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User Manual

UNIVERSAL MODULAR SCANNER UMS 101

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E:			
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C:			
B:		Page No: 1 of 31	
A: Initial Release	29-May-14		

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1.0 INTRODUCTION

1.1 UMS101 is a universal scanner system design and builds with modular and scalability.

1.2 This system is configurable for single or multiple probes for Phased Array (PA), Time Of Flight Diffraction (TOFD) and conventional Pulse Echo (P/E) inspection. It has a built in encoder and magnetic wheels for ferrous piping and pressure vessels.

1.3 Being modular, the system allows the user to apply their creativity to adapt this system to any unforeseen situation to complete their roles during their site inspection.

1.4 Having scalability in this system allows investing company to upgrade their investment from a simple manual scanner to a fully automatic motorized system

2.0 FEATURES

2.1 Multiple Configurations:

2.1.1 One, two, or four probes are standard scanning configuration, optional probe holder can be added to increase scanning configuration.

2.2 Quick Release Chain Guide

2.2.1 Quick release chain guide with modular links used to inspects pipe sizes from 6” to 48” diameter.

2.2.2 Even the most odd diameter pipe within the listed range is able to be configured. While sizes smaller than 6” can be inspected without the chain guide.

2.3 Fine Adjustment

2.3.1 Fine adjustment features on the selected tools allow fine adjustment without unlatching the chains. These tools are :

2.3.1.1 Adjustable band

2.3.1.2 Toggle latch assembly

2.3.1.3 Link Bridge Assembly

2.4 Link Band Magnet

2.4.1 For pressure vessel inspection, the Chain Link Assembly when install with a Link Band Magnet will act as a ruler to the Universal Modular Scanner 101, ensuring consistence distance from the weld to the probe to achieve best inspection result with a shorter setup time.

2.4.2 Beside pressure vessel, it also allows the scanner to work on very large diameter pipes where fully chain link is not practical to achieve.

2.5 Inspection

2.5.1 External (outside diameter)

2.5.2 Internal (inside diameter).

2.6 Optional motorized module can be purchase to upgrade the UMS 101 into an automated scanner.

3.0 STANDARD SPECIFICATION

3.1 Pipe Range : 1” - 48” Outside Diameter

3.2 Pipe Range : 8” and above, Inside Diameter

3.3 Encoder Resolution : 19.2 steps / mm (Calibration is mandatory before production inspection)

3.4 Encoder Umbilical Length : 5.5 m (with extension cable)

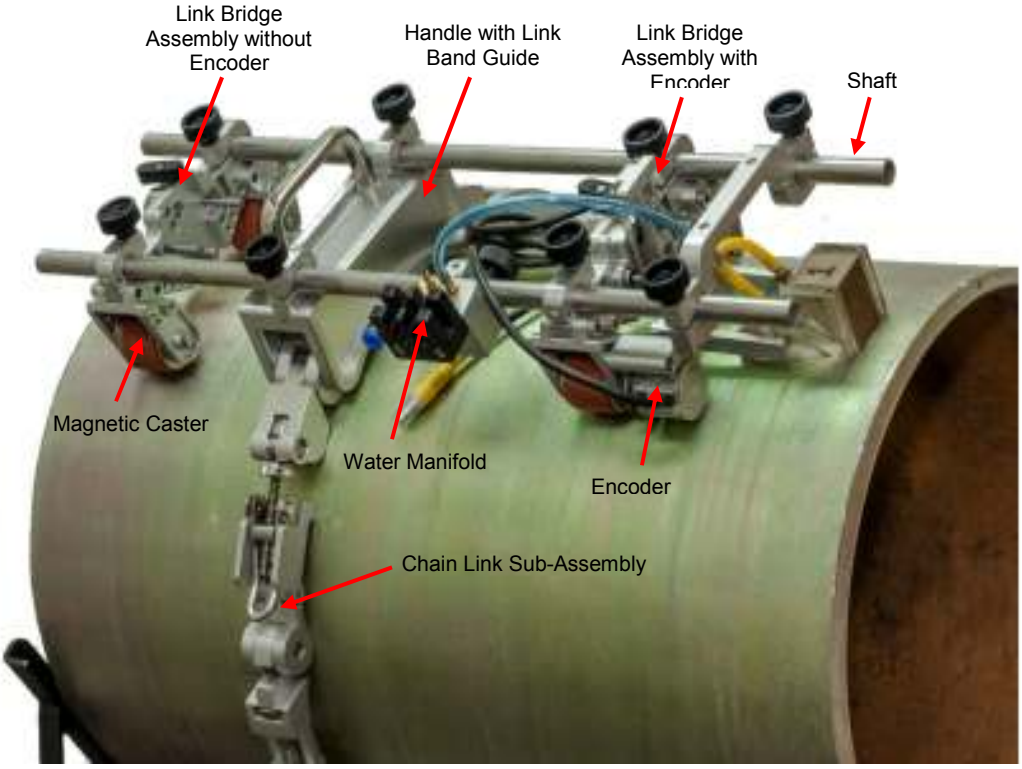
3.5 Probe Holding Capacity: standard 4 probes with option to increase.

3.6 Inspection Surface : Ferrous materials

4.0 OVERVIEW

4.1 Full Assembly of the UMS 101 Scanner

4.1.1 Figure below show an overview of a standard configuration for UMS101 Scanner, with its sub assembly kits.

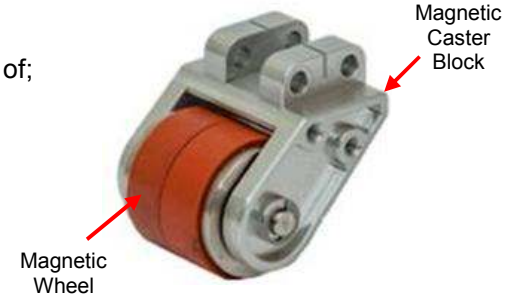


4.2 Magnetic Caster

4.2.1 The magnetic caster consists mainly of;

4.2.1.1 Magnetic Caster Block

4.2.1.2 Magnetic Wheels.



4.2.2 This unit is specially design and milled as a complete block to withstand harsh environment and light weight for ease of usage.

4.2.3 Rubberized magnetic wheels providing good holding to Fe pipe, yet smooth rolling during inspection.

4.2.4 The designed allows the unit to cater for a larger diameter pipes inspection too.

4.3 Encoder Assembly

4.3.1 UMS101 scanner comes with a detachable encoder of 19.2 steps/mm resolution.

4.3.2 This encoder is mounted on a precision linear guide that is protected with side seal that prevent foreign object intrusions.

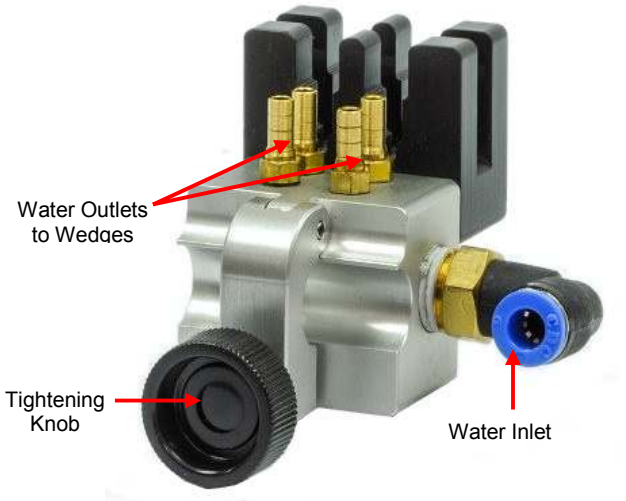
4.3.3 The assembly is loaded with springs that provide the necessary pressure to the rubber wheel for an anti slip reading.

