



PipeWIZARD iX

User's Manual

10-038774-01EN — Rev. 2
February 2024

EVIDENT CANADA, INC., 3415, Pierre-Ardouin, Quebec (Quebec), 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

EFUP	environment-friendly use period
PRF	pulse repetition frequency

Important Information — Please Read Before Use

This chapter contains information important to the use of the system. Some, or all, of the warnings, safety symbols, and regulatory markings may appear on the system. If you view a visual marking on the system, adhere to the cautions in this chapter.

Intended Use

The PipeWIZARD iX is designed to perform nondestructive inspections on pipeline girth welds on industrial and commercial materials.



WARNING

Do not use the PipeWIZARD iX 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.

Repair and Modification

The PipeWIZARD iX Acquisition Unit does not contain any user-serviceable parts. Opening the Acquisition Unit might void the warranty.

The PipeWIZARD iX system has some user-serviceable parts, for details on maintenance for the serviceable parts of the system, refer to “Maintenance” on page 81.



CAUTION

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

Safety Symbols

All, or some, of the following safety symbols might appear on the device and in the instruction manual. This section describes what they mean. Should you encounter any of these safety symbols on your device, follow the warnings to avoid danger.



General warning symbol

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



Shock hazard caution symbol

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



Finger or hand crushing warning symbol

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



Magnetic field warning symbol

This symbol is used to alert the user to potentially strong magnetic fields. All safety messages that follow this symbol shall be obeyed to avoid possible harm.

Safety Signal Words

The following safety signal words might appear in the documentation of the 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

- For California (USA) only:
- The CR battery contains perchlorate material, and special handling may be required. Refer to <http://www.dtsc.ca.gov/hazardouswaste/perchlorate>.

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 PipeWIZARD iX 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	×	○	○	○	○	○
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。

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 PipeWIZARD iX 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: PipeWIZARD iX

Model / Configurations: PWZiX-PA64256, PWZiX-PA32128, PWZiX-PA32256

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 SCIENTIFC, INC.

Address:

48 Woerd Avenue, Waltham, MA 02453, USA

Phone number:

+1 781-419-3900

ICES-001 (Canada) Compliance

This Class A digital apparatus complies with Canadian ICES-001.

Cet appareil numérique de la classe A est conforme à la norme NMB-001 du Canada.

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://EvidentScientific.com/evident-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 <https://EvidentScientific.com/service-and-support/service-centers/>.

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.

Minimum Requirements

The following specifications are the minimum required for the computer connected to the scanner:

- i7 processor
- 32GB RAM for regular setup
- 128GB RAM for FMC/TFM processing
- 512GB SSD
- GPU 12GB for FMC/TFM processing

Instruments

There is no compatibility with other instruments or software.

File Format

There is no compatibility with previous versions of PipeWIZARD (V2 or V4).

1. System Overview

PipeWIZARD iX is an automated ultrasonic system designed to inspect girth welds during pipeline construction onshore and offshore. Phased array and conventional ultrasonic transducers are mounted on an automated scanner to collect data during the scan process. The operator uses a dedicated software system to configure the system, collect the data, and analyze the results.

1.1 PipeWIZARD iX Software

The PipeWIZARD iX uses dedicated software. Refer to the PipeWIZARD iX *User Interface Guide* for details on the software.

1.2 Power Unit

The PipeWIZARD iX power unit (see Figure 1-1 on page 24) is responsible for providing stable power to the scanner, and communicating with the computer. There are two connectors for the umbilical (power and data), and a hook on the front panel to attach the umbilical and avoid tension on the connectors during operation. The power unit includes a handle for safely transporting the unit.



CAUTION

Use only the provided power supply to power the PipeWIZARD iX power unit.

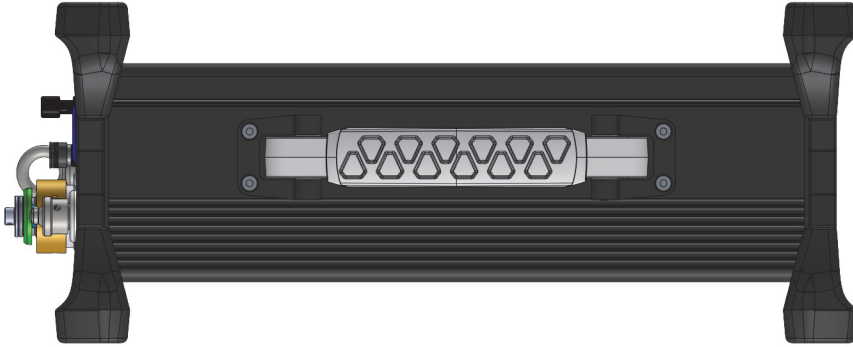


Figure 1-1 PipeWIZARD iX power unit

1.2.1 Connectors

The connectors on the power unit (see Figure 1-2 on page 25) consist of the following:

- Umbilical connectors
- Ethernet connector (linking the computer to the PipeWIZARD iX system)
- Remote stop (use the provided bypass if unused)
- DC input (from power supply)

The On/Off (power) button is also on the front panel of the power unit.

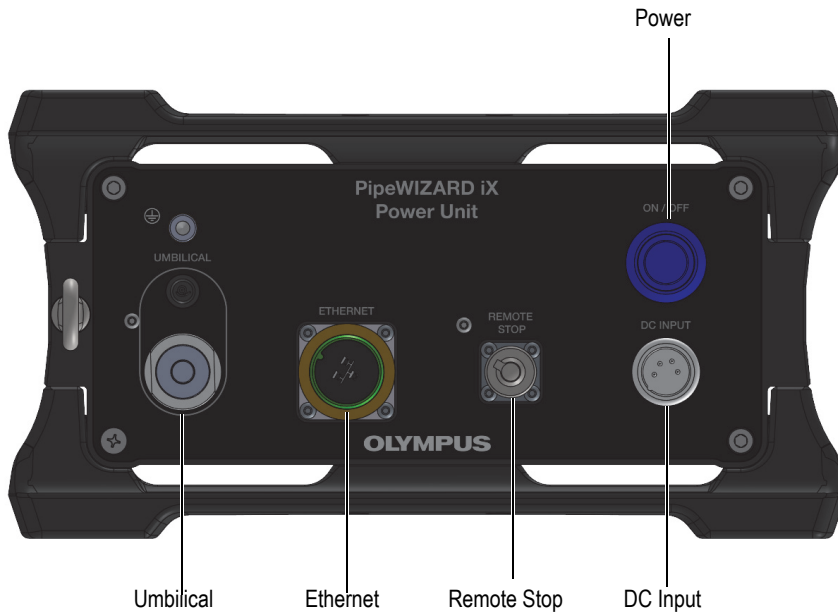


Figure 1-2 Power unit connections and power button

1.3 Umbilical

The umbilical cable (see Figure 1-3 on page 26) is a sturdy cable that consists of the power cable, the data cable, and a water hose for the couplant. To allow the scanner to move freely along the circumference without bending the umbilical cable, one end has a swivel elbow. One end of the umbilical is designed to be attached to the front panel of the power unit (see Figure 1-2 on page 25) and includes a carabiner, while the other end of the umbilical is designed with a latch to secure it to the right panel of the acquisition unit (see Figure 1-6 on page 30). Different lengths for the umbilical are available (see Table 12 on page 117).



CAUTION

Do not connect or disconnect the umbilical with the power unit on. Always turn off the power unit before connecting or disconnecting the umbilical connectors.

IMPORTANT

When using the PipeWIZARD iX in temperatures that may descend below freezing, clear all water from the umbilical when not in use. Never allow the umbilical to sit with water inside overnight, or when in storage.

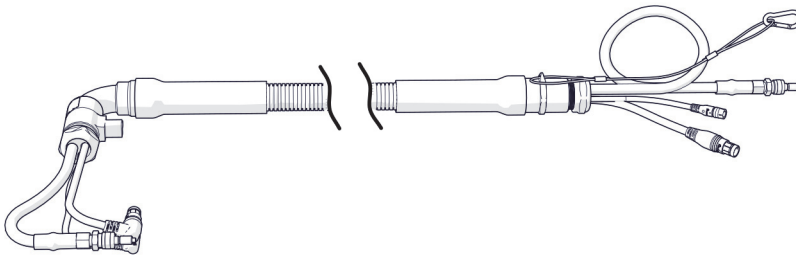


Figure 1-3 PipeWIZARD iX umbilical line

1.3.1 Installing the Umbilical

To install the umbilical, complete the following steps.

1. Identify the side with the carabiner and secure it to the hook on the power unit front panel.
2. Connect the two umbilical connectors to their ports on the front panel of the power unit (see Figure 1-2 on page 25) and the quick-connect water hose to the water pump.
3. Release the latch on the right side of the acquisition unit.
4. Align the groove of the strain relief section of the umbilical with the receptacle on the acquisition unit (see Figure 1-6 on page 30).

5. Close and secure the latch.
6. Connect the two umbilical connectors to their ports on the left side of the acquisition unit (see Figure 1-7 on page 31) and the quick-connect water hose to the water feed system on the scanner.

1.4 Acquisition Unit Front Panel

NOTE

The following information applies only to the 64:256 configuration (see Table 8 on page 113).

The PipeWIZARD iX Acquisition Unit front panel (see Figure 1-4 on page 27) provides the following functionality:

- Connect two PA probes with up to 128 elements each, providing a total of 256 elements.
- Connect up to ten conventional UT probes in P/E or P/C configuration — 10 P/E or 5 P/C (optional).
- Power button. This power button is redundant, and should not be used, as the power is controlled by powering on and off the power unit.
- Determine the PipeWIZARD iX status via the indicator lights.



Figure 1-4 Acquisition Unit front panel

1.4.1 Probe Types

The following probe types are supported.

1.4.1.1 Phased Array (PA) Probes

The two 160-pin (P1-128 and P129-256) terminals provide connection for phased array probes, and deliver up to 256 channels.

NOTE

Evident strongly recommends using PA probes with shielded connectors.

1.4.1.2 Ultrasonic (UT) Probes

The ten LEMO terminals (P1/R1 through P10/R10) are used to connect conventional ultrasonic probes. These ten connections allow for up to ten Pulse-Echo (PE) and up to 5 Pitch-Catch (P-C) configurations (or a combination of those).

1.4.2 Indicator Lights

The Acquisition Unit has the following indicator lights on the front panel.

1.4.2.1 Ethernet Indicator

When this indicator light is green, it denotes that the Ethernet link is established.
When the light is flashing green, it indicates that there is activity on the Ethernet link.

1.4.2.2 Power Supply Indicator

When this indicator light is green, it denotes that the PipeWIZARD iX acquisition unit is properly powered by the power unit. If the light is red, it indicates a problem with the voltage or current being supplied by the power unit (out of specification). If the light is flashing red, it indicates a fault on the PipeWIZARD iX acquisition unit link adapter. If the light is not illuminated, there is no power being supplied to the unit.

1.4.2.3 Temperature Indicator

When this indicator light is green, it denotes that the PipeWIZARD iX unit is operating within the normal temperature range. If the light is fast-flashing red, it indicates that the internal temperature is less than 5 degrees Celsius below the upper limit. If the light is solid red, it indicates the internal temperature has reached the upper limit, and the PipeWIZARD iX acquisition unit will shut itself down imminently to prevent damage. You cannot restart the PipeWIZARD iX acquisition until the unit has cooled down sufficiently.

NOTE

The temperature indicator is also displayed on the status bar of the software interface.

1.5 Acquisition Unit Back Panel

The PipeWIZARD iX Acquisition Unit back panel (see Figure 1-5 on page 29) provides the following functionality:

- Connect the PipeWIZARD iX motor.
- Connect a GPS (optional).
- Connect a wedge temperature sensor.



Figure 1-5 Acquisition Unit back panel

1.6 Acquisition Unit Right Panel

The PipeWIZARD iX Acquisition Unit right side panel (see Figure 1-6 on page 30) provides the following functionality:

- Connect the PipeWIZARD iX umbilical cable to the latch mechanism.
- The heat sink and fan are located outside the sealed Acquisition Unit and are designed to regulate the temperature of the unit to prevent overheating during operation.

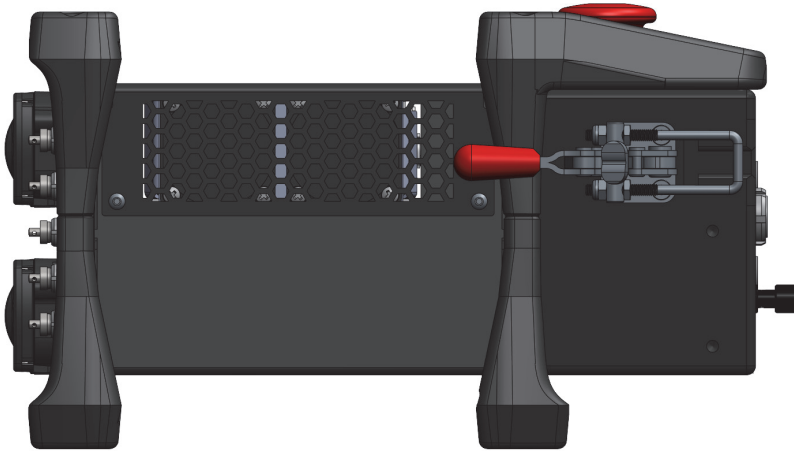


Figure 1-6 Acquisition Unit right side

1.7 Acquisition Unit Left Panel

The PipeWIZARD iX Acquisition Unit left side panel (see Figure 1-7 on page 31) provides the following functionality:

- Connect the PipeWIZARD iX umbilical cable.



Figure 1-7 Acquisition Unit left side

1.8 Acquisition Unit Top

The PipeWIZARD iX Acquisition Unit top (see Figure 1-8 on page 32) provides the following functionality:

- Stop button
- Ready button (optional).
- Scan validation indicator (optional).

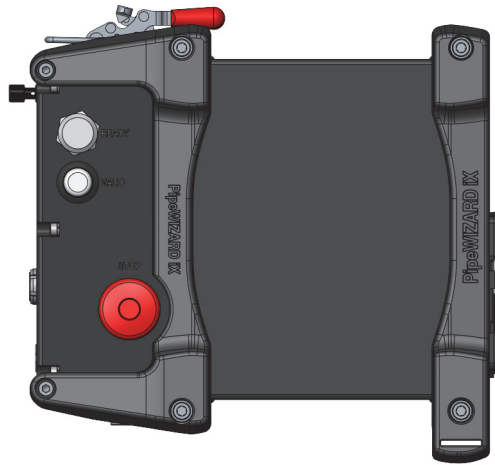


Figure 1-8 Acquisition Unit top

1.8.1 Stop Button

The stop button provides a large easy-to-access method for causing the motorized scanner to promptly come to a stop. Before restarting the scanner, you must disengage the stop button by pulling it up.

1.8.2 Ready Button

The optional-use ready button provides a method for the scanning technician to send a signal to the operator of the PipeWIZARD iX software indicating the scanner is in position, ready to initiate a scan sequence. When the technician pushes the ready button, a white ring around the button is illuminated and the signal is relayed to the software.

1.8.3 Scan Validation Indicator

The optional-use scan validation indicator light provides a method for the software operator to send a signal to the scanning technician indicating whether the scan was successful or not. If the light is green, the operator of the PipeWIZARD iX software is signaling that the scan was successful and the data was valid. If the light is red, the operator of the PipeWIZARD iX software is signaling that the scan must be repeated.

1.9 Circumferential Band Overview

The circumferential band (see Figure 1-9 on page 33) encircles the pipe, providing a track on which the scanner moves. Circumferential bands are not included in the purchase of the motorized scanner, because they must be selected for specific pipe diameters. The bands were designed in increments of 5.08cm (2 in.). The feet of the band are adjustable to provide the best fit between the band and the pipe. Select the closest diameter band for the pipe being inspected. Make sure the latch mechanism is open a sufficient amount by unscrewing the 6 mm hexagonal bolt, then pushing down on the latch and pulling the band apart (see Figure 1-10 on page 33 and Figure 1-11 on page 34).



Figure 1-9 Circumferential band

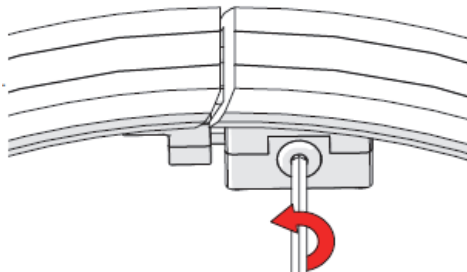


Figure 1-10 Loosen the latch

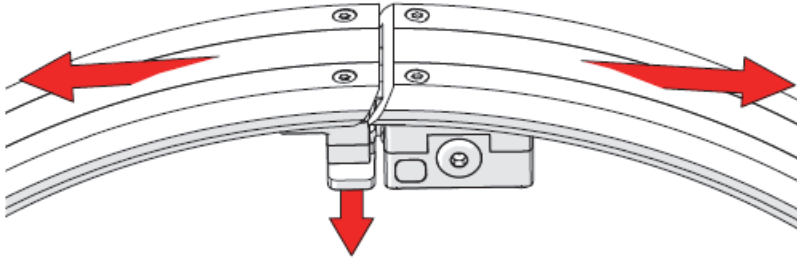


Figure 1-11 Press the latch down and pull apart the band

1.9.1 Advisories

There are multiple pinch points on the circumferential band. Use caution to avoid pinching or crushing a finger or hand in these areas (see Figure 1-12 on page 34 and Figure 1-13 on page 35).

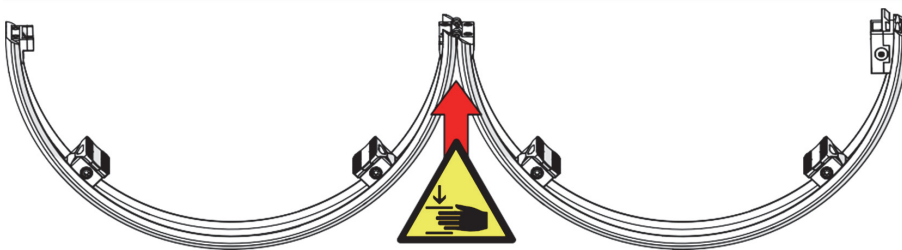


Figure 1-12 Circumferential band pinch point (open)

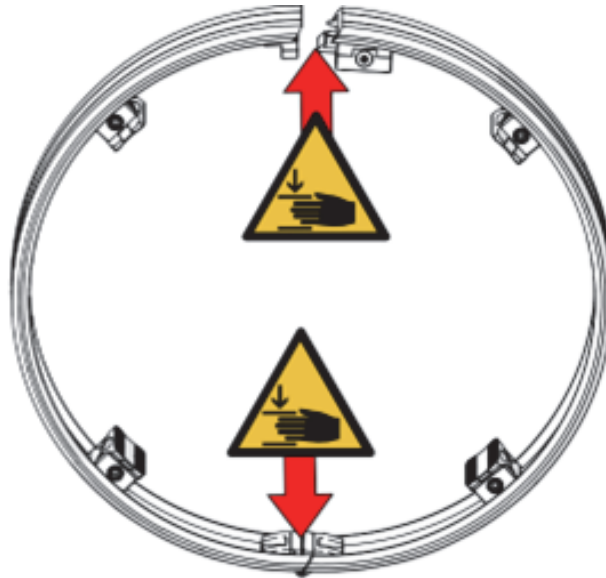


Figure 1-13 Circumferential band pinch points (closed)

1.9.2 Assembling the Band

TIP

Only unscrew one half of the hinge on the band when disassembling to make assembly easier.

To assemble the band, complete the following steps.

1. Place the two sections of the band together at the hinge (see Figure 1-14 on page 36).

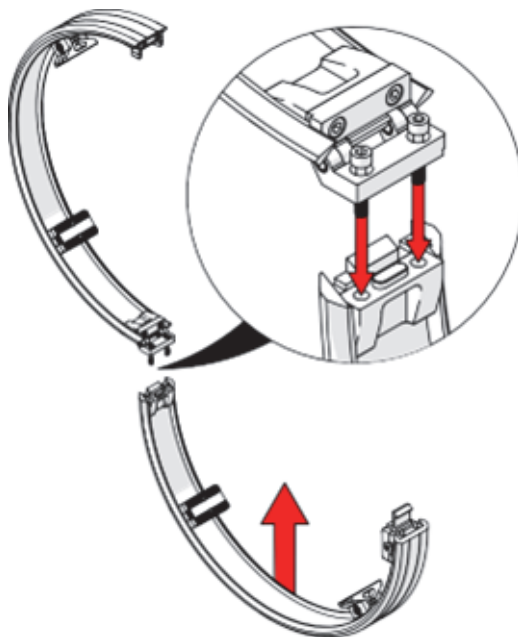


Figure 1-14 Connect the halves

2. Tighten the two hex screws with a 5mm hex driver to secure the two halves (see Figure 1-15 on page 36).

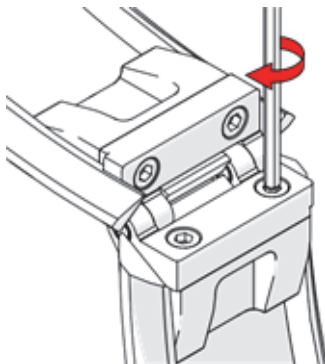


Figure 1-15 Secure the screws

1.9.3 Installing and Removing Spacers to the Feet

The feet inside the circumferential band are designed to adjust such that they firmly secure the band to the pipe. Spacers are required below the foot if the pipe is 5.08cm (2 in.) smaller than the band size. To add or remove the spacers, the feet must be removed. To install or remove the spacers, complete the following steps.

