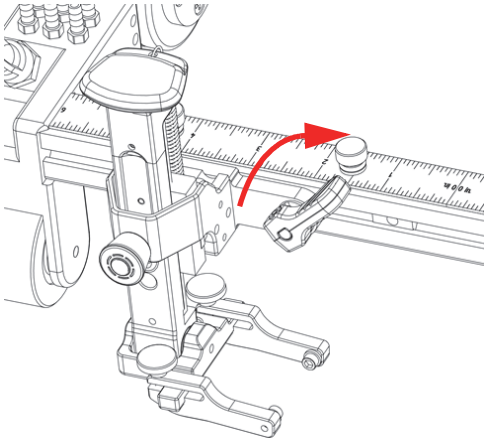

Figure 2-16 Position lever locked

2.6 Operating the Probe Holders

Ultrasonic transducers and phased array probes are mounted on the scanner through the use of probe holders (Figure 2-17 on page 48).

The position lever mounted on the bracket enables easy positioning of the probe holder along the probe holder mounting rails (Figure 2-17 on page 48).

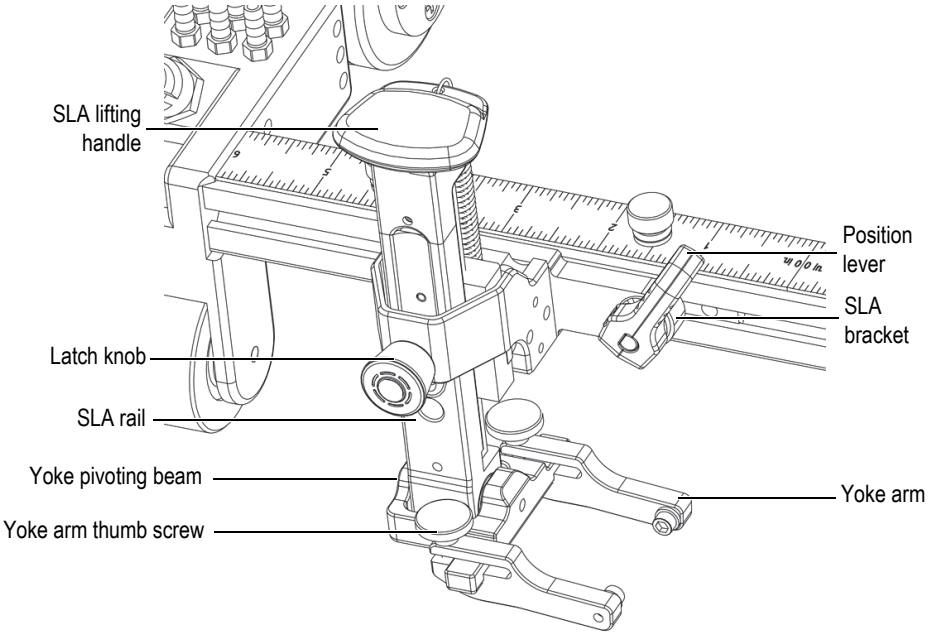

Figure 2-17 Probe holder assembly parts

To install or remove a probe/wedge assembly in the probe holder

1. Loosen the yoke arm thumb screw, and then slide one of the yoke arms outward to the tip of the yoke pivoting beam (Figure 2-18 on page 49).

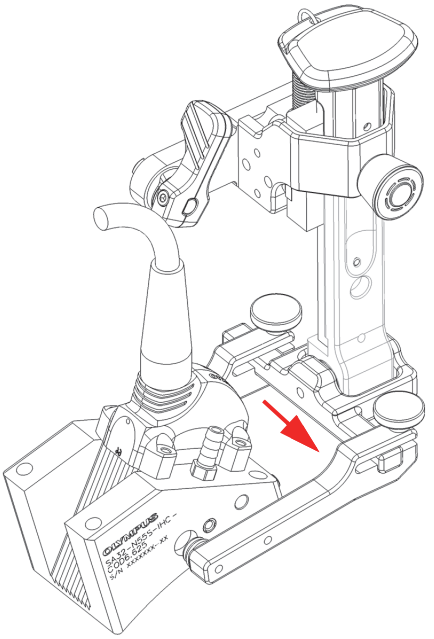

Figure 2-18 Sliding the yoke arm

2. Remove the probe/wedge assembly from the yoke.
3. To reinstall a probe/wedge assembly, align the wedge pivot holes with the button of the yoke arm that is not slid out (Figure 2-19 on page 50).

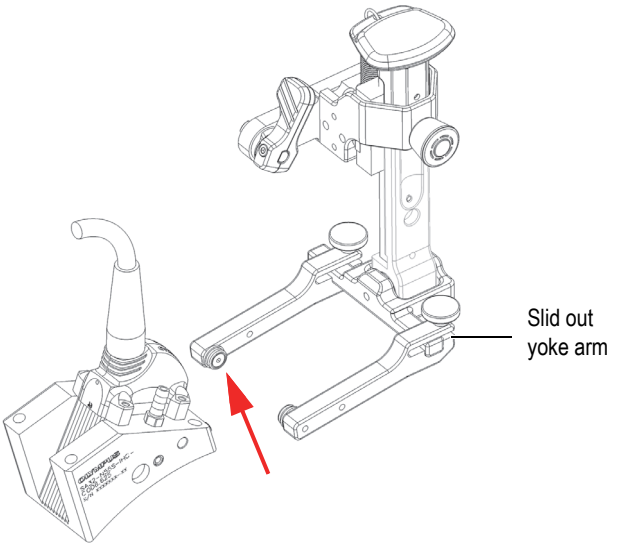

Figure 2-19 Aligning the wedge pivot hole with the yoke arm button

4. Slide the other yoke arm inward on the yoke pivoting beam making sure that the buttons are well inserted in the wedge holes and that the arms are holding the wedge tight.
5. Tighten the yoke arm thumb screw to secure the yoke arm into place. Make sure that the probe is centered with the yoke pivoting beam.

IMPORTANT

It is important to ensure that both yoke arms are properly aligned with the center of the yoke pivoting beam. Having unaligned yoke arms could result in the probe flipping during the inspection, compromising data acquisition. For correct and incorrect alignment examples, see Figure 1-14 on page 34 and Figure 1-15 on page 35 respectively.

2.7 Flipping a Probe Holder

To flip a probe holder from left to right or vice versa

1. Remove the two screws on the SLA bracket with a 2.5 mm hex key (Figure 2-20 on page 51).

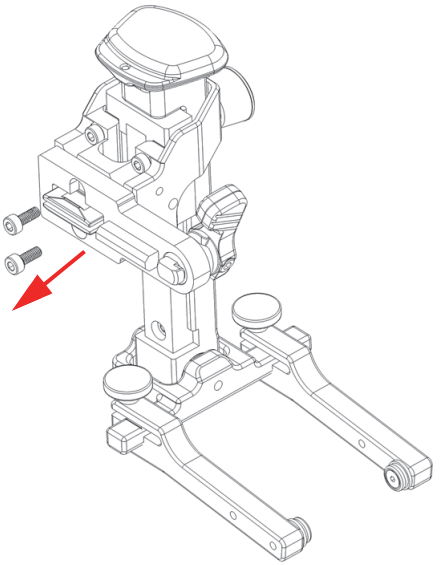

Figure 2-20 Removal of two screws

2. Rotate the SLA bracket 180 degrees (Figure 2-21 on page 52).
3. Put the two screws back into place (Figure 2-21 on page 52).