4.4 Water Manifold Assembly

4.4.1 The Water Manifold assembly provides the necessary pipes management for ease of setup and inspection.

4.4.2 It provides a single source for water inlet and multiple water outlets for the wedges.

4.4.3 The same assembly can be used for cable management.

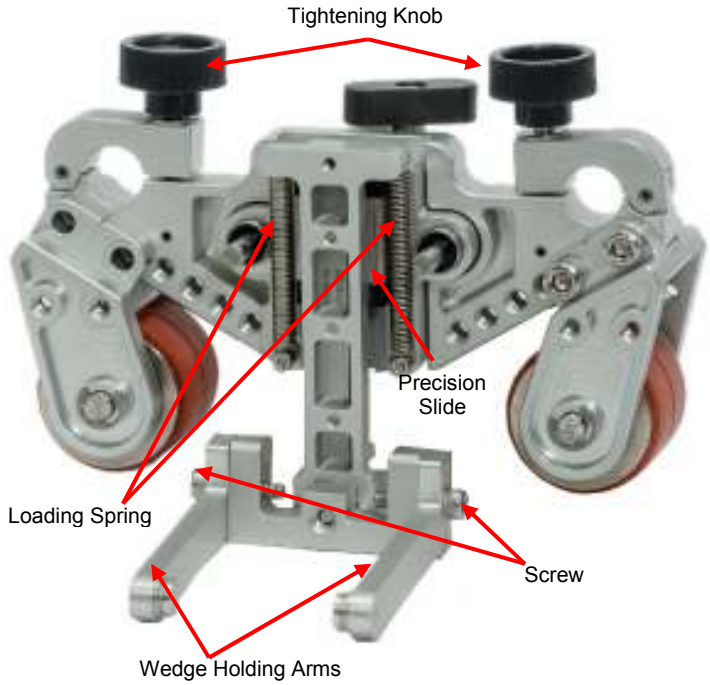


4.5 Probe Holder Sub Assembly

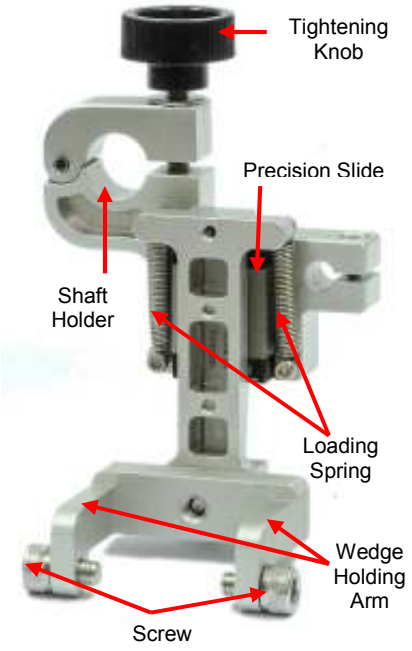
4.5.1 Standard UMS101 configuration comes with four probe holder assemblies, mainly for Phase Array and TOFD application.

4.5.2 Each probe holder is mounted on a precision linear guide that is protected with side seal that prevent foreign object intrusions. The assembly is loaded with two springs that provide the required pressure to the wedge for consistent reading.

4.5.3 The wedge is setup by loosening the wedge arm tightening screw as shown below, slot in the wedge in between the holding arms and tighten the screw.



Link Bridge Assembly with Phase Array Wedge Holder



Probe Holder with TOFD Wedge Holder

4.5.4 The Phase Array Probe holder is attached to the Standard Scanner Assembly, whereas the TOFD Probe holders are pack separately in the watertight case.

4.5.5 Both the Phase Array Probe holder and the TOFD probe holder are detachable and interchangeable on the Link Bridge Assembly. Depending on the inspection requirement, the probe holder on the Link Bridge Assembly can be removed and replace with the required holder.

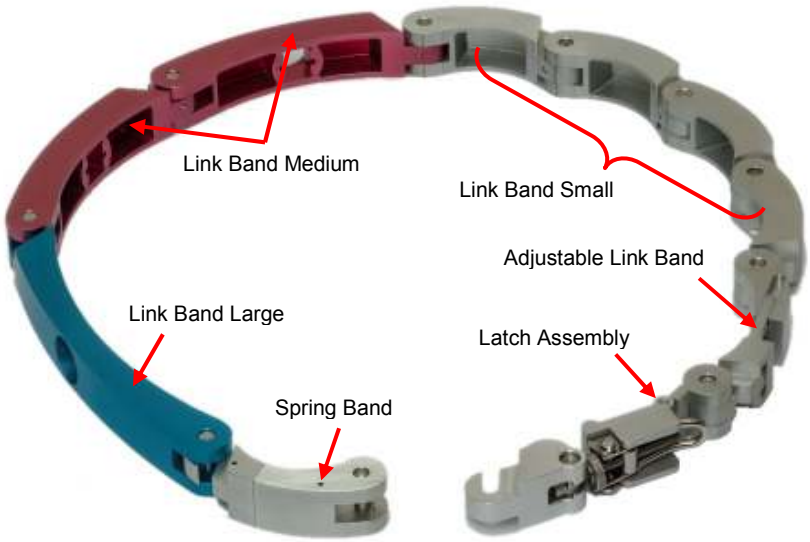
4.6 Chain Link Assembly

4.6.1 The Chain Link assembly is design to provide a precision alignment for the scanner to be positioned at a constant distance from the weld joint. This is to ensure a consistence inspection without the scanner drifting away from the weld.

4.6.2 Standard configuration covers pipe with outer diameter from 1” to 48”, even the most odd size pipe within the range can be accommodated via our unique adjustable link.

4.6.3 Refer to the Link Band Combination Tables (Table 1) on item # 6.4 for the details of different pipe sizes correlating to the required selection of the Link Bands.

4.6.4 Reference to the illustration below, the connection of the Chain Link Assembly begins with the Latch Assembly that will be linked to the Adjustable Link Band, followed by the Small / Medium / Large Link Band, and finally the Spring Band. On both end of the chain, shall be the Spring Band and the Latch Assembly.

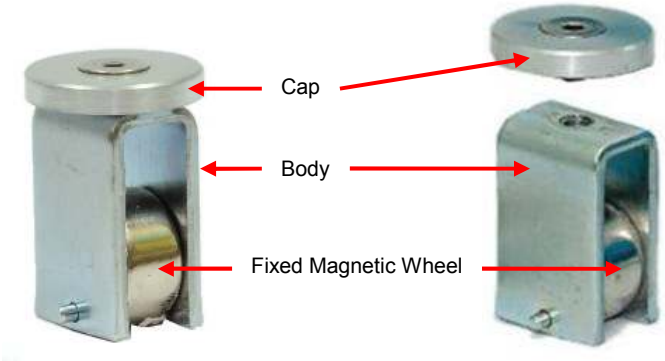


Chain Link Assembly

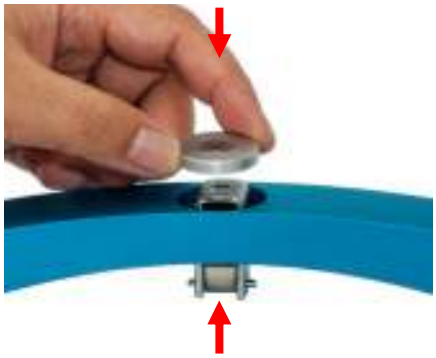
4.7 Link Band Magnet

4.7.1 The Link Band Magnet is designed as a ruler and to provide a better contact between the Chain Link Assembly to a pressure vessel or huge diameter pipe. With the fixed magnetic wheel on the Link Band Magnet, it will prevent the Link Band from unnecessary movement during the inspection.

