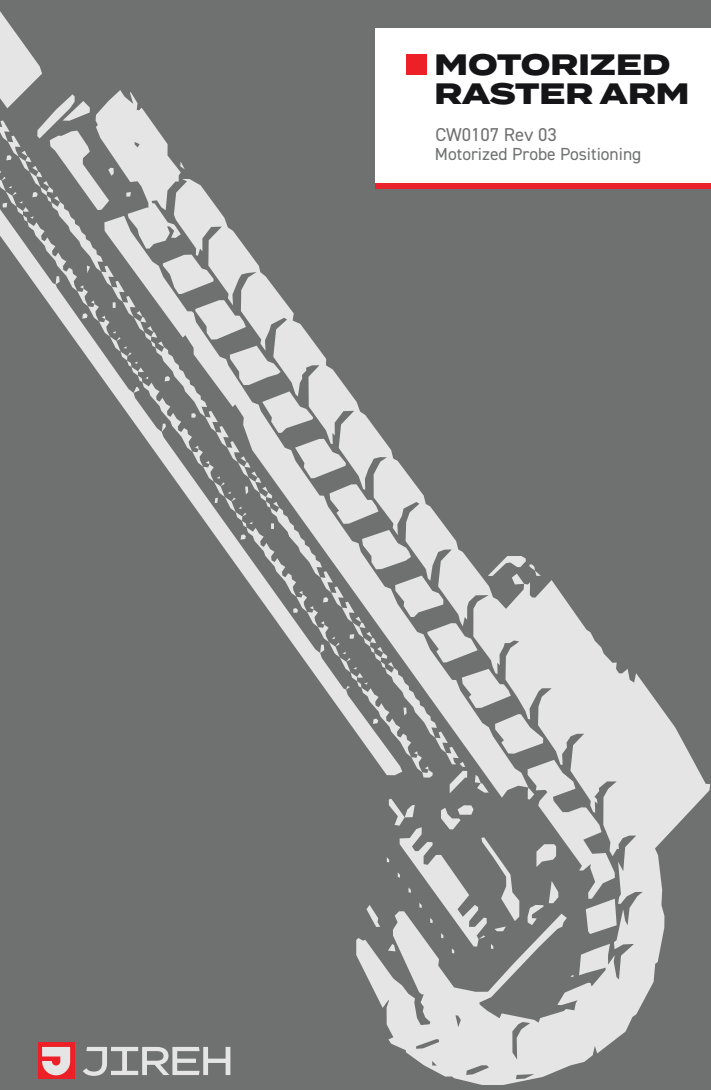
MOTORIZED RASTER ARM

CW0107 Rev 03
Motorized Probe Positioning



JIREH

SAFETY WARNINGS / PRECAUTIONS

KEEP THIS MANUAL – DO NOT LOSE
THIS MANUAL IS PART OF THE **MOTORIZED RASTER ARM** AND MUST BE RETAINED FOR THE LIFE OF THE PRODUCT. PASS ON TO SUBSEQUENT OWNERS.
Ensure any amendments are incorporated with this document.

WARNING! The Motorized Raster Arm is designed for a specific use. Using the Motorized Raster Arm outside of its intended use is dangerous. Failure to comply with the warnings, instructions, and specifications in this manual could result in **SEVERE INJURY** or **DEATH**. Read and understand this manual before using.

WARNING! Do **NOT** operate in an explosive environment. Do **NOT** operate in the presence of volatile substances.

WARNING! MAGNETIC MATERIAL. The magnetic base of the raster arm cable tray contains magnetic material. People with pacemakers or ICD's must stay at least 10 cm *(4 in)* away.

WARNING! DO NOT DISASSEMBLE. No user-serviceable parts. Disassembling any of the components in this product, beyond the instructions in this user manual, could void the regulatory certifications and/or effect the safety of the product.

CAUTION! Do **NOT** disconnect under load. Shut off power before connecting or disconnecting the. Permanent damage to electronics could occur.

The WEEE symbol indicates that the product must not be disposed of as unsorted municipal waste, but should be collected separately.

(see "Disposal" on page 108 for additional details).

TABLE OF CONTENTS

IDENTIFICATION

1.1. Product Brand

This user manual describes the proper safety precautions, setup and use of any length of Motorized Raster Arm system.

1.2. Manufacturer

Distributor:

Manufacturer:

Jireh Industries Ltd.

53158 Range Road 224
Ardrossan, Alberta, Canada
T8E 2K4

Phone: 780.922.4534

jireh.com

1.3. Compliance Declarations

1.3.1. ISED Emissions Compliance (Canada)

CAN ICES-003(A) / NMB-003(A)

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

1.3.2. FCC Suppliers Declaration of Conformity (United States)

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, and *(2)* this device must accept any interference received, including interference that may cause undesired operation.

This equipment 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 equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio

frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

RESPONSIBLE PARTY NAME:	Jireh Industries
ADDRESS:	2955 S Sam Houston Pkwy E Suite 300 Houston, Texas United States 77047
TELEPHONE:	832-564-0626

1.3.3. European Union CE Declarations

Jireh Industries hereby declares that the Motorized Raster Arm product complies with the essential requirements and other relevant provisions of the following European Union directives:

2014/30/EU	EMC Directive
2014/35/EU	Low Voltage Directive
2012/19/EU	Directive on Waste Electrical and Electronic Equipment
2011/65/EU	Directive on Restriction of Hazardous Substances (RoHS)

1.3.4. UKCA Declarations

Jireh Industries hereby declares that the Motorized Raster Arm product complies with the essential requirements and other relevant provisions of the following UK directives.

Title	Edition/ Date of Issue
Electromagnetic Compatibility Regulations	2016
Electrical Equipment (Safety) Regulations	2016
Waste Electrical and Electronic Equipment Regulations	2013
Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations	2012

PRODUCT SPECIFICATIONS

2.1. Base Motorized Raster Arm System Specifications

This section outlines the product specifications of the Base Motorized Raster Arm System.

2.1.1. Intended Use

The Motorized Raster Arm's primary purpose is to provide raster motion of inspection probes over assets such as pipes, vessels, or storage tanks. It is intended for use with the Parent Products and their limits listed in Section 2.2.

2.1.1.1 User

The Motorized Raster Arm is intended to be used by persons who have read and understand this user manual as well as the user manual of the relevant Parent Products.

2.1.1.2 Operating Environment

The Motorized Raster Arm is for use in dry industrial environments having ambient temperatures shown below. It is NOT intended for use in explosive environments.

Category	Parameter	Specification
Environment	Minimum ambient temperature	-20°C *(-4°F)*
	Maximum ambient temperature	50°C *(122°F)*

2.1.2. Unintended Use

The Motorized Raster Arm is NOT intended for:

- use outside of its intended use
- lifting / lowering objects or people *(i.e. using the Motorized Raster Arm as a crane / elevator)*
- use where obstructions are present, excluding standard weld caps
- use on any products other than those listed as Parent Products *("Parent Products Specifications")*

2.1.3. Dimensions and Weight

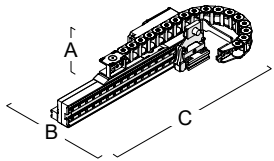


Fig. 1 - 300 mm Motorized Raster Arm dimensions

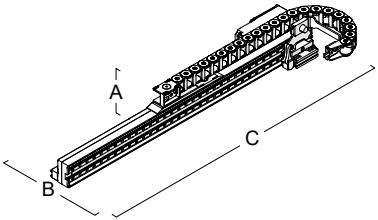


Fig. 2 - 600 mm Motorized Raster Arm dimensions

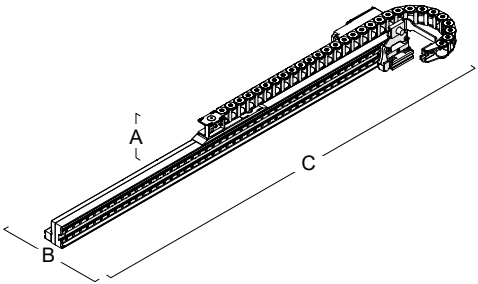


Fig. 3 - 900 mm Motorized Raster Arm dimensions

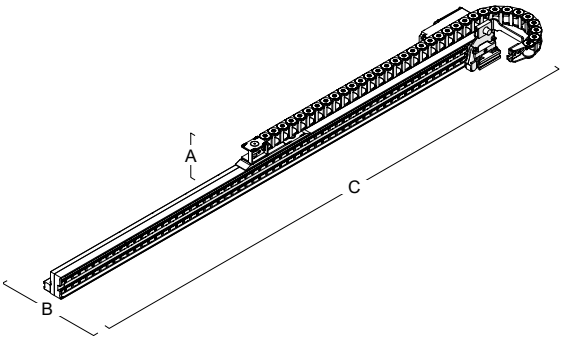


Fig. 4 - 1160 motorized raster am dimensions

	Model:	-0300	-0600	-900	-1160
A	Raster arm height:	9.6 cm *(3.8 in)*	9.6 cm *(3.8 in)*	9.6 cm *(3.8 in)*	9.6 cm *(3.8 in)*
B	Raster arm depth:	25.9 cm *(10.2 in)*	25.9 cm *(10.2 in)*	25.9 cm *(10.2 in)*	25.9 cm *(10.2 in)*
C	Raster arm width:	44 cm *(17.3 in)*	72.8 cm *(28.7 in)*	104 cm *(41 in)*	130 cm *(51.1 in)*
	Raster arm weight:	2.4 kg *(5.3 lb)*	3.3 kg *(7.2 lb)*	4 kg *(8.7 lb)*	4.6kg *(10.2 lb)*

2.1.4. Power Requirements

CAUTION! DO NOT DISCONNECT UNDER LOAD. Shut off power before connection or disconnecting. Permanent damage to electronics could occur.

Power requirements: 25-45VDC, MAX. 85W

2.1.5. Environmental Sealing

Dust-tight, watertight *(not submersible)*.

2.1.6. Performance Specifications

Category	Parameter	Specification
CWG002-0300	Stroke	300 mm *(11.8 in)*
CWG002-0600	Stroke	600 mm *(23.6 in)*
CWG002-0900	Stroke	900 mm *(35.4 in)*
CWG002-1160	Stroke	1160 mm *(45.7 in)*
All strokes	Maximum raster speed	762 mm/s *(30 in/s)*
	Encoder resolution	240.2 counts/mm *(6101 counts/in)*

2.2. Parent Products Specifications

The Motorized Raster Arm may be used with the products listed in this section. These products have a User Manual of their own, and shall be referred to for their product specifications. If the use of Motorized Raster Arm in conjunction with these products modifies the product specifications, those differences are shown here.

2.2.1. NAVIC System CXG023-

The **NAVIC** is an automated, magnetic crawler with steering capability. Various attachments may be affixed to the crawler for the purposes of UT inspection.

2.2.1.1 Operating Limits

Category	Parameter	Specification
Inspection Surface	Minimum OD, longitudinal driving	Flat *(longitudinal driving not recommended)*
Scanner	Required radial clearance (handles removed, cable tray removed, circumferential driving)	115 mm *(4.5 in)*
	Required radial clearance (handles removed, circumferential driving)	200 mm *(7.9 in)*

2.2.2. SKOOT System DNA001-

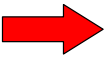
The **SKOOT** is an automated, magnetic crawler. Various attachments may be affixed to the crawler for the purposes of UT inspection.

2.2.2.1 Operating Limits

Category	Parameter	Specification
Inspection Surface	Minimum OD, longitudinal driving, 19 mm *(0.75 in)* probe holder stroke 300 mm raster stroke.	1220 mm *(4 ft)*
	Minimum OD, longitudinal driving, 19 mm *(0.75 in)* probe holder stroke 600 mm raster stroke.	4880 mm *(16 ft)*
	Minimum OD, longitudinal driving, 19 mm *(0.75 in)* probe holder stroke 900 mm raster stroke.	10700 mm *(35 ft)*
	Minimum OD, longitudinal driving, 19 mm *(0.75 in)* probe holder stroke 1160 mm raster stroke.	17700 mm *(58 ft)*
Scanner	Required radial clearance *(manipulation handle and cable tray removed, circumferential driving)*	115 mm *(4.5 in)*
	Required radial clearance *(manipulation handle removed, circumferential driving)*	200 mm *(7.9 in)*

DEFINITIONS

3.1. Definition of Symbols

	Instructions to ‘look here’ or to ‘see this part’.
	Denotes movement. Instructing users to carry out an action in a specified direction.
	Indicates alignment axis.
	Alerts the user that the view has changed to a reverse angle.

3.2. Definitions of Terms

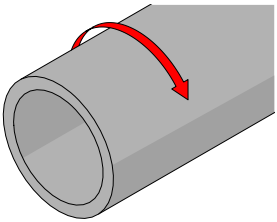


Fig. 5 - Circumferential scanning

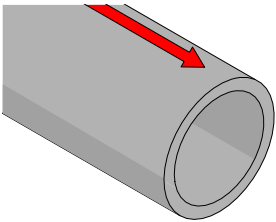


Fig. 6 - Longitudinal scanning

Circumferential	Direction of scan travel is around the circumference of the pipe/tube *(Fig. 5)*.
Longitudinal	Direction of scan travel is lengthwise of the pipe/tube *(Fig. 6)*.

3.3. Safety Symbols

The following safety symbols might appear on the product and in this document. Read and understand their meaning below:

	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.

3.4. Safety Signal Words

The following safety signal words might appear in this document. Read and understand their meaning below:

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

SYSTEM COMPONENTS

4.1. Base System Components

4.1.1. Base Motorized Raster Arm CWA006-

The Motorized Raster Arm adds automated two-axis scan capabilities to a crawler.