1. Loosen the two hex screws using a 4mm hex driver (see Figure 1-16 on page 37).

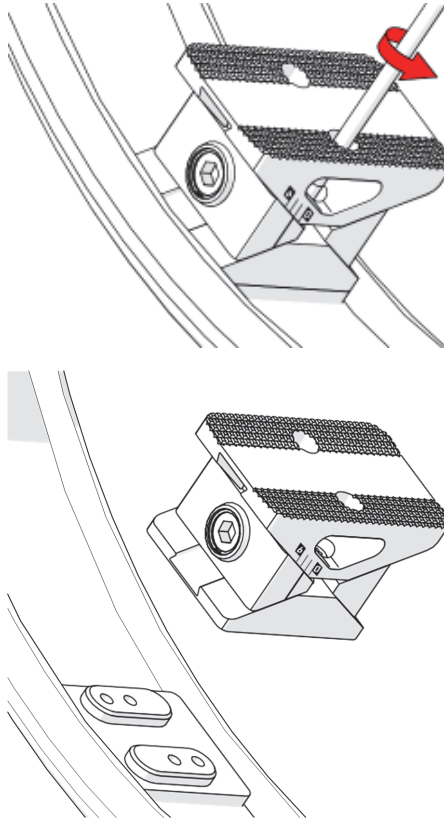


Figure 1-16 Remove the foot

2. With the foot removed, install or remove the spacer as needed for the pipe size (see Figure 1-17 on page 38).

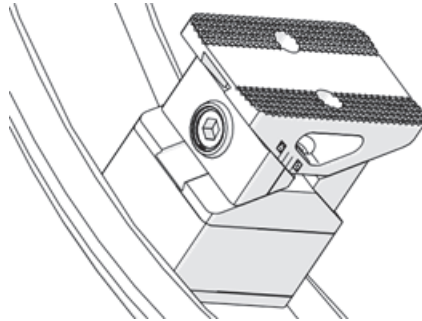


Figure 1-17 Foot spacer installed

1.9.4 Adjusting the Feet of the Band

Circumferential bands are equipped with four, six, or eight feet, depending on the diameter of the band. They sit between the band and the pipe. These feet are adjustable to match the diameter of the pipe and ensure a secure attachment. To adjust the feet, complete the following steps.

1. Turn the adjustment mechanism using a 6mm hex driver (see Figure 1-18 on page 38). The index markings on the feet are millimeter measurements.

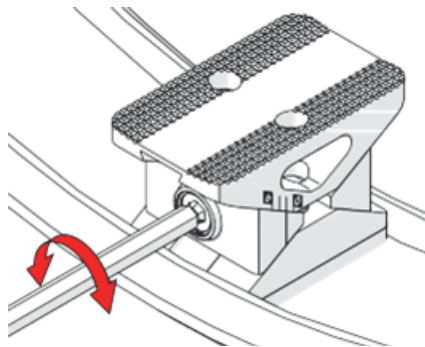


Figure 1-18 Adjust the foot

2. Adjust all four feet to the index marking that provides a firm mounting of the circumferential band to the pipe (see Figure 1-19 on page 39). Ensure that all four feet are keyed to the same index marking.

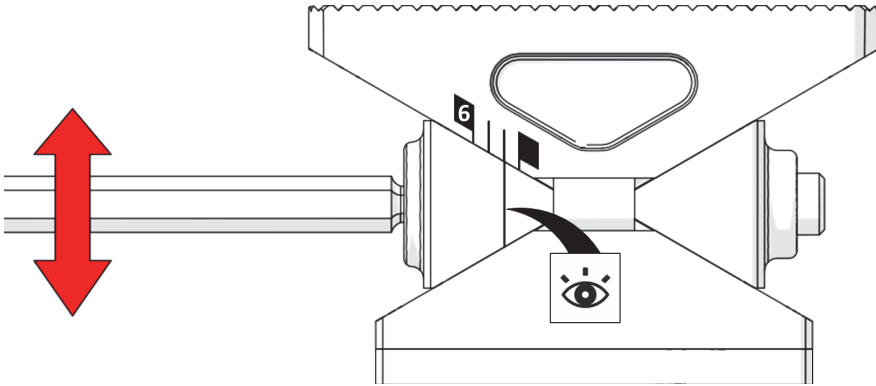


Figure 1-19 Align the index marking

1.9.5 Installing the Band on the Pipe

To install the band, complete the following steps.

1. Ensure the band is the correct size for the diameter of the pipe being inspected.
2. Wrap the band around the pipe (see Figure 1-20 on page 39).

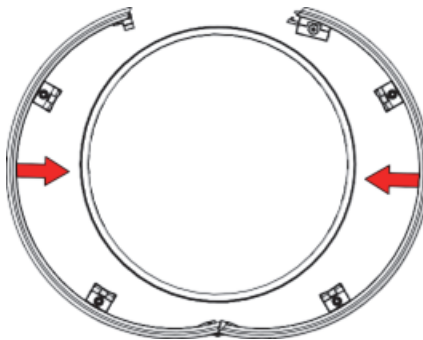


Figure 1-20 Installing the circumferential band

3. Connect the band by pressing the two ends together to engage the latch (see Figure 1-21 on page 40).

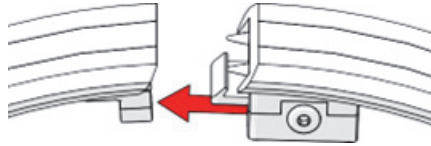


Figure 1-21 Close the latch

4. Tighten the band using a 6mm hex driver, such that all feet are lightly touching the pipe, to ensure a secure and stable attachment. Do not fully tighten yet.
5. Align the band as needed, taking measurements around the pipe between the weld and the band, to ensure the band is parallel to the weld (see Figure 1-22 on page 40).

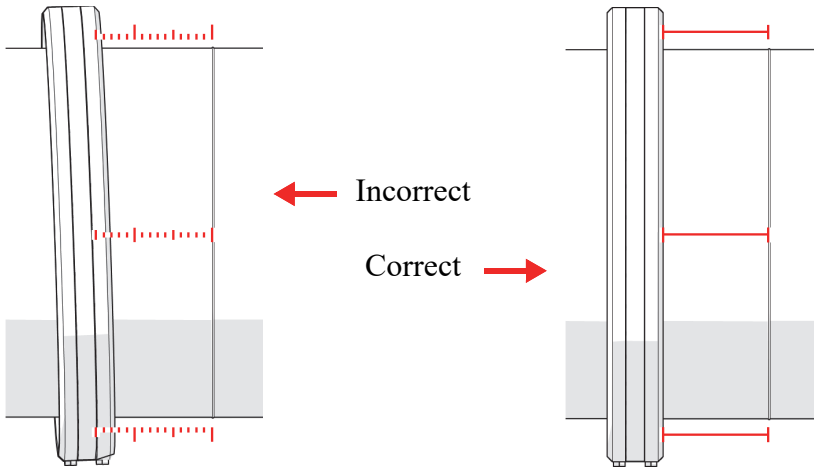


Figure 1-22 Align the band with the weld

6. Fully tighten the latch (see Figure 1-23 on page 41).

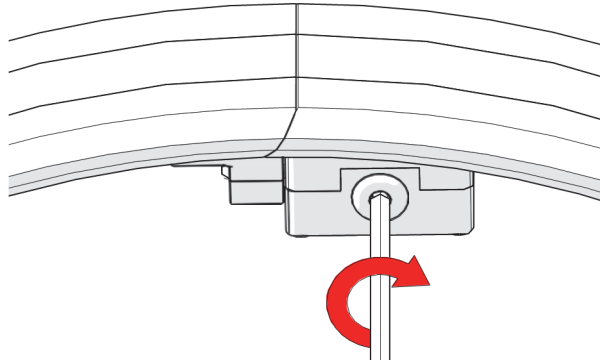


Figure 1-23 Tighten the latch

7. Completely secure the band to the pipe by adjusting the feet as needed (see “Adjusting the Feet of the Band” on page 38).

NOTE

To remove the band, loosen the latch with a 6mm hex driver, push down on the latch side, and pull apart the band to disengage the connection (see Figure 1-10 on page 33 and Figure 1-11 on page 34).

1.10 Motorized Scanner

The AUT scanner is a motorized device that mounts the PipeWIZARD iX acquisition unit. With the Acquisition Unit mounted, the PipeWIZARD iX automatically scans the circumferential weld of pipeline joints.

1.10.1 Components

The motorized scanner is comprised of the motor carriage, the acquisition unit, and the probe module. The motorized scanner (see Figure 1-24 on page 42) is clamped onto the band and rotates 360° around the pipe, riding on the band. A drive wheel

with adjustable tension drives the motor carriage. The acquisition unit mounts on the top of the motor carriage, and the probe module mounts below the motor carriage, for the purpose of weld inspection.

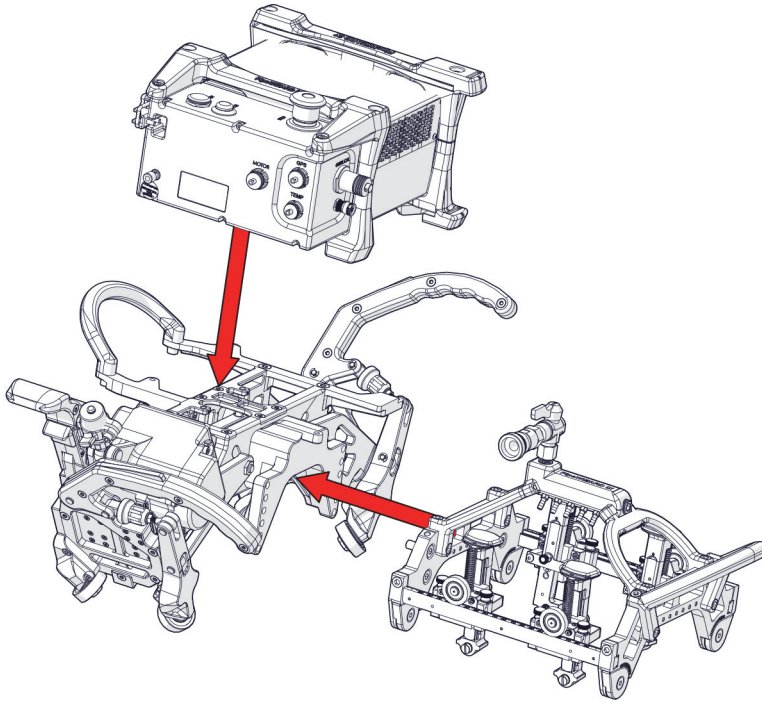


Figure 1-24 Motorized scanner

1.11 Setting Up and Calibrating the Motorized Scanner

The following sections illustrate how to set up the motorized scanner on a pipe. The motorized scanner must be set up and calibrated any time a new pipe diameter is being scanned.

1.11.1 Advisories

There are multiple pinch points on the motor carriage. Use caution to avoid pinching or crushing a finger or hand in these areas (see Figure 1-25 on page 43).

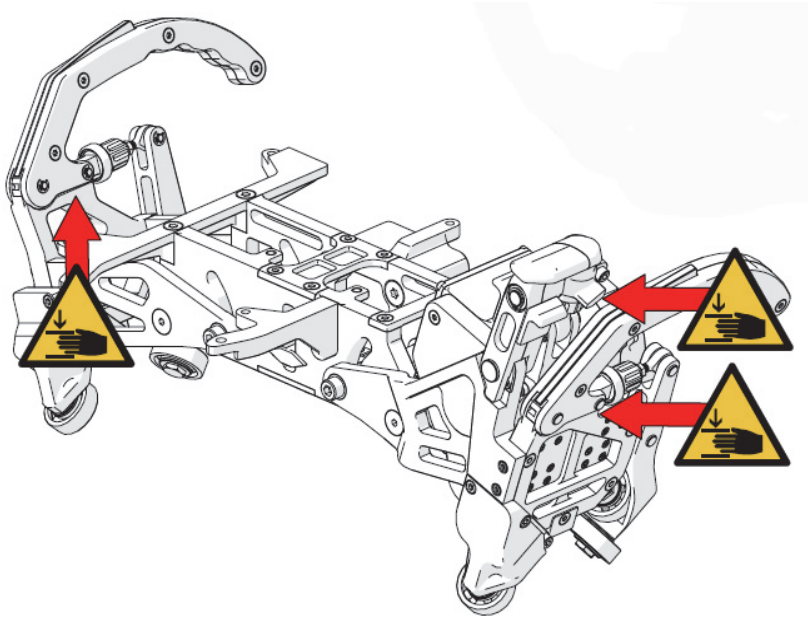


Figure 1-25 Motor carriage pinch points

1.12 Identification of Motor Carriage Parts

Figure 1-26 on page 44 and Figure 1-27 on page 45 show the motor carriage, and Table 1 on page 45 identifies the parts of the motor carriage.

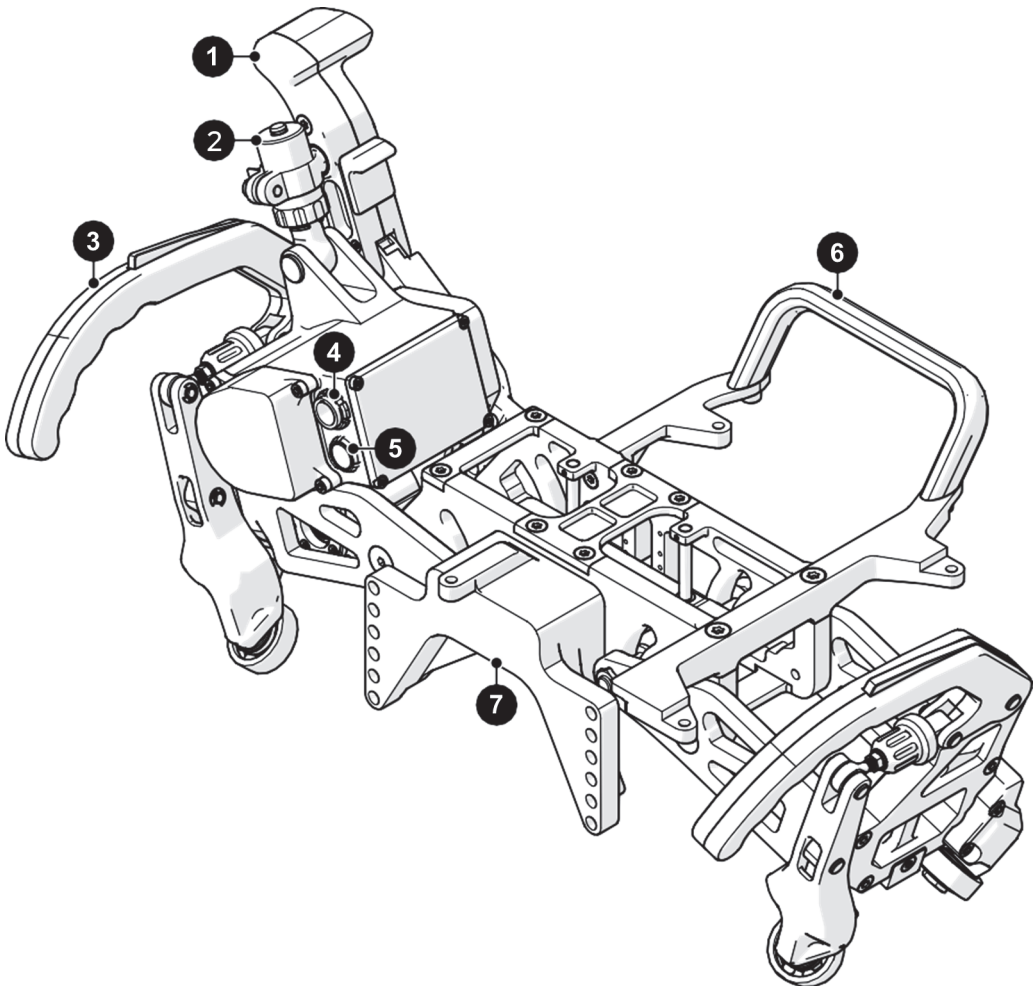


Figure 1-26 Motor carriage top

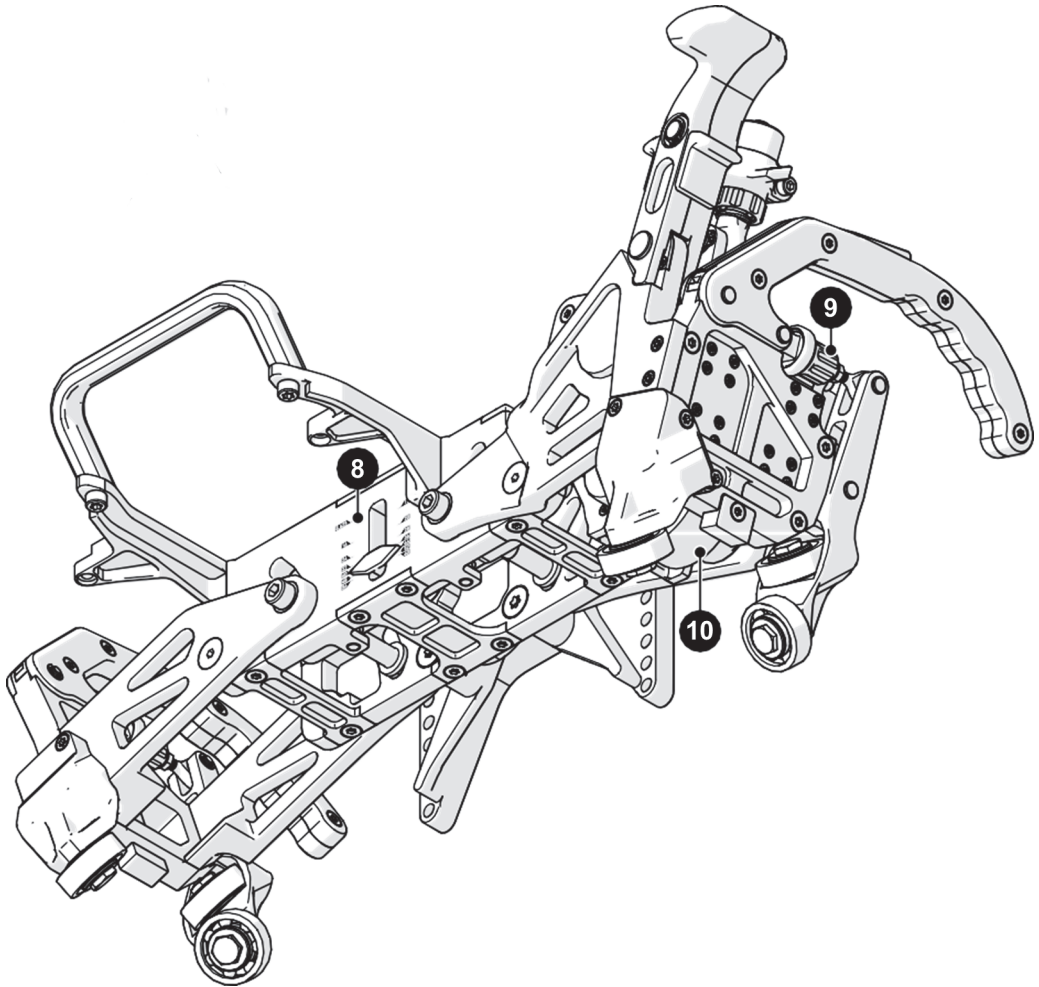


Figure 1-27 Motor carriage bottom

Table 1 Motor carriage parts

ID	Description	ID	Description
1	Motor engage handle	6	Handle
2	Gauge cylinder	7	Probe module mount
3	Band clamp lever	8	Pipe diameter indicator

Table 1 Motor carriage parts (continued)

ID	Description	ID	Description
4	Power connector	9	Clamp adjuster
5	Idle encoder connector	10	Drive wheel

1.13 Adjusting for Pipe Diameter

The markings on the rear of the motor carriage indicate various pipe diameters in inches (see Figure 1-29 on page 47). To adjust the Motorized Scanner to the pipe diameter, locate the pre-determined marks on the back of the scanner (see Figure 1-29 on page 47).

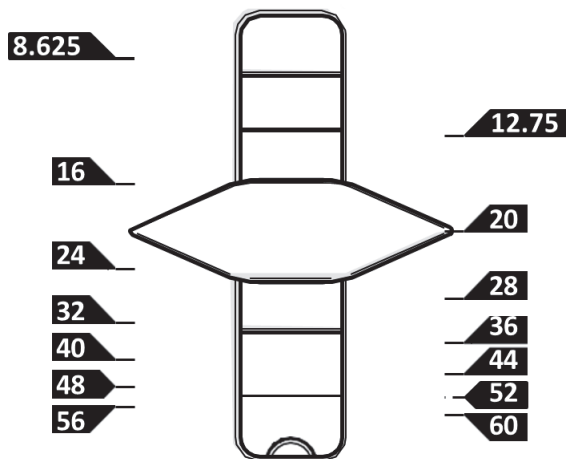


Figure 1-28 Available pipe diameters (inches)

To adjust the motorized scanner to a new pipe diameter, complete the following steps.

1. Loosen the two bolts using 6mm hex driver and swivel the tractor arms to slide the pointer aligned with the desired diameter mark (see Figure 1-29 on page 47).
2. Tighten the two bolts to lock the motor carriage at the correct diameter.

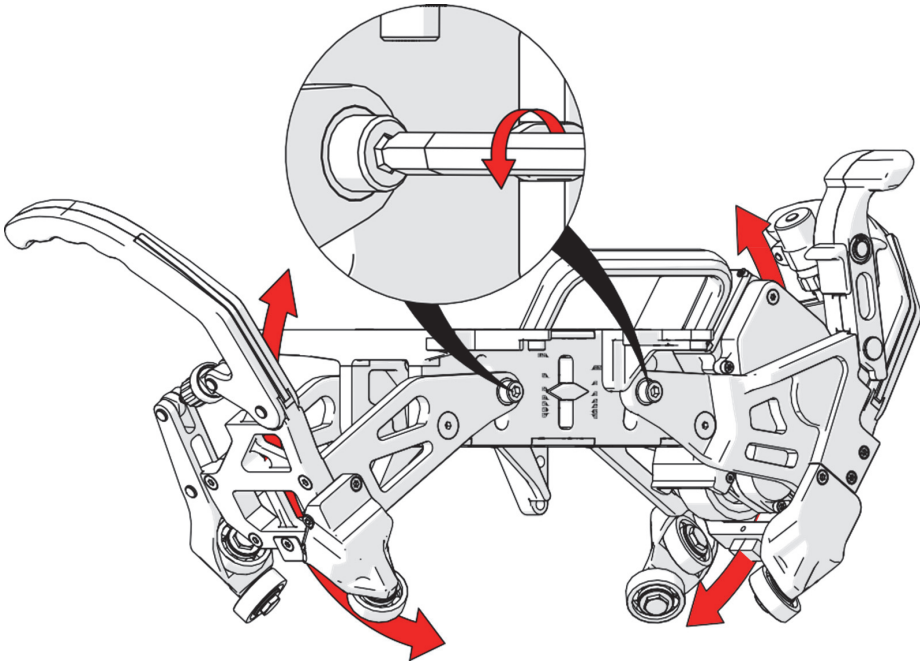


Figure 1-29 Adjusting the pipe diameter

1.14 Motor Carriage Band Clamp Operation

The motor carriage band clamps secure the motor carriage to the circumferential band on the pipe. To engage or disengage the band clamps, you must press the band clamp locks while simultaneously pressing down or lifting up on the band clamp levers (see Figure 1-30 on page 48).