4.7.2 The Link Band Magnet consists of two parts which is the Cap and the Body with a fixed magnetic wheel.

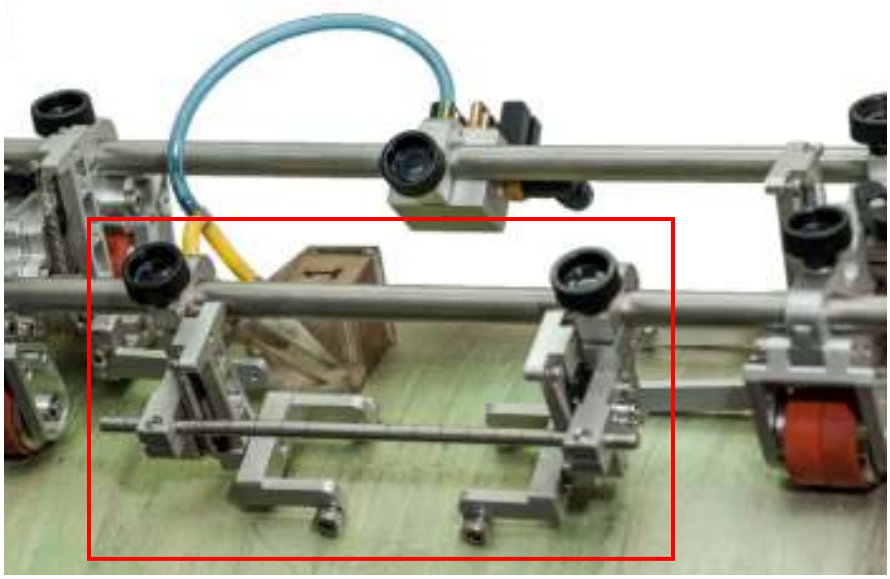


4.7.3 The Link Band Magnet shall be mounted on the Medium or the Large Band as shown below. The Body of the Link Band Magnet will be inserted from the bottom side of the Link Band, and the Cap is screwed onto the body from the top side of the Link Band. Use an allen key to tighten the Cap to the Body.



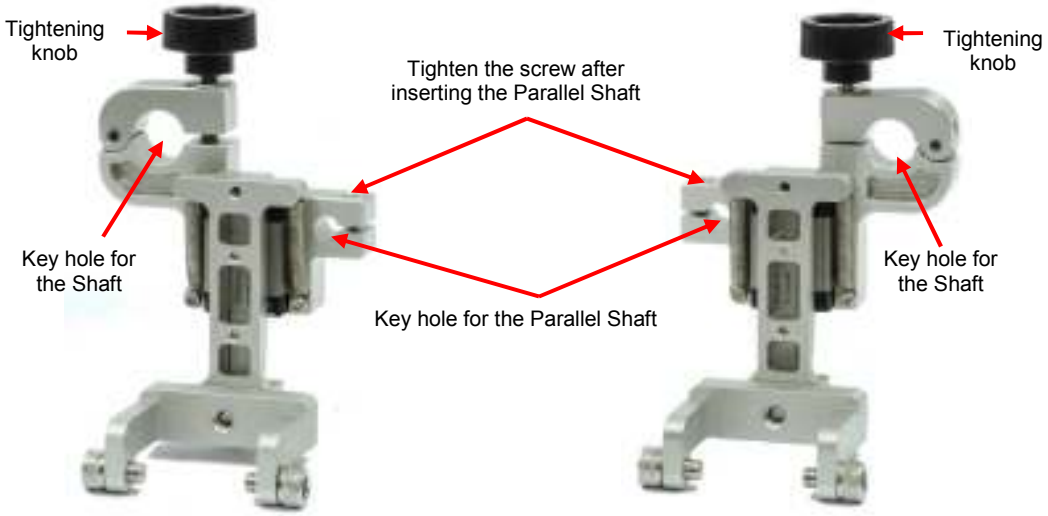
4.8 TOFD Wedge Holder Assembly

4.8.1 The TOFD Wedge Holder Assembly can be mounted on the Standard Scanner Assembly to shorten the process of setting up.



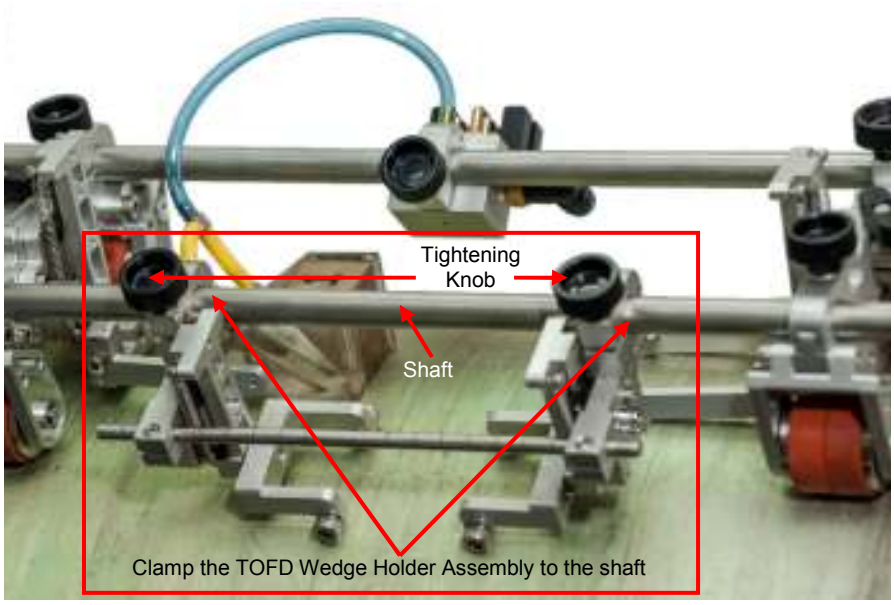
4.8.2 Insert the Parallel Shaft into the TOFD Wedge Holder

Parallel Shaft



TOFD Holder Right **TOFD Holder Left**

4.8.3 Clamped the TOFD Scanner Sub-Assembly to the Standard Scanner Assembly shaft as shown below, and tightened the tightening knob to secure the unit to the shaft.