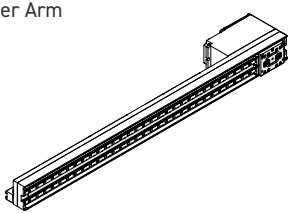


Fig. 7 - Base Motorized Raster Arm

The Motorized Raster Arm can carry many different probes for various types of corrosion scans, including conventional 0° transducers, phased array probes *(e.g. Olympus HydroFORM™)* and more. The handheld controller is used to set up all the parameters of the scan *("2 Axis Scan Mode" on page 79).*

4.1.2. Cable Tray CWS018-

WARNING! MAGNETIC MATERIAL. The magnetic base of the Motorized Raster Arm cable tray contains magnetic material. People with pacemakers or ICD's must stay at least 10 cm *(4 in)* away.

The cable tray is a flexible container for organizing and holding cables, tubes and hoses.

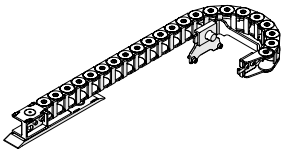


Fig. 8 - Cable tray

4.1.3. Raster Arm Cable UMA020-

The raster arm cable connects the Motorized Raster Arm to a crawler or umbilical. The cable provides the 36VDC and network connections to the raster arm module and transmits the raster arm encoder signals.

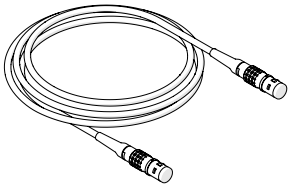


Fig. 9 - Raster arm cable

4.1.4. Raster Arm Pivot Nose, Female CWS023

The raster arm pivot nose (female) allows probe holders to be affixed to the raster arm.

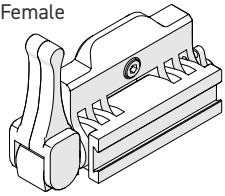


Fig. 10 - Raster arm cable

4.1.5. Raster Arm Case 300 mm/600 mm CWA009

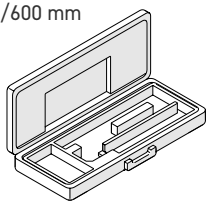


Fig. 11 - Raster arm case 300 mm/600 mm

4.1.6. Raster Arm Case 900 mm/1160 mm CWA008

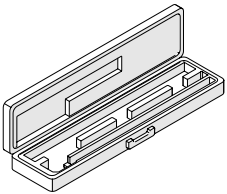


Fig. 12 - Raster arm case 900/1160 mm

4.2. Compatible Components

4.2.1. Frame Bar BG0038-

Frame bars use dovetail grooves into which probe holders and accessories may be attached. Available in various lengths.

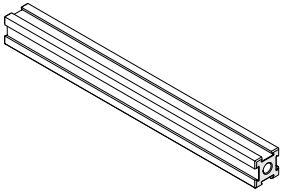


Fig. 13 - Frame bar

4.2.2. Raster Arm Pivot Nose, Male CWS030

The raster arm pivot nose (male) allows a frame bar to be affixed to the raster arm, usually to accommodate two probe scanning.

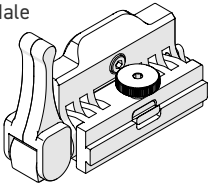


Fig. 14 - Raster arm pivot nose (male)

4.2.3. Slip Joint Probe Holder PHA012-

The slip joint probe holder is generally used during limited access inspection. The low profile design requires minimal radial clearance. The slip joint probe holder is designed to carry many different types of probes and wedges. It is available with various types of yokes, arms and pivot buttons.

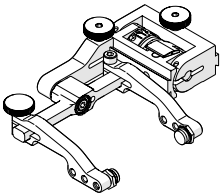


Fig. 15 - Slip joint probe holder

4.2.4. Vertical Probe Holder PHA015-

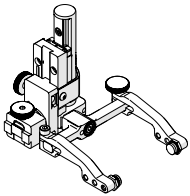


Fig. 16 - Vertical probe holder

The vertical probe holder is designed to carry many different types of probes and wedges. Available with various types of yokes, arms and pivot buttons. The vertical probe holder features several different adjustment options for each unique probe/wedge setup.

4.2.5. Heavy Duty Vertical Probe Holder PHS043-

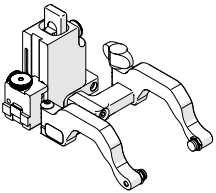


Fig. 17 - Heavy duty vertical probe holder

The heavy duty vertical probe holder is designed to carry larger probes. Available with various arm, yoke and pivot buttons, the heavy duty vertical probe holder exerts more downforce on a large footprint probe/wedge.

4.2.6. Corrosion Thickness Probe Holder PHS046- / PHS056-

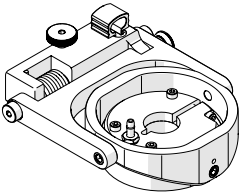


Fig. 18 - Corrosion thickness probe holder

The corrosion thickness probe holder carries various probes for corrosion inspection and is available with either a flat or curved wear plate.

4.2.7. HydroFORM Cart PHS044

The HydroFORM cart is intended to provide a solution for holding the Olympus HydroFORM probe. It is used in conjunction with the heavy duty vertical probe holder.

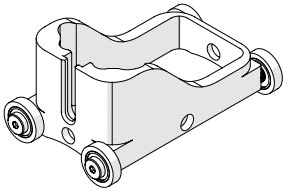


Fig. 19 - HydroFORM cart

4.3. Child Products

4.3.1. Raster Arm Corrosion Actuated Probe Lift CWG007- / CWG008-

The raster arm corrosion actuated probe lift allows the user to raise and lower a corrosion thickness probe holder remotely from the handheld controller. This allows the probe to avoid obstacles and large welds, preventing damage and unnecessary wear to the probe. The raster arm corrosion actuated probe lift is intended to be mounted to the Motorized Raster Arm.

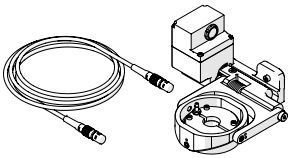


Fig. 20 - Raster arm corrosion actuated probe lift

4.4. Parent Products

4.4.1. NAVIC CXG023-

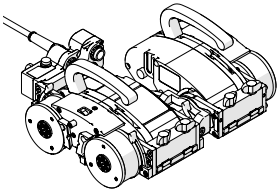


Fig. 21 - NAVIC system

The NAVIC is a modular, motorized, steerable scanner that carries various attachments for scanning and inspection applications. The list of possibilities is seemingly endless with this industry-leading crawler. The NAVIC can perform circumferential and longitudinal inspections on ferrous tanks, pipes, and vessels.

4.4.2. SKOOT DNG001-

The SKOOT is an automated scanner able to carry multiple attachments and various accessories.

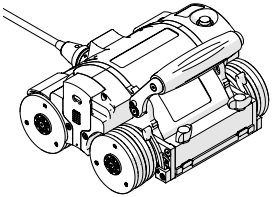


Fig. 22 - SKOOT system

4.4.3. MOTIX EJG001-

The MOTIX is a motorized crawler capable of various configurations on non-ferrous surfaces such as GRP, HDPE, plastic, stainless steel and more.

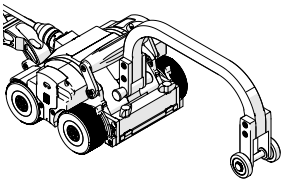


Fig. 23 - MOTIX system

4.5. Tools

4.5.1. Included Tools

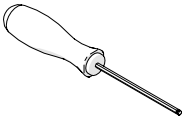


Fig. 24 - 3 mm hex driver

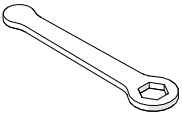


Fig. 25 - 3/8 in wrench

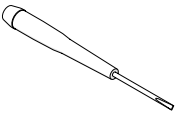


Fig. 26 - 3 mm flat driver

A 3 mm hex driver *(Fig. 24)* is included in the **NAVIC**, **SKOOT** and **MOTIX** systems. This driver is suitable for most typical probe holders and raster arm system adjustments.

A 3/8 in wrench *(Fig. 25)* is included in the **NAVIC**, **SKOOT** and **MOTIX** systems. The 3/8 in wrench is used to remove and install probe holder pivot buttons.

A 3 mm flat driver *(Fig. 26)* is included in the **NAVIC**, **SKOOT** and **MOTIX** systems. This driver helps release the raster arm's cable tray flaps.

4.5.2. Optional Tools

Some specialized adjustments require tools that are not included with this kit.

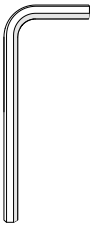


Fig. 27 - 1.5 mm hex wrench

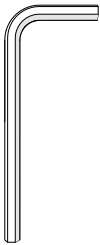


Fig. 28 - 2 mm hex wrench

Fig. 29 - 3 mm hex wrench

PREPARATION FOR USE

5.1. NAVIC System Configuration

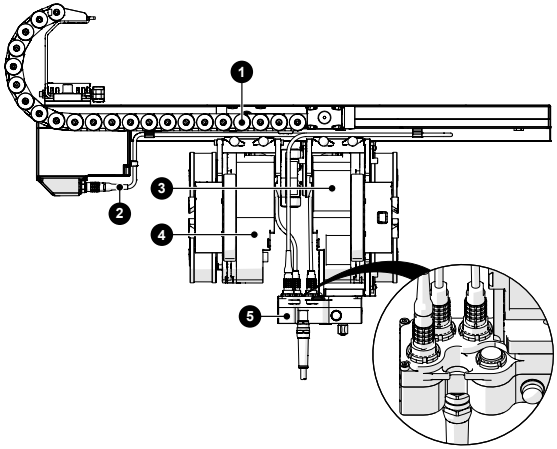


Fig. 30 - Standard NAVIC Motorized Raster Arm configuration

BOM ID	Description
1	Motorized Raster Arm
2	Raster arm cable
3	Right drive module
4	Left drive module
5	Umbilical

NOTE: *Use of the Motorized Raster Arm on a NAVIC is limited to flat or circumferential operation only. It is not recommended to use the Motorized Raster Arm on a NAVIC for longitudinal operation.*

To configure the Motorized Raster Arm with a **NAVIC** crawler, follow these steps:

CAUTION! Do **NOT** disconnect under load. Shut off power before connecting or disconnecting the. Permanent damage to electronics could occur.

1. Install the 1 Motorized Raster Arm on the 3 right and 4 left drive modules of the **NAVIC** crawler *(see "Motorized Raster Arm Installation" on page 22)*.
2. Connect the 2 raster arm cable to the 1 Motorized Raster Arm and the opposite end of the cable to the 5 umbilical.
3. Configure the 1 Motorized Raster Arm *(see "Motorized Raster Arm Configurations" on page 35)* to attach a particular probe holder.

5.1.1. Motorized Raster Arm Installation (Flat or Circumferential Only)

DANGER! FALLING OBJECT HAZARD. When the Motorized Raster Arm is mounted in both the left hand and right hand swivel mounts, operation must be limited to driving in the circumferential direction. Only very slight corrective steering is permitted. Excessive steering may cause the crawler to fall and **SEVERE INJURY** or **DEATH** could result.

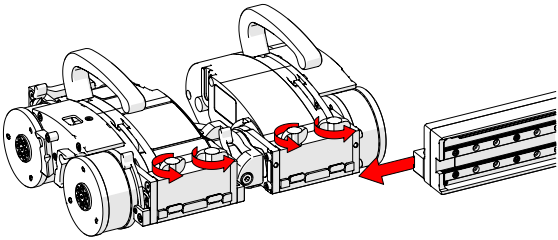


Fig. 31 - Slide onto one swivel mount

1. Loosen all four black wing knobs on both modules. Slide the raster arm's mounting rail onto the dovetail jaws of one of the modules *(Fig. 31)*.

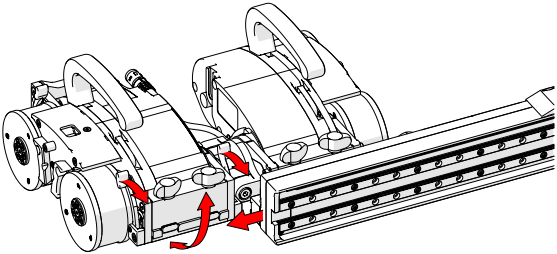


Fig. 32 - Slide onto second swivel mount

2. Release the swivel mount levers and pivot the swivel mount to align with the mounting rail of the raster arm *(Fig. 32)*. Slide the raster arm onto the remaining module's swivel mount and tighten all four black wing knobs.

5.1.2. Connect and Route Raster Arm Cable

CAUTION! DO NOT DISCONNECT UNDER LOAD. Shut off power before connecting or disconnecting the. Permanent damage to electronics could occur.

1. Plug the supplied raster arm cable into the raster arm's connector *(Fig. 33)*.
2. Press the raster arm cable into the cable bracket on the side of the raster arm encoder housing *(Fig. 34)*.
3. Route the cable through the adjustable clips on the raster arm *(Fig. 35)*. These clips slide along the raster arm, allowing the raster arm cable to be positioned as required.