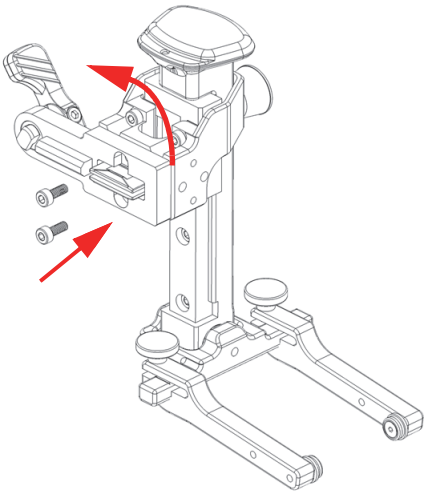

Figure 2-21 Flipping of the SLA bracket

4. Remove the screw of the yoke pivoting beam with a 2.5 mm hex key (Figure 2-22 on page 52).

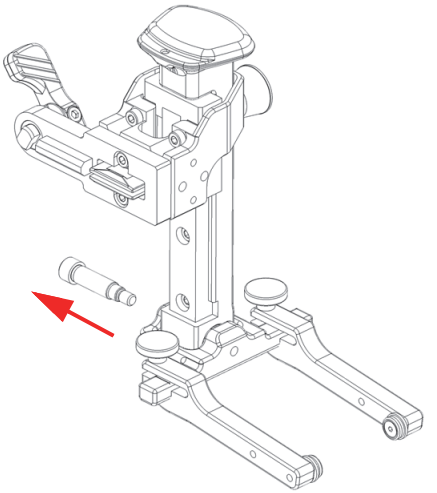

Figure 2-22 Removal of yoke pivoting beam screw

5. Slide the SLA rail out of the yoke pivoting beam (Figure 2-23 on page 53).

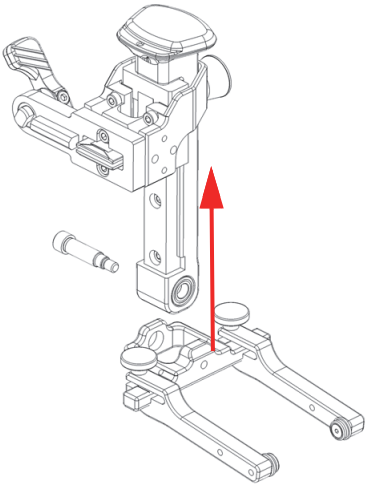

Figure 2-23 Sliding the SLA rail out the yoke pivoting beam

6. Rotate the yoke pivoting beam 180 degrees and slide it back into the SLA rail (Figure 2-24 on page 54).

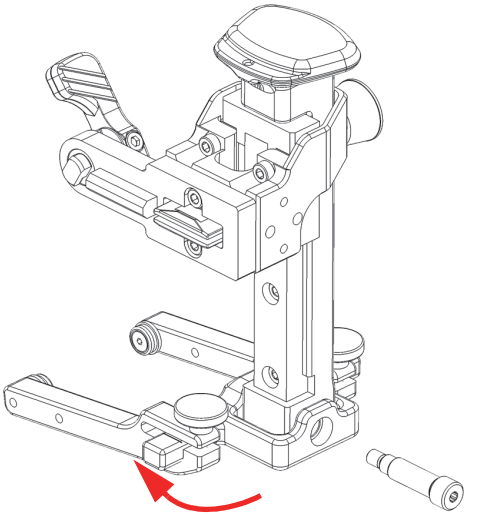

Figure 2-24 Flipping of the yoke pivoting beam

7. Reinstall the screw into the yoke pivoting beam (Figure 2-25 on page 54).

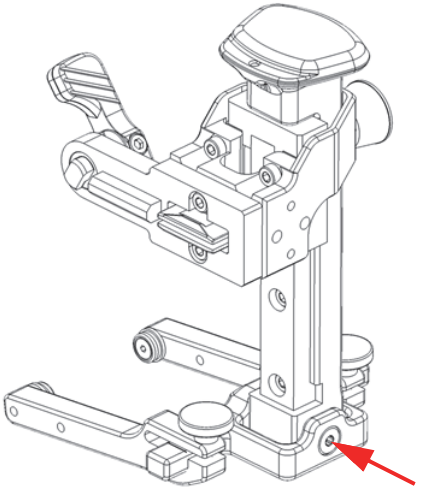

Figure 2-25 Putting the screw back in

2.8 Choosing and Changing the Probe Holder Spring Tension

The springs that are provided for the probe holders have three different spring rates: standard, medium, and strong.

The standard spring are the ones with the least tension but should be able to accommodate most situations. However, there might be situations where the standard spring would not put enough pressure on the probe, resulting in less accurate readings. The springs are color-coded for quick identification:

- The standard spring has a blue mark on the tip.
- The medium spring has no mark.
- The strong spring has a red mark on the tip.

NOTE

Although changing the springs can be done without tools, it is preferred to use a pair of long-nose pliers to change the springs.

WARNING

Use caution when removing or replacing springs under tension as this could cause potential damage or serious personal injury. It is recommended to wear safety glasses when changing the springs.

To choose and change the probe holder spring tension

1. Using a pair of long-nose pliers, remove the bottom part of the spring from the hole of the SLA bracket (Figure 2-26 on page 56).