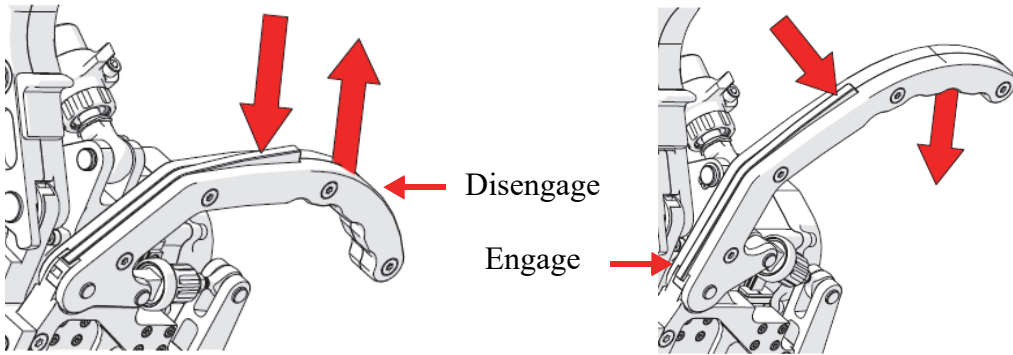


Figure 1-30 Operating the band clamps

1.15 Mounting the Motor Carriage to the Band

To mount the motor carriage to the circumferential band, complete the following steps.

1. Ensure the motor engage handle is disengaged (see Figure 1-31 on page 48).

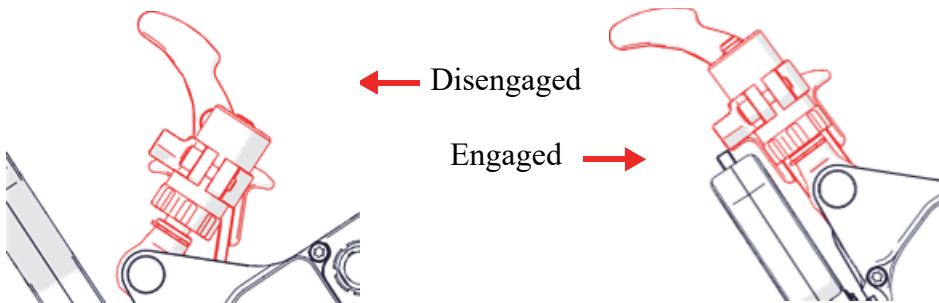


Figure 1-31 Motor engage handle positions

2. Ensure the band clamp lever is in the unlocked position (see Figure 1-32 on page 49).

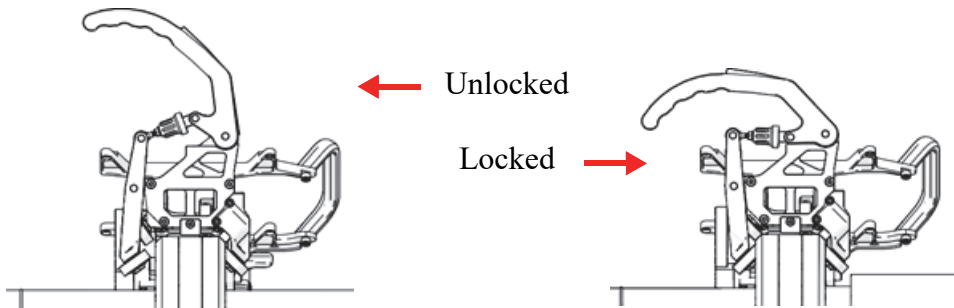


Figure 1-32 Band clamp lever positions

TIP

The band clamp levers have a lock located on the top of each one. To move the band clamp lever, depress the lock on top of each lever as you raise or lower it.

3. Lower the motor carriage onto the circumferential band (see Figure 1-33 on page 50).

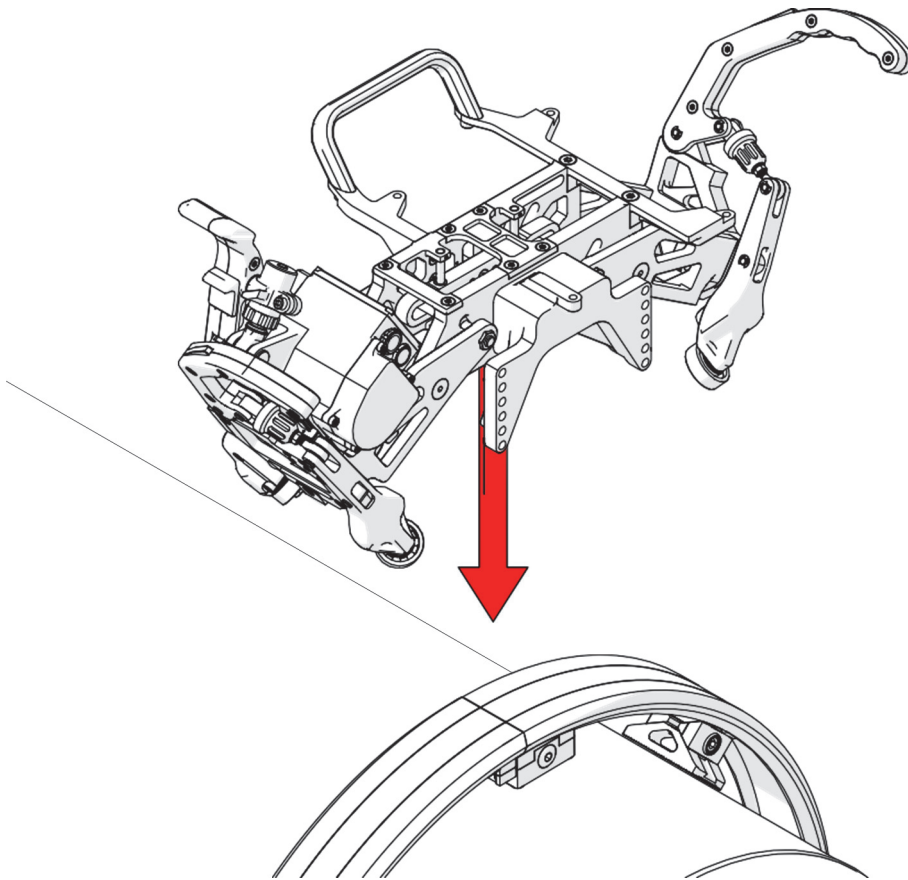


Figure 1-33 Mounting the motor carriage onto the band

IMPORTANT

Maintain a firm hold on the motor carriage until it has been secured to the circumferential band to prevent the unit from falling and receiving damage.

4. Lower the band clamp levers to lock the clamp to the band (see Figure 1-34 on page 51).

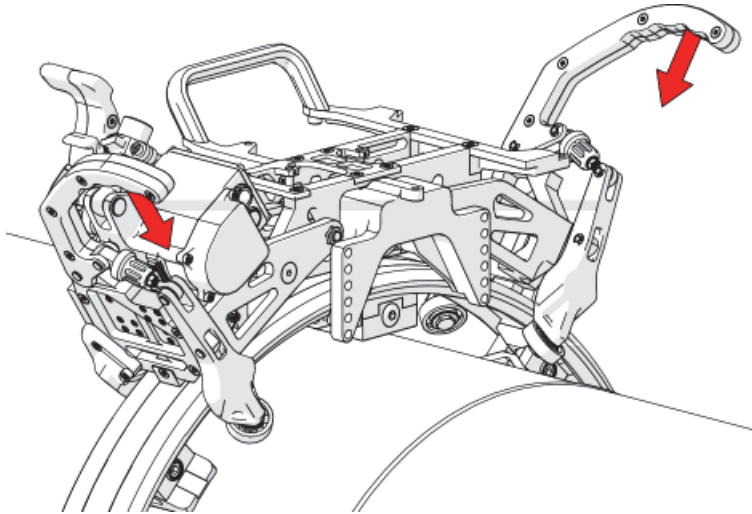


Figure 1-34 Locking the band clamp levers

5. Loosen the clamp adjuster lock on each band clamp lever (see Figure 1-35 on page 51).

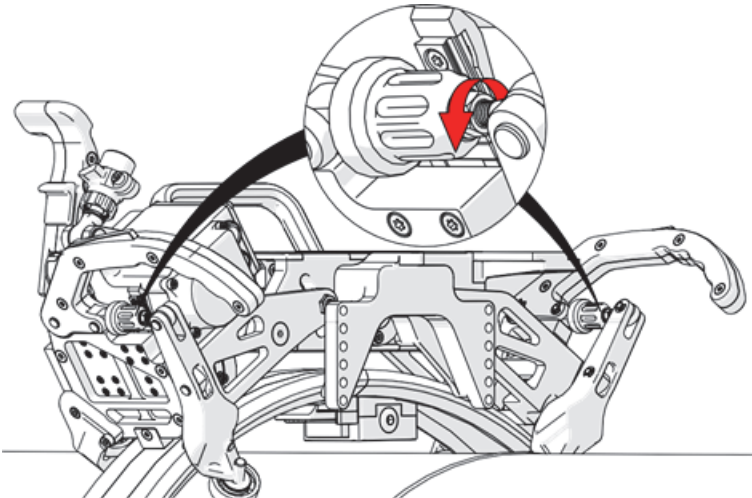


Figure 1-35 Loosening the clamp adjuster locks

6. Tighten the clamp adjusters until all of the motor carriage wheels are contacting the band (see Figure 1-36 on page 52).

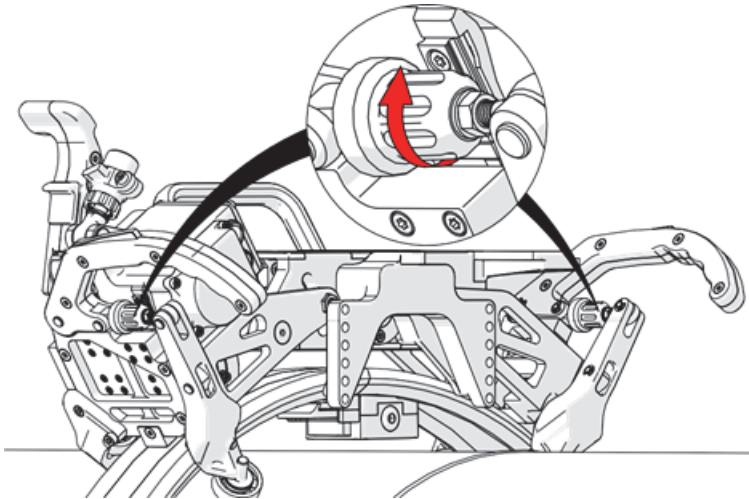


Figure 1-36 Tightening the clamp adjusters

7. Visually inspect all eight wheels and ensure they are all touching the band (see Figure 1-37 on page 52). If necessary, reposition or shift the motor carriage while tightening the clamp adjusters.

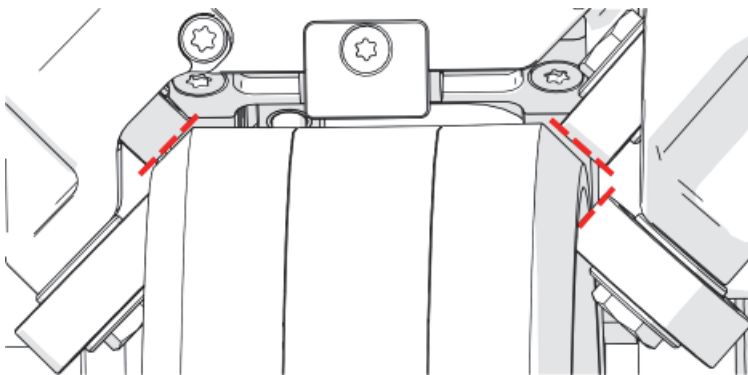


Figure 1-37 Visually inspecting the wheels

8. When all eight wheels are firmly touching the band, unlock the band clamp levers.
9. Tighten each clamp adjuster by 1/4 turn (see Figure 1-38 on page 53).

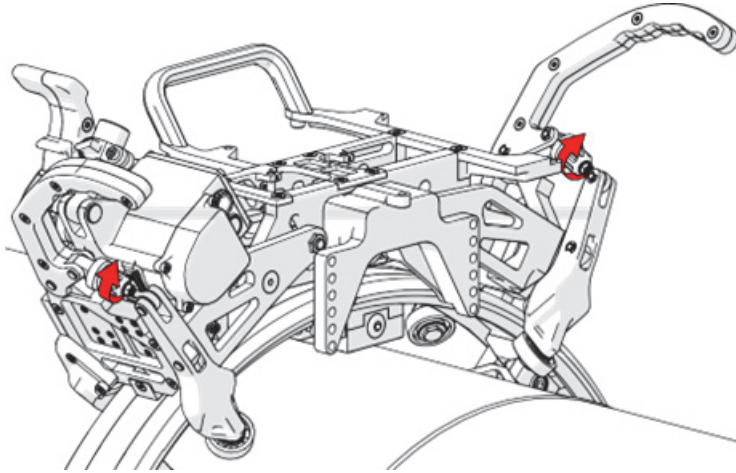


Figure 1-38 Tightening the clamp adjusters 1/4 turn

10. Tighten the clamp adjuster locks.
11. Lock the band clamp levers down again.

1.16 Engaging and Disengaging the Drive Wheel

A vertical handle is used to engage and disengage the drive wheel once the motor carriage is mounted on the circumferential band. When placing the motor carriage on the circumferential band for the first time, or when changing the size of the circumferential band for a different pipe diameter, you must adjust the drive wheel tension.

IMPORTANT

The drive wheel tension can only be adjusted when the motor engage handle is disengaged (see Figure 1-31 on page 48).

1.16.1 Disengaging the Drive Wheel

To disengage the drive wheel, lift the motor engage handle lock and push the handle towards the acquisition unit (see Figure 1-39 on page 54).

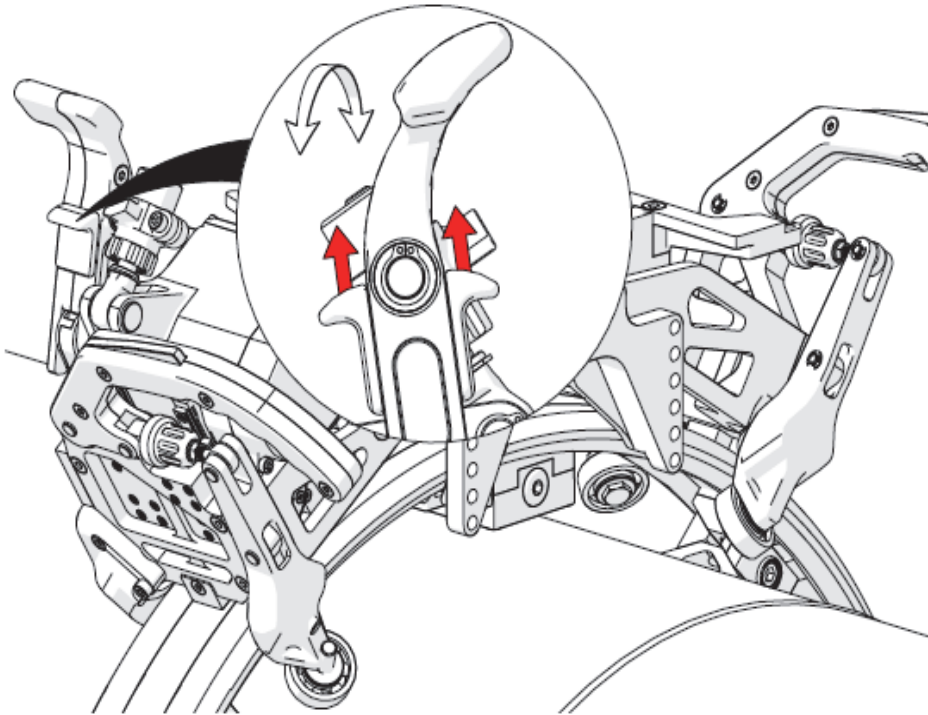


Figure 1-39 Disengaging the drive wheel with the vertical handle

1.16.2 Adjusting the Drive Wheel Tension

The drive wheel must have the proper amount of pressure against the band for the scanner to take accurate measurements. To adjust the pressure of the drive wheel, complete the following steps.

1. Unlock the securing mechanism to change the preset on the drive wheel tension cylinder using a 4mm hex driver (see Figure 1-40 on page 55).

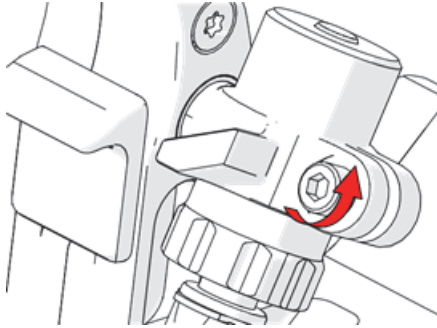


Figure 1-40 Unlocking the drive wheel tension cylinder

NOTE

You may need to repeat these steps a few times to get the tension set correctly.

2. Rotate the tension cylinder to increase or decrease the amount of pressure (see Figure 1-41 on page 55).

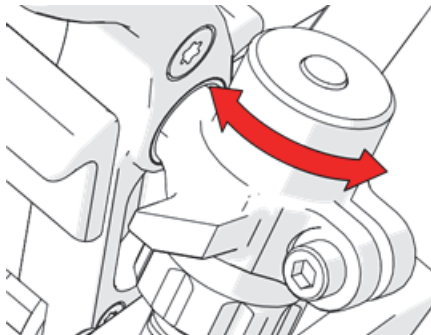


Figure 1-41 Rotate the tension cylinder

3. Engage the motor engage handle and observe the indicator on the top of the drive wheel tension cylinder.

- Correct pressure will allow the green o-ring to be visible on the indicator piston on the top of the mechanism (see Figure 1-42 on page 56).

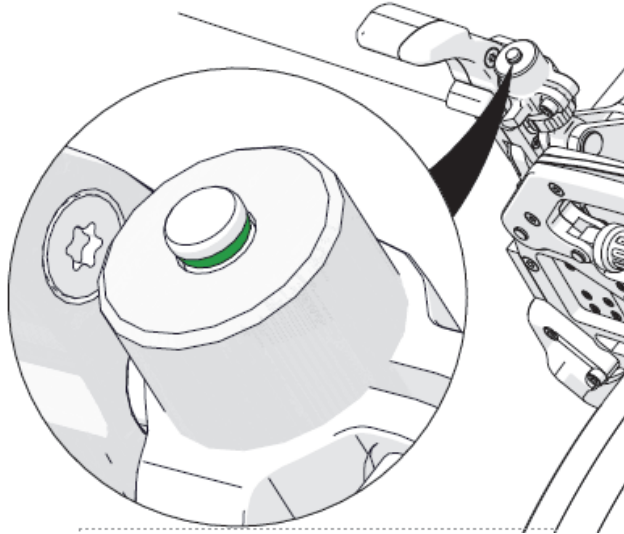


Figure 1-42 Correct pressure

- If there is not enough pressure (see Figure 1-43 on page 56), disengage the motor engage handle and increase the tension.



Figure 1-43 Too little pressure

- If there is too much pressure (see Figure 1-44 on page 57), disengage the motor engage handle and decrease the tension.

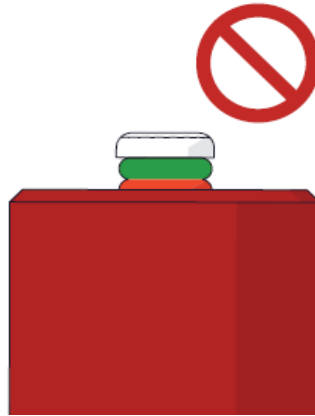


Figure 1-44 Too much pressure

4. Lock the securing mechanism on the drive wheel tension cylinder using a 4mm hex driver (see Figure 1-40 on page 55).

1.16.3 Engaging the Drive Wheel

To engage the drive wheel, lift the motor engage handle lock and pull the handle away from the Acquisition Unit (see Figure 1-39 on page 54).

1.17 Probe Module

PipeWIZARD iX has two models of probe modules available. The standard probe module (see Figure 1-45 on page 58) has a total length of 240 mm (9.45 in.) and allows a maximum PA wedge (SPWZ6 style) index offset of 34 mm (1.34 in.). The extended probe module (see Figure 1-46 on page 58) has a total length of 330 mm (13 in.) and allows a maximum PA wedge index offset of 79 mm (3.11 in.).

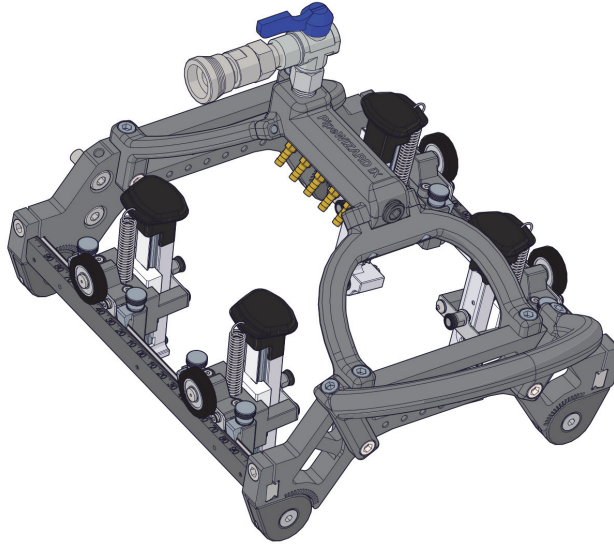


Figure 1-45 Standard probe module

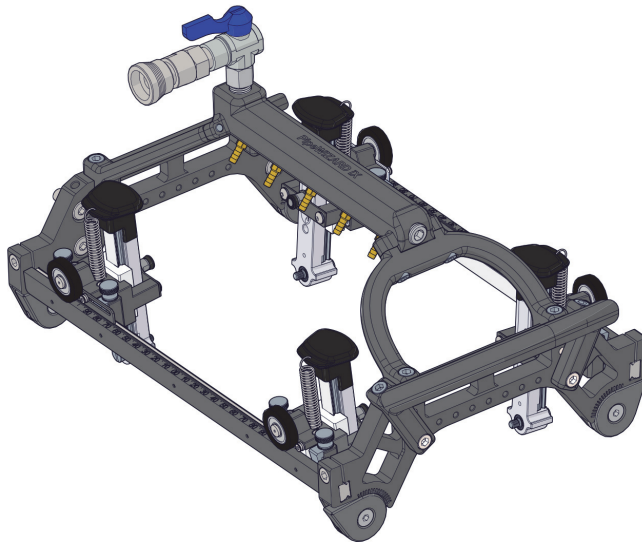


Figure 1-46 Extended probe module

1.17.1 Installing/Removing Probe Module

Four screws (see Figure 1-47 on page 59) hold the probe module on the carriage plate. To remove the probe module from the carriage plate, use an 8mm Hex driver to remove the four screws.