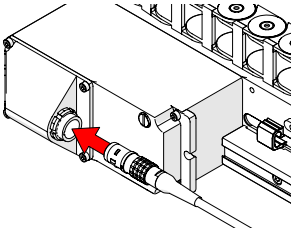


Fig. 33 - Plug raster arm cable into raster connector

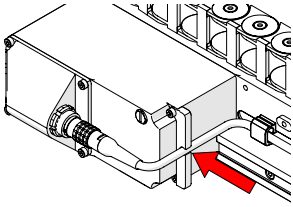


Fig. 34 - Press raster arm cable into cable bracket

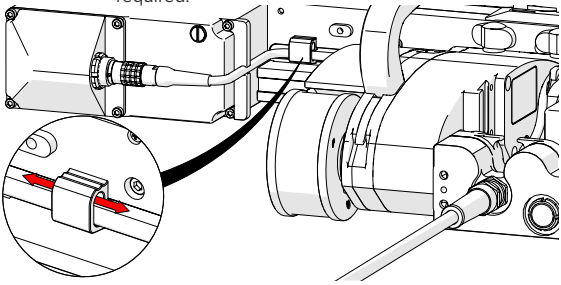


Fig. 35 - Adjustable cable clips

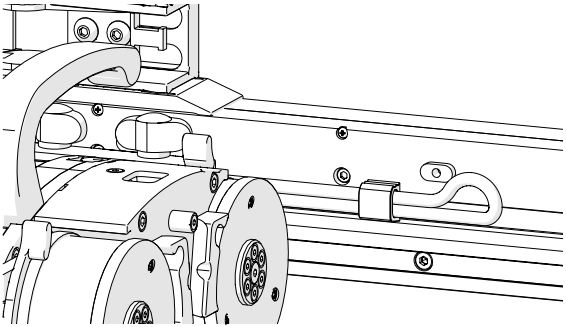


Fig. 36 - Route cable through the clip twice

4. The clips can accommodate the raster cable twice when necessary to route excess cabling *(Fig. 36)*.

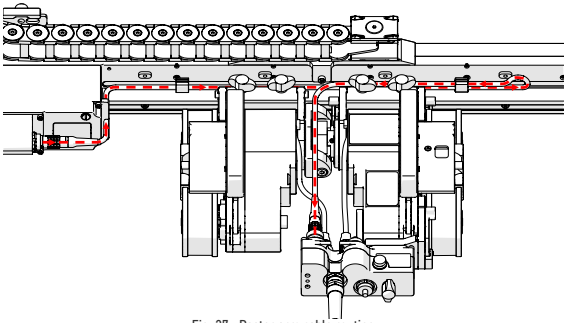


Fig. 37 - Raster arm cable routing

5. The opposite end of the raster arm cable is connected to the crawler umbilical port marked **Y-ENC** *(Fig. 37)*.

> ***TIP:*** *The raster arm cable may be connected to any other 8-pin receptacles on the umbilical for troubleshooting or non-standard configurations.*

5.2. SKOOT System Configuration

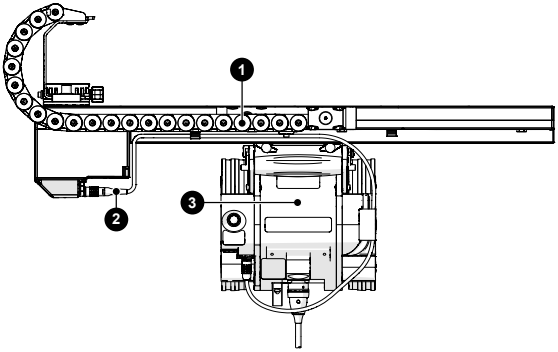


Fig. 38 - Standard SKOOT Motorized Raster Arm configuration

BOM ID	Description
1	Motorized Raster Arm
2	Raster arm cable
3	**SKOOT** crawler

To configure the Motorized Raster Arm with a **SKOOT** crawler, follow these steps:

CAUTION! Do **NOT** disconnect under load. Shut off power before connecting or disconnecting the. Permanent damage to electronics could occur.

1. Install the 1 Motorized Raster Arm on the 3 **SKOOT** crawler *(see "Motorized Raster Arm Installation" on page 26)*.
2. Connect the 2 raster arm cable to the 1 Motorized Raster Arm and the opposite end of the cable to the 3 **SKOOT** crawler.
3. Configure the 1 Motorized Raster Arm *(see "Motorized Raster Arm Configurations" on page 35)* to attach a particular probe holder.

5.2.1. Motorized Raster Arm Installation

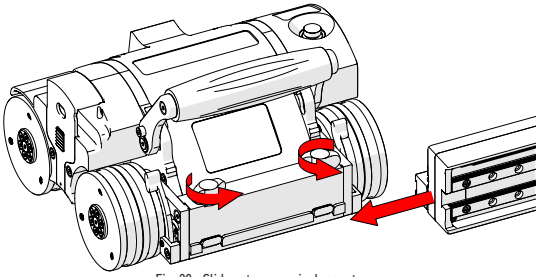


Fig. 39 - Slide onto one swivel mount

1. Loosen the two black wing knobs, and slide the raster arm's mounting rail onto the dovetail jaws of the crawler *(Fig. 39)*.

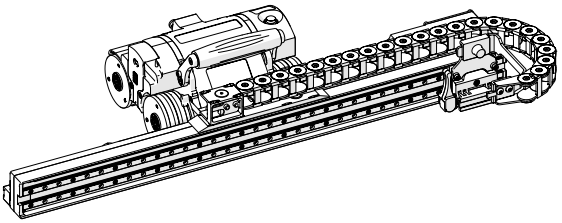


Fig. 40 - Properly mounted Motorized Raster Arm

2. Tighten the two black wing knobs to secure the raster arm *(Fig. 40)*.

5.2.2. Connect and Route Raster Arm Cable

CAUTION! DO NOT DISCONNECT UNDER LOAD. Shut off power before connecting or disconnecting the. Permanent damage to electronics could occur.

1. Plug the supplied raster arm cable into the raster arm's connector *(Fig. 41)*.
2. Press the raster arm cable into the cable bracket on the side of the raster arm encoder housing *(Fig. 42)*.

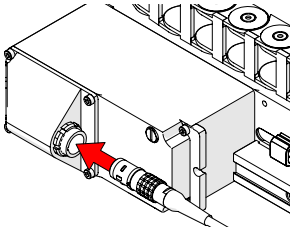


Fig. 41 - Plug raster arm cable into raster connector

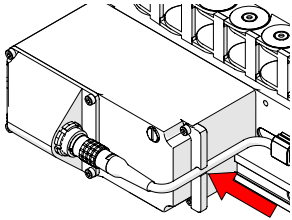


Fig. 42 - Press raster arm cable into able bracket

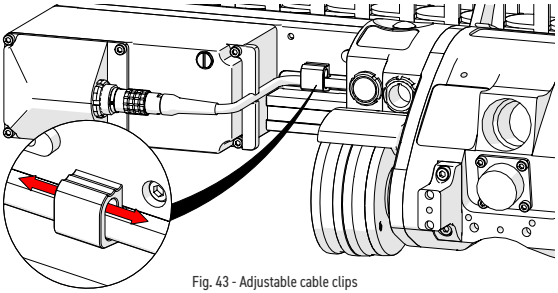


Fig. 43 - Adjustable cable clips

3. Route the cable through the adjustable clips on the raster arm *(Fig. 43)*. These clips slide along the raster arm, allowing the raster arm cable to be positioned as required.

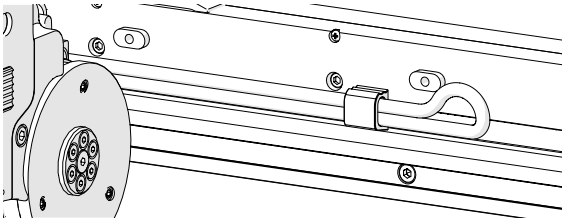


Fig. 44 - Route cable through the clip twice

4. The cable management can accommodate two cables to route excess cabling *(Fig. 44)*.

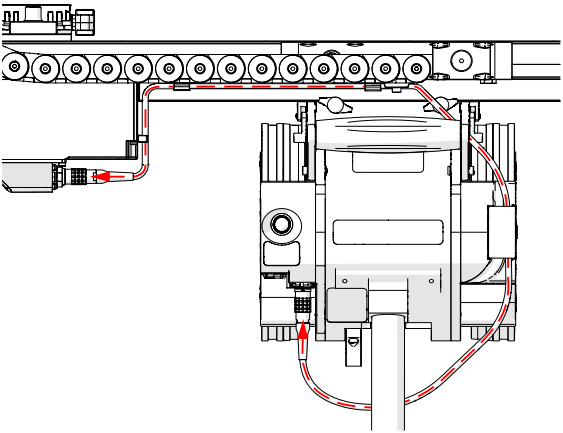


Fig. 45 - Raster arm cable routing

5. The opposite end of the raster arm cable is connected to the 8-pin port of the crawler *(Fig. 45)*.

5.3. MOTIX System Configuration

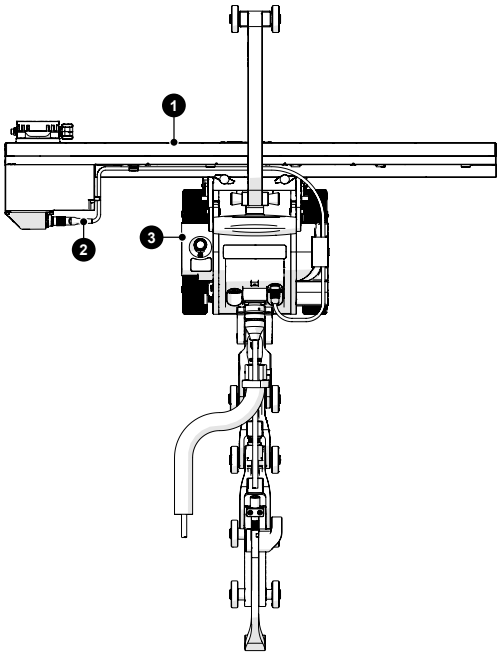


Fig. 46 - Standard MOTIX Motorized Raster Arm configuration

BOM ID	Description
1	Motorized Raster Arm
2	Raster arm cable
3	**MOTIX** crawler

To configure the Motorized Raster Arm with a **MOTIX** crawler, follow these steps:

1. Install the 1 Motorized Raster Arm on the 3 **MOTIX** crawler *(see "Motorized Raster Arm Installation" on page 32)*.

   > ***NOTE:*** *Removal of the cable tray is required. Reverse steps found in (see "Cable Tray" on page 39).*

2. Connect the 2 raster arm cable to the 1 Motorized Raster Arm and the opposite end of the cable to the 3 **MOTIX** crawler.
3. Configure the 1 Motorized Raster Arm *(see "Motorized Raster Arm Configurations" on page 35)* to attach a particular probe holder.

5.3.1. Motorized Raster Arm Installation

> ***NOTE:*** *The cable tray is not used with the **MOTIX** system.*

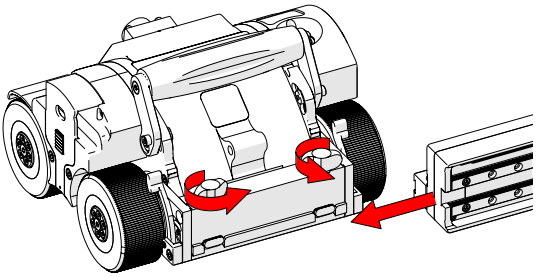


Fig. 47 - Slide onto one swivel mount

1. Loosen the two black wing knobs, and slide the raster arm's mounting rail onto the dovetail jaws of the crawler *(Fig. 47)*.

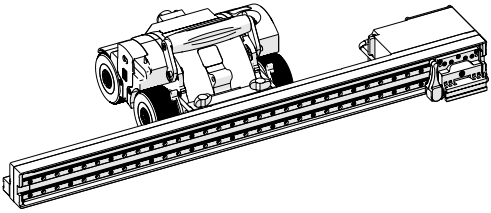


Fig. 48 - Properly mounted raster arm

2. Tighten the two black wing knobs to secure the raster arm *(Fig. 48)*.

5.3.2. Connect and Route Raster Arm Cable

CAUTION! DO NOT DISCONNECT UNDER LOAD. Shut off power before connecting or disconnecting the. Permanent damage to electronics could occur.

1. Plug the supplied raster arm cable into the raster arm's connector *(Fig. 49)*.
2. Press the raster arm cable into the cable bracket on the side of the raster arm encoder housing *(Fig. 50)*.
3. Route the cable through the adjustable clips on the raster arm *(Fig. 51)*. These clips slide along the raster arm, allowing the raster arm cable to be positioned as required.

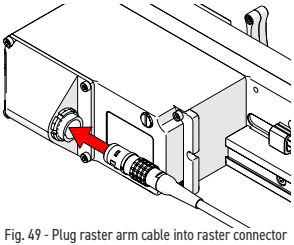


Fig. 49 - Plug raster arm cable into raster connector

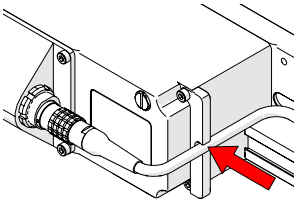


Fig. 50 - Press raster arm cable into cable bracket

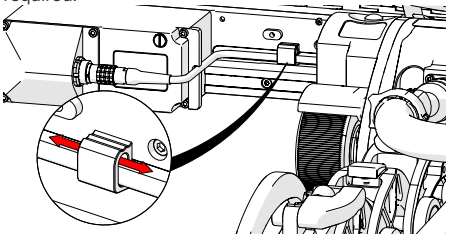


Fig. 51 - Adjustable cable clips

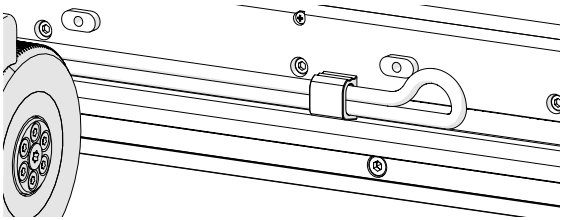


Fig. 52 - Route cable through the clip twice

4. The cable management can accommodate two cables to route excess cabling *(Fig. 52)*.

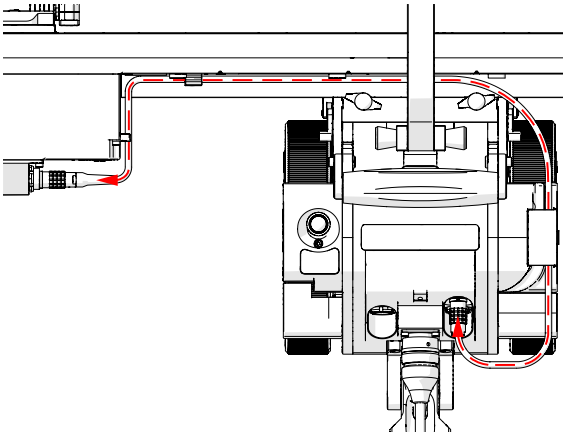


Fig. 53 - Raster arm cable routing

5. The opposite end of the raster arm cable is connected to the 8-pin port of the crawler *(Fig. 53)*.

5.4. Motorized Raster Arm Configurations

5.4.1. Corrosion Thickness Probe Holder

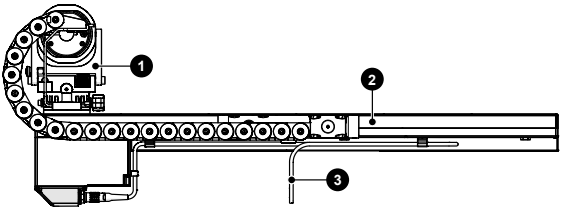


Fig. 54 - Standard Motorized Raster Arm configuration with corrosion thickness probe holder