5.0 UNIVERSAL MODULAR SCANNER 101 (UMS 101)

5.1 A complete set of UMS101 consists of the following items, packed in a watertight case.

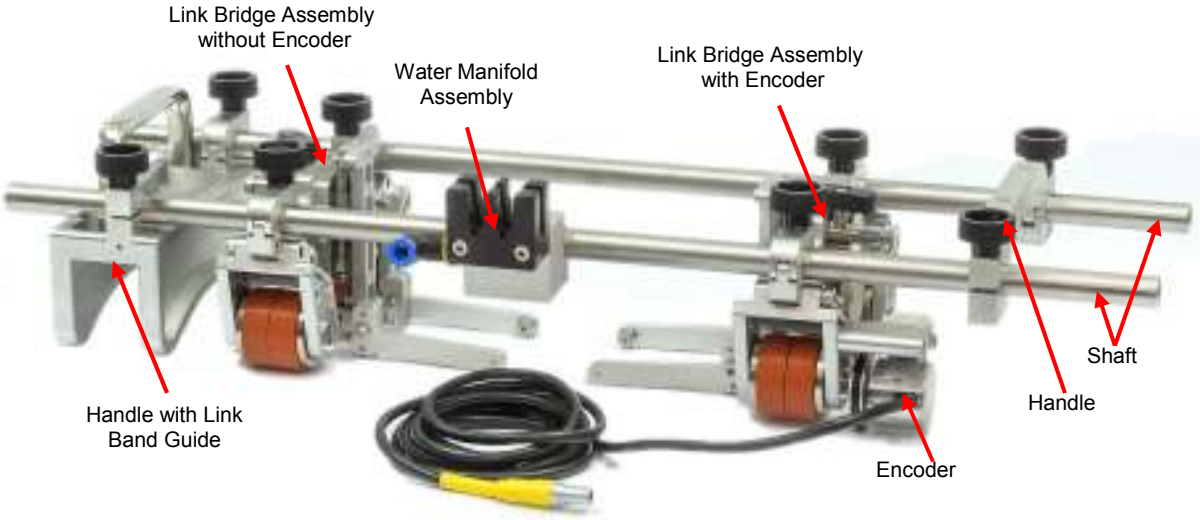
Item #	Photo	Description	Qty
5.1.1		Spring Link Band	1
5.1.2		Toggle Latch Assembly	1
5.1.3		Adjustable Link Band	3
5.1.4		Link Band Small (Clear Color)	9
5.1.5		Link Band Medium (Red Color)	8
5.1.6		Link Band Large (Blue Color)	17

Item #	Photo	Description	Qty
5.1.7		Link Band Magnet Assembly	6
5.1.8		Scanner Handle	1
5.1.9		TOFD Wedge Holder Assembly Right	1
5.1.10		TOFD Wedge Holder Assembly Left	1

Item #	Photo	Description	Qty
5.1.11		Parallel Shaft (200 mm)	1
5.1.12		Standard Scanner Assembly	1
5.1.13		Encoder Extension Cable (3.5 m) Compatible with Olympus and other instruments using the appropriate encoder cable	1
5.1.14		Shaft (250 mm)	2
5.1.15		Watertight case	1

5.2 Standard Scanner Assembly

5.2.1 A pre-assembled Standard Scanner Assembly is supplied in the package.



5.2.2 The pre-assembled scanner is ready for use with minor adjustment upon mounting on the vessel on the Link Chain Assembly.

5.2.3 The user shall need to mount the applicable Wedges to the Probe holder for the inspection.

5.2.4 This set is also detachable and can be re-configured depending on the user creativity to any suitable form for inspection.

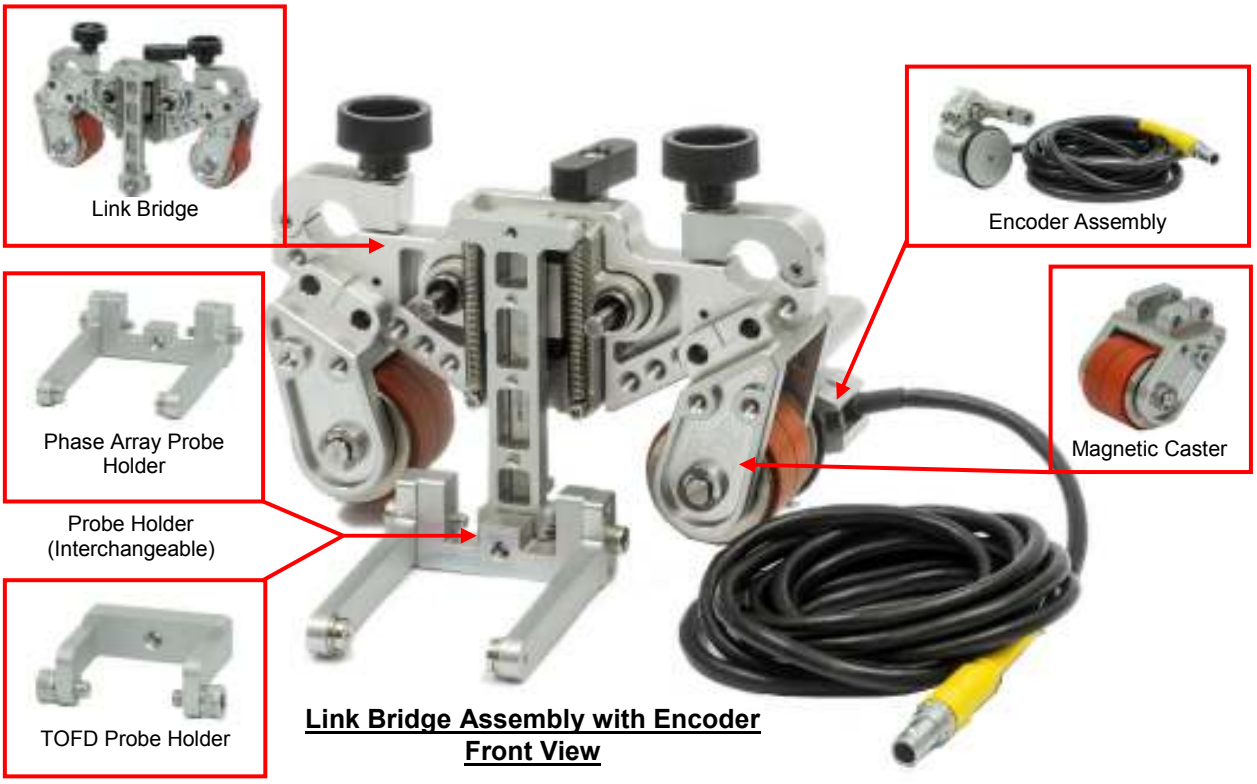
5.2.5 Link Bridge Assembly

5.2.5.1 2 sets of Link Bridge Assembly

5.2.5.1.1 1 set of Link Bridge Assembly without Encoder

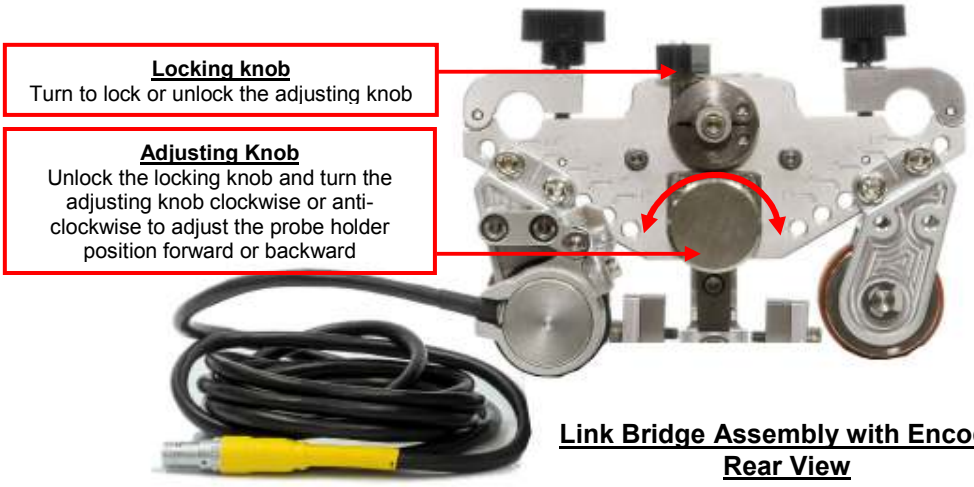
5.2.5.1.2 1 set of Link Bridge Assembly with Encoder (the Encoder can be detachable)