TIP

Slide all spring loaded arms (SLA) to the opposite side of the probe module to access the screws and make room for the driver tool.

When installing the probe module, be sure to select the appropriate height position. If spacers are used with the circumferential band select the lower position. Once the scanner is installed on the band, ensure all SLAs and the encoder are approximately at the center of their travel range.

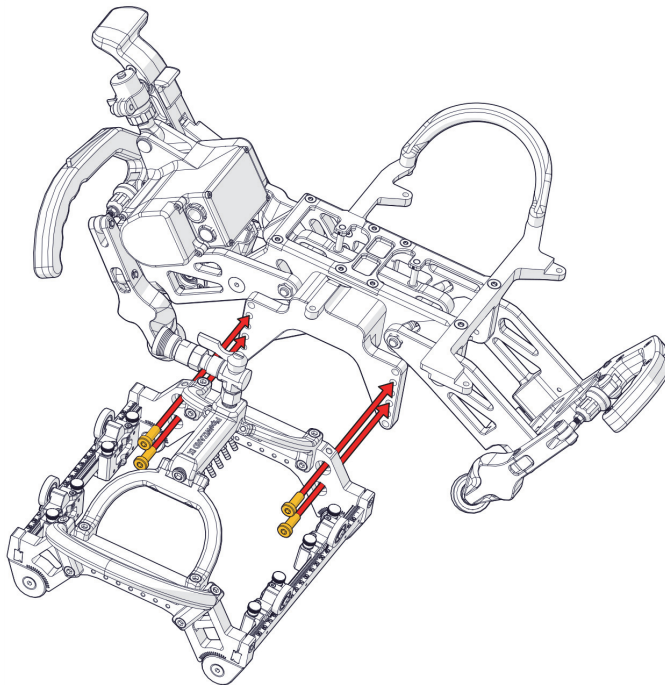


Figure 1-47 Probe module mounting screws

1.17.2 Adding a Pair of Probes

You can expand the probe module by adding up to 4 sections (pairs of probes), 2 on each side, for a maximum number of 12 probes. Probe module sections can be either Level 1 (L1) with probes inside the frame, or Level 2 (L2) with probes outside the frame. Sections L1 and L2 can be combined together.

IMPORTANT

Sections are dedicated for the left and right sides of the probe module, with their own unique part numbers. They are not mirror images and cannot be flipped. For example, a left section will not fit on the right side.

To add a pair of probes, complete the following steps.

1. Remove the two protective caps using a 6mm Hex driver (see Figure 1-48 on page 60).

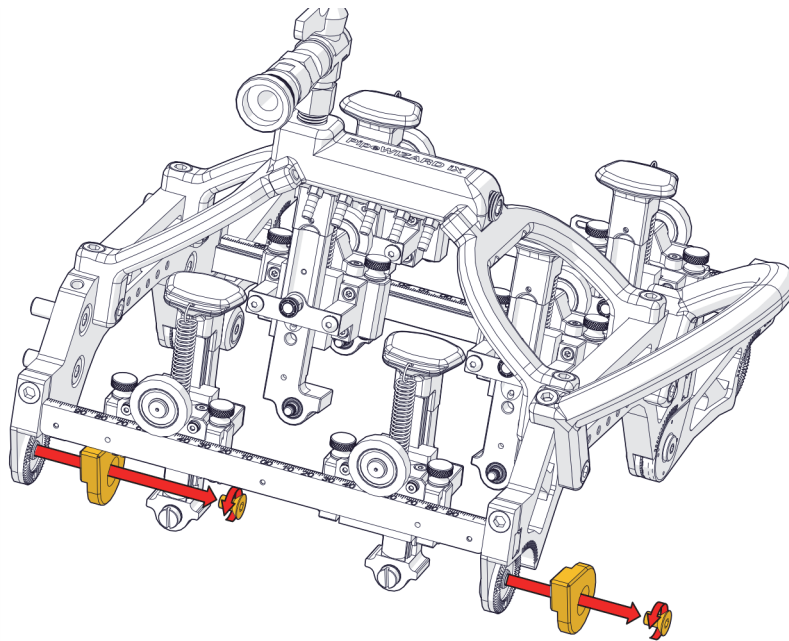


Figure 1-48 Removing the protective caps

2. Position and align the probe module section (see Figure 1-49 on page 61).

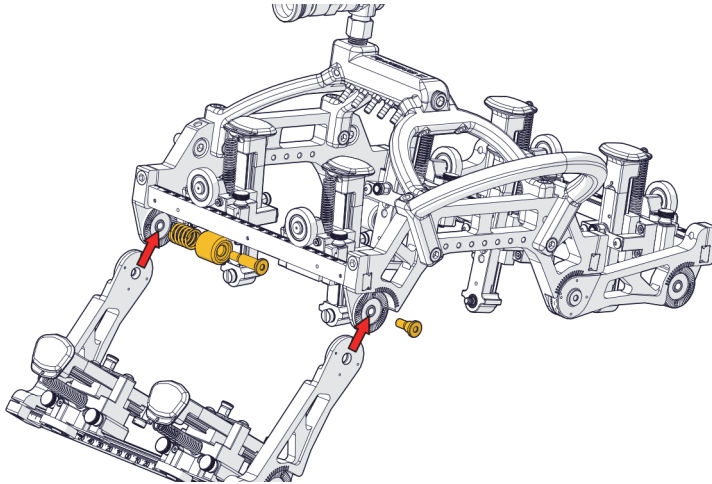


Figure 1-49 Positioning the probe module

3. Mount the probe module section in place using the spring, small spacing cylinder, and two screws (see Figure 1-50 on page 61).

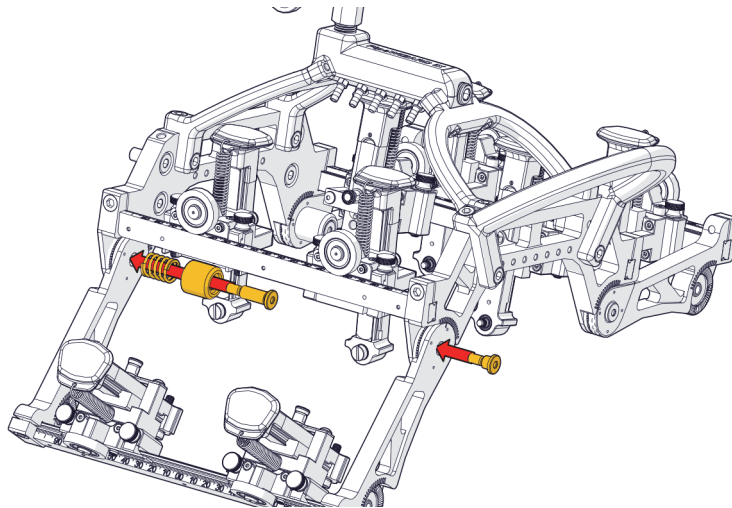


Figure 1-50 Mounting the probe module with spring and spacer

4. Tighten the screws, but do not fully tighten them at this time (see Figure 1-51 on page 62).

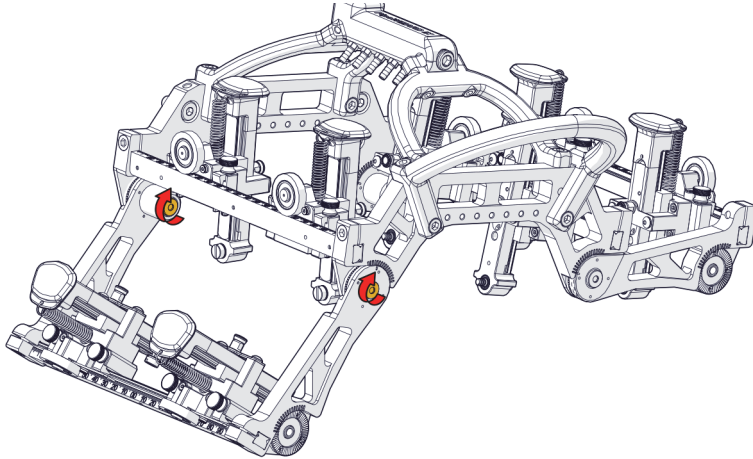


Figure 1-51 Tightening the screws

5. Adjust the angle of the probe module as required (see Figure 1-52 on page 62).

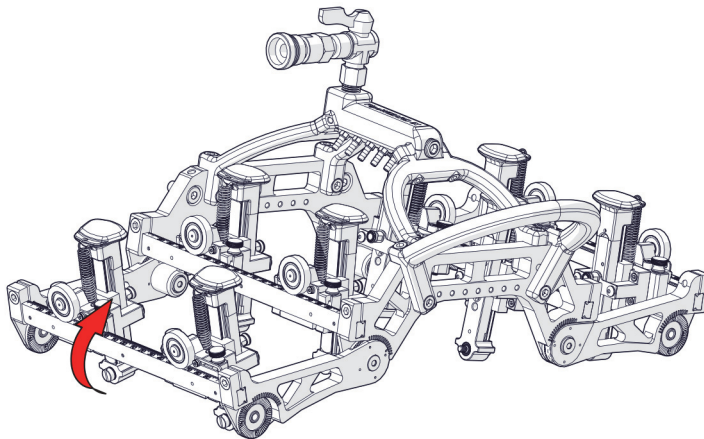


Figure 1-52 Adjusting the probe module angle

6. Tighten down the screws fully (see Figure 1-53 on page 63).

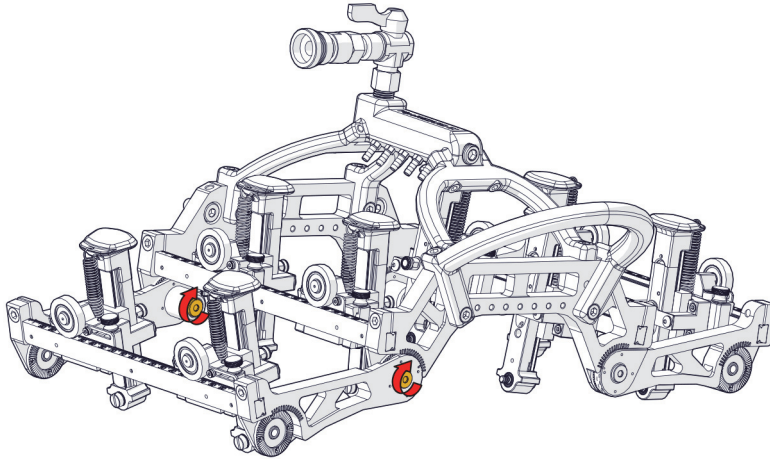


Figure 1-53 Tightening down the screws

1.17.2.1 Adjusting the Probes to the Proper Pipe Diameter

Adjust the new probe module section to position the SLAs perpendicular to the pipe surface.

1. Loosen the arm screw using a 6mm Hex driver (see Figure 1-54 on page 63).

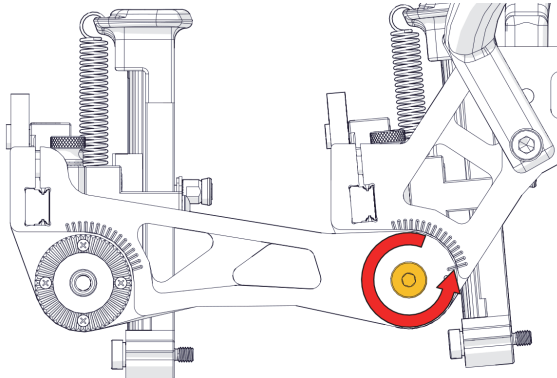


Figure 1-54 Loosen the arm screw

2. Position the arm so the SLA is perpendicular to the pipe surface (see Figure 1-55 on page 64). If you have two arms configured on the central probe module section, use the index markers to ensure that both sides are identical.

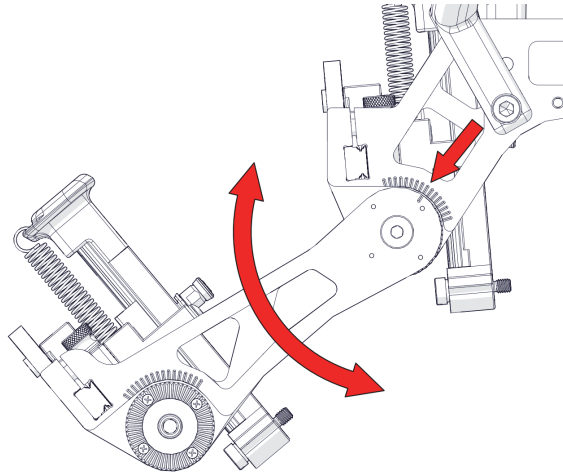


Figure 1-55 Position the arm

3. Tighten the arm screw (see Figure 1-56 on page 64).

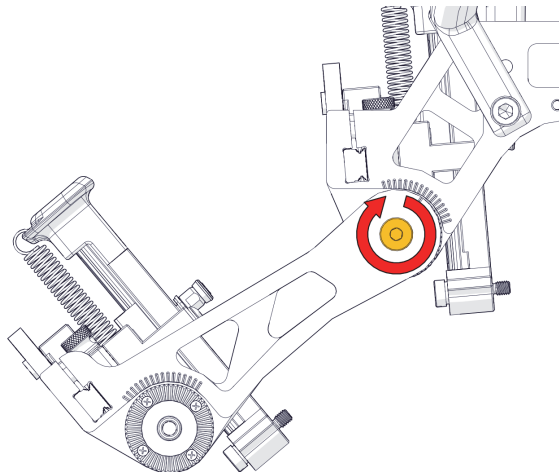


Figure 1-56 Tighten the arm screw

1.17.3 Spring Loaded Arms (SLAs)

The standard Spring Loaded Arm (SLA) is designed to have the wedge yoke centered. There are also left and right (see Figure 1-57 on page 65) offset SLAs, with a mechanical offset of 6.5 mm. Offset SLAs are typically used for TOFD wedges and probes.

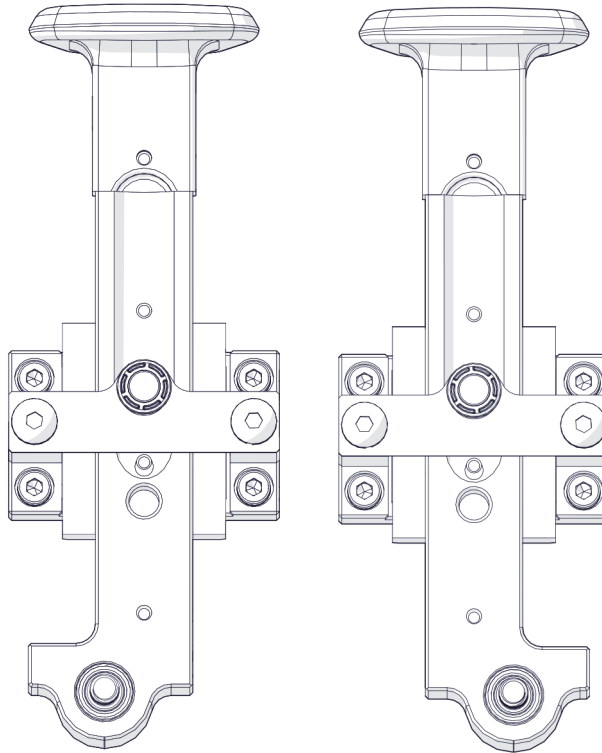


Figure 1-57 Left and Right offset SLAs

Pulling up the SLA will lock it in upper position (this ensures the wedge is not in contact with pipe surface), allowing adjustments or maintenance to be conducted on the wedge or probe, or to check the flow of couplant to the probes. To lower the SLA back in position (with the wedge in contact with pipe surface), lift up the SLA and pull out the locking plunger, then slowly lower the SLA down to contact the pipe (see Figure 1-58 on page 66).

IMPORTANT

If you pull the locking plunger without lifting the SLA, you may damage the wedge on the pipe surface due to the force of the spring.

TIP

The SLA spring can easily be replaced by hand without any tools.

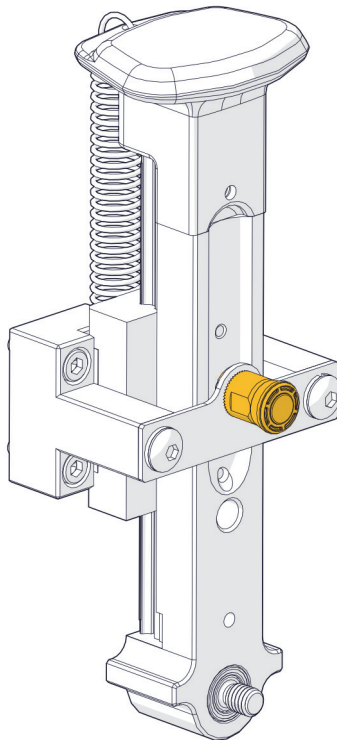


Figure 1-58 Locking and unlocking the SLA

1.17.3.1 Replacing the SLA

To replace the SLA, complete the following steps:

1. Remove the 4 mounting screws using an M3 Hex driver (see Figure 1-59 on page 67).

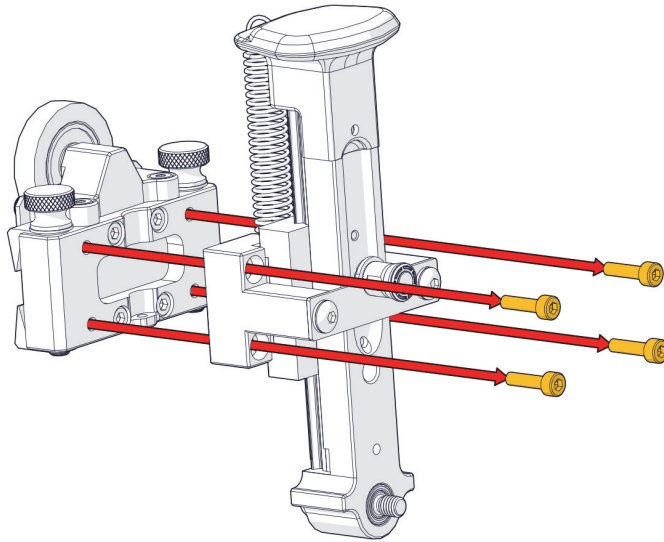


Figure 1-59 Removing the SLA

2. Remove the SLA.
3. Position the new SLA to align the mounting screw holes.
4. Replace the 4 mounting screws using an M3 Hex driver.

1.17.3.2 Replacing the SLA Spring

The SLA spring is not high-tension and can be replaced without tools. To replace the spring on an SLA, complete the following steps:

1. Grasp the top of the old spring and lift it up, disconnecting the spring from the mounting hole.
2. Slide the bottom of the old spring out of its mounting hole.

3. Seat the bottom of the new spring into the lower mounting hole, and keep it seated with light tension on the spring.
4. Stretch the spring enough to seat the top connection point into the top mounting hole, and release the spring.

1.17.4 Band Position

The band must be located a specific distance from the weld centerline. The distance depends on the probe module being used (standard or extended).

1.17.4.1 Standard Probe Module

For the standard probe module, the edge of the band must be positioned 162mm from the weld centerline. Use the 162mm band positioning tool (see Figure 1-60 on page 68) to align the band at the required distance, ensuring the 0 marking on the ruler is aligned with the weld centerline.

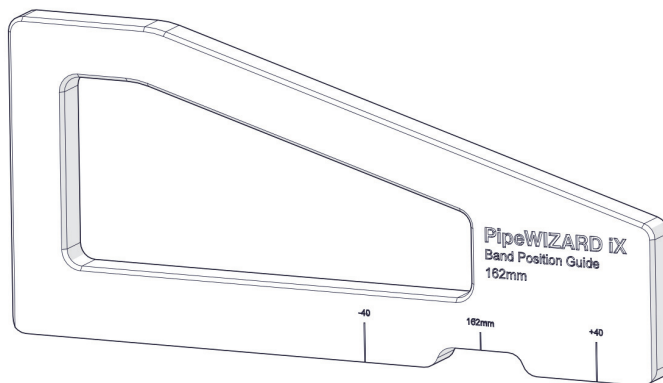


Figure 1-60 162mm band positioning tool

1.17.4.2 Extended Probe Module

For the extended probe module, the edge of the band must be positioned 207mm from the weld centerline. Use the 207mm band positioning tool (see Figure 1-61 on page 69) to align the band at the required distance, ensuring the 0 marking on the ruler is aligned with the weld centerline.

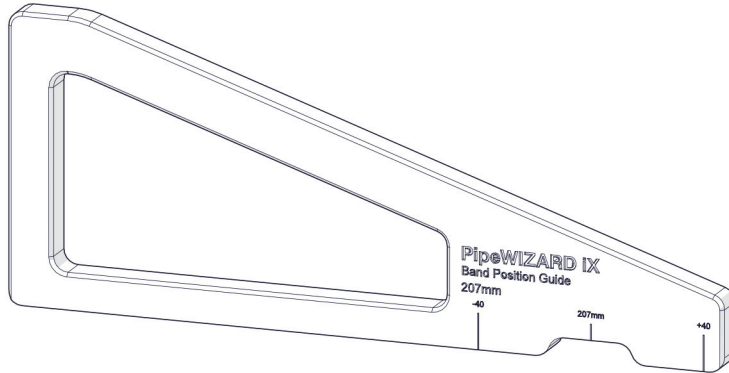


Figure 1-61 207mm band positioning tool

1.17.4.3 Weld Centerline Zero Alignment

When the band is secured at the proper distance, the weld centerline has a zero alignment (see Figure 1-62 on page 69).