BOM ID	Description
1	Corrosion thickness probe holder
2	Raster arm
3	Raster arm cable

To configure a Motorized Raster Arm with a corrosion thickness probe holder, follow these steps:

1. Install the 1 corrosion thickness probe holder on the 2 Motorized Raster Arm's pivot nose.
2. Setup and adjust the 1 corrosion thickness probe holder as per section *("Corrosion Thickness Probe Holder" on page 70).*

5.4.2. Heavy Duty Vertical Probe Holder

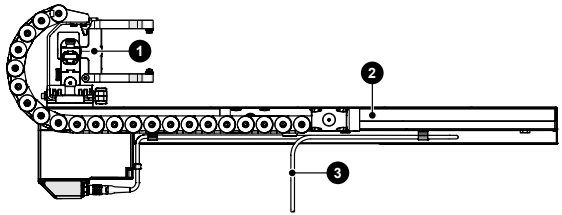


Fig. 55 - Standard Motorized Raster Arm configuration with heavy duty vertical probe holder

BOM ID	Description
1	Heavy duty vertical probe holder
2	Raster arm
3	Raster arm cable

To configure a Motorized Raster Arm with heavy duty vertical probe holder, follow these steps:

1. Install the 1 heavy duty vertical probe holder on the raster arm's pivot nose.
2. Setup and adjust the 1 heavy duty vertical probe holder as per section *("Heavy Duty Vertical Probe Holder" on page 62).*

5.4.3. HydroFORM Cart

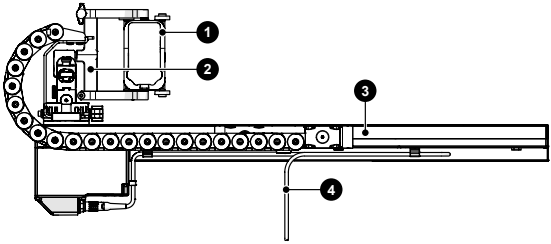


Fig. 56 - Standard Motorized Raster Arm with heavy duty vertical probe holder & HydroFORM cart

BOM ID	Description
1	HydroFORM cart
2	Heavy duty vertical probe holder
3	Raster arm
4	Raster arm cable

To configure a Motorized Raster Arm with heavy duty vertical probe holder and HydroFORM cart, follow these steps:

1. Install the 1 HydroFORM cart in the 2 heavy duty vertical probe holder.
2. Install the 2 heavy duty vertical probe holder on the 3 Motorized Raster Arm's pivot nose.
3. Setup and adjust the 1 HydroFORM cart as per section *("Heavy Duty Vertical Probe Holder" on page 62)*

5.4.4. Dual Probe Holder

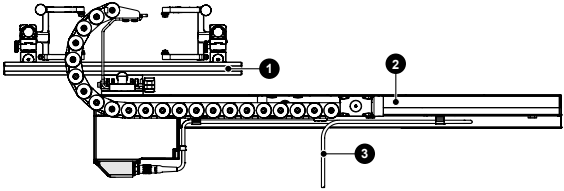


Fig. 57 - Standard Motorized Raster Arm configuration with dual probe holder

BOM ID	Description
1	Frame bar with vertical probe holders
2	Raster arm
3	Raster arm cable

To configure a Motorized Raster Arm with dual probe holders, follow these steps:

1. Install the 1 frame bar and vertical probe holders on the 2 Motorized Raster Arm's pivot nose.
2. Setup and adjust the 1 dual probe holder as per section *("Dual Probe Holder" on page 74)*.

5.5. Cable Tray

WARNING! MAGNETIC MATERIAL. The magnetic base of the Raster arm Cable tray contains magnetic material. People with pacemakers or ICD's must stay at least 10 cm *(4 in)* away.

5.5.1. Cable Tray Installation

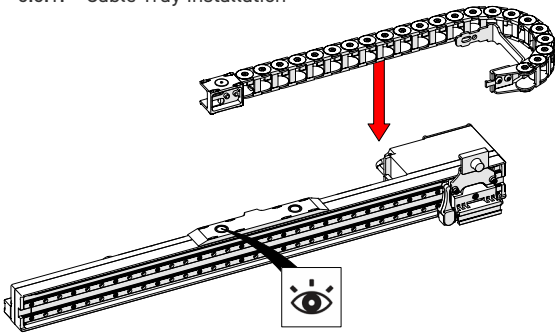


Fig. 58 - Attaching the cable tray

> ***TIP:*** *The cable tray can be flipped over and reversed to switch which side of the raster arm the cable tray protrudes.*

> ***NOTE:*** *The cable tray is not used with the MOTIX system.*

1. Attach the cable tray's magnetic end to the magnetic base on the raster arm. Ensure the four nubs are aligned with divots on the magnetic end *(Fig. 58)*.

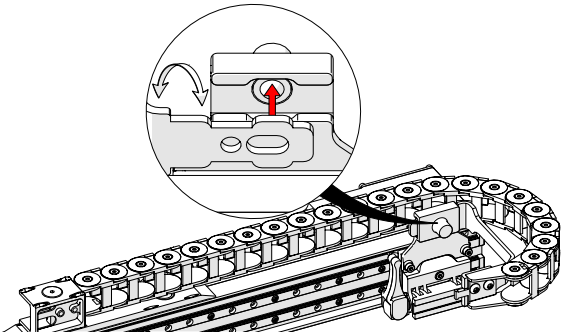


Fig. 59 - Press bracket to carriage

2. Press the cable tray bracket into the rear of the carriage bracket *(Fig. 59)*.

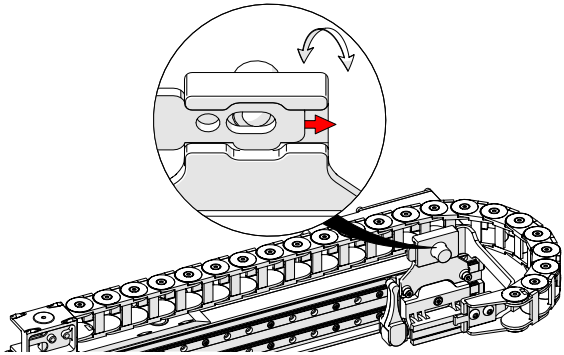


Fig. 60 - Slide bracket attaching to carriage

3. Slide the cable tray bracket until it locks in place *(Fig. 60)*.

5.5.2. Cable Tray Use

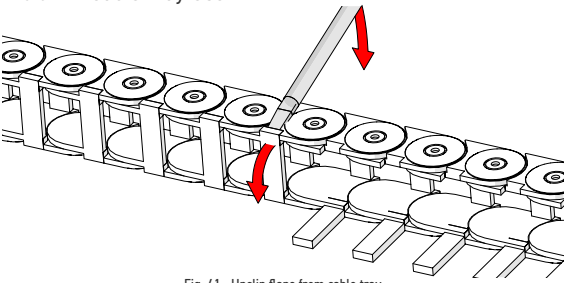


Fig. 61 - Unclip flaps from cable tray

1. Using the supplied 3 mm flat driver *(Fig. 26)*, unclip the flaps of the cable tray *(Fig. 61)*.

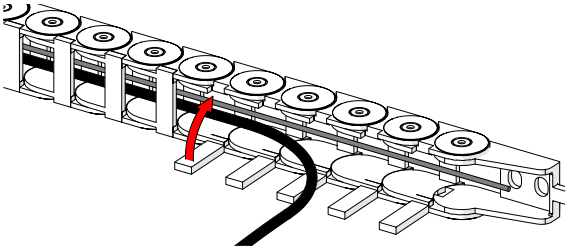


Fig. 62 - Route cabling and close flaps

2. Route all hoses and cables into the cable tray. Clip the flaps to trap the cables in the cable tray *(Fig. 62)*.

> ***TIP:*** *Cable routing can be made more convenient. Removal of several flaps every few inches can ease the cable routing process.*

5.6. Probe Holders

5.6.1. Vertical Probe Holder

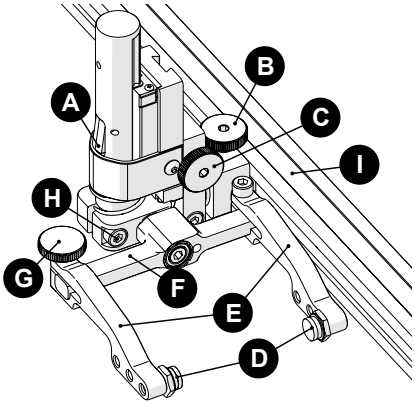


Fig. 63 - Vertical probe holder

A	Latch
B	Probe Holder Adjustment Knob
C	Vertical Adjustment Knob
D	Pivot Buttons
E	Probe Holder Arms
F	Yoke
G	Probe Holder Arm Adjustment Knob
H	Transverse Adjustment Screw
I	Frame Bar

5.6.1.1 Probe Holder Setup

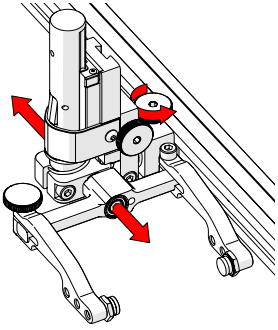


Fig. 64 - Adjust on frame bar

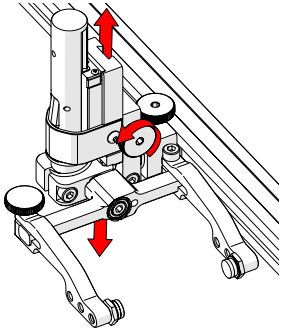


Fig. 65 - Vertical adjustment

1. The probe holder adjustment knob allows the probe holder to be attached to a frame bar, as well as horizontal positioning on a frame bar *(Fig. 64)*.
2. The vertical adjustment knob allows the vertical probe holder height adjustment *(Fig. 65)*.

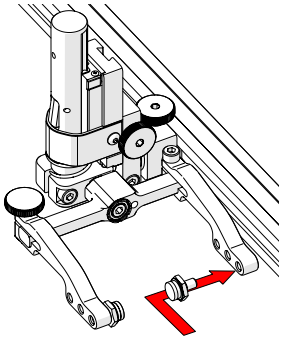


Fig. 66 - Place buttons

3. Position the pivot buttons where necessary. When a narrow scanning footprint is required, use the pivot button holes closest to the yoke *(Fig. 66)*.

> ***TIP:*** *Probe pivoting may be impeded when closer to the yoke.*

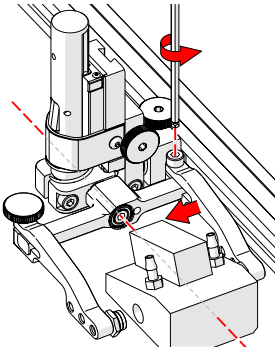


Fig. 67 - Adjust inner arm

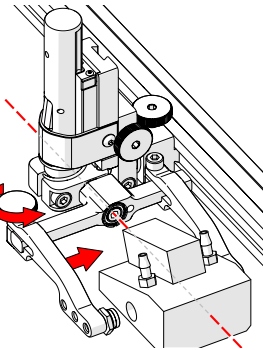


Fig. 68 - Adjust outer arm

4. Position the wedge on the inner probe holder arm *(Fig. 67)*.

> ***TIP:*** *The probe holder yoke can accommodate many different probe and wedge sizes of varying widths. It is best to centre the wedge with the yoke's pivot axis. This can reduce wedge 'rocking' when scanning. Position the inner probe holder arm accordingly (Fig. 67) using the supplied 3 mm hex driver (Fig. 24).*

5. Loosen the probe holder arm adjustment knob *(Fig. 68)* and slide the probe holder arm along the yoke pinching the wedge in place.

6. Tighten the probe holder arm adjustment knob *(Fig. 69)*.

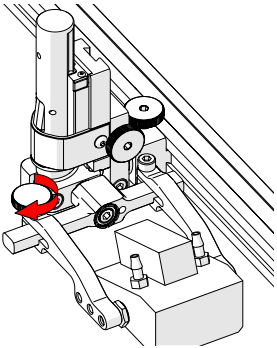


Fig. 69 - Tighten arm knob

5.6.1.2 Probe Holder Vertical Adjustment

To adjust the probe holder vertically, follow these steps:

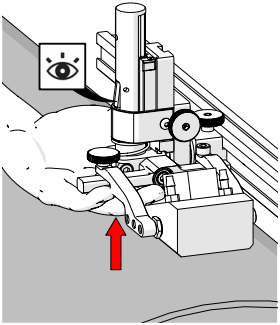


Fig. 70 - Latch probe holder

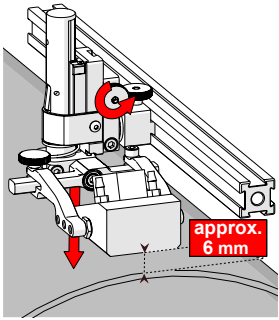


Fig. 71 - Lower toward scan surface

1. Ensure the probe holder is in the latched, upper position. Lift the probe holder until the latch is fully exposed and snaps out to lock *(Fig. 70)*.
2. Loosen the vertical adjustment knob and slide the probe holder down until the wedge is approximately 6 mm *(¼ in)* above inspection surface.
3. Tighten the vertical adjustment knob *(Fig. 71)*.