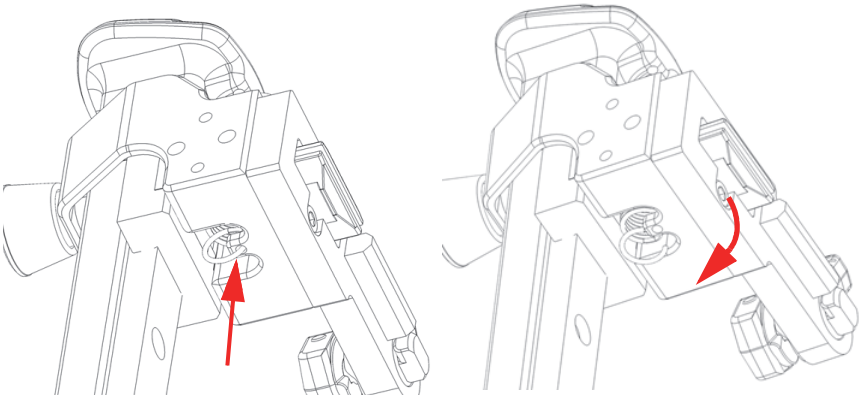

Figure 2-26 Removal of the spring from the fixation hole

2. Remove the top part of the spring from the hole in the SLA lift handle (Figure 2-27 on page 56).

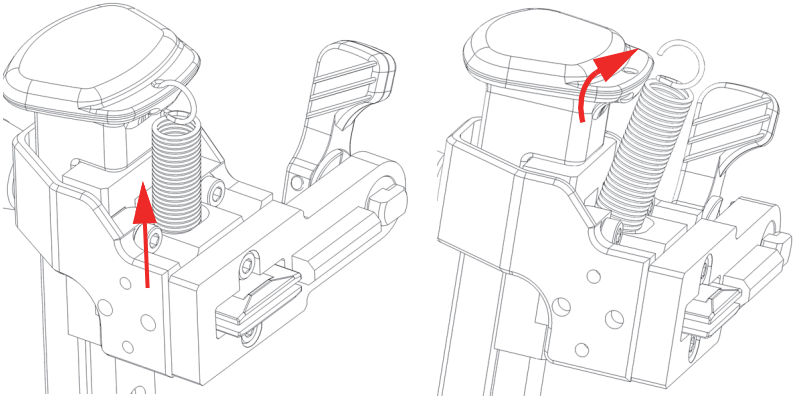

Figure 2-27 Removal of the spring

3. To reinstall a spring, perform step 1 and step 2 in reverse.

2.9 Changing the Frame Bar Sections

When necessary, the frame bar sections of the scanner can be replaced with sections of a different length to suit physical constraints or probe-configuration requirements.

To change the frame bar sections

Refer to Figure 2-28 on page 57 for the logical steps.

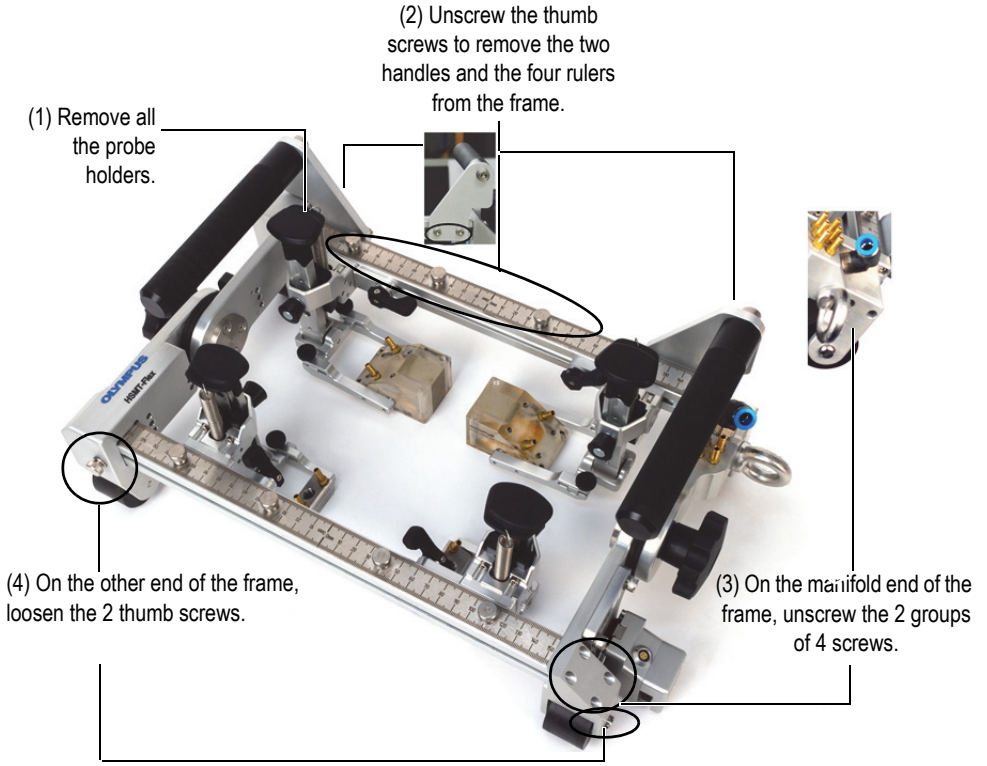

Figure 2-28 Changing the frame bar sections

1. Remove all the probe holders (Figure 2-28 on page 57 [1]).
2. Unscrew the thumb screws to remove the two handles and the four rulers from the frame (Figure 2-28 on page 57 [2]).

3. Use the appropriate hexagonal key to loosen and remove the two groups of four screws on the manifold end of the frame (Figure 2-28 on page 57 [3]).
4. Remove manually the two thumb screws on the other end of the frame (Figure 2-28 on page 57 [4]).
5. Recuperate the T-nuts from the former frame bar sections and install them on the new frame bar sections. Each each handle requires two T-nuts, each rulers requires two, and each frame bar section requires one to attach the side frame (Figure 2-29 on page 58).

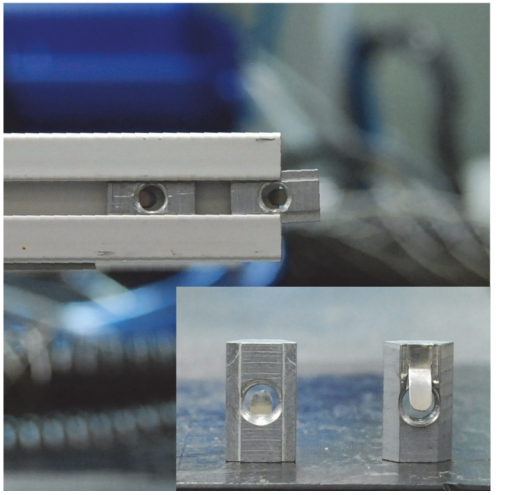

Figure 2-29 T-nuts are used to attach accessories to the frame bar sections

6. Proceed with the reinstallation of the two ends of the frame bar section, the two handles, the rulers, and the probe holders.

This concludes the procedure for changing the frame bar sections.

2.10 Basic Operations on Probes and Wedges

This section covers the basic operations performed on probes and wedges, which include adjusting the carbide wear pins and replacing a phased array probe or wedge.

2.10.1 Adjusting the Carbide Wear Pins on Wedges

Wedges are designed to hold a transducer or a phased array probe in order to ensure adequate ultrasonic diffusion through the surface to be inspected, and to direct the couplant flow correctly. To limit wearing of the wedge, carbide wear pins can be inserted at each corner of the contact surface of the wedge (Figure 2-30 on page 59).