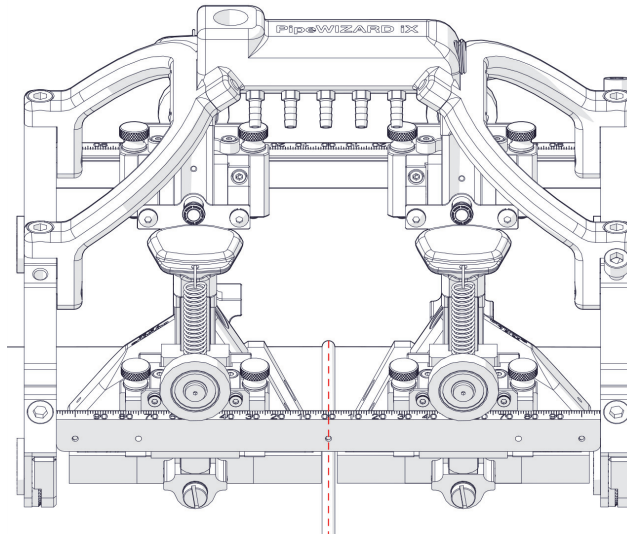


Figure 1-62 Weld Centerline

1.17.5 Index Offset

The index offset is used to correctly position the probes (PA wedge or TOFD wedge) to the correct distance along the weld centerline.

1.17.5.1 PA Wedge Index Offset

When using a PA wedge (SPWZ6 type) the pointer indicating the offset position for the front of the wedge (highlighted in yellow in Figure 1-63 on page 70) should be located all the way to the outside edges of the probe module mount.

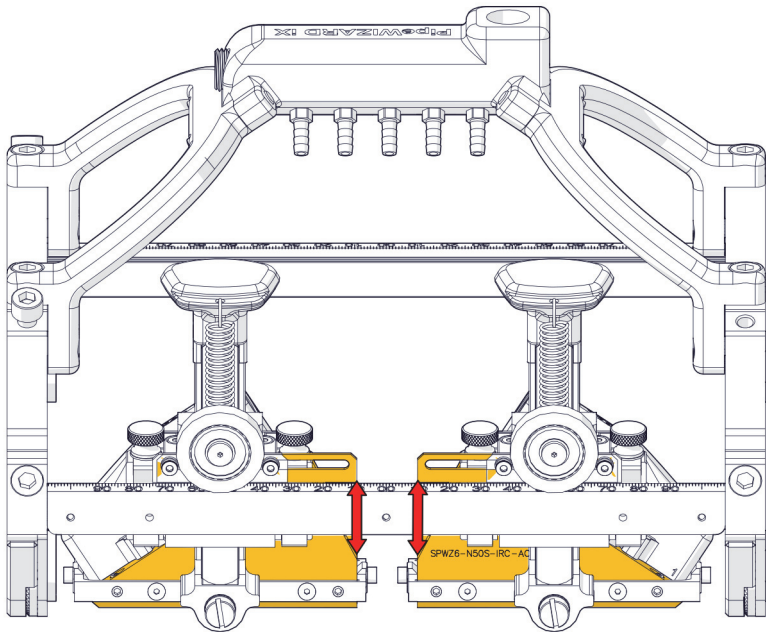


Figure 1-63 PA Wedge Index Offset

1.17.5.2 TOFD Wedge Index Offset

When using a TOFD wedge (ST7 type) and the offset SLAs, the pointer indicating the offset position for the front of the wedge (highlighted in yellow in Figure 1-64 on page 71) should be located all the way to the inside edges of the probe module mount.

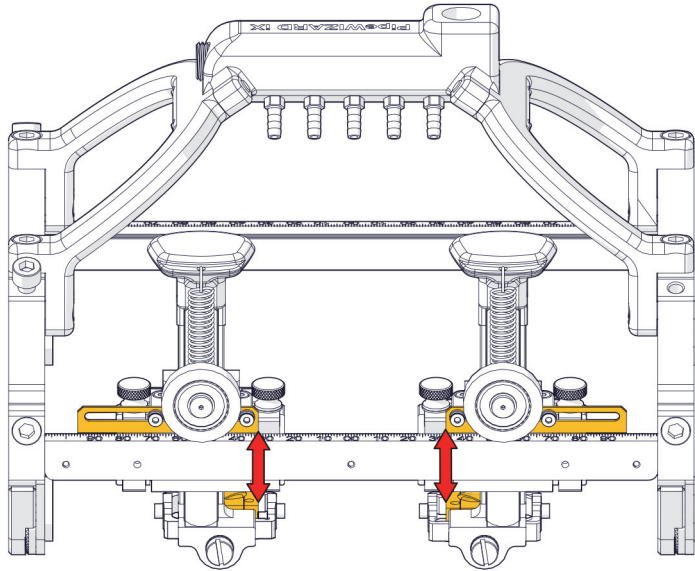


Figure 1-64 TOFD Wedge Index Offset

1.17.6 Scan Offset

The scan offset is the distance between the pair of probes. For example, if a phased array pair of probes is the zero reference, the distance to the other pair of probes is the scan offset value.

This section provides the mechanical distances necessary to realign the data in the software due to the fact that all probes collect the data simultaneously, but from different locations on the scan axis. Only the following standard wedge types are considered in this section: SPWZ6 or PA, ST7 for TOFD, and STR for transverse. For other wedges, the scan offset must be physically measured with a ruler.

NOTE

For transverse wedges, the distances indicated do not correspond to the distance to the target (due to the probe skew angle). Distances correspond to the center of the wedge.

Table 2 on page 72 provides the distance (mm) from the mechanical pivot of the module to the center of the wedge in the scan axis. Figure 1-65 on page 73 shows the distance between pivots. Given this information, you can calculate the distance between the pair of probes based on the module and probe type used.

Table 2 Wedge to pivot distance (mm)

Probe	Central Module	Section 1	Section 2
PA	67	61	116
TOFD	60	54	109
TRV	70	64	119

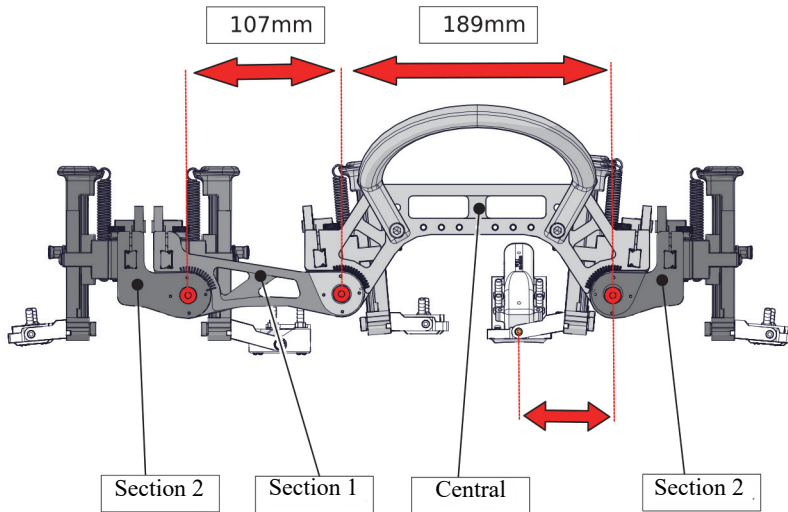


Figure 1-65 Distances between pivots

NOTE

In Figure 1-65 on page 73, the small arrow below the image shows an example measurement between the central module pivot and the center of the PA wedge (67 mm in Table 2 on page 72).

Table 3 on page 74 and Table 4 on page 74 indicates the scan offsets (mm) for each probe type and location with reference to a fixed PA probe (see Figure 1-66 on page 74). You must enter these scan offset values into the software setup to align the data received from each pair of probes. Scan offset values can be positive or negative, depending on scan direction.

Table 3 Distance (mm) from reference PA wedge (Central and Section 1)

Type	Central			Section 1		
	PA	TOFD	TRV	PA	TOFD	TRV
Dir A	N/A			113	120	110
Dir B	56	63	53	169	176	166

Table 4 Distance (mm) from reference PA wedge (Section 1 and Section 2)

Type	Section 2 w/o Section 1			Section 2 With Section 1		
	PA	TOFD	TRV	PA	TOFD	TRV
Dir A	183	176	186	290	283	293
Dir B	239	232	242	346	339	349

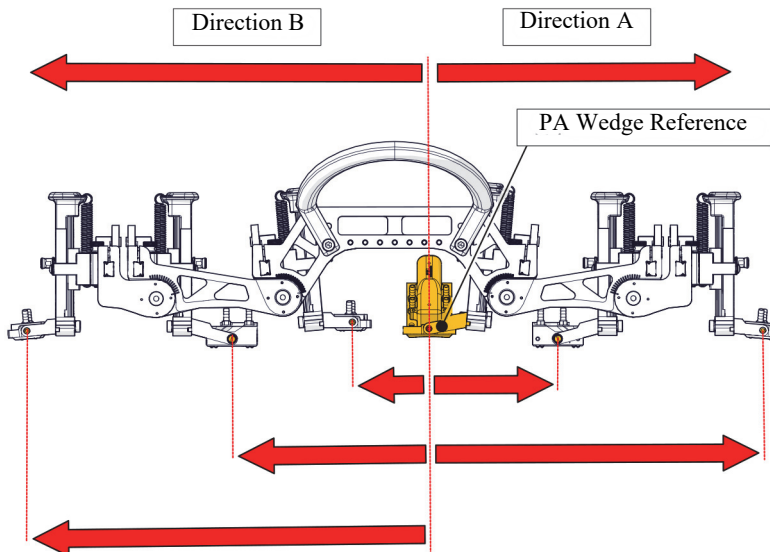


Figure 1-66 Scan offset reference values

1.17.7 Encoder Position

The encoder uses a small spring-loaded wheel in contact with the pipe to read the position of the scanner on the pipe. The encoder can be positioned in multiple locations on the probe module depending on the setup of the probes. It can be located inside or outside the module frame (see Figure 1-67 on page 75), can be positioned left or right along the frame rail (see Figure 1-68 on page 76), and has two available vertical positions to ensure the spring-loaded encoder wheel rests in contact with the pipe at the center of its vertical range (see Figure 1-67 on page 75).

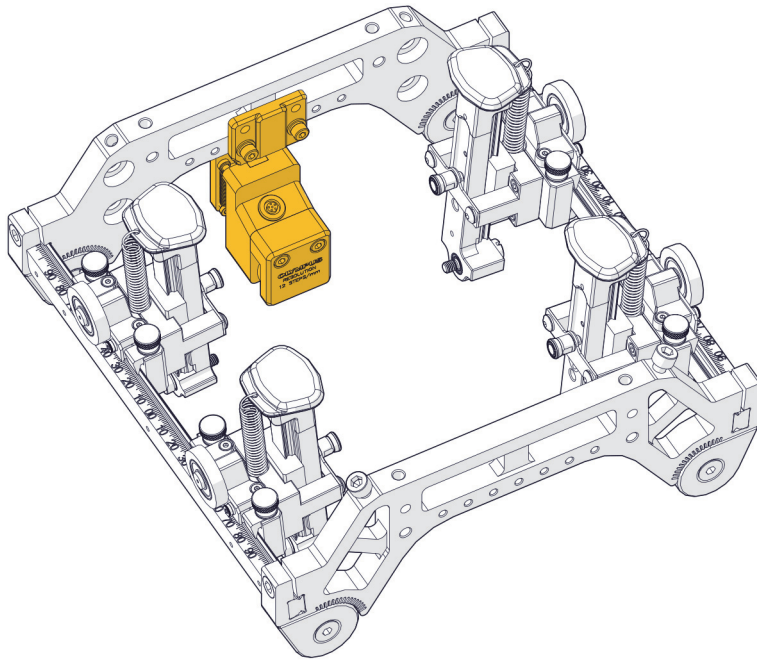


Figure 1-67 Encoder inside probe module frame

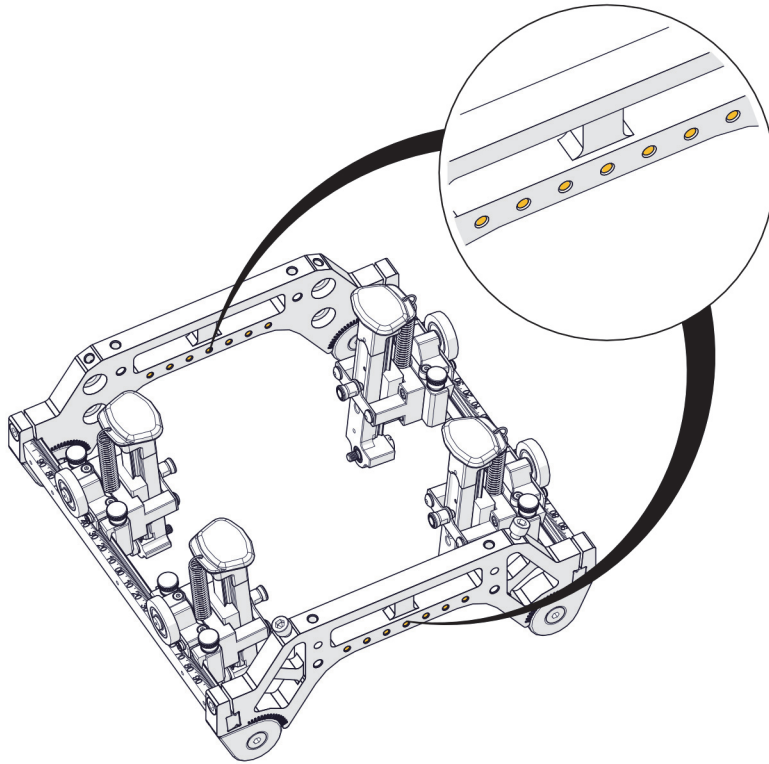


Figure 1-68 Encoder positions

1.17.8 Couplant Distributor

The couplant distributor is a manifold (see Figure 1-69 on page 77) that directs the couplant flow from the pump to the wedges. The manifold contains 10 irrigation connection points for the flexible tubes carrying the couplant to each wedge. The valve on the top of the manifold turns the couplant output on or off. The flow of the couplant should be controlled at the pump, to ensure consistency between scans.

IMPORTANT

Clear couplant from all lines when not in use, especially in freezing temperatures.

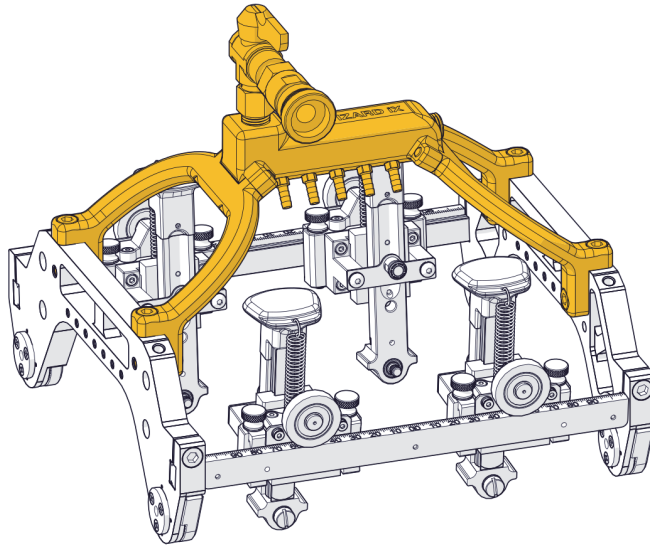


Figure 1-69 Couplant distributor manifold

1.18 Temperature Sensor

A temperature sensor is optional, to be used when temperature data is required to be collected with the scan results.

1.18.1 Installing the Temperature Sensor

Position the temperature sensor on the side of any PA probe wedge (see Figure 1-70 on page 78 and Figure 1-71 on page 78). Removing the PA probe from the wedge significantly simplifies the installation and removal of the temperature sensor. Securely screw or unscrew the sensor by turning it clockwise or counterclockwise. Plug the cable end of the sensor into the Wedge Temperature port on the acquisition unit (see Figure 1-5 on page 29).

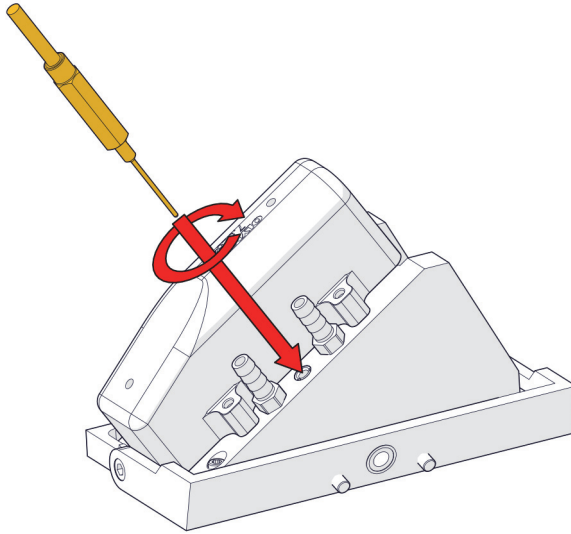


Figure 1-70 Installing temperature sensor in a wedge

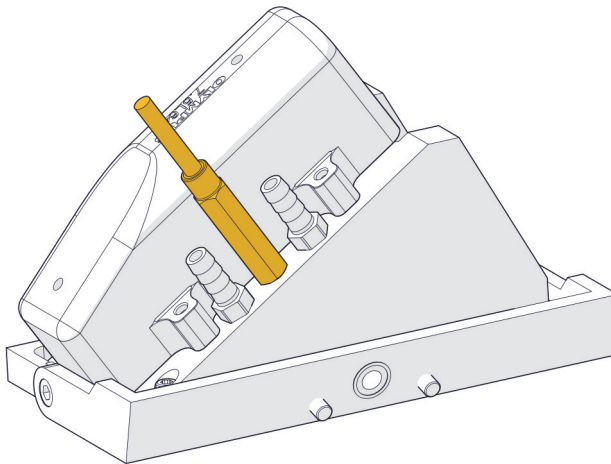


Figure 1-71 Installed temperature sensor

1.19 GPS Module

The optional GPS module is a satellite-based augmentation system which can operate on WAAS, EGNOS, MSAS, and GAGAN. Use the GPS when you are required to collect GPS data as part of the scan results.

The GPS device may take a few minutes to achieve a satellite fix, depending on the signal quality and environment. GPS positioning data are automatically transferred to the PipeWIZARD iX software when connected with a strong satellite signal. Refer to the *PipeWIZARD User Interface Guide* for more details.

To connect the GPS, ensure that the device is fully fastened on the PipeWIZARD iX system (see Figure 1-72 on page 79). Next, locate the cable included with the GPS and connect it to the acquisition unit GPS port (see Figure 1-73 on page 80 and Figure 1-5 on page 29).

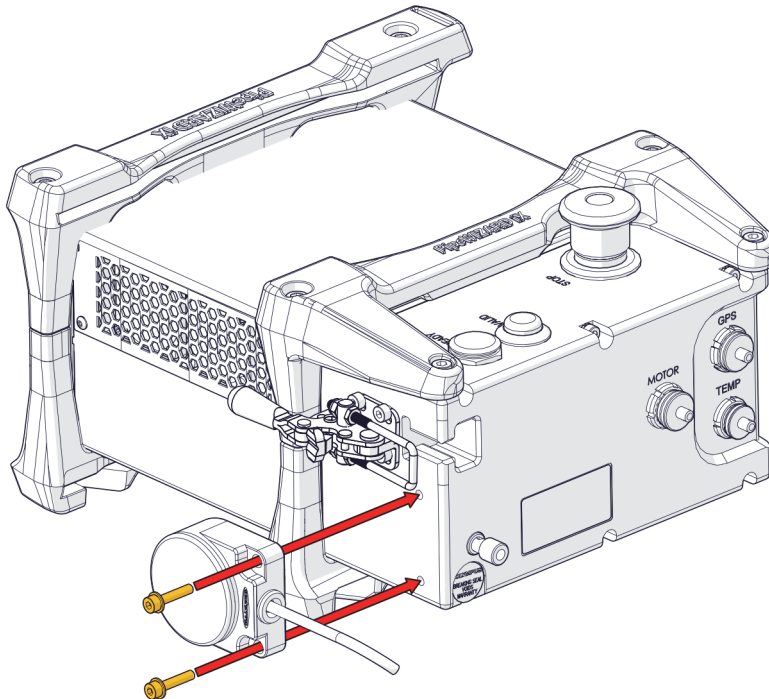


Figure 1-72 Attaching the GPS to the acquisition unit

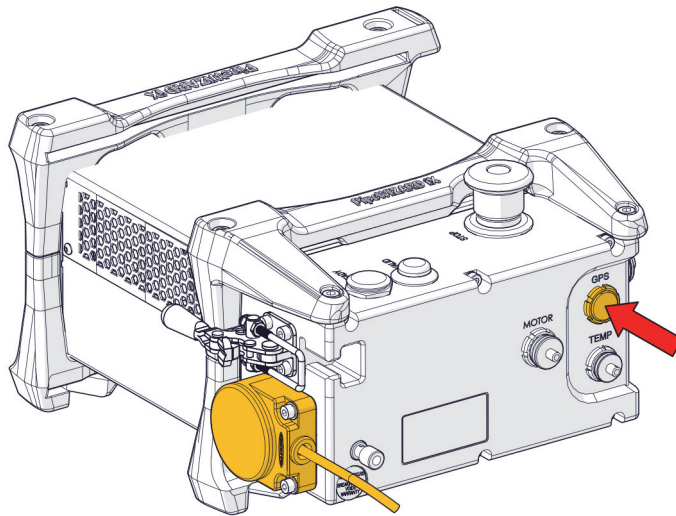


Figure 1-73 Connect the GPS cable

1.20 Couplant Feeding Unit

The couplant feeding unit is a standard Evident product (CFU-PWZ). Refer to the *CFU03/CFU05/CFU-PWZ Couplant Feed Unit User's Manual* for specifications and details of operation and maintenance.

2. Maintenance

This chapter describes the basic maintenance for the PipeWIZARD iX data acquisition unit. The maintenance operations explained below help keep the PipeWIZARD iX unit in good physical and working condition. The PipeWIZARD iX unit has been designed so that it only requires minimal maintenance.