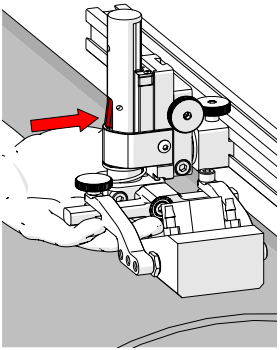


Fig. 72 - Press latch button

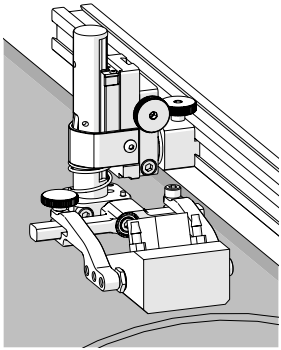


Fig. 73 - Lower toward scan surface

4. Lift the yoke slightly and press the latch button *(Fig. 72)*, then slowly lower towards scanning the surface to apply spring pressure to the wedge *(Fig. 73)*.

> ***TIP:*** *If less spring force is desired, refer to step 2 and place the wedge approximately 20 mm (¾ in) above the inspection surface.*

5.6.1.3 Probe Holder Transverse Adjustment

To adjust the probe holder's transverse angle, follow these steps:

1. Ensure the probe holder is in latched, upper position *(Fig. 70)*.

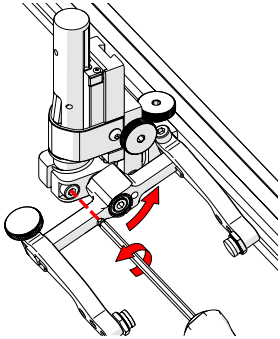


Fig. 74 - Loosen 3 mm screw

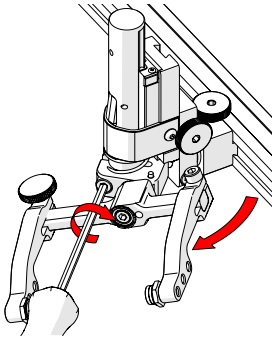


Fig. 75 - Rotate and tighten

2. Using the supplied 3 mm hex driver loosen the transverse adjustment screw *(Fig. 74)* and rotate the yoke about the vertical shaft achieving the desired angle.
3. Tighten the transverse adjustment screw *(Fig. 75)*.

To return the transverse adjustment to neutral *(90°)*. The probe holder must be in the latched, upper position *(Fig. 70)*. Rotate the yoke until the stop post contacts the base of the probe holder *(Fig. 76)*. Then tighten the transverse adjustment screw.

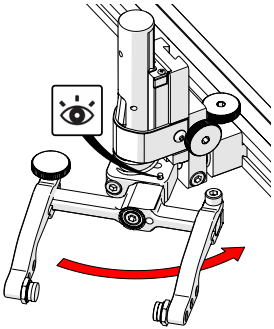


Fig. 76 - Stop post locates 90°

5.6.1.4 Probe Holder Longitudinal Adjustment

To adjust the probe holder's vertical angle for longitudinal scanning, follow these steps:

1. Ensure the probe holder is in the latched, upper position *(Fig. 70)*.

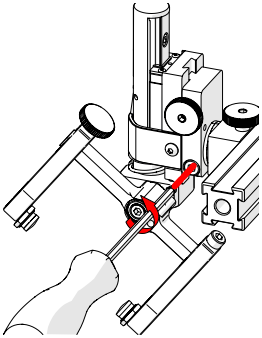


Fig. 77 - Loosen 3 mm screw

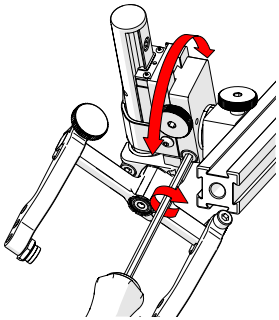


Fig. 78 - Rotate to position

2. Using the supplied 3 mm hex driver *(Fig. 24)*, loosen the longitudinal adjustment screw *(Fig. 77)*.
3. Rotate the main body of the probe holder until it is at the desired angle *(Fig. 78)*.

4. Tighten the longitudinal adjustment screw *(Fig. 78)*.

To return the longitudinal adjustment to neutral *(90°)*. Line up the longitudinal adjustment indicator markers *(Fig. 79)*.

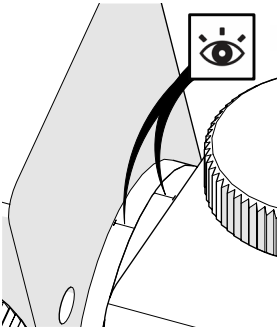


Fig. 79 - Line up markers

5.6.1.5 Probe Holder Left/Right Conversion

To reverse the probe holder, follow these steps:

> ***NOTE:*** *The 1.5 mm hex wrench (Fig. 27) is required to perform this operation.*

1. Ensure the probe holder is in the latched, upper position *(Fig. 70)*.

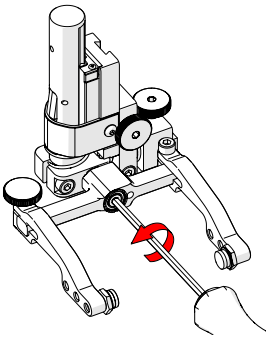


Fig. 80 - Unscrew yoke pivot screw

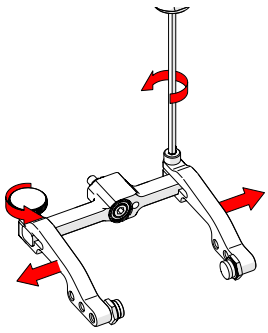


Fig. 81 - Remove probe holder arms

2. Using the supplied 3 mm hex driver *(Fig. 24)*, unscrew the yoke pivot screw and remove the yoke *(Fig. 80)*.

3. Loosen the probe holder arm adjustment knob and the arm clamp screw. Slide the probe holder arms off the yoke *(Fig. 81)*.

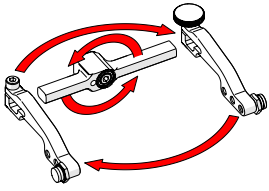


Fig. 82 - Flip yoke and reverse arms

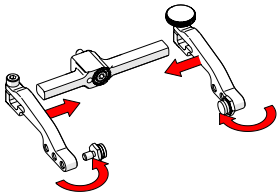


Fig. 83 - Attach arms & move buttons

4. Flip the yoke 180° and reverse the probe holder arms *(Fig. 82)*.

5. Place the pivot buttons on the inside of the probe holder arms *(Fig. 83)* using a 3/8 in wrench *(Fig. 25)*.

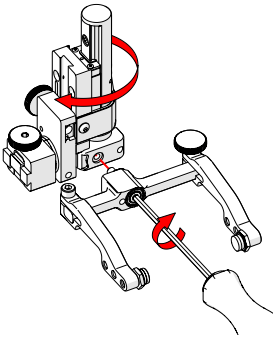


Fig. 84 - Screw yoke to opposite side

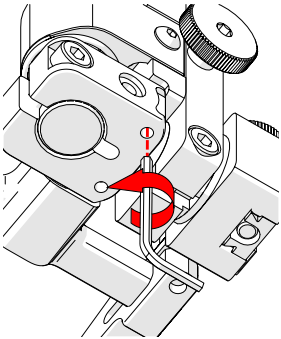


Fig. 85 - Lower 90° stop post

6. Mount the yoke to the opposite side of the base using the supplied 3 mm hex driver *(Fig. 84)*.

> ***TIP:*** *Keep the yoke level with the base to ensure no conflicts with the plunger/set screw attached to the yoke.*

7. Locate the recessed M3 screw *(stop post)* on the bottom of the probe holder. Unscrew the stop post using a 1.5 mm hex wrench until it has cleared all obstructions. Do not remove the stop post *(Fig. 85)*.

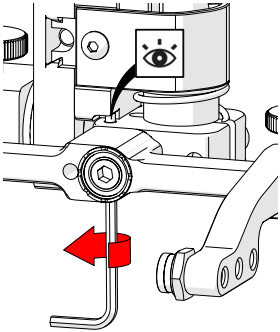


Fig. 86 - Raise opposite 90° stop post

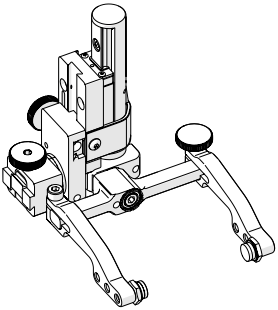


Fig. 87 - Reversed probe holder

8. Raise the stop post on the opposite side until the side of the post contacts the 90° stop point on the probe holder's base *(Fig. 86)*.

5.6.2. Slip Joint Probe Holder

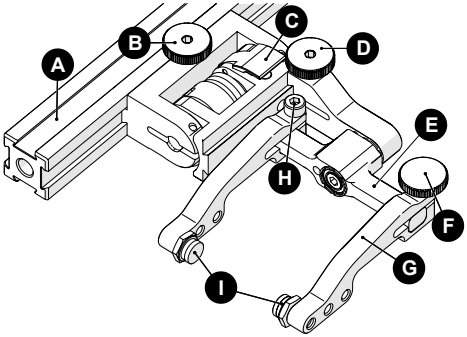


Fig. 88 - Slip Joint Probe Holder

A	Frame Bar
B	Probe Holder Adjustment Knob
C	Latch
D	Swing Arm Knob
E	Yoke
F	Probe Holder Arm Adjustment Knob
G	Probe Holder Arm
H	Arm Clamp Screw
I	Pivot Buttons

5.6.2.1 Probe Holder Setup

To mount a UT wedge in the probe holder, follow these steps:

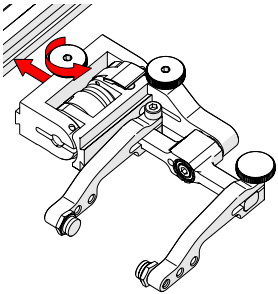


Fig. 89 - Attach to frame bar

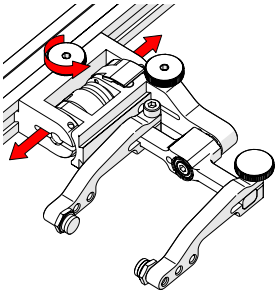


Fig. 90 - Adjust on frame bar

1. Rotate the probe holder adjustment knob and attach the probe holder to a frame bar *(Fig. 89)*.
2. Use the probe holder adjustment knob to position the probe holder along the frame bar *(Fig. 90)*.

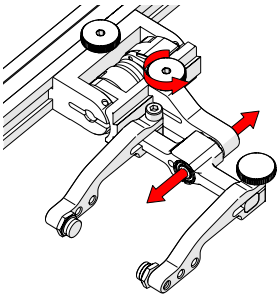


Fig. 91 - Adjust swing arm

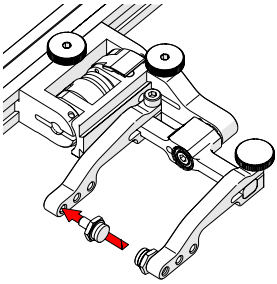


Fig. 92 - Place pivot buttons

3. Use the swing arm knob to position the swing arm *(Fig. 91)*.

> ***TIP:*** *The swing arm is typically used to adjust TOFD center to center distance relative to the phased array probes on a four probe configuration.*

4. Using the supplied 3/8 in wrench, place the pivot buttons *(Fig. 92)* farthest from the yoke for maximum wedge clearance.

> ***TIP:*** *If narrow scanning footprint is required, use pivot button holes closest to the yoke. Wedge pivoting may be impeded when closer to the yoke.*

5. Loosen the probe holder arm adjustment knob *(Fig. 93)* and remove the outer probe holder arm from yoke.

6. Adjust the inner probe holder arm as required to best centre the probe on the yoke's pivot axis *(Fig. 93)*.

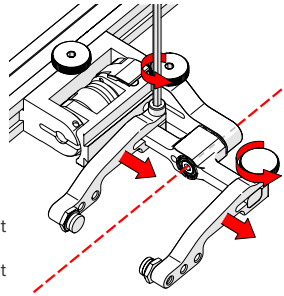


Fig. 93 - Adjust probe holder arms

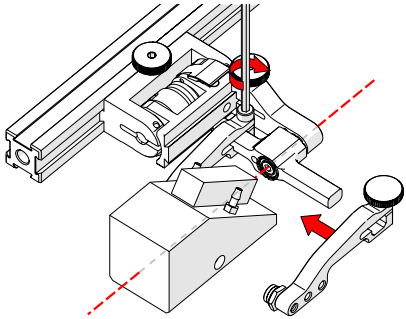


Fig. 94 - Place wedge

TIP: *The probe holder yoke can accommodate many different probe and wedge sizes of varying widths. It is best to centre the wedge with the yoke's pivot axis to reduce wedge tipping when scanning. Position the inner probe holder arm accordingly with the centre of the yoke (Fig. 93).*

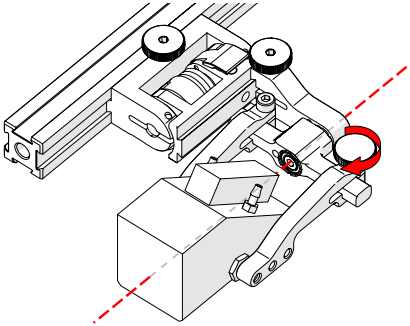


Fig. 95 - Pinch wedge with arm

7. Position the wedge on the inner probe holder arm *(Fig. 94)*.
8. Slide the outer probe holder arm along the yoke pinching the wedge in place.
9. Tighten the probe holder arm adjustment knob *(Fig. 95)*.