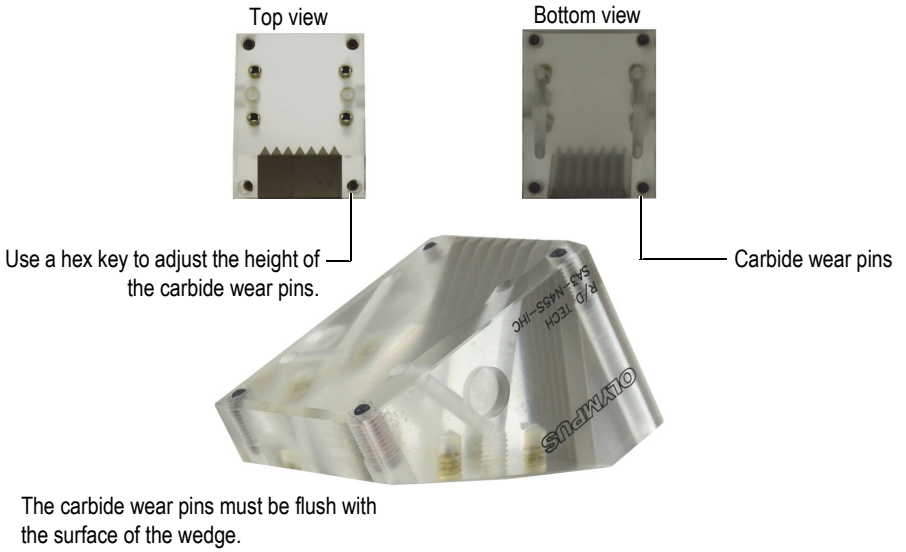

Figure 2-30 Adjusting the wedge's carbide wear pins

To adjust the carbide wear pins on a wedge

- Use a hex 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 (Figure 2-30 on page 59).

IMPORTANT

A carbide that is screwed too far inside the wedge can cause the wedge to wear faster and unevenly, while a carbide that protrudes too far outside the wedge can contribute to loss of coupling and degraded data. The use of thread-locking fluid is recommended to help maintain the carbide adjustment while scanning.

2.10.2 Replacing a Phased Array Probe or a Wedge

To replace a phased array probe or a wedge

1. Disconnect the couplant tubes from the wedge.
2. Disconnect the probe cable on the instrument.
3. Using a cross-head screwdriver, unscrew the screws that hold the probe on the wedge (either 2 or 4 screws, depending on the model), and then remove the probe from the wedge (Figure 2-31 on page 60).

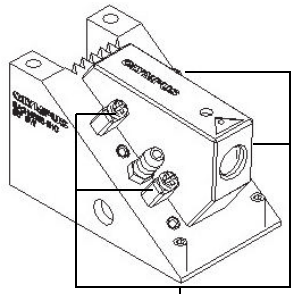

Figure 2-31 Removing the probe from the wedge

4. Clean the probe surface and the wedge surface to remove any of the old coupling product.
5. Add a generous amount of the new coupling product.

6. Install the new probe onto the wedge.
7. Using the cross-head screwdriver, tighten the screws that hold the probe on the wedge in a cross pattern.

IMPORTANT

Not tightening the screws using a cross pattern results in the probe being positioned with a slight angle on the wedge and affects the acoustic performance.

2.11 Replacing Wheels

WARNING

The HSMT-Flex scanner has magnetic wheels that must be carefully handled to prevent the risk of injury and equipment damage from magnetic fields and inadvertent attractive forces. Before unpacking and handling, observe the magnetic wheel safety precautions, as outlined in the warning note on page 20.

To replace a wheel

1. Using a flat-headed screwdriver, remove the screw that holds the wheel (Figure 2-32 on page 61).

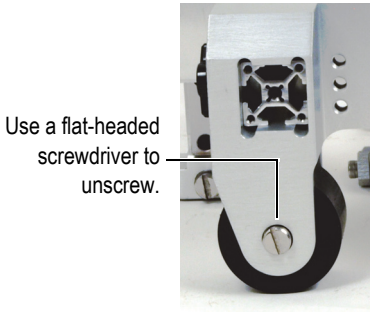

Figure 2-32 Wheel mounted on the frame

2. Remove the wheel.
3. Install the new wheel on the frame and secure it with the screw. Be sure to re-install the bearings correctly.

NOTE

If one of the wheels stops functioning correctly, it is recommended that all four wheels be replaced. Depending on how much the wheels have worn, replacing only one wheel could hinder the smooth motion of the scanner.

WARNING

To avoid injury, be careful when handling the magnetic wheels; the magnetic pull of the wheels is strong and could pinch your finger—for example, between two wheels, or between a wheel and a steel surface.

3. Preparing the Scanner for an Inspection

This chapter covers the connections and adjustments to make to prepare the HSMT-Flex scanner for an inspection.

To prepare the scanner for an inspection

1. Position the scanner on or near the part to be inspected.
2. Attach the umbilical cable or a safety line to the attachment ring or the PMA Flex to the umbilical bracket (Figure 3-1 on page 63).

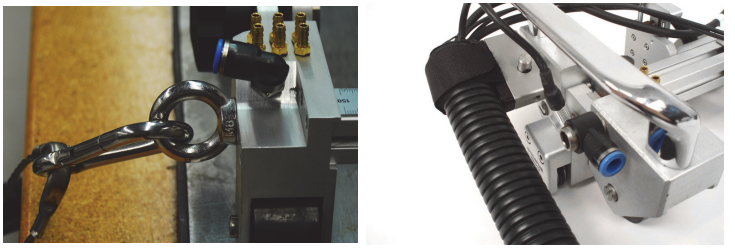

Figure 3-1 Attach the umbilical cable to the attachment ring

NOTE

The attachment ring serves two purposes: when used to attach a safety line, it retains the scanner in case of an accidental fall; and when used to attach an umbilical, it prevents tension loads on cables and tubes.

3. Connect the appropriate cables to the probes.

4. Connect the encoder's cable.
5. Connect the water tube from the water source to the intake of the scanner's manifold (Figure 3-2 on page 64).
6. Connect the irrigation tubes from the manifold outlets to the wedges inlets (Figure 3-2 on page 64).

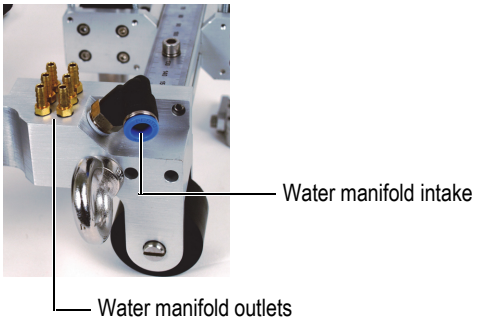

Figure 3-2 Water manifold, details

TIP

When your configuration does not require all three manifold outlet pairs, use a small section of tubing in a loop to connect the remaining outlets together (Figure 3-3 on page 64).

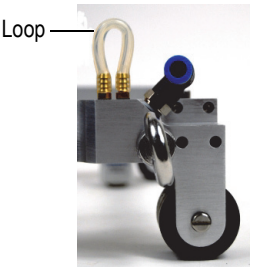

Figure 3-3 Using a loop to connect unused manifold outlets

7. Attach the other end of the umbilical cable to the acquisition unit.
8. Adjust the position of the different probe holders on the bar according to the PCS value defined in the scan plan and make sure that the probes are centered according to the center of the rulers of with the optional laser.
9. To facilitate the installation, raise the probe holders by sliding the SLA rail up until it reaches the locked position (Figure 3-4 on page 65).