IMPORTANT

The power supply must be disconnected from the system before conducting any maintenance. Failure to disconnect the power supply may result in injury, or damage to the system.

2.1 Maintenance Schedule

Conduct system maintenance according to the schedule in table.

Table 5 Maintenance Schedule

Task	Process	Frequency
Clean the drive wheels	Debris can collect on the wheels. Remove all debris before every use.	Every use
Clean the band surface	Ensure the surface and edges of the circumferential band are clean and free of dirt and contaminants before every use.	Every use
General cleaning	Wipe off any dirt or debris from the scanner after every use (see "Cleaning" on page 82).	Every use

Table 5 Maintenance Schedule (continued)

Task	Process	Frequency
Clean Acquisition Unit fans	Blow air through the grid protecting the heat sink and fans to remove dirt. Remove the cover for better access.	Before and after every use

2.2 Cleaning

General cleaning of components is important to keep your system working well. All components that have no wiring or cables are completely waterproof. Components can be washed with warm water, dish soap, and a medium bristle brush.

IMPORTANT

Before using the scanner, ensure all connectors are free of water and moisture.

IMPORTANT

Never use strong solvents or abrasive materials to clean your scanner components.

2.3 Clearing Water from the Tubing

Always clear water from tubing before storage, including the umbilical. To clear water from the tubing, you must push the quick-connect valve to open it and allow the water to flow out.

IMPORTANT

When operating the PipeWIZARD iX in temperatures that may drop below freezing, clear water from all tubing and the umbilical whenever it is not in use.

2.4 Installing/Removing the Acquisition Unit from the Scanner

To remove the acquisition unit from the scanner, complete the following steps.

1. Remove the 6 mounting screws (4 screws are 6mm, 2 screws are 5mm) from the acquisition unit (see Figure 2-1 on page 83).

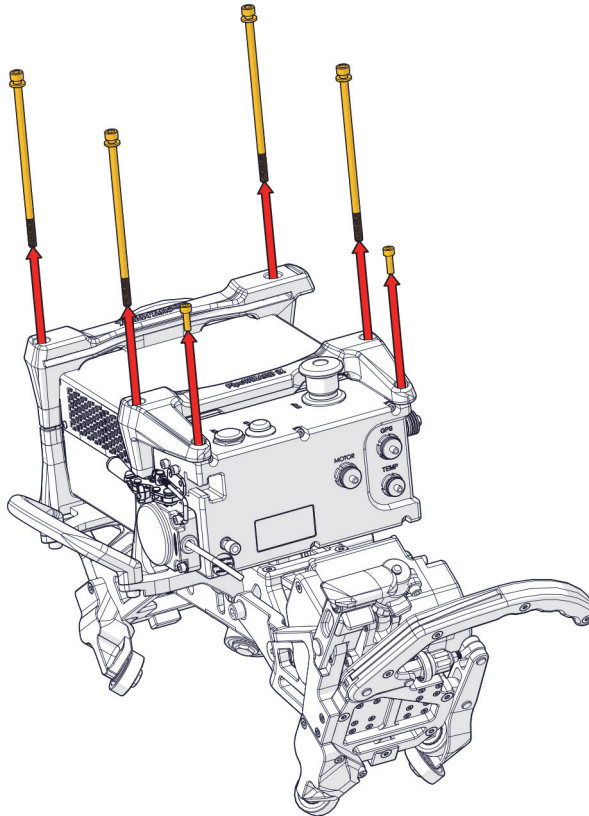


Figure 2-1 Remove 6 mounting screws

2. Remove the top bumpers from the acquisition unit (see Figure 2-2 on page 84).

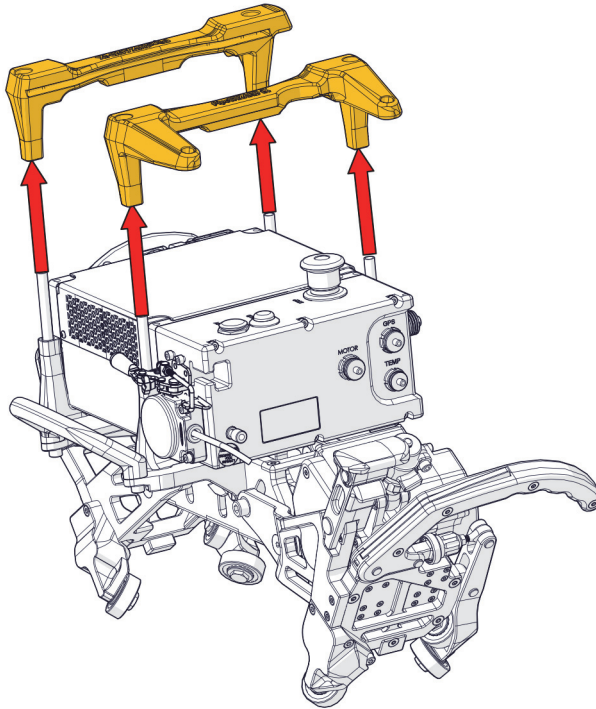


Figure 2-2 Remove the top bumpers

3. Remove the acquisition unit (see Figure 2-3 on page 85).

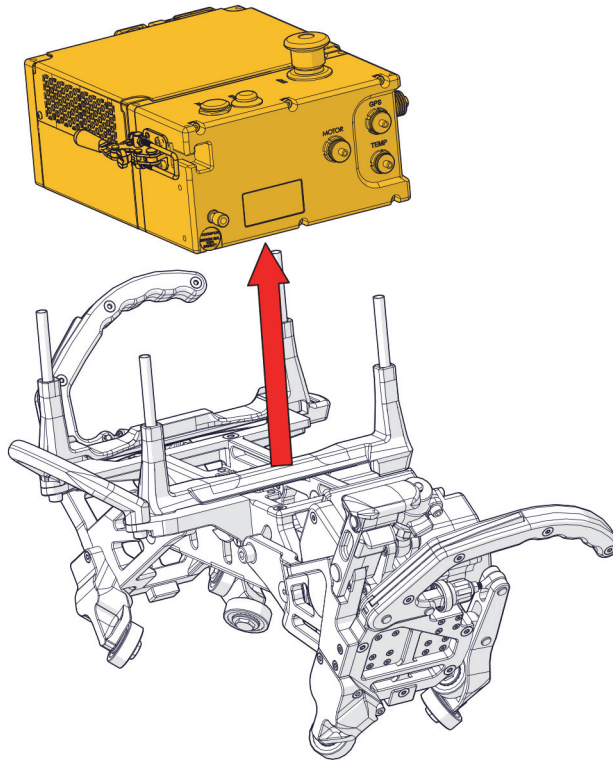


Figure 2-3 Remove the acquisition unit

TIP

To install the acquisition unit, complete the previous steps in reverse.

2.5 Replacing the Drive Wheel

To replace the drive wheel, complete the following steps.

1. Disengage the motor engage handle, revealing a Torx screw near the top of the drive wheel guard (see Figure 2-4 on page 86).

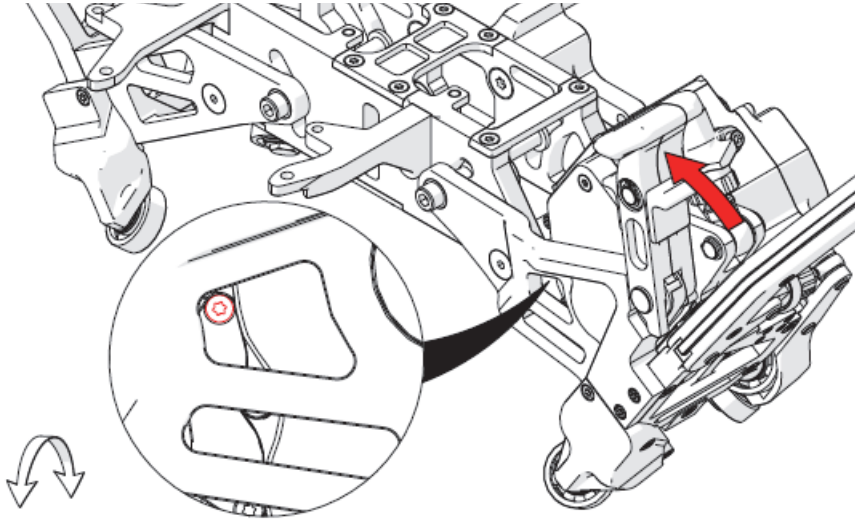


Figure 2-4 Removing Torx screw from top of drive wheel guard

2. Using a T10 Torx driver, remove the screw from the drive wheel guard.
3. Engage the motor engage handle, revealing a Torx screw near the bottom of the drive wheel guard (see Figure 2-5 on page 87).

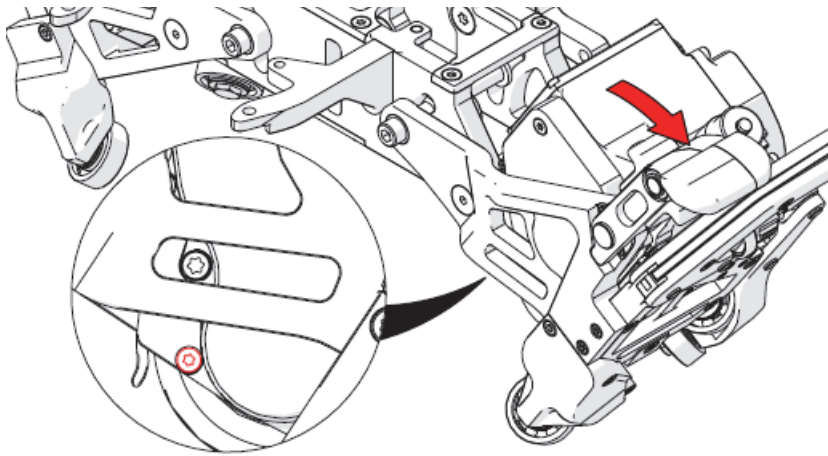


Figure 2-5 Removing Torx screw from bottom of drive wheel guard

4. Using a T10 Torx driver, remove the screw from the drive wheel guard.
5. Using a 6mm hex driver, remove the pivot clamp bolt (see Figure 2-6 on page 87).

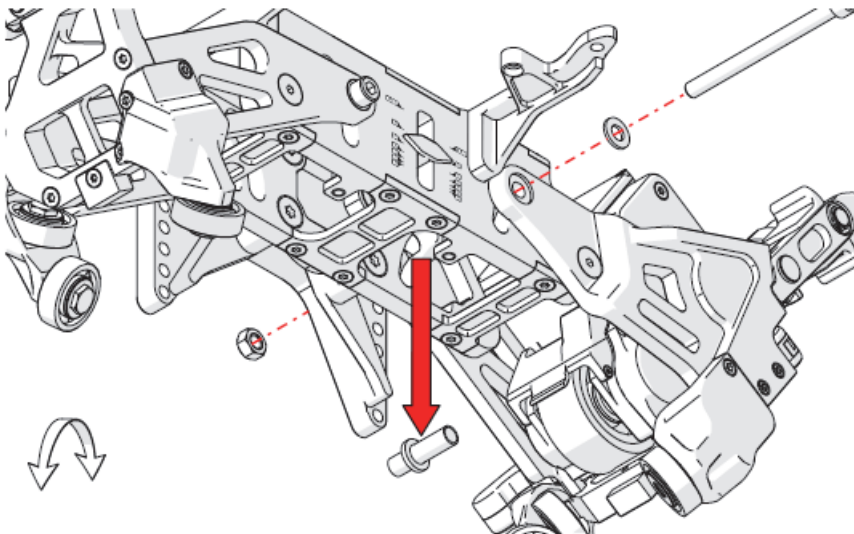


Figure 2-6 Removing pivot clamp bolt

6. Remove the nut, washer, and inner sleeve.

TIP

The motor carriage assembly will become unstable when the pivot clamp bolt is removed..

7. Using a T25 Torx driver, remove the wheel puller screw (see Figure 2-7 on page 88).

TIP

Set this screw aside, you will need it later in this process.

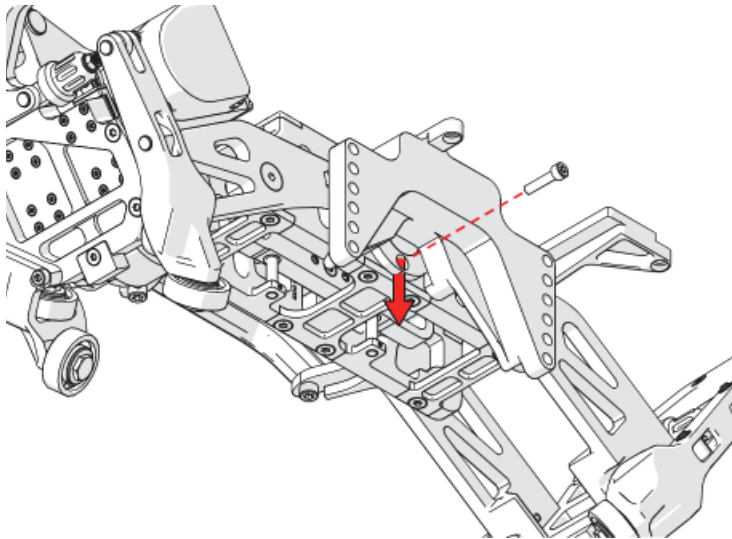


Figure 2-7 Removing the wheel puller tool and screw

8. Remove the wheel puller tool from the motor carriage (see Figure 2-7 on page 88).

TIP

Set the wheel puller tool aside for use later in this process.

9. Using a T25 Torx driver, remove two screws from the motor carriage (see Figure 2-8 on page 89).

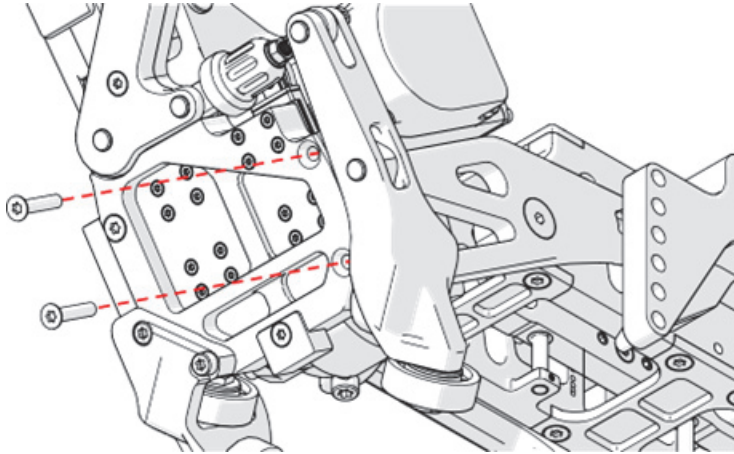


Figure 2-8 Remove two screws

10. Using a 4mm hex tool, remove the shoulder bolt from the motor carriage arm (see Figure 2-9 on page 90).

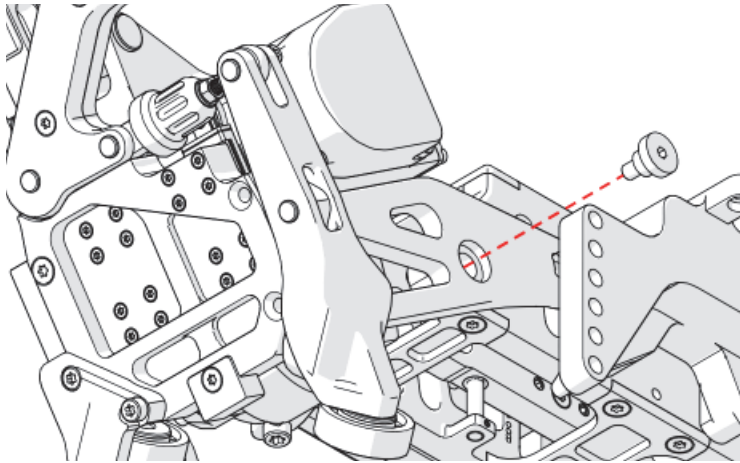


Figure 2-9 Remove shoulder bolt

11. Lay the motor carriage on its side with the probe holder plate facing up, and remove the motor carriage arm (see Figure 2-10 on page 90).

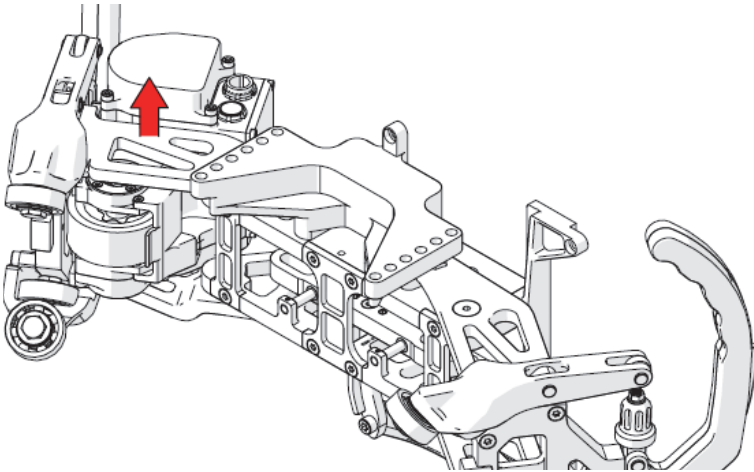


Figure 2-10 Remove motor carriage arm

12. Using a T20 Torx driver, remove the axle screw (see Figure 2-11 on page 91).

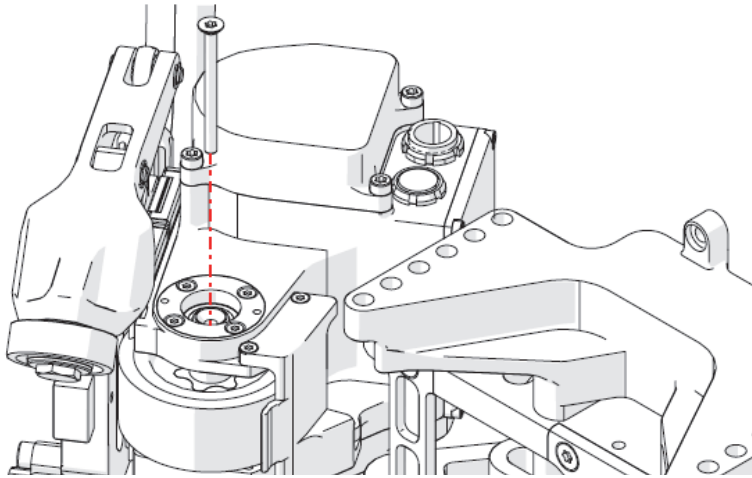


Figure 2-11 Remove screw from axle

13. Using a T10 Torx driver, remove the four screws from the bearing housing (see Figure 2-12 on page 91).

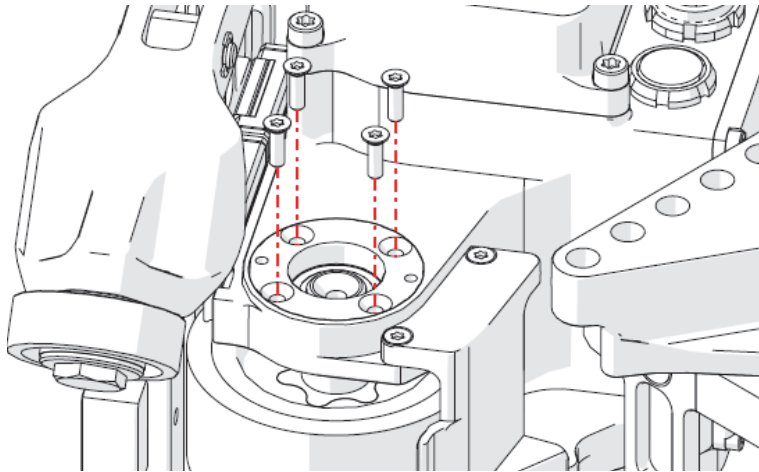


Figure 2-12 Remove bearing housing screws

14. Use two of the bearing housing screws to jack the bearing housing loose and remove it (see Figure 2-13 on page 92).

IMPORTANT

Make small adjustments to the screws equally to prevent the bearing housing from becoming stuck at an angle.

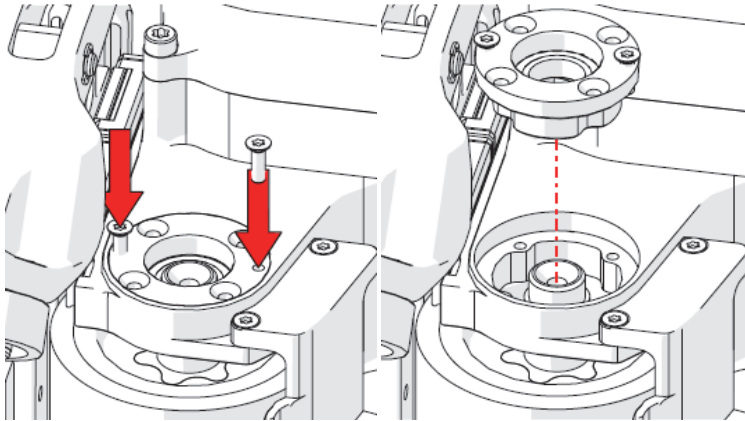


Figure 2-13 Screw-jack the bearing housing loose

15. Remove the two screws from the bearing housing, and set them aside.
16. Using a T10 Torx driver, unscrew the two screws and remove the drive wheel guard (see Figure 2-14 on page 93).