5.6.2.2 Probe Holder Adjustment

To adjust the probe holder, follow these steps:

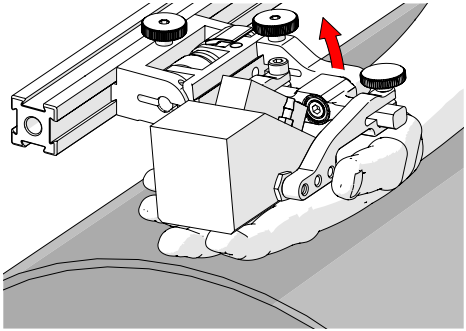


Fig. 96 - Lift to latched position

1. Ensure probe holder is in the latched, upper position *(Fig. 96)*. If the probe holder is already latched, it will only move within the slip joint adjustment range and have no spring tension.

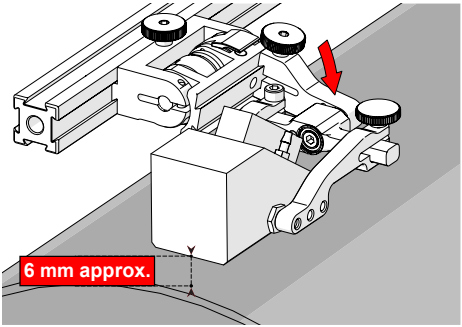


Fig. 97 - Lower to scanning surface

2. Push the probe holder yoke toward the inspection surface until the wedge is approximately 6 mm *(¼ in)* from the inspection surface *(Fig. 97)*.

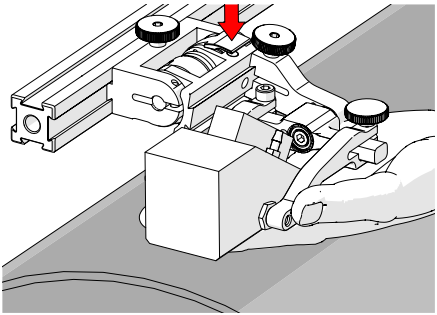


Fig. 98 - Lift and press latch button

3. Lift the probe slightly and press the latch button *(Fig. 98)* to apply spring pressure to the wedge.

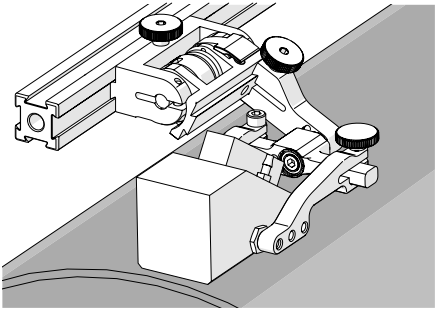


Fig. 99 - Spring loaded scan position

4. Gently lower probe holder and wedge to the scanning surface *(Fig. 99)*.

5.6.2.3 Probe Holder Force Adjustment

It is possible to adjust the tension of the probe holder spring.

> ***NOTE:*** *To perform this operation, the 2 mm hex wrench (Fig. 28) and 3 mm hex wrench (Fig. 29) are required.*

Light	1 kg	2 lb
Medium	2 kg	4 lb
Heavy	3 kg	6 lb

When configured correctly, these settings exert the indicated spring force on the probe.

To adjust the probe holder's force, follow these steps:

> ***NOTE:*** *Do not perform this operation on the scanning surface.*

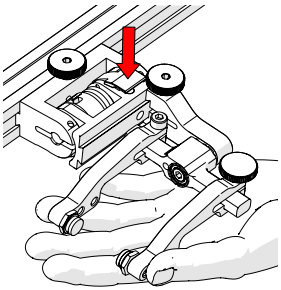


Fig. 100 - Lift slightly and press latch

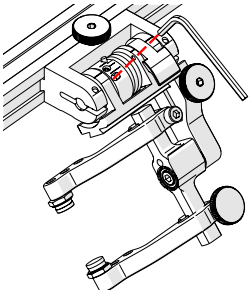


Fig. 101 - Unlatched position

1. Ensure the probe holder is in the upright latched position *(Fig. 96)*.
2. Lift the probe holder slightly and press the latch button *(Fig. 100)* to release the probe holder the full 45° degrees.
3. Insert the short arm of a 3 mm hex wrench into the 3 mm slot *(Fig. 101)*.

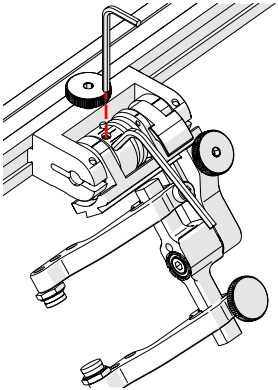


Fig. 102 - Insert hex tools

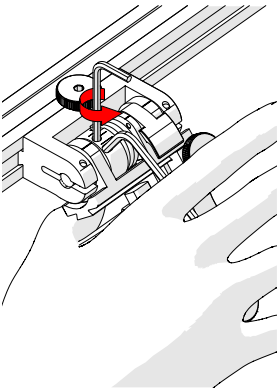


Fig. 103 - Press 3 mm hex wrench down

4. Place the 2 mm hex wrench into the force adjustment screw *(Fig. 102)*.

5. Lightly press the long arm of the 3 mm hex wrench down. Using the 2 mm hex wrench, loosen the force adjustment screw but do not remove it *(Fig. 103)*.

6. Gently apply pressure on the long leg of the 3 mm hex wrench until the force adjustment marker lines up with the desired spring tension. While keeping the markers in line, tighten the force adjustment screw *(Fig. 104)*.

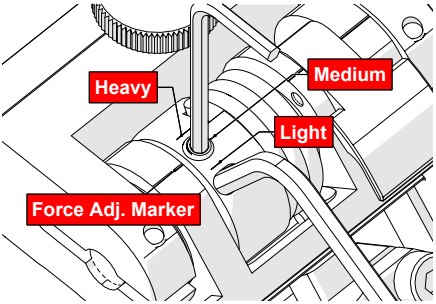


Fig. 104 - Choose desired tension

5.6.2.4 Slip Joint Probe Holder Left/Right Conversion

To reverse the probe holder, follow these steps:

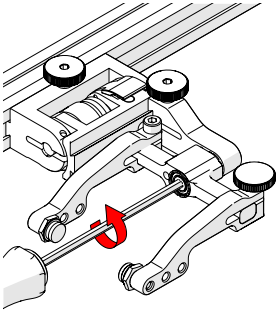


Fig. 105 - Unscrew yoke pivot screw

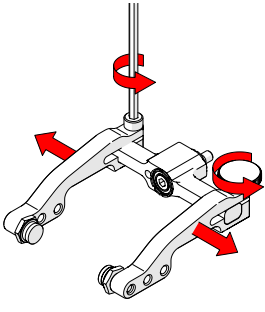


Fig. 106 - Remove arms

1. Unscrew the yoke from the swing arm *(Fig. 105)*.
2. Loosen the probe holder arm adjustment knob and arm clamp screw. Slide the arms from the yoke *(Fig. 106)*.

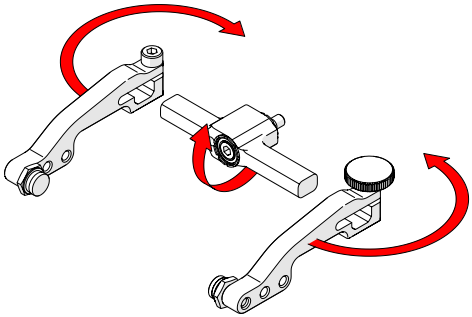


Fig. 107 - Flip yoke and reverse arms

3. Flip the yoke 180° and reverse the probe holder arms *(Fig. 107)*.

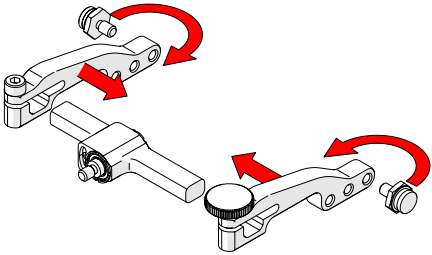


Fig. 108 - Attach arms and move buttons

4. Place the pivot buttons on the inside of the probe holder arms *(Fig. 108)* using a 3/8 in wrench *(Fig. 25)*. Slide the arms onto the yoke and tighten the probe holder arm adjustment knob and the arm clamp screw.

5. Loosen the swing arm knob and slide the swing arm to the opposite end of the probe holder bracket *(Fig. 109)* or preferred position. Tighten the swing arm knob.

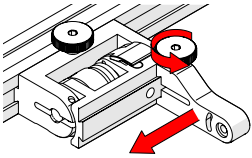


Fig. 109 - Position swing arm

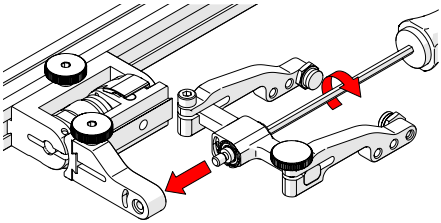


Fig. 110 - Install yoke to swing arm

6. Using the 3 mm hex driver, screw the yoke pivot screw into the opposite side of the probe holder swing arm *(Fig. 110)*. Ensure the yoke is level to avoid issues with the plunger/set screw.

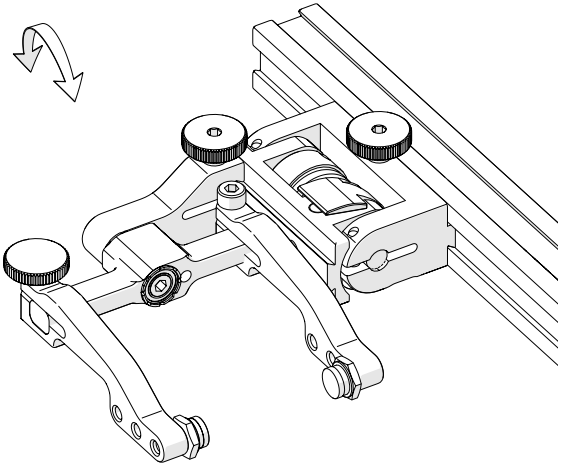


Fig. 111 - Reversed probe holder

5.6.3. Heavy Duty Vertical Probe Holder

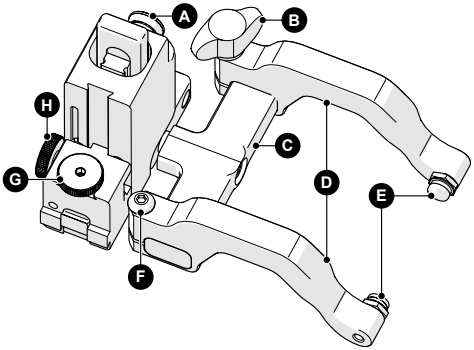


Fig. 112 - Heavy duty vertical probe holder

A	Latch
B	Probe Holder Arm Adjustment Knob
C	Yoke
D	Probe Holder Arms
E	Pivot Buttons
F	Arm Clamp Screw
G	Probe Holder Adjustment Knob
H	Vertical Adjustment Knob

5.6.3.1 Probe Holder Setup

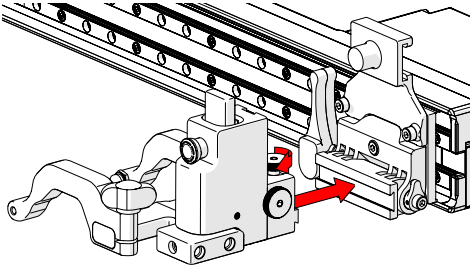


Fig. 113 - Mount probe holder to carrier

1. Loosen the probe holder adjustment knob *(Fig. 113)* and mount the heavy duty vertical probe holder's dovetail jaw to the raster arm pivot nose.

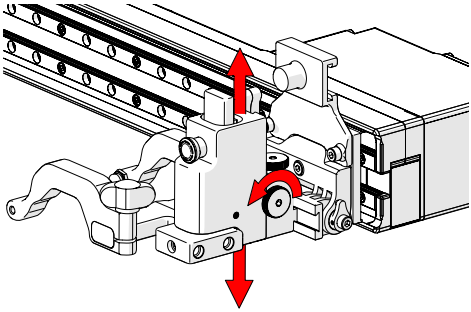


Fig. 114 - Vertical adjustment

2. The vertical adjustment knob *(Fig. 114)* allows the heavy duty vertical probe holder's height adjustment. This adjustment also controls the probe holder's spring tension.

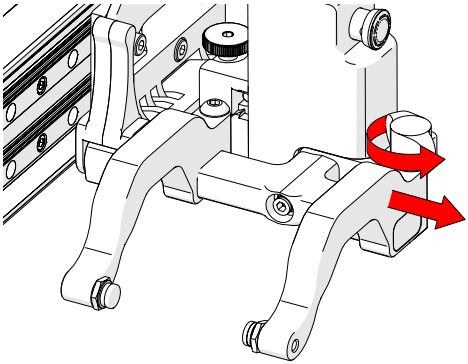


Fig. 115 - Remove outer arm

3. Loosen the probe holder arm adjustment knob and remove the outer probe holder arm *(Fig. 115)*.

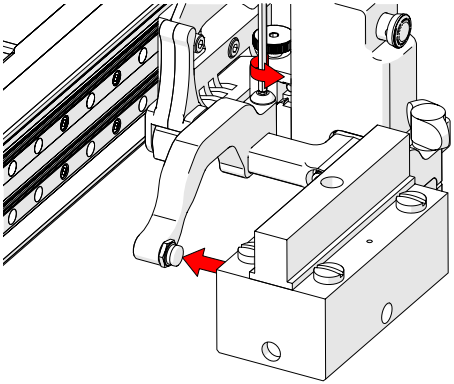


Fig. 116 - Adjust inner arm

4. Loosen the arm clamp screw *(Fig. 116)*.

5. Place the wedge on the pivot button of the inner probe holder arm *(Fig. 116)*.

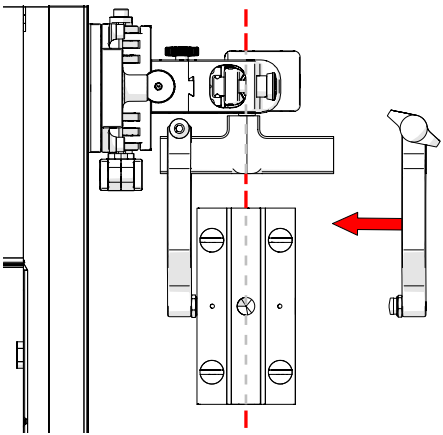


Fig. 117 - Align probe with yoke

6. Align the middle of the wedge with the centre of the yoke *(Fig. 117)*.

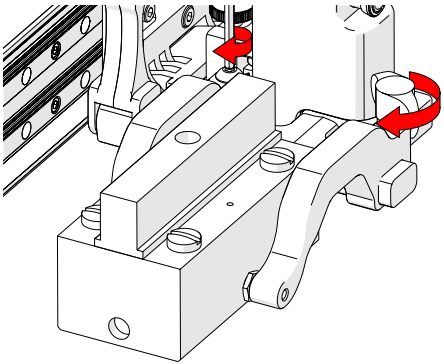


Fig. 118 - Tighten knob and screw

7. Tighten both the probe holder arm adjustment knob and the arm clamp screw *(Fig. 118)* while ensuring the wedge remains centred with the yoke.