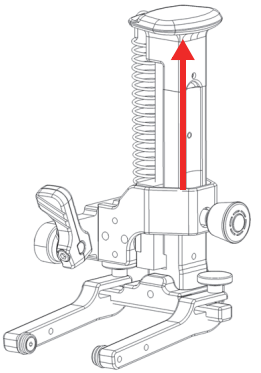

Figure 3-4 Sliding the rail to the locking position

10. Install the scanner onto the pipe as follows:
    a) Grasp the scanner's handles on each side of the scanner.
    b) Bring the scanner parallel to the weld.
    c) Align the center of the probes or the optional laser on the weld.
    d) Place the two front wheels in contact with the pipe.
    e) Put the two rear wheels in contact with the pipe.
11. Release the probe holders so the wedges come in contact with the pipe surface.

4. Operating the HSMT-Flex Scanner

The HSMT-Flex scanner is designed to be used manually. It is simple to operate.

To operate the scanner

1. Verify that the probe holders are not in the upper (latched) position and that the wedges are in contact with the part and that their pressure on the surface is good.
2. Verify that the probes are well centered within their yoke as indicated. An offset probe can result in the probe flipping during the scan.

CAUTION

All wedge-probe assemblies must be correctly positioned on the surface being inspected. Make sure that the probe cables are not conflicting with the probe holders. the cables need to be loose and not applying any pulling force on the probes. Verify that the encoder is correctly set up in the OmniScan instrument and that the encoder value is increasing when you are rolling the scanner forward.

CAUTION

All carbide wear pins should be flush with the wedge surface (Figure 2-30 on page 59).

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

NOTE

If the inspection surface is a ferromagnetic material, there is no need to push down on the scanner to prevent lift-off—the magnetic wheels hold the scanner against the surface.

5. Maintenance

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

5.1 Preventive Maintenance

As the HSMT-Flex scanner has few moving parts, it does not require preventive maintenance. A regular inspection of the product is recommended to ensure that the HSMT-Flex scanner functions correctly.

The wheels of the scanner need to be replaced at interval. For more information, see “Replacing Wheels” on page 61.

5.2 Scanner Cleaning

The HSMT-Flex scanner external surfaces can be cleaned when needed. This section provides the procedure for the appropriate cleaning of the product.

To clean the unit

1. Disconnect the cables from the acquisition unit.

CAUTION

During cleaning, the cables must remain connected to the scanner's connector to prevent water intrusion and avoid any equipment damage.

2. To bring the scanner back to its original finish, clean the housing with a soft cloth.
3. 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.
4. Wait until the scanner dries completely before connecting the cables to the acquisition unit.

6. Spare Parts

This chapter presents exploded views and lists of spare parts for the HSMT-Flex scanner.

To order accessories or replacement parts, contact Evident.

6.1 General Exploded View — Part one

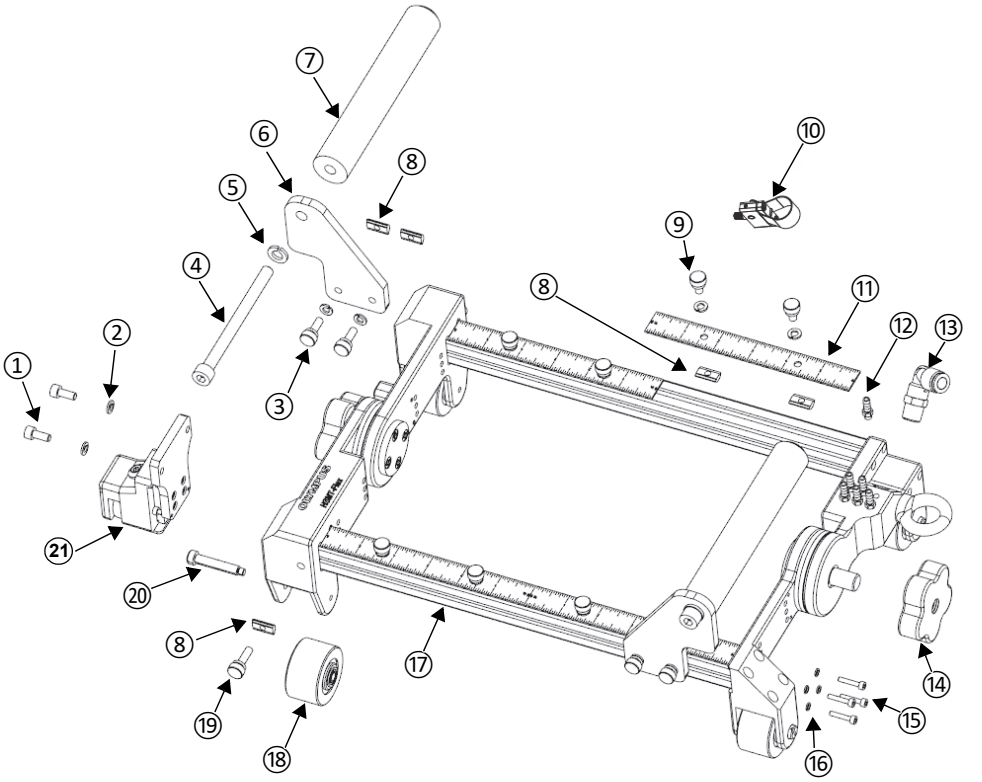

Figure 6-1 General exploded view — Part one

Table 1 Scanner's spare parts — Part one

Item number	Part number	Description
1	U8900317	M5 × 12 mm hexagonal screw
2	U8900327	M5 spring washer
3	U8909789	M5 × 12 mm thumb screw assembly
4	U8909792	M8 × 110 mm hexagonal screw

Table 1 Scanner's spare parts — Part one *(continued)*

Item number	Part number	Description
5	U8900329	M8 spring washer
6	Q8300933	Handle support
7	U8830781	Handle
8	U8900310	M5 dovetail nut
9	U8909791	M5 × 6 mm thumb screw assembly
10	Q8300895	Umbilical bracket
11	Q8300422	Stainless steel 6 in. ruler
12	U8902678	10–32 barb brass, 1/8 in. fitting
13	U8901371	1/4 in. elbow, 8 mm push-in fitting
14	Q8300863	M12 lobed knobs
15	U8908261	M3 × 16 mm hexagonal screw
16	U8905961	M3 spring washer
17	U8775072 U8779212	340 mm frame bar 500 mm frame bar
18	U8750050	Scanner magnetic wheel
19	U8909790	M5 × 16 mm thumb screw assembly
20	U8902414	Shoulder screw for wheel
21	U8775096	Encoder and support kit