5.2.5.2 The Link Bridge Assembly is made up of the following items, as shown below.



Link Bridge Assembly with Encoder Front View

5.2.5.3 These items are detachable and can be re-mounted in different options where the user can apply their creativity to adapt to any unforeseen situation to complete their role during their site inspection. For example, the Phase Array Probe Holder can be replaced with the TOFD Probe Holder



Link Bridge Assembly with Encoder Rear View

5.2.5.4 Adjusting Knob

5.2.5.4.1 The Adjusting Knob shall be used to provide fine tuning of the Probe Holder to the required position.

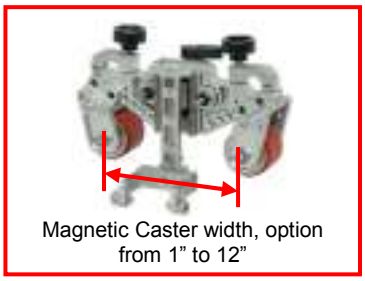
5.2.5.4.2 Unlock the adjusting knob and turn it clockwise or anti-clockwise to move the probe holder forward or backward to achieve the required position of the wedge.

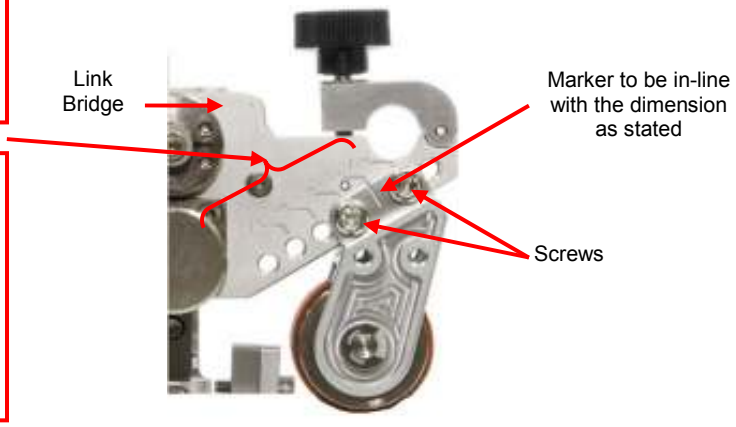
5.2.5.4.3 Once the wedge position is achieved, lock the adjusting knob to prevent it from unnecessary movement.

5.2.5.5 Magnetic Caster

5.2.5.5.1 The Magnetic Caster is adjustable depending on the size of the vessel and can be mounted in opposite direction to cater for a larger diameter vessels.

5.2.5.5.2 There are two screws that hold the magnetic caster to the Link Bridge. The Magnetic Caster is adjustable by removing the screw and positions it to the new position, depending on the size of the vessel, re-insert and tighten the screws again.





5.2.6 A set of pre-assembled Standard Scanner Assembly consist of the following items;

Item #	Photo	Description	Qty
5.2.4.1		Link Bridge Assembly with Encoder	1
5.2.4.2		Link Bridge Assembly without Encoder	1
5.2.4.3		Water Manifold Assembly	1

Item #	Photo	Description	Qty
5.2.4.4		Handle with Link Band Guide	1
5.2.4.5		Handle	1
5.2.4.6		Shaft (500 mm)	2

6.0 UMS 101 LINK BAND COMBINATION TABLE

6.1 The UMS 101 Link Band Combination Table (see Table 1) list the types of chains combination appropriate for the inspection of a given pipe size.

6.2 The first column on the left list the range of the diameter of the pipe to be inspected; moving across the row would indicate the quantity of each type of link band to be use to set-up the required Chain Link Assembly for inspection.

6.3 Optional chain links set for OD 48" to 60" are available for purchase.

6.4 Table 1 : UMS 101 Link Band Combination Table

						
Pipe Diameter (Inch)	**Spring Band**	**Latch Assy**	**Adjustable Band**	**S (small) Band**	**M (medium) Band**	**L (large) Band**
6.00 - 6.75	**1**	**1**	**3**	**0**	**0**	**0**
6.75 - 7.50	**1**	**1**	**3**	**1**	**0**	**0**
7.50 - 8.50	**1**	**1**	**3**	**2**	**0**	**0**
8.50 - 9.50	**1**	**1**	**3**	**3**	**0**	**0**
9.50 - 10.50	**1**	**1**	**3**	**4**	**0**	**0**
10.50 - 11.50	**1**	**1**	**3**	**5**	**0**	**0**
11.50 - 12.50	**1**	**1**	**3**	**6**	**0**	**0**
12.50 - 13.50	**1**	**1**	**3**	**7**	**0**	**0**
13.50 - 14.00	**1**	**1**	**3**	**0**	**4**	**0**
14.00 - 15.00	**1**	**1**	**3**	**1**	**4**	**0**
15.00 - 16.00	**1**	**1**	**3**	**2**	**4**	**0**
16.00 - 17.00	**1**	**1**	**3**	**1**	**5**	**0**
17.00 - 18.00	**1**	**1**	**3**	**2**	**5**	**0**
18.00 - 19.00	**1**	**1**	**3**	**3**	**5**	**0**
19.00 - 19.75	**1**	**1**	**3**	**2**	**6**	**0**
19.75 - 20.75	**1**	**1**	**3**	**3**	**6**	**0**
20.75 - 21.75	**1**	**1**	**3**	**0**	**1**	**5**
21.75 - 22.75	**1**	**1**	**3**	**1**	**1**	**5**