5.6.3.2 Probe Holder Vertical Adjustment

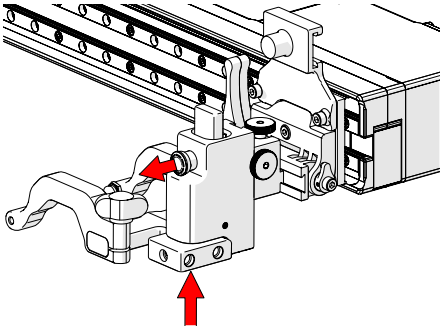


Fig. 119 - Press up and pull latch

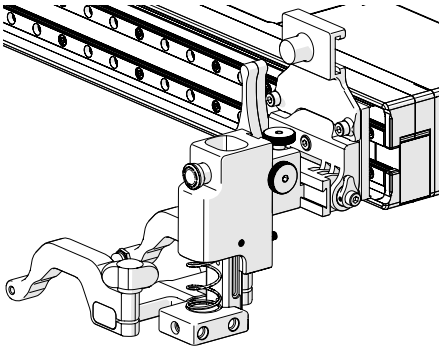


Fig. 120 - Lowered toward scan surface

1. Gently lift the heavy duty vertical probe holder and simultaneously pull the latch *(Fig. 119)*. This action will unlock the probe holder. Slowly lower the probe holder towards the scan surface *(Fig. 120)*.

5.6.3.3 Probe Holder Left/Right Conversion

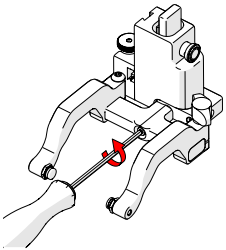


Fig. 121 - Remove yoke

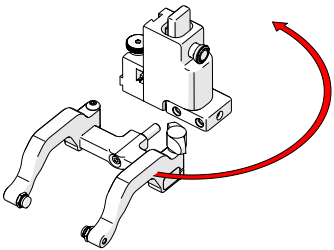


Fig. 122 - Orient to opposite side

1. Using the supplied 3 mm driver, unscrew the yoke *(Fig. 121)*.
2. Position the yoke and arms to the opposite side of the probe holder *(Fig. 122)*.
3. Loosen the arm clamp screw and probe holder arm adjustment knob allowing removal of the probe holder arms *(Fig. 123)*.

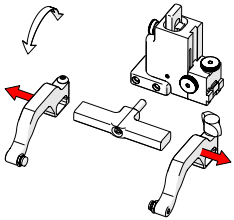


Fig. 123 - Remove probe holder arms

4. Position removed arms to opposite sides of the yoke *(Fig. 124)*.

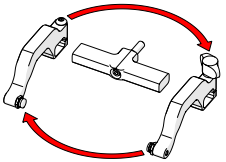


Fig. 124 - Reverse position around yoke

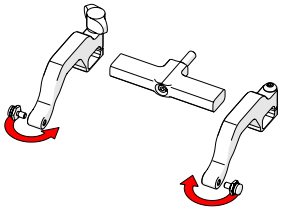


Fig. 125 - Position pivot buttons

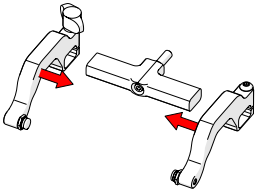


Fig. 126 - Place arms back onto yoke

5. Position the pivot buttons to the inside of the probe holder arms *(Fig. 125)*.

6. Place the probe holder arms on the yoke and tighten the arm clamp screw and probe holder adjustment knob *(Fig. 126)*.

7. Screw the yoke to the probe holder *(Fig. 127)*.

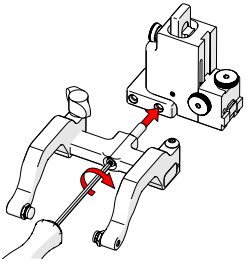


Fig. 127 - Screw into threaded hole

> ***TIP:*** *When using a standard yoke length, position the yoke in the threaded hole closest to the frame bar. When using a wide yoke length, position the yoke in the threaded hole furthest from the frame bar.*

5.6.3.4 Probe Holder 90° Adjustment

1. Remove the yoke using the supplied 3 mm hex driver *(Fig. 24)*.
2. Orient the yoke to the front of the probe holder and screw the yoke into the threaded hole provided *(Fig. 128)*.

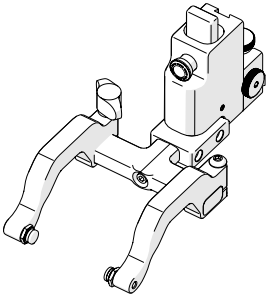


Fig. 128 - 90° probe holder positioning

5.6.4. Corrosion Thickness Probe Holder

DANGER! FALLING OBJECT HAZARD. It is imperative that the steps below be followed to properly set the latched height of the probe holders. If the height of the probe holders is set too low, the crawler may fall and **SEVERE INJURY** or **DEATH** could result.

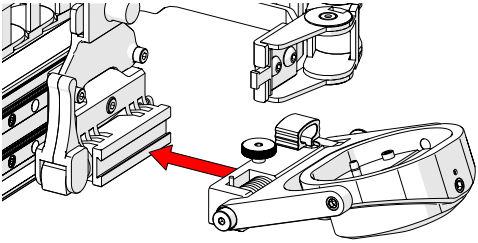


Fig. 129 - Attached to dovetail jaw

1. Align the dovetail jaw of the corrosion thickness probe holder *(Fig. 129)* and the pivot mount of the raster arm.

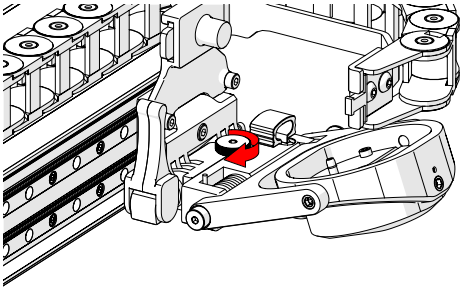


Fig. 130 - Tighten knob

2. Tighten the probe holder adjustment knob *(Fig. 130)*.

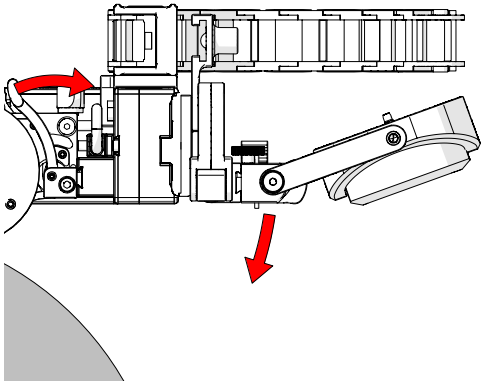


Fig. 131 - Pivot raster arm

3. Release the two levers on the swivel mount to allow pivoting of the raster arm *(Fig. 131)*.

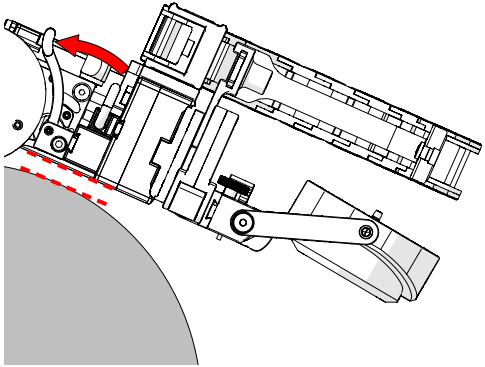


Fig. 132 - Parallel with scan surface

4. Align the raster arm parallel with the tangent of the scan surface *(Fig. 132)*.
5. Engage the swivel mount levers to hold the position of the raster arm *(Fig. 132)*.

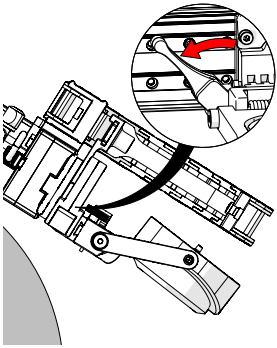


Fig. 133 - Adjust raster arm pivot nose

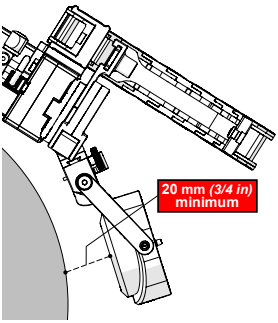


Fig. 134 - Raster arm pivot nose

6. Release the raster arm pivot nose lever *(Fig. 133)*.
7. Lower the probe holder to a minimum of 20 mm *(¾ in)* above the scan surface *(Fig. 134)*, and lock the raster arm pivot nose at this position.

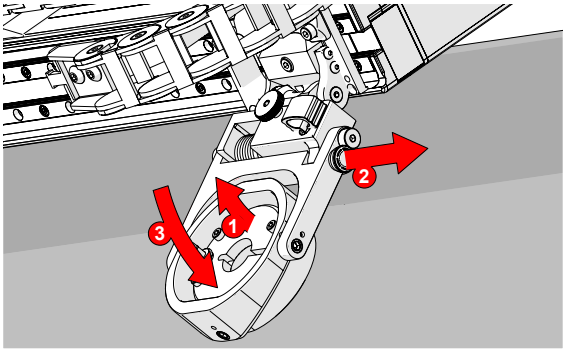


Fig. 135 - Pull probe holder latch to release corrosion thickness probe holder

8. Gently 1 lift the probe holder *(Fig. 135)*.
9. 2 Pull the probe holder latch *(Fig. 135)*.
10. 3 Lower the probe holder gently to the scan surface *(Fig. 135)*.

5.6.4.1 Probe Installation

1. Angle the corrosion thickness probe holder receptacle and loosen the receptacle screw with a 2.5 mm hex driver *(Fig. 136)*.

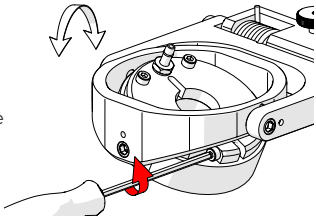


Fig. 136 - Losen screw

2. Insert the probe into the receptacle to the appropriate depth *(Fig. 137)*.

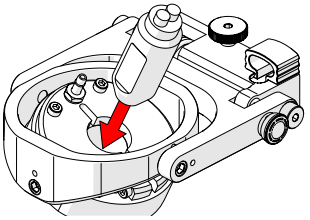


Fig. 137 - Insert probe

3. Tighten the receptacle screw to hold the probe in place *(Fig. 138)*.

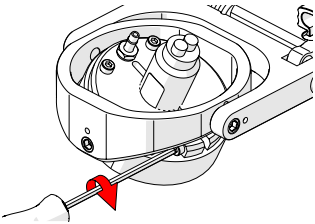


Fig. 138 - Tighten screw

5.6.5. Dual Probe Holder

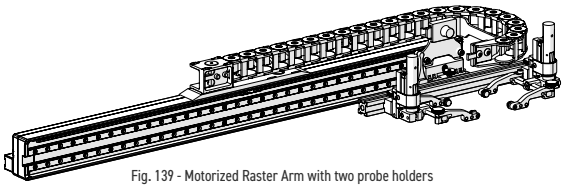


Fig. 139 - Motorized Raster Arm with two probe holders

To mount two probe holders to the Motorized Raster Arm, follow these steps:

> ***NOTE:*** *Do not mount more than two probe holders to the front of the Motorized Raster Arm.*

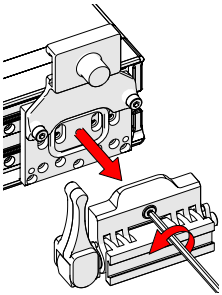


Fig. 140 - Remove pivot nose

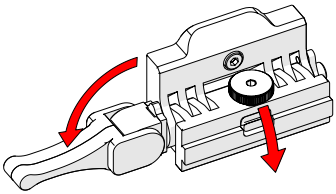


Fig. 141 - Angle pivot nose down

1. Remove the cable tray by reversing the steps found in *(see "Cable Tray" on page 39)*.
2. Using the supplied 3 mm hex driver, remove the raster arm pivot nose *(female)* from the raster arm *(Fig. 140)*.
3. Release the side lever of the raster arm pivot nose *(male)* and angle the raster arm pivot nose downward *(Fig. 141)*.

4. Mount the *(male)* pivot nose *(sold separately)* to the raster arm *(Fig. 142)*.

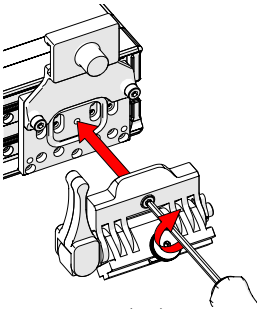


Fig. 142 - Install (male) pivot nose

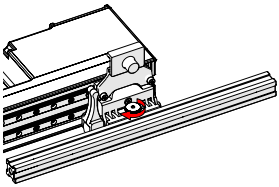


Fig. 143 - Mount frame bar

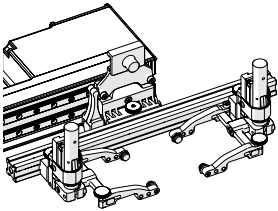


Fig. 144 - Mount probe holders

5. Mount a frame bar to the raster arm pivot nose *(Fig. 143)*.
6. Follow the steps *(see "Vertical Probe Holder" on page 16)* to mount and set up the vertical probe holders *(Fig. 144)*.