6.2 General Exploded View — Part two

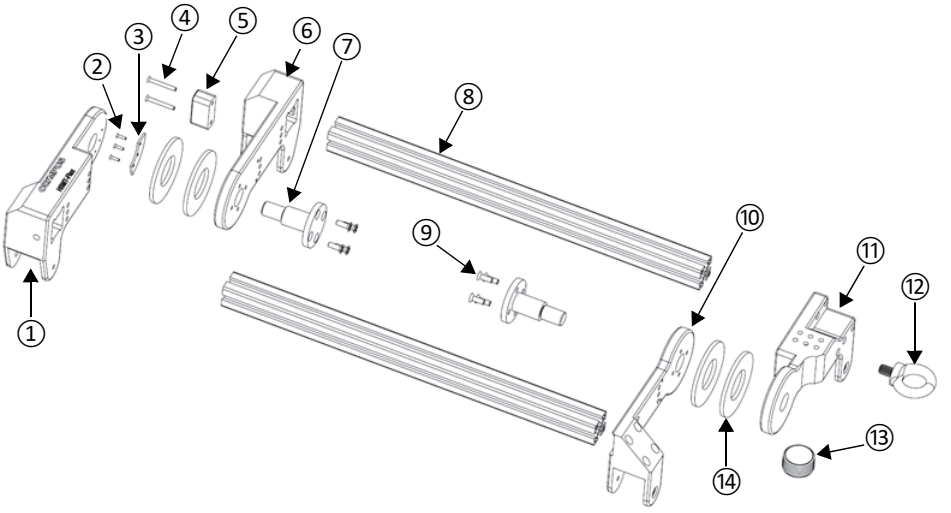

Figure 6-2 General exploded view — Part two

Table 2 Scanner's spare parts — Part two

Item number	Part number	Description
1	U89094428	Sliding block
2	U8904044	M2 × 8 mm Phillips flat stainless screw
3	Q8300870	Angulation rule
4	Q8300866	M3 × 25 mm Phillips flat stainless screw
5	Q8302048	Reset block
6	Q8302049	Sliding support
7	Q8300869	Locking angulation pivot
8	U8775072	340 mm long frame bar
9	U8907950	M4 × 12 mm Phillips flat stainless screw
10	Q8300867	Fixed wheel support
11	Q8300868	Wheel support for water manifold

Table 2 Scanner's spare parts — Part two *(continued)*

Item number	Part number	Description
12	U8831178	M8 × 13 mm eyebolt screw for lifting
13	Q8300864	3/4 in. NPT plug brass
14	Q8300865	Neoprene gasket, ID 1.63 mm, OD 2.25 mm

6.3 Probe Holder

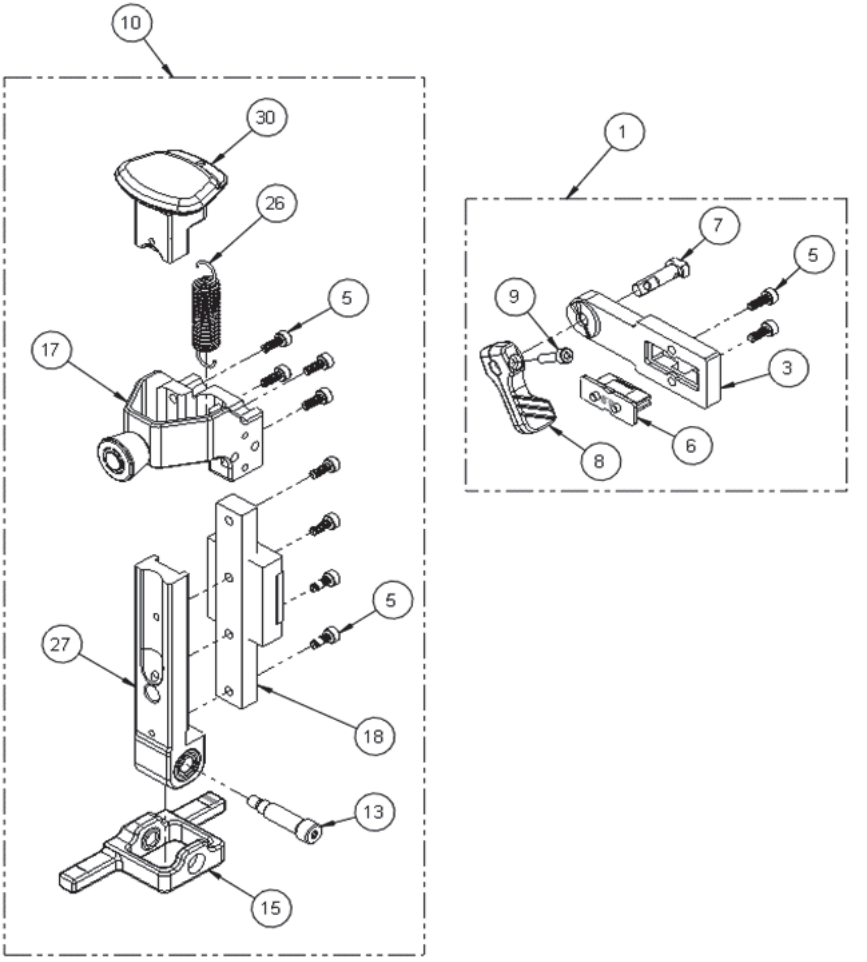

Figure 6-3 Probe holder exploded view

Table 3 Probe holder spare parts

Item number	Part number	Description
1	Q8301780	Bracket SLA to rail assembly
3	Q8301777	Bracket SLA
5	Q8301772	M3 × 0.5 mm, 8 mm socket head stainless steel screw
6	Q8301779	SLA to rail clip
7	Q8301778	Pin probe holder fixation
8	Q8301776	Knob holder fixation
9	Q8300195	M3 × 12 mm stainless steel hex screw
10	Q8301781	SLA PA left assembly, does not include arms and rail fixation.
	Q8301782	SLA PA right assembly, does not include arms and rail fixation.
13	Q8301774	Shaft yoke
15	Q8302047	31.75–40 mm arm center
	Q8301775	31.75–55 mm arm center
17	Q8301766	Plunger and housing assembly for SLA
18	Q8301773	Rail and bearing assembly
26	Q8301770	Spring standard (soft) tension, kit of 10 pieces (blue mark)
	Q8301769	Spring medium tension, kit of 10 pieces (no color)
	Q8301771	Spring strong tension, kit of 10 pieces (red mark)
27	Q8301765	Pivot and bearings assembly for SLA
30	Q8301767	Knob SLA

6.4 Compatible Frame Bars

Table 4 Compatible frame bars part numbers

Part number	Description
U8775229	250 mm (9.84 in.) long frame bar

Table 4 Compatible frame bars part numbers *(continued)*

Part number	Description
U8775072	340 mm (13.39 in.) long frame bar (OEM)
U8775104	450 mm (17.7 in.) long frame bar
U8779212	500 mm (19.69 in.) long frame bar (OEM)
U8775103	650 mm (25.6 in.) long frame bar
U8779847	900 mm (35.43 in.) long frame bar

6.5 Full Spare Part Kit

NOTE

The full spare part kit includes the basic spare part kit.