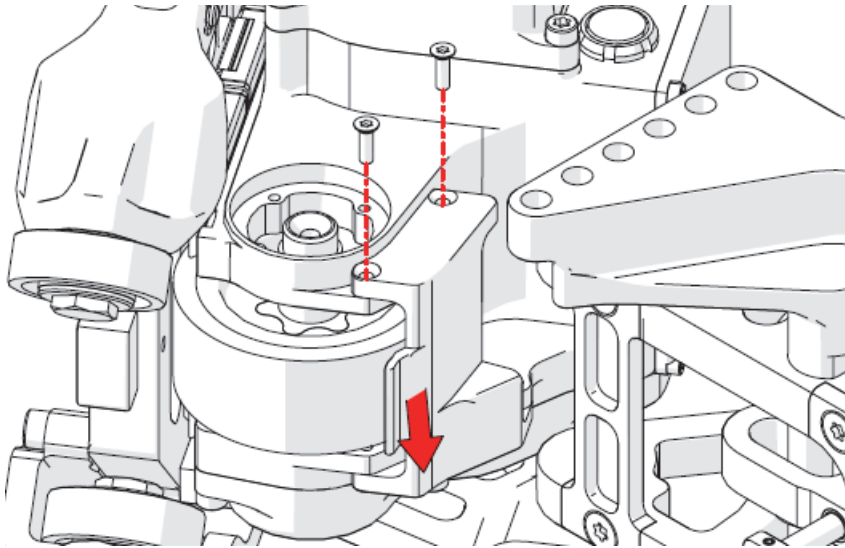


Figure 2-14 Remove the drive wheel guard

17. Remove the washer from the center of the wheel pulling tool (see Figure 2-15 on page 93).

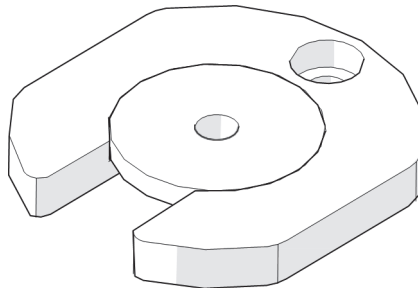


Figure 2-15 Wheel pulling tool with washer

18. Flip the bearing housing upside down, and insert it into the hole of the axle arm (see Figure 2-16 on page 94).

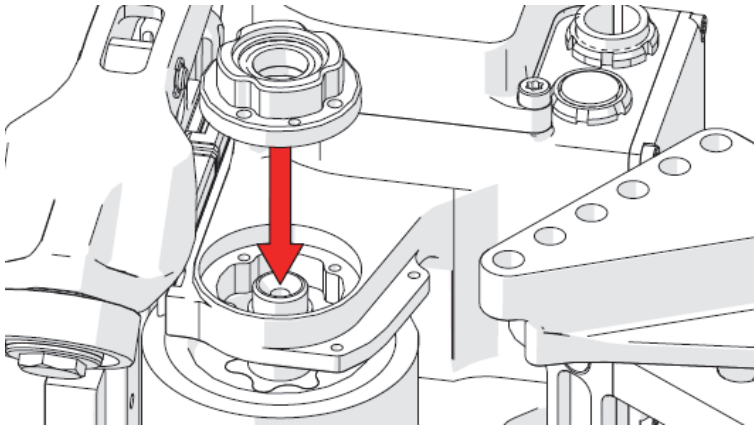


Figure 2-16 Insert the bearing housing

19. Slide the wheel removal tool between the wheel and the axle arm, ensuring the counter-bored side is facing down towards the wheel (see Figure 2-17 on page 94).

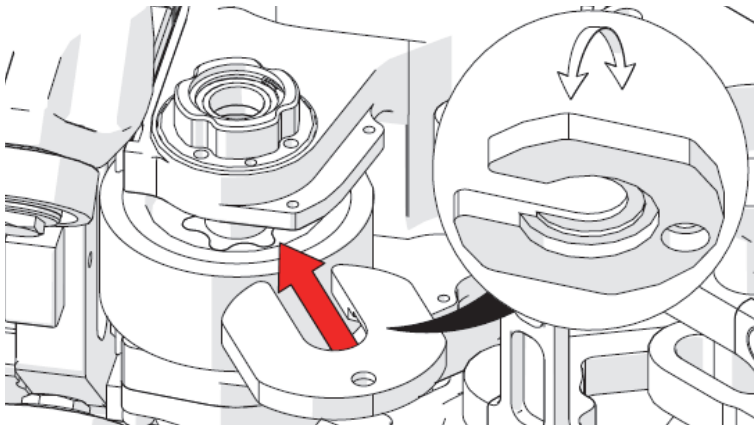


Figure 2-17 Insert the wheel removal tool

20. Place the washer from the wheel removal tool on the inverted bearing housing, making sure that the shoulder of the washer is facing down into the bearing housing (see Figure 2-18 on page 95).

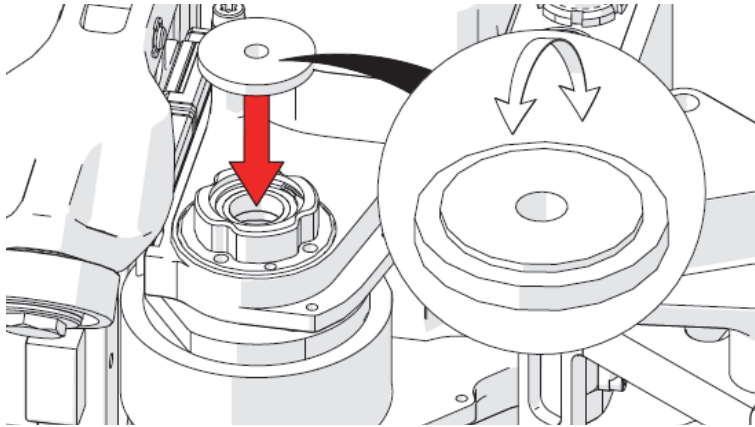


Figure 2-18 Place the washer on the bearing housing

21. Thread the wheel puller screw through the washer and bearing housing into the axle (see Figure 2-19 on page 95).

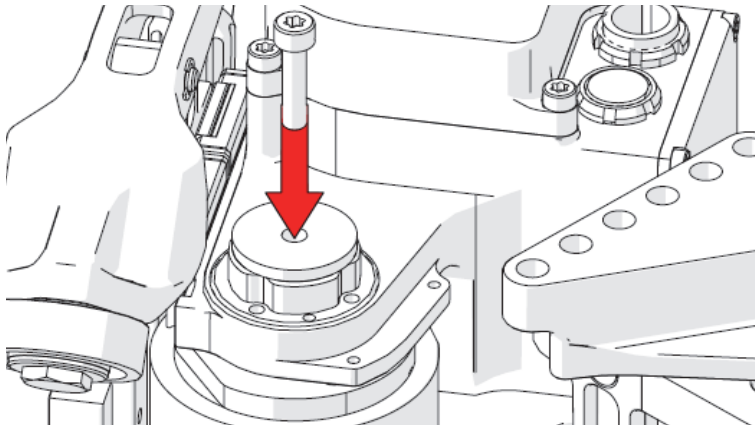


Figure 2-19 Inserting the wheel puller screw

22. Holding the wheel, use a T25 Torx driver to thread the screw until the axle separates from the wheel (see Figure 2-20 on page 96).

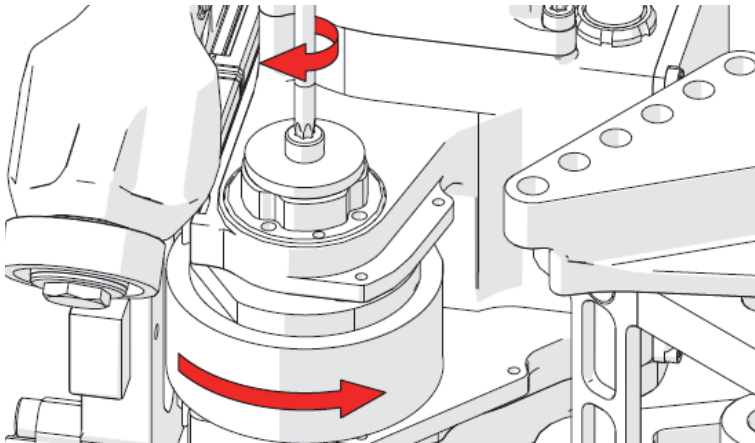


Figure 2-20 Separate the axle from the wheel

23. Unthread the wheel puller screw and remove it, along with the washer, the bearing housing, and the wheel puller tool (see Figure 2-21 on page 97).

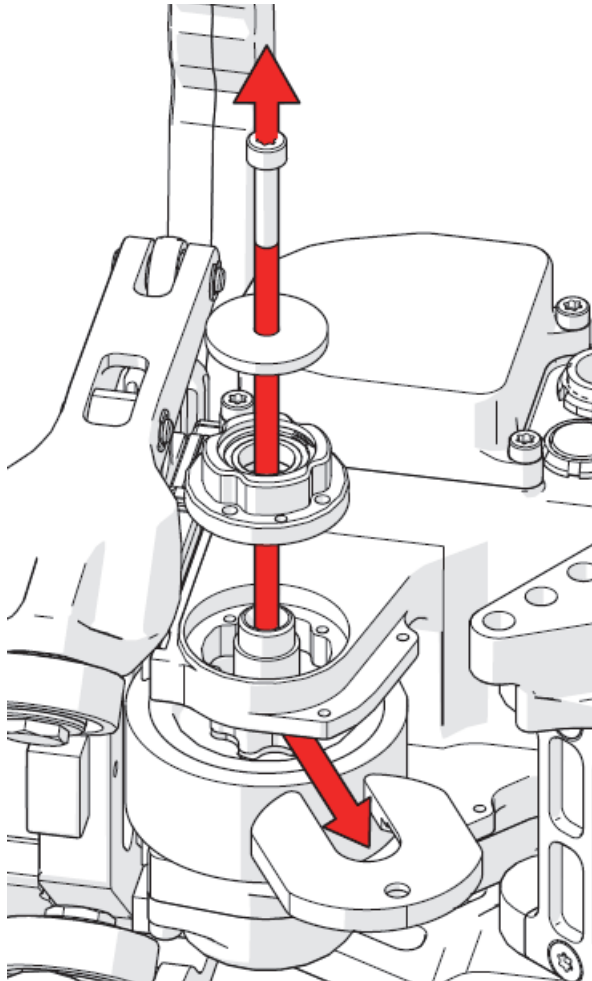


Figure 2-21 Remove the wheel pulling tools

24. Remove the axle from the drive wheel through the axle arm (see Figure 2-22 on page 98).

TIP

If the axle does not freely remove from the wheel, thread the wheel puller screw into the axle and use it to work the axle free.

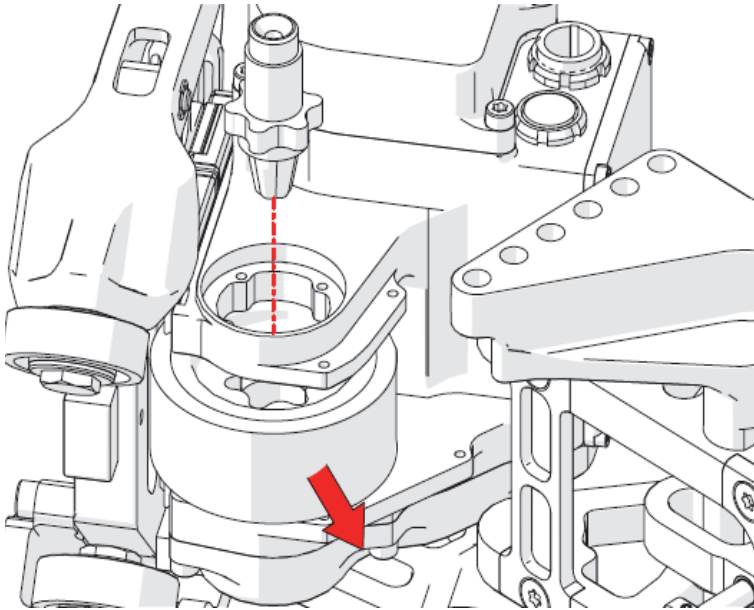


Figure 2-22 Remove the axle and wheel

25. Remove the worn drive wheel (see Figure 2-22 on page 98).
26. Clean the drive wheel area of any dirt or debris.
27. Install the new drive wheel, ensuring the grooves for the axle are facing up (see Figure 2-23 on page 99).

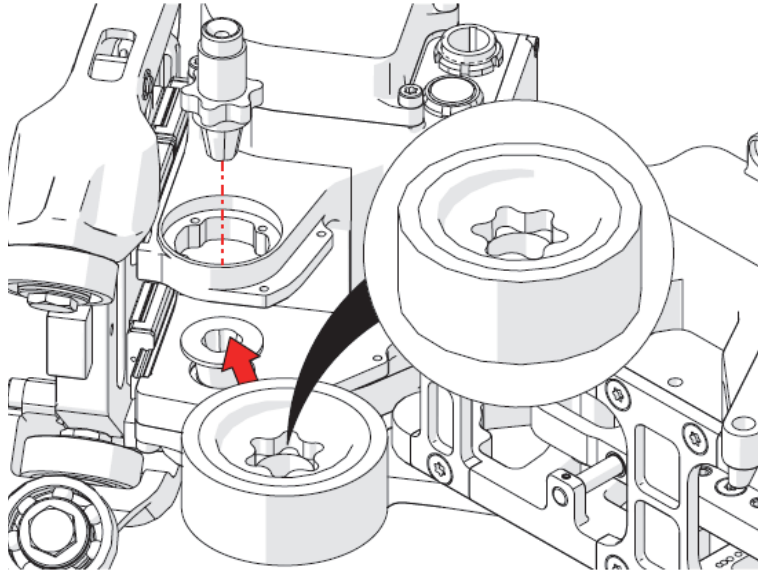


Figure 2-23 Install the new drive wheel

28. Press the axle firmly into the wheel by hand.
29. Install the axle screw into the axle to ensure the wheel has proper alignment. Do not tighten yet.
30. Reinstall the bearing housing by hand, and reinstall the four screws.
31. Using a T20 Torx driver, tighten the axle screw.
32. Reinstall the drive wheel guard.
33. Reinstall the motor carriage arm.
34. Reinstall the pivot clamp sleeve, bolt, washer, and nut.
35. Reinstall the shoulder bolt, and the two screws from the motor carriage.
36. Replace the wheel puller tool in its storage location.
37. Adjust the drive wheel tension for the new drive wheel (see “Engaging and Disengaging the Drive Wheel” on page 53).

2.6 Replacing the Motor Module

To replace the motor module, complete the following steps.

IMPORTANT

Disconnect the power supply and remove all cables and accessories prior to replacing the motor module. Failure to disconnect the power supply may result in injury, or damage to the system.

1. Disengage the band clamp levers and the motor engage handle (see Figure 2-24 on page 100).

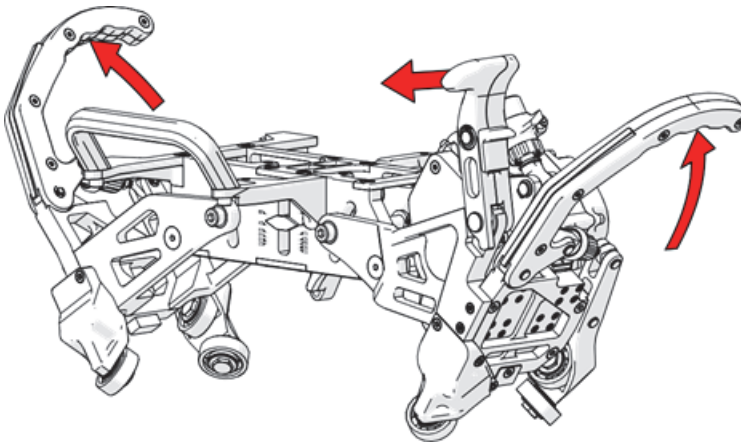


Figure 2-24 Disengage the levers and handle

2. Using a 6mm hex driver, remove the pivot clamp bolt and set aside the bolt, nut, washer, and inner sleeve (see Figure 2-6 on page 87).
3. Using a 4mm hex driver, remove the shoulder bolt from the motor carriage (see Figure 2-9 on page 90).

NOTE

The motor carriage will become unstable once the shoulder bolt is removed.

4. Remove the snap ring from the base of the wheel tension cylinder (see Figure 2-25 on page 101).

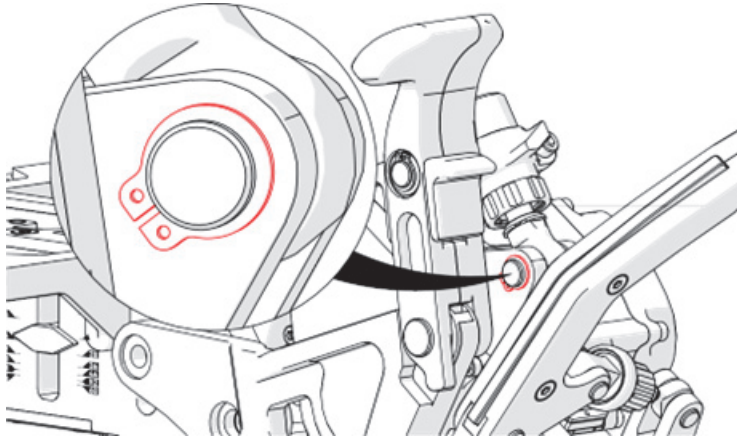


Figure 2-25 Remove the snap ring

5. Remove the pin that holds the wheel tension cylinder to the carriage (see Figure 2-26 on page 102).

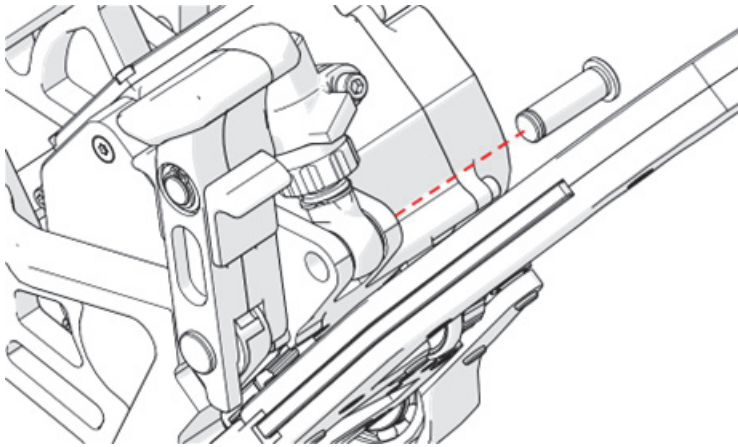


Figure 2-26 Remove the pin

6. Using a T-25 Torx driver, remove the three screws from the left-hand wheel and bearing assembly (see Figure 2-27 on page 102).

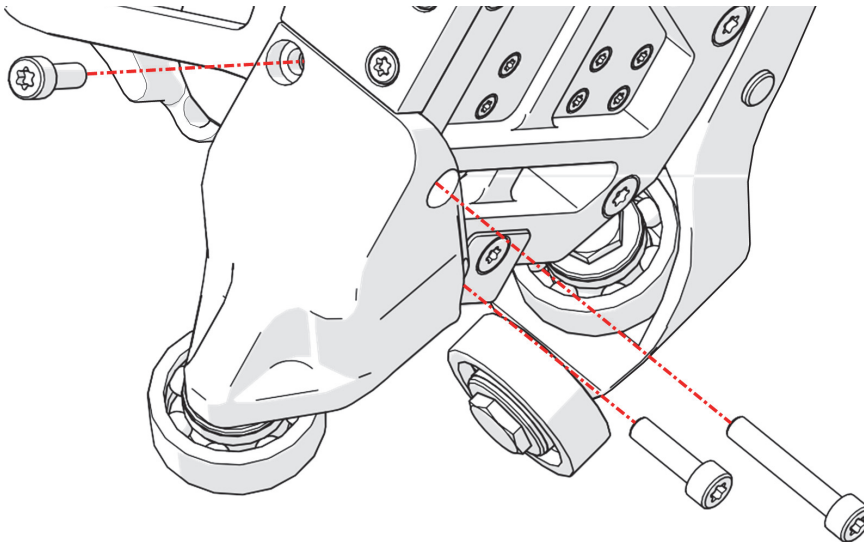


Figure 2-27 Remove the bearing assembly screws

7. Remove the left-hand wheel and bearing assembly.
8. Remove the screw indicated in Figure 2-28 on page 103 from the carriage.

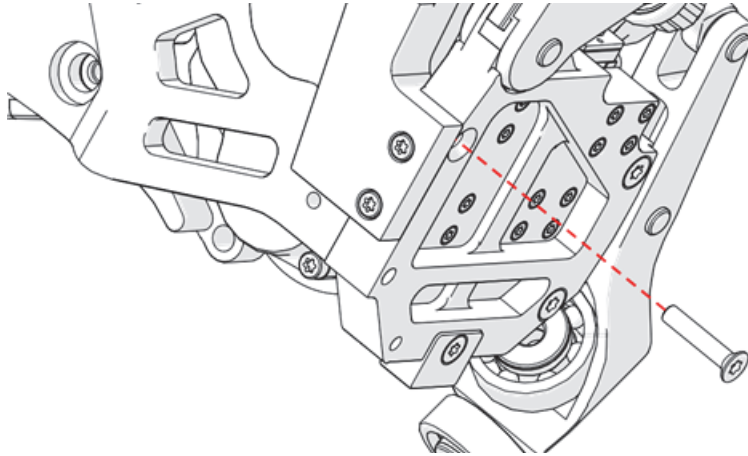


Figure 2-28 Remove the screw

9. Remove the two screws from the motor carriage arm (see Figure 2-29 on page 103).

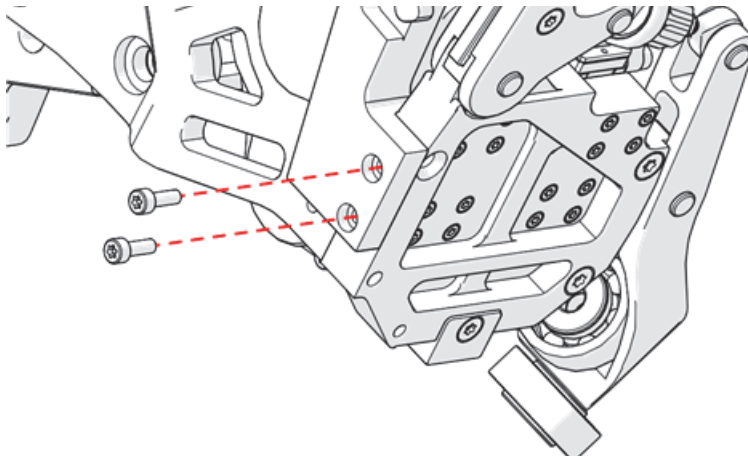


Figure 2-29 Remove motor carriage arm screws

10. Remove the motor carriage arm and attached motor engage lever (see Figure 2-30 on page 104).

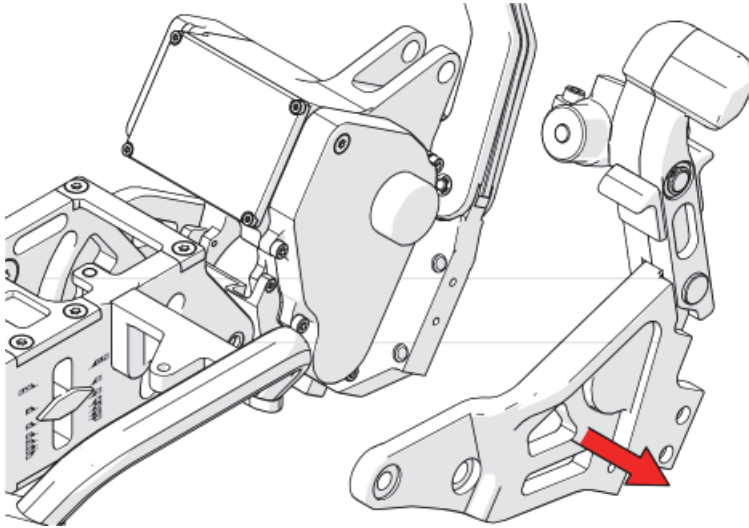


Figure 2-30 Remove the motor carriage arm

11. Using a T-10 Torx driver, remove the 16 screws identified in Figure 2-31 on page 104 from the carriage.

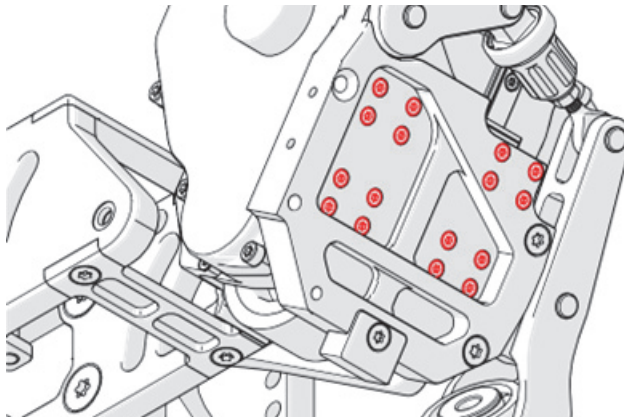


Figure 2-31 Remove 16 screws

IMPORTANT

Four of the screws are longer than the other 12, and must be reinstalled in the same location during reassembly.