						
Pipe Diameter (Inch)	**Spring Band**	**Latch Assy**	**Adjustable Band**	**S (small) Band**	**M (medium) Band**	**L (large) Band**
22.75 - 23.75	**1**	**1**	**3**	**2**	**1**	**5**
23.75 - 24.50	**1**	**1**	**3**	**1**	**2**	**5**
24.50 - 25.50	**1**	**1**	**3**	**2**	**2**	**5**
25.50 - 26.50	**1**	**1**	**3**	**2**	**1**	**6**
26.50 - 27.50	**1**	**1**	**3**	**3**	**1**	**6**
27.50 - 28.50	**1**	**1**	**3**	**4**	**1**	**6**
28.50 - 29.50	**1**	**1**	**3**	**0**	**1**	**8**
29.50 - 30.50	**1**	1	**3**	**1**	**1**	**8**
30.50 - 31.50	**1**	**1**	**3**	**0**	**2**	**8**
31.50 - 32.50	**1**	**1**	**3**	**1**	**2**	**8**
32.50 - 33.50	**1**	**1**	**3**	**2**	**2**	**8**
33.50 - 34.50	**1**	**1**	**3**	**3**	**2**	**8**
34.50 - 35.50	**1**	**1**	**3**	**2**	**3**	**8**
35.50 - 36.50	**1**	**1**	**3**	**3**	**3**	**8**
36.50 - 37.25	**1**	**1**	**3**	**3**	**2**	**9**
37.25 - 38.25	**1**	**1**	**3**	**0**	**0**	**12**
38.25 - 39.50	**1**	**1**	**3**	**1**	**0**	**12**
39.50 - 40.50	**1**	**1**	**3**	**2**	**0**	**12**
40.50 - 41.50	**1**	**1**	**3**	**3**	**0**	**12**
41.50 - 42.25	**1**	**1**	**3**	**2**	**1**	**12**
42.25 - 43.25	**1**	**1**	**3**	**3**	**1**	**12**
43.25 - 44.25	**1**	**1**	**3**	**4**	**1**	**12**
44.25 - 45.00	**1**	**1**	**3**	**1**	**3**	**12**
45.00 - 46.00	**1**	**1**	**3**	**2**	**3**	**12**
46.00 - 47.00	**1**	**1**	**3**	**3**	**3**	**12**
47.00 - 48.00	**1**	**1**	**3**	**4**	**3**	**12**

7.0 UMS 101 SET-UP FOR INSPECITON

7.1 Preparing the Chain Link Assembly

7.1.1 Determine the outside diameter (OD) of pipe to be inspected, and refer to the Link Band Combination Table (See Table 1) to select the appropriate Link Bands. For this illustration purpose we use a 22.25” OD pipe.

7.1.2 Refer to the Link Band Combination Table, in the Pipe Diameter column, look for the range of diameter for 22.25 inch;

7.1.2.1 22.25 inch OD pipe fall within the range of 21.75 – 22.75

7.1.2.2 Read long the “21.75 – 22.75” Pipe Diameter row; listed the required quantity of the items needed to build the chain, items are highlighted in the respective color of the column, stating its quantity.

7.1.2.3 Therefore for the 22.25” OD, the required link chains are :

7.1.2.3.1 1 piece of Spring Band

7.1.2.3.2 1 piece of Latch Assembly

7.1.2.3.3 3 pieces of Adjustable Band

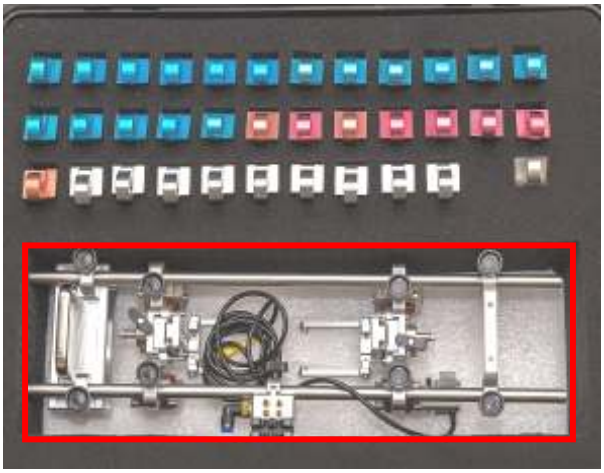
7.1.2.3.4 1 piece of Small Band (Clear color)

7.1.2.3.5 1 piece of Medium Band (Red color)

7.1.2.3.6 5 pieces of Large Band (Blue color)

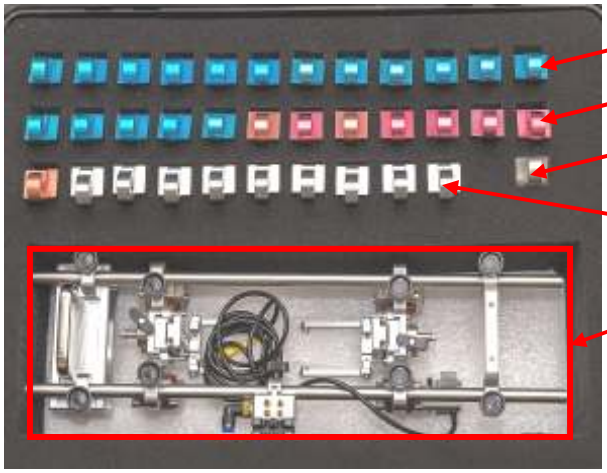
						
Pipe Diameter (Inch)	**Spring Band**	**Latch Assy**	**Adjustable Band**	**S (small) Band**	**M (medium) Band**	**L (large) Band**
18.00 - 19.00	**1**	**1**	**3**	**3**	**5**	**0**
19.00 - 19.75	**1**	**1**	**3**	**2**	**6**	**0**
19.75 - 20.75	**1**	**1**	**3**	**3**	**6**	**0**
20.75 - 21.75	**1**	**1**	**3**	**0**	**1**	**5**
21.75 - 22.75	**1**	**1**	**3**	**1**	**1**	**5**

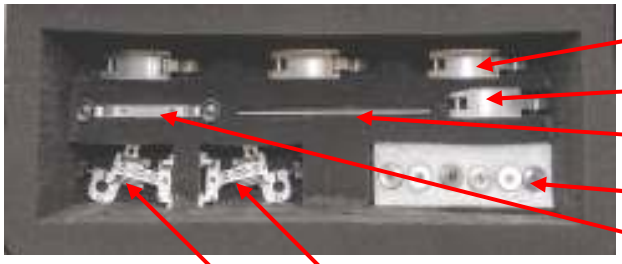
7.1.2.4 Pick up all the necessary Link Bands mentioned in item # 7.1.2.3, from the case for preparation.



Upper Case View

Lower Case View





7.1.3 Method to assemble the Bands

7.1.3.1 This method applies to all types and sizes of Bands.

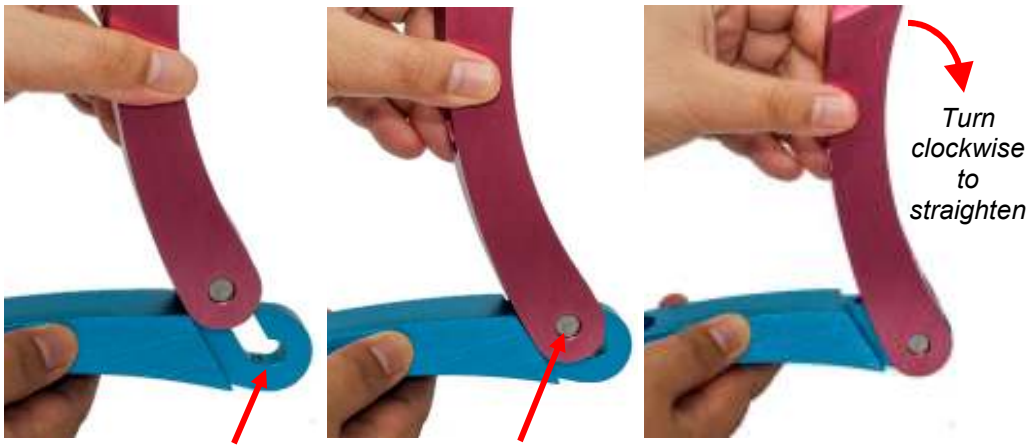
7.1.3.2 All Bands are designed with a hook at one end and dowel pin at the other end.