Figure 6-4 Full spare part kit

Table 5 Full spare part kit

Item number	Part number	Quantity	Description
1	U8775042	1	Vibra-Tite red adhesive thread locker
2	U8775039	50	8 in. weather resistant cable ties
3	U8775313	1	5 m encoder cable
4	U8900315	12	M4 × 4 mm stainless steel hex screws
5	Q8302063	24	Carbide screws with Loctite adhesive
6	U8775096	1	Encoder and support kit
7	Q7750196	2	30 mm arm yokes

Table 5 Full spare part kit *(continued)*

Item number	Part number	Quantity	Description
8	U8750050	4	Magnetic wheels
9	Q8302065	1	38–55 mm probe holder left arm
10	Q8302064	1	38–55 mm probe holder right arm
N/A	Q7750224	1	Basic spare part kit

6.6 Basic Spare Part Kit

Figure 6-5 Basic spare part kit

Table 6 Basic spare part kit

Item number	Part number	Quantity	Description
1	U8902318	20	Blue tubing ID 5 mm, OD 8 mm
2	U8775040	1	1.5 mm-10 mm hex key set
3	U8900341	14	Water tubing ID 1/8 in., OD 1/4 in.
4	U8902323	4	Clear tubing ID 2 mm, OD 2 mm

Table 6 Basic spare part kit *(continued)*

Item number	Part number	Quantity	Description
5	U8902317	1	HE-2-QS-8 shut-off valve
6	Q8300195	4	M2 × 12 mm stainless steel hex screws
7	Q8302058	4	Spring, SLA, length 1.75 mm, OD 0.359 mm, WD 0.031 mm (blue)
8	Q8302059	4	Spring, SLA, length 1.75 mm, OD 0.359 mm, WD 0.037 mm (no colour)
9	Q8302060	4	Spring, SLA, length 1.75 mm, OD 0.359 mm, WD 0.041 mm
10	Q8302061	8	Shim for 40 mm wedges
11	Q8301767	1	SLA knob
12	Q8300904	1	QS-1/4-8 push-in fitting
13	Q8300871	3	3 foot-long one-piece hook and loop Velcro, width 5/8 in.
14	U8902322	4	Barb fittings, PU-3 to PU-4
15	U8900310	4	T-slot nuts
16	Q8302062	1	M5 × 13 mm stainless steel knurled thumb screw
17	Q8300908	1	M5 × 16 mm stainless steel knurled thumb screw
18	Q8300905	1	M5 × 9 mm stainless steel knurled thumb screw
19	U8900327	4	M5 stainless steel split lock washers
20	U8902321	10	Barb fittings, Y-shaped, PU-3 to PU-4
21	Q8301733	2	M3 × 10 mm raised thumb screws
22	Q8300013	1	Tubing connector, RTU-PK-4/4
23	Q8301772	4	M3 0.5 mm × 8 mm stainless steel socket screws
24	U8721914	2	7.8 mm wedge pivots
25	U8770531	2	Yoke spacers
26	U8830239	2	M3 × 10 mm flat socket head stainless steel screws
27	U8770530	2	Probe pivot screws
28	Q8301776	2	Knob holder fixations
29	Q8301779	2	SLA to rail clip

6.7 Pivot Bracket

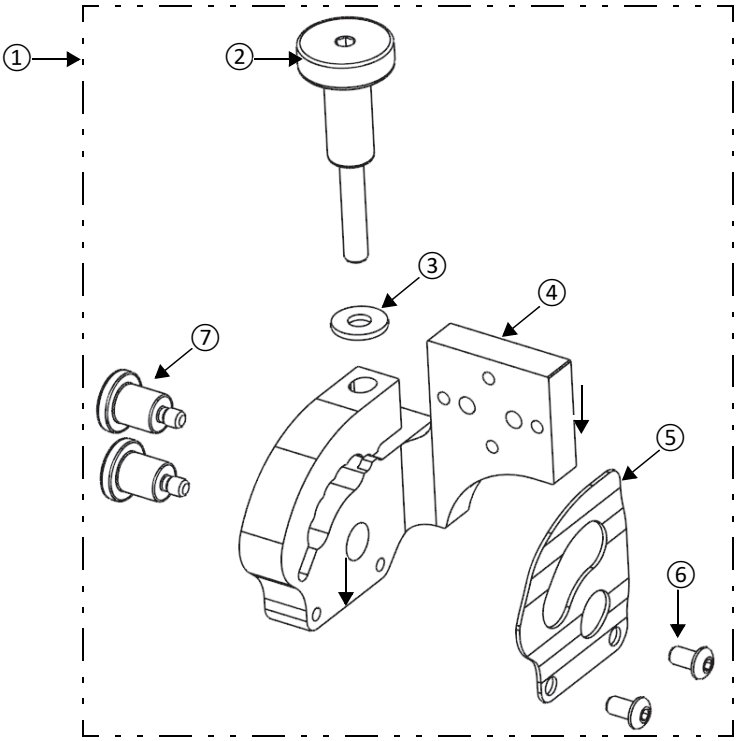

Figure 6-6 Pivot bracket exploded view

Table 7 Pivot bracket spare parts

Item number	Part number	Description
1	Q8302066 Q8302067	Right angle pivot bracket Left angle pivot bracket
2	Q8302050	Screw lock pivoting bracket
3	Q8302052	PVC flat washer for M4 screw

Table 7 Pivot bracket spare parts *(continued)*

Item number	Part number	Description
4	Q8302053	Bracket SLA to rail, 90 degrees, right angle (shown in Figure 6-6 on page 82)
	Q8302054	Bracket SLA to rail, 90 degrees, left angle
5	Q8302055	Plate wearing probe holder-A
	Q8302056	Plate wearing probe holder-B
6	Q8302057	M3 × 6 mm hex button head stainless steel screw
7	Q8302051	Screw probe holder pivoting bracket

6.8 TOFD Yoke Arm

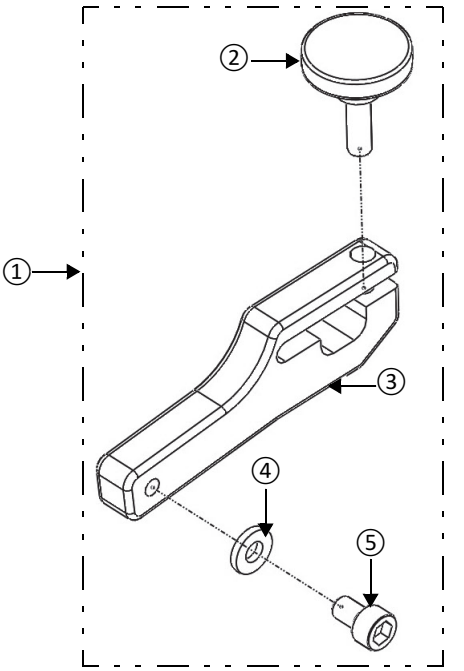

Figure 6-7 TOFD yoke arm exploded view

Table 8 TOFD yoke arm spare parts

Item number	Part number	Description
1	Q8301734 Q8301735 Q7750196	30 mm right assembly yoke arm 30 mm left assembly yoke arm 30 mm left and right assemblies pair of yoke arms
2	Q8301733	M3 × 10 mm raised thumb screws
3	Q8301735	30 mm yoke arm
4	Q7750196	0.040 in. yoke spacer
5	U8770530	Probe pivot screw