12. Remove the motor module from the motor carriage (see Figure 2-32 on page 105).

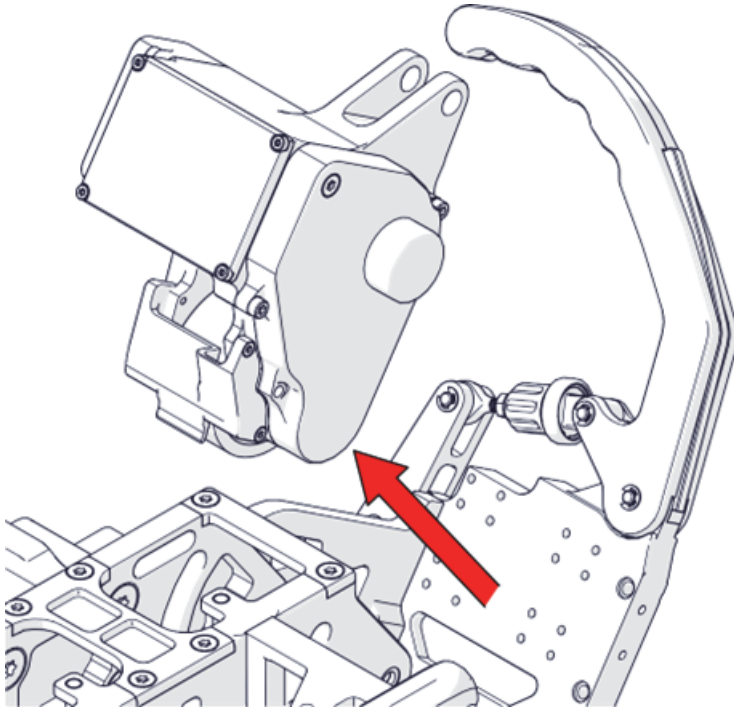


Figure 2-32 Remove the motor module

13. Install the new motor module by reversing the steps for disassembly.
14. After reassembly is completed with the new motor module, you must readjust the drive wheel tension (see “Engaging and Disengaging the Drive Wheel” on page 53).

3. Troubleshooting

This chapter will help you resolve minor problems that could occur during operation of your PipeWIZARD iX data acquisition unit. This troubleshooting guide (see Table 6 on page 107) has been prepared based on the assumption that the PipeWIZARD iX unit has not been modified and that all cables and connectors used are those provided and documented by Evident.

Table 6 Troubleshooting

Problem	Possible Cause	Solution
Scanner does not drive properly.	A drive motor module is dead.	Replace the drive motor module (see Section).
Drive wheel slips.	Excessive drive wheel wear.	Replace the drive wheel (see “Replacing the Drive Wheel” on page 85).
	Incorrect drive wheel tension.	Adjust the drive wheel tension (see “Engaging and Disengaging the Drive Wheel” on page 53).

Table 6 Troubleshooting (continued)

Problem	Possible Cause	Solution
No couplant under the wedges.	Water pump is not functioning.	Inspect the water pump for proper function (refer to the <i>CFU03/CFU05/CFU-PWZ Couplant Feed Unit User's Manual</i>).
	Water pump pressure is too low.	Increase the pressure or flow of the water pump using the pump controls.
	Quick-connect blue tubing is not connected properly.	Push in and fully seat all hose quick-connect couplings.
Motor not responding to commands.	Drive is disconnected.	Reconnect from the software user interface if necessary.
	Stop button is active.	Pull out the two stop buttons (one on the scanner and one on the remote module).
Lost connection with the motor drive.	Plugging in or unplugging a USB device on the computer can cause this interrupt.	Reconnect from the software user interface.
Lost connection with the data acquisition unit.	Acquisition unit has reached the maximum internal temperature and shut down.	Wait for the acquisition unit to cool down, then restart the system.

Table 6 Troubleshooting (continued)

Problem	Possible Cause	Solution
Scanner stops before the end of the predefined scan length.	Idler wheel or drive wheel stuck on the gap in the drive band sections at the latch location.	Reduce the gap by tightening the latch screw, or by adjusting the band feet.
	Encoder wheel does not sit properly on the pipe surface.	Adjust the height of the encoder mounted on the probe module, or adjust the height of the probe module itself.
	Encoder is not calibrated properly.	Calibrate the encoder (refer to the <i>PipeWIZARD iX User Interface Guide</i>).

4. Specifications

This chapter presents the general specifications (size, operating temperature, power requirements) of the PipeWIZARD iX data acquisition unit. It also presents the operating specifications, specifications of recorded data, specifications of the Ethernet link, and safety standards.

4.1 General Specifications

Table 7 on page 111 details the general specifications of the PipeWIZARD iX unit.

Table 7 General specifications

Category	Specification	Value
Housing size (W × H × D)	Full scanner w/handles	577 mm × 578 mm × 210 mm (22.7 in. × 22.7 in. × 8.3 in.)
	Acquisition unit	243 mm × 188 mm × 100 mm (9.6 in. × 7.4 in. × 3.9 in.)
Housing weight (Net)	Full scanner w/handles	18 kg (40 lb)
	Acquisition unit	4.8 kg (10.6 lb)
Pipe diameter range	N/A	168 mm (6.625 in.) to 1524 mm (60 in.)
Max scanning speed	N/A	100 mm/s (3.9 in./s)

Table 7 General specifications (continued)

Category	Specification	Value
Environment	Storage temperature	-30°C to 60°C (-22°F to 140°F)
	Operating temperature	-30°C to 50°C (-22°F to 122°F)
	Maximum relative humidity	90% noncondensing
	Pollution degree (level)	4
	Altitude	Up to 2000 m (6561 ft)
	IP rating	IP65
	Installation category	III
Ethernet Connectivity	Ethernet interface	1000BASE-T (bandwidth of 1000 Mbps)
	Ethernet cable length	30 m max. (100 ft)
	Ethernet cable type	Category 5e or higher, shielded
	Transfer rate on Ethernet cable	940 Mbps max.
	Connector	Female RJ-45, shielded
DC power requirements	Voltage	24 VDC \pm 5%
	Maximum power consumption	360 W
System	Warm-up time	None
Probe connectors	N/A	2 phased array (IPEX) and 10 conventional (Lemo)
Positioning system	N/A	External GPS (optional)
Temperature sensor	N/A	Thermocouple for wedge temperature monitoring
Techniques	N/A	Zone discrimination, PA, TOFD, UT

4.2 Pulsar and Receiver Specifications

Table 8 on page 113, Table 9 on page 113, and Table 10 on page 113 detail the pulser and receiver specifications of the PipeWIZARD iX.

Table 8 Pulsar specifications

PipeWIZARD iX System Configuration	QuickScan iX PA Acquisition Unit Configuration	Description
PWZiX-PA64256	QSiX-PA64256	64 input channels for 256 addressable probe elements
PWZiX-PA32256	QSiX-PA32256	32 input channels for 256 addressable probe elements
PWZiX-PA32128	QSiX-PA32128	32 input channels for 128 addressable probe elements

Table 9 Pulsar specifications (PipeWIZARD iX PA64256)

Parameter	PA	UT	Notes
Number of focal laws	1024	N/A	
Pulse output (into a 50 Ω) $\pm 10\%$	5, 10, 20, 40, 60, 80, and 90 volts peak-to-peak (V _{pp})		For a bipolar pulse
Pulse output (in high impedance) $\pm 10\%$	7.8, 15.6, 31, 62, 93, 124, and 140 volts peak-to-peak (V _{pp})		For a bipolar pulse
Number of pulsers	64:256PR	10	W/Parallel firing
Number of elements	256	N/A	
UT channels	N/A	P/E: up to 10 P/C: up to 5	
Pulse width/step (precision of 5 ns or $\pm 10\%$, whichever is greater)	30 ns to 1000 ns (steps of 5 ns)		
Fall time	< 15 ns		For a 40 V _{pp} bipolar pulse
Pulse shape	Bipolar, positive, and negative square pulse		
Output impedance	25 Ω	39 Ω	

Table 10 Receiver specifications

Parameter	PA	UT	Notes
Gain range/increment	0 dB to 80 dB (44 dB analog + 36 dB digital)		
Gain resolution	0.1 dB		

Table 10 Receiver specifications (continued)

Parameter	PA	UT	Notes
Maximum input signal	P/E & P/C: 1.15 Vpp	P/E & P/C: 1.04 Vpp	
Input impedance	P/E: 59 Ω \pm 10% P/C: 69 Ω \pm 10%	P/E & P/C: 132 Ω \pm 10%	
Gain precision between channels (measured at 20dB)	0.5 dB	0.1 dB	
Crosstalk isolation between channels	>46 dB @ 5 MHz	>67 dB @ 5 MHz	
Bandwidth of the system (-3 dB) \pm 10 %	0.68 MHz to 22.3 MHz		

4.3 Data Specifications

Table 11 on page 114 details the data specifications of the PipeWIZARD iX.

Table 11 Data specifications

Parameter	Specification
Elementary A/D converter	PA: 14 bits, 120 MSPS UT: 14 bits, 120 MSPS
Digitizing frequency	100 MHz
Amplitude resolution	8 bits / 16 bits
A-Scan height	Up to 800%
Global data throughput	Up to 90 MB/s
Maximum pulse repetition frequency (PRF)	25 kHz
Maximum number of A-scan samples	16380
Acquisition depth	163.8 μ s without compression
Compression	1 to 2000
Averaging	1, 2, 4, 8, 16, 32, 64
Rectifier	RF/FW/HW+/HW-

Table 11 Data specifications (continued)

Parameter	Specification
Digital Filtering	Low-pass 2, 4, 7.45 MHz
	Band-pass 2 MHz (1-3.5 MHz)
	Band-pass 4 MHz (2-6.5 MHz)
	Band-pass 5 MHz (2.5-8 MHz)
	Band-pass 8 MHz (4-12 MHz)
	Band-pass 10 MHz (5-16 MHz)
	Band-pass 12 MHz (6-18 MHz)
High-pass 4, 6, 8, 10 MHz	

5. Accessories and Spare Parts

Table 12 Accessories and spare parts

Accessory or spare part (product code)	Part order number	Description
PWZiX-QSiXPA64256	Q1100207	PWZiX QuickScan iX 64:256 data acquisition unit for PipeWIZARD-iX
PWZiX-PowerUnit	Q1100208	PWZiX power unit with stop bypass and power supply
PWZiX-Thermocouple	Q1503015	PWZiX thermocouple for PA wedge (0.5m cable)
PWZiX-Encoder	Q1503016	PWZiX encoder with bracket (no cable)
PWZiX-GPS	Q1100209	PWZiX GPS (0.4m cable)
QuickScaniXPA-FanKit	Q1503017	Fan kit QuickScan iX PA
PWZiX-PowerSupply-CI	Q1503018	PWZiX power supply 24V 360W - Class I
PWZiX-AcqUnit-Bumpers	Q1503020	PWZiX bumper kit for acquisition unit
PWZiX-PowerUnit-Bumpers	Q1503021	PWZiX bumper kit for power unit
PWZiX-Umbilical-10m	Q1100211	PWZiX umbilical 10m for power, data, water
PWZiX-Umbilical-20m	Q1100212	PWZiX umbilical 20m for power, data, water
PWZiX-Umbilical-30m	Q1100213	PWZiX umbilical 30m for power, data, water

Table 12 Accessories and spare parts (continued)

Accessory or spare part (product code)	Part order number	Description
PWZiX-Umbilical-50m	Q1100214	PWZiX umbilical 50m for power, data, water
PWZiX-MotorCable	Q1503022	PWZiX motor cable (0.2m)
PWZiX-EncoderCable	Q1503023	PWZiX encoder cable (0.6m)
PWZiX-EthernetCable-3m	Q1503024	PWZiX Ethernet cable (3m)
PWZiX-EthernetCable-10m	Q1503025	PWZiX Ethernet cable (10m)
PWZiX-L90-L180Cable-0.75m	Q1100215	UT cable Lemo 90deg - Lemo 180deg (0.75m) - RG316DS double shielded
PWZiX-MotorizedCarriage	Q1100217	PWZiX scanner motorized carriage (no cables)
PWZiX-Motor	Q8302686	PWZiX motor module, retaining ring, and tools
PWZiX-DriveWheel	Q8302687	PWZiX drive wheel and tools
PWZiX-WearBlocks	Q8302688	PWZiX wear blocks and tools
PWZiX-ClampHandle	Q8302689	PWZiX clamp handle and retaining rings
PWZiX-DriveWheelPuller	Q8302690	PWZiX drive wheel puller and bolt
PWZiX-ScannerScrewKit	Q1503026	PWZiX scanner screw kit
PWZiX-IdlerWheelKit	Q8302691	PWZiX idler wheel kit (8)
PWZiX-ClampHandlePin	Q8302692	PWZiX clamp handle pin
PWZiX-IdlerWheelBoltsKit	Q8302693	PWZiX idler wheel bolts kit (8)
PWZiX-ProbeModule-YR	Q1503027	PWZiX central probe module with yokes/rings for PA/TOFD
PWZiX-ProbeModule	Q1503028	PWZiX central probe module (no yokes/rings)
PWZiX-ProbeModule-XL-YR	Q1503029	PWZiX extended central probe module with yokes/rings for PA/TOFD

Table 12 Accessories and spare parts (continued)

Accessory or spare part (product code)	Part order number	Description
PWZiX-ProbeModule-XL	Q1503030	PWZiX extended central probe module (no yokes/rings)
PWZiX-ProbeModule-1L	Q1503031	PWZiX probe module section 1L for 2 probes (no yokes/rings)
PWZiX-ProbeModule-1R	Q1503032	PWZiX probe module section 1R for 2 probes (no yokes/rings)
PWZiX-ProbeModule-2L	Q1503033	PWZiX probe module section 2L for 2 probes (no yokes/rings)
PWZiX-ProbeModule-2R	Q1503034	PWZiX probe module section 2R for 2 probes (no yokes/rings)
PWZiX-ProbeModule-XL-1L	Q1503035	PWZiX extended probe module section 1L for 2 probes (no yokes/rings)
PWZiX-ProbeModule-XL-1R	Q1503036	PWZiX extended probe module section 1R for 2 probes (no yokes/rings)
PWZiX-ProbeModule-XL-2L	Q1503037	PWZiX extended probe module section 2L for 2 probes (no yokes/rings)
PWZiX-ProbeModule-XL-2R	Q1503038	PWZiX extended probe module section 2R for 2 probes (no yokes/rings)
PWZiX-2SLA	Q1503039	PWZiX straight SLA (pair)
PWZiX-2SLA-Offset	Q1503040	PWZiX offset L/R SLA (pair)
PWZiX-Irrigation-Kit	Q1503041	PWZiX probe module irrigation parts kit (hose fittings, barbs, rubber tube, Y fittings)
PWZiX-TRV-Kit	Q1100218	PWZiX transverse kit (2 probe module sections, 4 yokes, 4 UT probes, 4 Lemo cables), wedges not included
ADUX305	U8902466	PWZ-SCAN-Yoke and ring assembly for standard PA wedge (SPWZ1 and SPWZ6) for PipeWIZARD scanner

Table 12 Accessories and spare parts (continued)

Accessory or spare part (product code)	Part order number	Description
ADUX0593	U8110146	PWZ-SCAN-Yoke for standard PA wedge (SPWZ1 and SPWZ6) for PipeWIZARD scanner
MQUX2362	U8905452	PWZ-SCAN-Ring for standard PA wedge (SPWZ1 and SPWZ6) for PipeWIZARD scanner
ADIX656	U8907637	PWZ-SCAN-Yoke for standard transverse wedge for PipeWIZARD scanner
ADIX305	U8904376	PWZ-SCAN-Yoke and ring assembly for TOFD wedge for PipeWIZARD scanner
SOFT-BEAMTOOL-PWZ-PKG	Q1440001	ES BeamTool software with Zonal add-on and Zonal Calibration Block Designer for PipeWIZARD iX. The HardLock license uses a HASP USB key to activate BeamTool. BeamTool may be installed on multiple machines but will only run with the HASP key present
SOFT-PWZIX-I	Q1440002	PipeWIZARD iX Inspection software license key. Includes data acquisition and analysis functionalities. Comes with one single hard USB key. DOES NOT include a dedicated analysis key. NO replacement key is available if lost
SOFT-PWZIX-A	Q1440003	PipeWIZARD iX Analysis software license key. Includes data analysis functionalities only. Does NOT include data acquisition functionalities. Comes with one single hard USB key. NO replacement key is available if lost
PWZiX-Band-8.625in	Q1100190	PWZiX band 8.625 in. - no feet (4 required)
PWZiX-Band-12.75in	Q1100191	PWZiX band 12.75 in. - no feet (4 required)
PWZiX-Band-16in	Q1100192	PWZiX band 16 in. - no feet (4 required)
PWZiX-Band-20in	Q1100193	PWZiX band 20 in. - no feet (4 required)

Table 12 Accessories and spare parts (continued)

Accessory or spare part (product code)	Part order number	Description
PWZiX-Band-24in	Q1100194	PWZiX band 24 in. - no feet (4 required)
PWZiX-Band-28in	Q1100195	PWZiX band 28 in. - no feet (4 required)
PWZiX-Band-32in	Q1100196	PWZiX band 32 in. - no feet (6 required)
PWZiX-Band-36in	Q1100197	PWZiX band 36 in. - no feet (6 required)
PWZiX-Band-40in	Q1100198	PWZiX band 40 in. - no feet (6 required)
PWZiX-Band-44in	Q1100199	PWZiX band 44 in. - no feet (6 required)
PWZiX-Band-48in	Q1100200	PWZiX band 48 in. - no feet (8 required)
PWZiX-Band-52in	Q1100201	PWZiX band 52 in. - no feet (8 required)
PWZiX-Band-56in	Q1100202	PWZiX band 56 in. - no feet (8 required)
PWZiX-Band-60in	Q1100203	PWZiX band 60 in. - no feet (8 required)
PWZiX-Band-Foot	Q1100204	PWZiX band foot
PWZiX-Band-Spacer-1in	Q1100205	PWZiX band 1 in. spacer
PWZiX-BandLatch	Q8302694	PWZiX guide band latch
PWZiX-BandFootScrewKit	Q8302695	PWZiX foot screws kit (for 4 feet)
PWZiX-BandHinge	Q8302696	PWZiX guide band hinge
KITX155	U8780013	Kit of 24 carbide wear pins for IHC and IRC wedges
10-042120-00	Q1100180	Kit of 40 hex set screws M4x6mm to lock carbides
PWZiX-ToolKit	Q1100219	PWZiX tool kit including hex keys, ruler, wrench, screwdrivers, pliers
CFU-PWZ	U8779727	PWZ-CFU water pump complete assembly
PWZ-StopBypass	U8110012	PipeWIZARD stop bypass for MCDU (V4) or power unit (iX)
PWZiX-RemoteStop	Q1100220	PWZiX remote stop module

Table 12 Accessories and spare parts (continued)

Accessory or spare part (product code)	Part order number	Description
PWZiX-SparePartKit	Q1503042	PWZiX spare part kit including encoder, encoder cable, motor cable, 2 Lemo cables, scanner screw kit, 2 SLA springs
PWZiX-HoseAdaptor-FF	Q1100221	PWZiX hose adaptor female-female
PWZiX-BandPosition-162mm	Q1100188	PWZiX band position guide (162mm)
PWZiX-BandPosition-207mm	Q1100189	PWZiX band position guide (207mm)
PWZiX-PACableGuideKit	Q1503043	PWZiX guide kit (2) for PA probe cable
7.5L64-64X12-PWZ6-P-0.5-OM	Q3302348	Standard phased array probe, 7.5 MHz linear array, 64 elements, 64x12mm total active aperture, 1.00mm pitch, 12mm elevation, PWZ6 case type, impedance matching to Rexolite, PVC sheathing, 0.5m cable length, Omniscan connector
C541-SL	U8423775	Centrascan composite angle beam transducer, 5 MHz, 0.50 in. (12.5mm) element diameter, miniature screw-in case style, straight Lemo 00 connector
C563-SL	U8474032	Centrascan composite TOFD transducer, 10 MHz, 0.125 in. (3mm) diameter, straight Lemo 00 connector, transducer housed in 0.25 in. (6mm) screw-in case, includes test form certificate

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