7.1.3.3 The hook is designed with a bearing that will act as a locking mechanism to the mating part, in order to hold the mating part from slipping off the hook during transportation and inspection.

7.1.3.3.1 All Band types and sizes are designed with the bearing except for the Latch Assembly.

7.1.3.4 Hold the bands to 90º (as shown below) and slot into the hook to engage to the dowel pin of the other part of the band, push slightly to hear a “click” sound to ensure that the dowel pin is latch to the hook by the bearing.

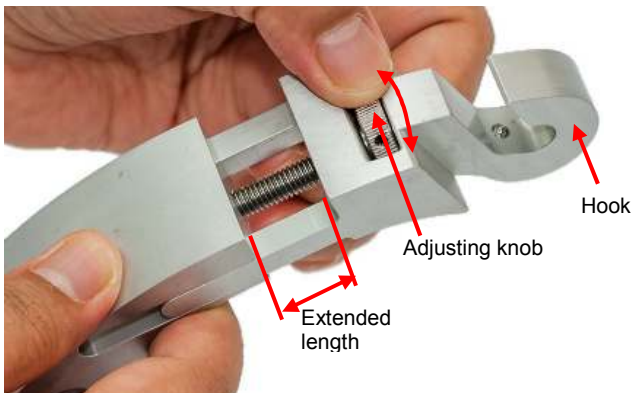
7.1.3.5 Turn the top band clockwise to straightening the joints.



7.1.4 Assembly of the Chain Link Bands

7.1.4.1 Refer to item # 7.1.3 for the method to assemble the rest of the bands.

7.1.4.2 Extend the length of the Adjustable Band to the near maximum extension, by turning the adjusting knob. The extended length is limited to 30 mm extension, do not exceed the given extension length, as the band will be dismantled.

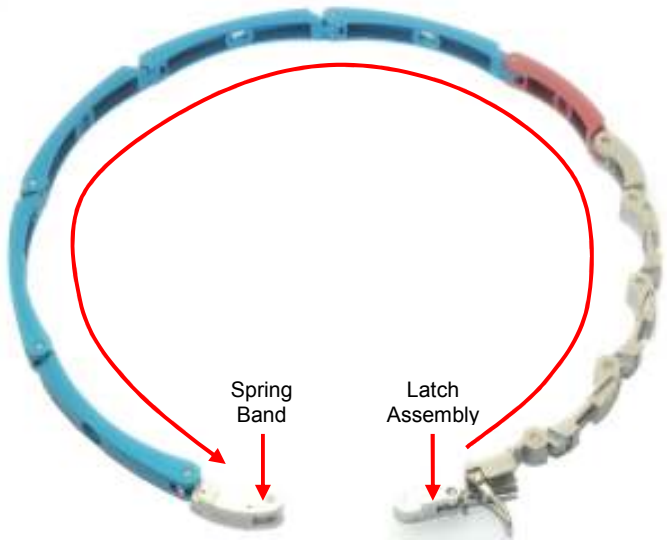


7.1.4.3 Assemble the Latch Assembly to the Adjustable Band hook.

7.1.4.4 Followed by assemble the Adjustable Band dowel to the Link Band Small hook, and followed by the Link Band Medium, and Link Band Large, where applicable.

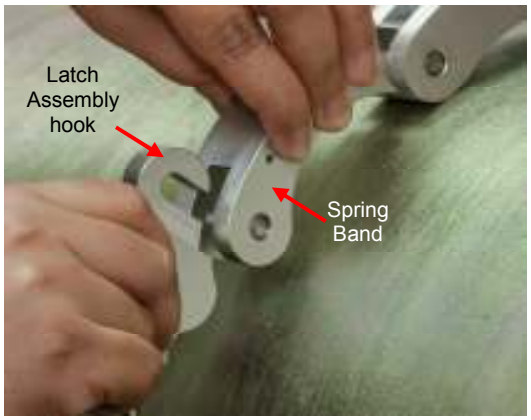
7.1.4.5 The last Link Band will be assembled to the Spring Band.

7.1.4.6 Therefore at the end of the Chain Link Bands, the Spring Band will meet the Latch Assembly.

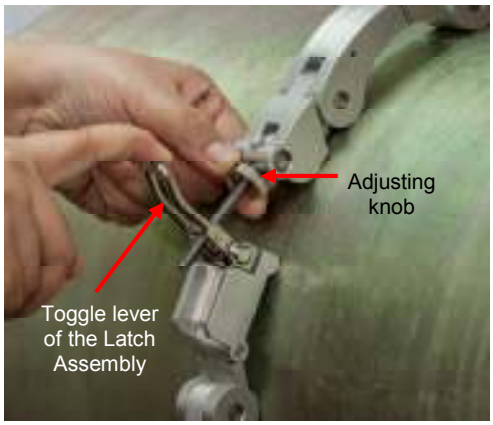


7.2 Installing the Chain Links on the pipe for inspection

7.2.1 Sling the whole Chain Link Assembly around the pipe and connect the Latch Assembly to the Spring Band. Ensure that the hook of the Latch Assembly is facing downward, and the toggle lever of the Latch Assembly is not in the lock position.



7.2.2 If the chain is too tight and it is difficult to hook the Latch Assembly to the Spring Band, adjust the Latch Assembly to the required distance by turning the adjusting knob until you can hook the Latch Assembly to the Spring Band.



7.2.3 Adjust the whole Chain Link to ensure that they are equally distance from the weld joint before locking the Latch Assembly by pushing down the toggle lever of the Latch Assembly, to secure the link chain to the pipe.

7.2.4 If the link chain is too loose, adjust the chain by turning the adjusting knob on the Latch Assembly too.

7.2.5 Finally, pull down the toggle lever on the Latch Assembly to secure the Chain Link Band Assembly to the pipe.

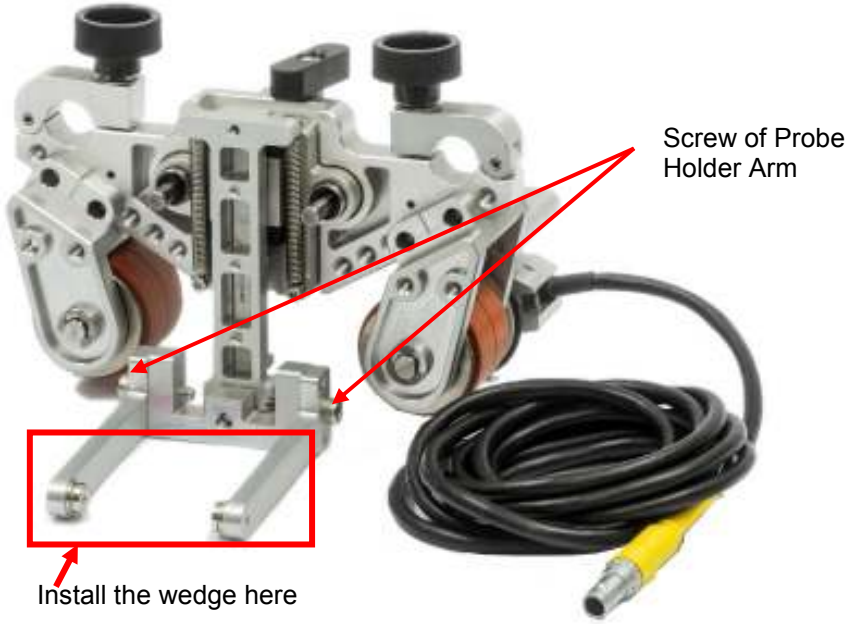
7.2.6 Note : please ensure the Chain Link Assembly is tightly secured to the pipe, it must not be loose.