6.9 Phased Array Yoke Arm

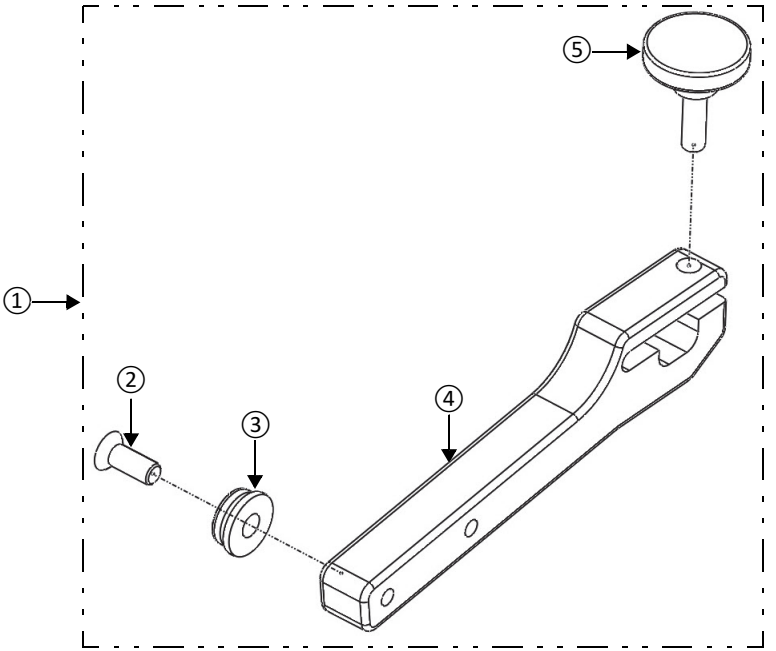

Figure 6-8 Phased array yoke arm exploded view

Table 9 Phased array yoke arm spare parts

Item number	Part number	Description
1	Q8301738 Q8301739 Q7750197	38–55 mm left assembly yoke arm 38–55 mm right assembly yoke arm 38–55 mm left and right assemblies pair of yoke arms
2	U8830239	M3 × .0.5 mm, 8 mm flat socket head stainless steel screw
3	U8721914	7.8 mm wedge pivot
4	Q8301737	38–55 mm yoke arm
5	Q8301733	M3 × 10 mm raised thumb screws

7. Specifications

This chapter contains the general specifications for the HSMT-Flex scanner. The overall dimensions are illustrated in Figure 7-1 on page 88.

7.1 General Specifications

Table 10 General specifications

Parameter	Value
Dimensions (overall) [Figure 7-1 on page 88]	Width: 382 mm (15 in.), or 458.3 mm (18 in.) with encoder on the outside. Length: 263.3 mm (10.36 in.) Height: 147.25 mm (5.79 in.)
Encoder type	Quadrature
Encoder resolution	12 steps/mm ± 0.15 steps/mm (encoder calibration is recommended for every setup)
Voltage	5 V
Current	25 mA maximum
Frequency	0–1.5 kHz (maximum displacement velocity of 100 mm/s [4 in./s])

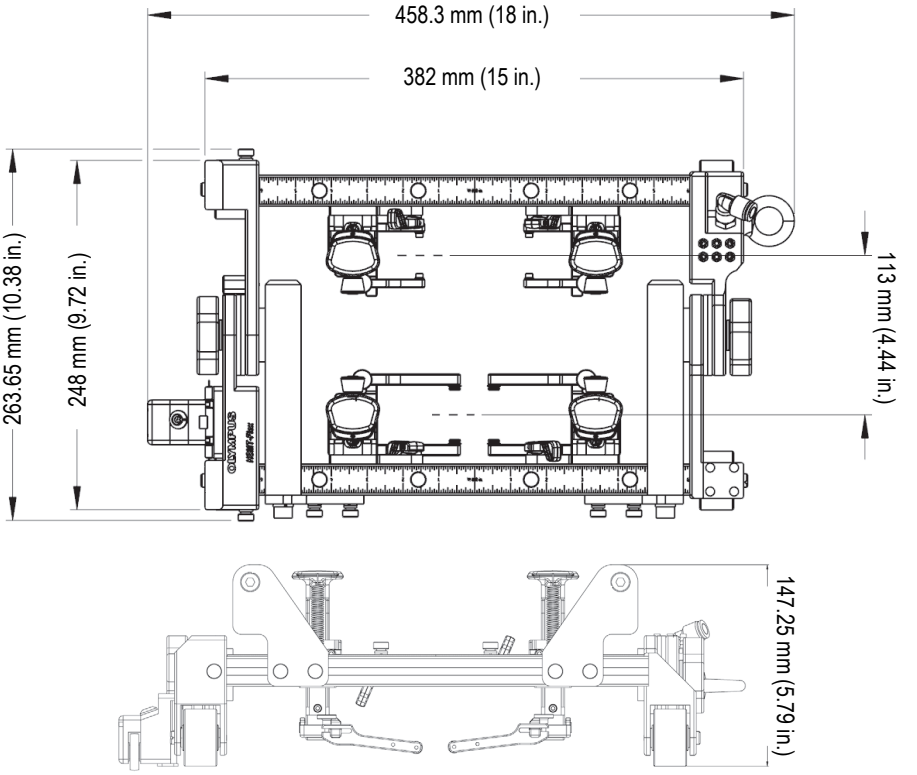

Figure 7-1 Scanner dimensions —Top and side views

Table 11 Operating environment specifications

Parameter	Value
Operating temperature	–10 °C to 45 °C (14 °F to 113 °F)
Storage temperature	–20 °C to 60 °C (–4 °F to 140 °F)
Relative humidity (RH)	Max. 85 % RH noncondensing
Wet location	Yes
Altitude	Up to 2000 m
Outdoor use	Yes

Table 11 Operating environment specifications *(continued)*

Parameter	Value
Pollution level	1
IP rating	Waterproof (designed to meet IP67)

7.2 Connector Reference

HSMT-Flex scanners 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 (Table 12 on page 89).

Table 12 Required encoder cable adaptor

Scanner connector	Instrument		
	OmniScan MX	OmniScan MX2, SX, X3, and FOCUS PX	TomoScan FOCUS LT
LEMO (from July 2013 onward)	P/N: U8780329	–	P/N: U8769010
DE15 (Prior to July 2013)	–	P/N: U8775201	P/N: U8767107

Figure 7-2 on page 89 contain the pinout for the LEMO connector used on the OmniScan SX, MX2, X3, and FOCUS PX instruments.

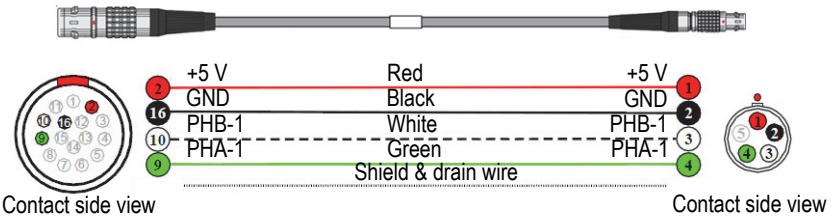

Figure 7-2 Encoder pinout

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