7.3 Preparing the Scanner

7.3.1 Depending on the inspection technique (PA or TOFD) used; the user would have to pick up the necessary parts from the case for configuration. We will be using PA technique for this illustration purpose.

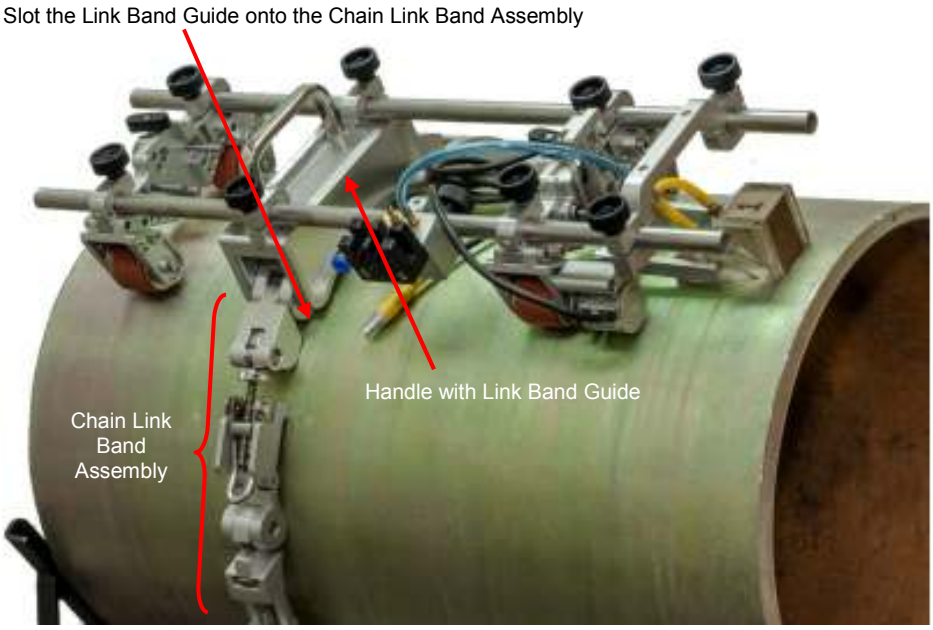
7.3.2 For PA technique use the pre-assembled Scanner Assembly, provide in the package.

7.3.3 Install the correct wedge complete with probe (which are not included in this package) to the Probe holder, by tightening the screw on the probe holder arm.

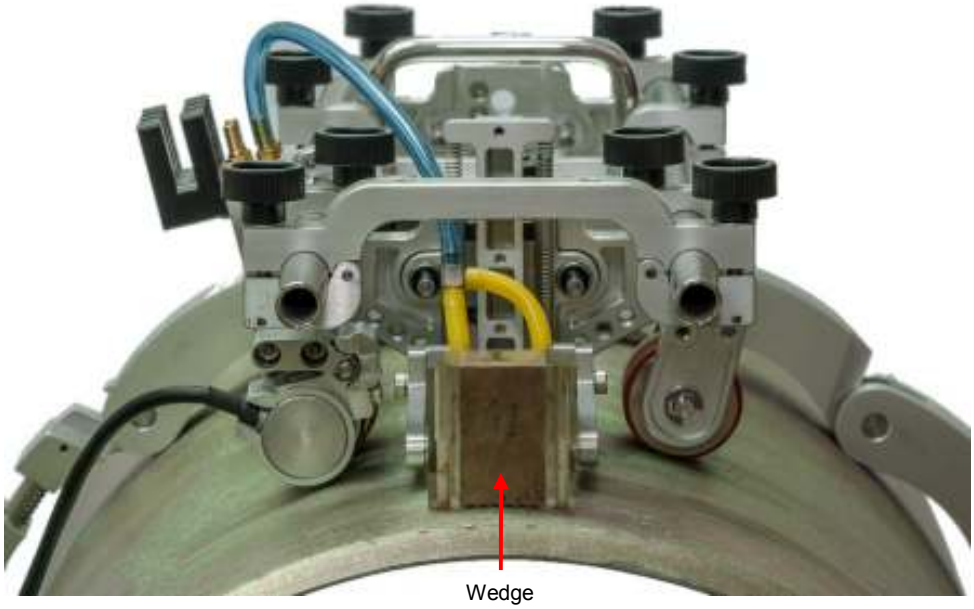


7.4 Preparing for Inspection

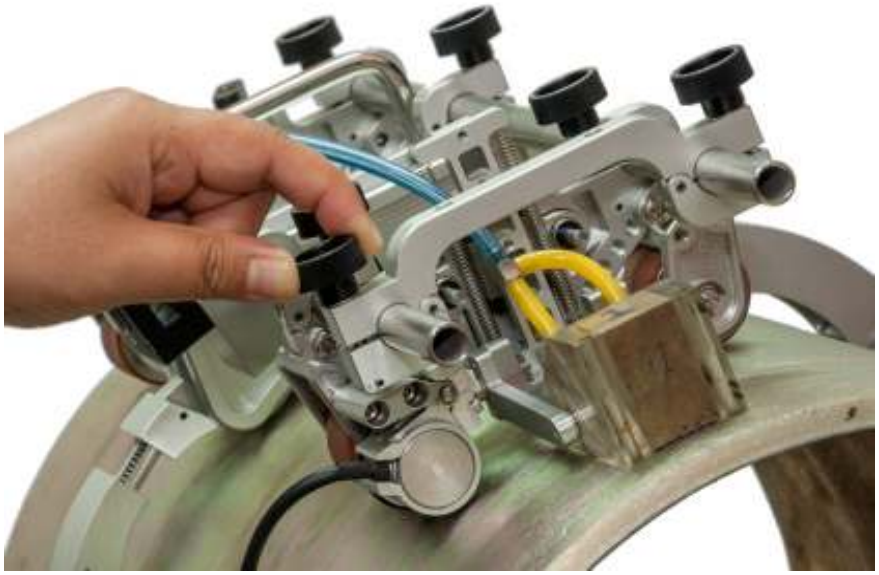
7.4.1 Slot the Handle with Link Band Guide onto the Chain Link Band Assembly as shown



7.4.2 Ensure the Probe Holder and wedge is 90º to the pipe.



7.4.3 Align all Magnetic Caster, and ensure all magnetic wheels are in contact with the pipe before tightening the knobs.



7.4.4 Secure all water pipes, probe and encoder wire connections to their respective place. The set up is now ready for inspection.

7.5 Inspection

7.5.1 Hold the handles of the Scanner and carefully move the scanner to begin the inspection.

8.0 TYPES OF SCANNER CONFIGURATION

8.1 UMS 101 can be configured for external, internal and small OD inspections as shown respectively below:

EXTERNAL CONFIGURATION

INTERNAL CONFIGURATION

SMALL DIAMETER CONFIGURATIONS

9.0 CONTACTS

Should you need any clarification, repair assistance, please contact

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