OPERATION

Refer to the **NAVIC** user manual for preparation, use and operation of the **NAVIC**. Powering up the **NAVIC** system with the Motorized Raster Arm connected will activate the Motorized Raster arm and various Motorized Raster arm control screens described below.

Refer to the **SKOOT** user manual for preparation, use and operation of the **SKOOT**. Powering up the **SKOOT** system with the Motorized Raster Arm connected will activate the Motorized Raster Arm and various Motorized Raster Arm control screens described below.

Refer to the **MOTIX** user manual for preparation, use and operation of the **MOTIX**. Powering up the **MOTIX** system with the Motorized Raster Arm connected will activate the Motorized Raster Arm and various Motorized Raster Arm control screens described below.

6.1. System Startup

Fig. 145 - Raster homing warning

When a raster arm is detected, a warning will appear *(Fig. 145),* indicating the carriage must move to the home position. Ensure the raster arm and carriage are free of interference. If an obstruction is present, touch **Disable**. The raster arm will be disabled until the system is restarted.

While the raster arm performs the homing procedure, the **Homing Raster** screen will be displayed.

6.2. Jog and Latched Jog Mode

When a raster arm is connected, additional controls are added to the Jog and Latched Jog Modes *(Fig. 146)*.

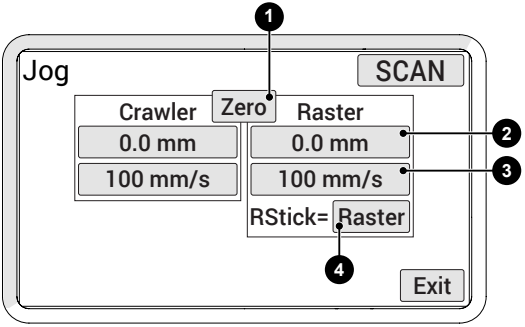


Fig. 146 - Button identification

1	Zero Button	Sets the current position to zero for all modules.
2	Raster Position Button	Displays the current position of the raster arm. Press to set the position to any value using the **Edit** screen. When the position is modified, the position will be modified for all other system modes.

> ***NOTE:*** *This function only zeroes the number displayed on the handheld controller. It does not zero the position used in the data acquisition instrument.*

3	Raster Rate Button	Displays the current maximum rate for the selected speed mode. Press to set the maximum rate using the **Edit** screen. The movement commanded by the joysticks will be limited to the indicated rate. When a rate is modified, the rate will be modified for all other system modes.
4	Raster/Steer Button *(only available with NAVIC)*	Indicates and selects the function of the right joystick. The right joystick controls either the raster arm position or crawler steering. ► When steer is selected, the right joystick steers the crawler when moving forward or reverse. ► When raster is selected, the right joystick controls the raster arm movement. The system automatically limits movement to the mechanical end limits of the raster arm.

6.3. 2 Axis Scan Mode

The 2 axis scan mode is enabled when a Motorized Raster Arm is connected.

6.3.1. 2 Axis Scan Setup Screen

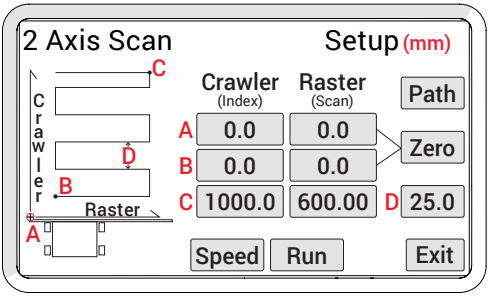


Fig. 147 - 2 axis scan setup

The **2 Axis Scan Setup** screen is used to program the desired scan pattern the system will use *(Fig. 147)*.

> ***NOTE:*** *The "Index" label corresponds to the axis that will move the short distance "D" between "Scan" moves. The "Scan" label corresponds to the axis that will do the longer moves of the scan. These labels will swap when the path direction is toggled.*

Each point and setting, **A, B, C, D,** corresponds to a coordinate entry button on the right side of the screen.

Point **A**	The current position of the Crawler and Raster axis.
Point **B**	The start point of the scan grid. The system will move the Crawler and Raster axis from the A point to this point at the start of a scan.
Point **C**	The finish point of the scan grid.

Setting D	The distance the system will advance (index) after each sweep.

A typical operation begins at the **A** position and moves to the **B** position. Scanning begins at the **B** position and scans using the increment distance **D** until the **C** position is reached.

> ***NOTE:*** *For maximum motion flexibility, negative values are allowed when setting the current or target positions of a motion axis. For an axis that has mechanical constraints, such as a Raster Arm, setting the current position also shifts the limits for the minimum and maximum allowable target positions for the axis.*

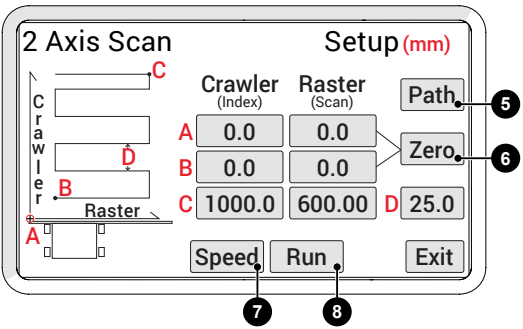


Fig. 148 - 2 axis scan setup

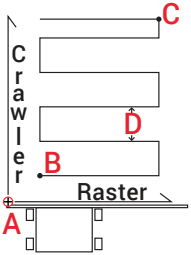


Fig. 149 - Raster scan direction

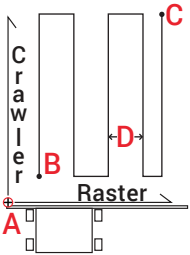


Fig. 150 - Crawler scan direction

5	Path Button	A toggle between raster scan direction *(Fig. 149)* or the crawler's scan direction *(Fig. 150)*. ***TIP:*** *Pressing the path button will swap the (Index) and (Scan) labels on the 2 Axis Scan Setup screen.*
6	Zero Button	Set the numerical value for Crawler and Raster in rows **A** and **B** to zero.
7	Speed Button	Access the **Scan Speed** screen *(see "Scan Speeds Screen" on page 82)*.

8	Run Button	Initiates a check of the input values to ensure they are within the system capabilities. When a scan pattern is invalid, a warning will be displayed. Pressing **OK** returns to the **2 Axis Scan Setup** screen allowing correction of the error. When no issues are detected, the **Scan** screen is enabled *(see "2 Axis Scan Screen" on page 83).*

6.3.1.1 Scan Speeds Screen

Adjust speed settings for the 2 axis scan.

> ***TIP:*** *Scan speeds may also be adjusted in the Jog Mode or User Settings screens.*

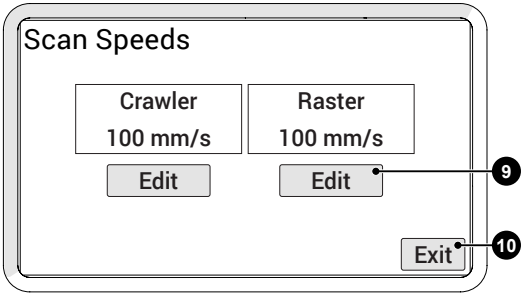


Fig. 151 - Scan speeds

9	Edit Button	Allow adjustment to the corresponding axis speed.
10	Exit Button	Return to the **2 Axis Scan Setup** screen.

6.3.1.2 2 Axis Scan Screen

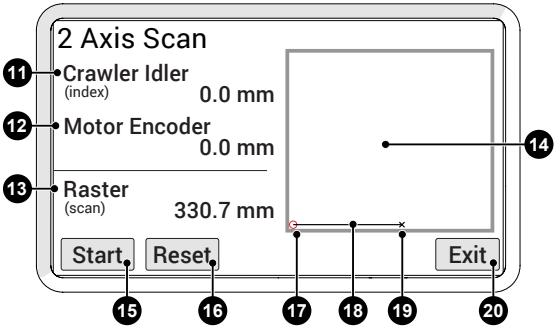


Fig. 152 - 2 axis scan screen

The **2 Axis Scan** screen initiates and monitors the 2 axis scan.

> ***NOTE:*** *The "Index" label corresponds to the axis that will move the short distance "D" between "Scan" moves. The "Scan" label corresponds to the axis that will do the longer moves of the scan. These labels will swap when the path direction is toggled.*

11	Crawler Idler	The current position of the crawler as indicated by the crawler's idler encoder.

12	Motor Encoder	The current position of the crawler as indicated by the crawler's motor encoder.

> ***NOTE:*** *The crawler position indicated by "Crawler Idler" is typically more accurate than the position indicated by the "Motor Encoder". The "Motor Encoder" reading is affected by drive wheel slippage. The "Crawler Idler" reading is not affected by drive wheel slippage.*

13	Raster	Current position of the raster arm carrier.
14	Summary screen	A visual representation of the scan area.
15	Start/Stop button	Start or stop the scan sequence. When a scan has been stopped while in progress, the **Start Button** resumes the scan.
16	Reset button	Return the scanner to the **A** position. Press the **Start Button** to begin the scan sequence from the initial setting.
17	Scan location	Small red circle indicates the **A** position.
18	Scan path	The scan path is illustrated during operation.
19	Scanner position	The blinking crosshair indicates the current scanner position.
20	Exit button	Exit to the **2 Axis Scan Setup** screen.

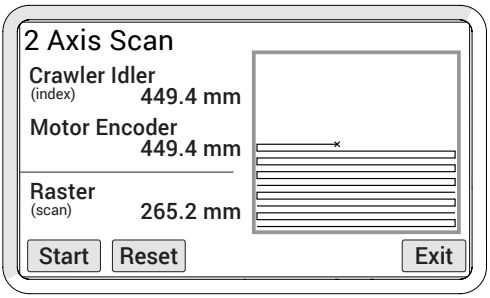


Fig. 153 - Scan path illustrated

When the scanner reaches the scan area, the summary screen displays a graphical representation of the scan area. The scan path will be illustrated *(Fig. 153)* as the scan sequence takes place.

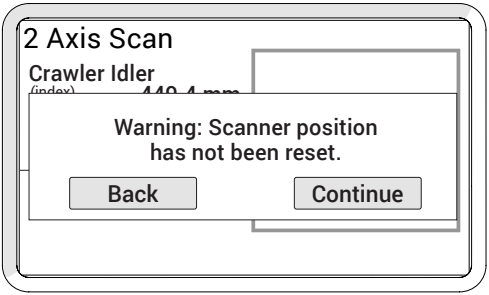


Fig. 154 - Exit warning

Pressing **Exit** stops all scanning and motion. If the scanner is not in the **A** position, a warning appears *(Fig. 154)*. The warning alerts that the **A** position of the scanner will be changed to the current position. Press **Back** to return to the **2 Axis Scan** screen to reset the scanner and maintain the original **A** position. Press **Continue** to reset the **A** position and exit to the **2 Axis Scan Setup** screen.

6.4. User Settings Screen

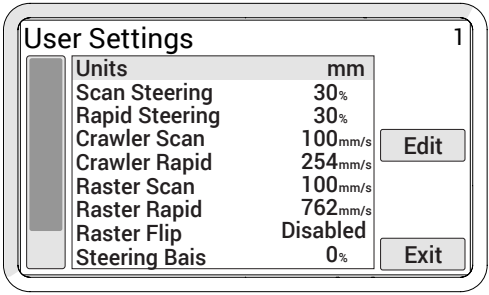


Fig. 155 - User settings screen

Allows a user to customize the settings applicable to the raster arm.

Press **Edit** to enter the **Edit** screen to apply changes to the selected setting.

Title	Description	Valid Range	Default
Raster Scan	Sets the raster arm scan rate in the current units/second. This setting can also be changed through the **Jog** or **2 Axis Scan Speed** screens.	5-762 mm/s *(02-30 in/s)*	76 mm/s *(3.0 in/s)*
Raster Rapid	Sets the raster arm's rapid rate in the current units/second. This setting can also be changed through the **Jog** screen.	5-762 mm/s *(0.2- 30 in/s)*	762 mm/s *(30.0 in/s)*

Raster Flip	Set raster arm orientation. When the raster arm is mounted with the motor housing to the left of the crawler, the appropriate setting is 1. When the raster arm is mounted with the motor housing to the right of the crawler, the appropriate setting is 0. When this setting is changed, the system must be rebooted.	0-1	Enabled

6.4.1.1 Diagnostics Screens

Several diagnostic screens allow various system functions to be monitored.

> ***NOTE:*** *The diagnostic information requires an in-depth understanding of the underlying technologies and programming in the system. Not all functions and information is explained in this manual.*

6.4.1.6.2 Detected Modules

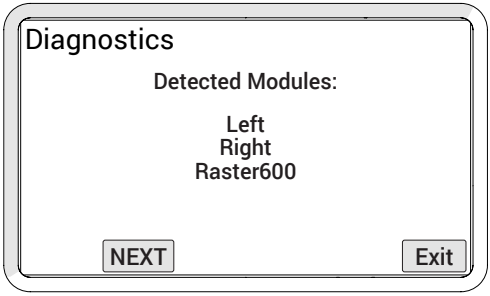


Fig. 156 - Detected modules screen

Raster *(length of raster)* will appear when the raster arm is properly connected.

MAINTENANCE

7.1. Maintenance Schedule

The Motorized Raster Arm must be maintained according to the following schedule:

Task	Frequency
Inspect cables and connectors Inspect the Raster Arm cable for damage. Have any damaged cable repaired by a qualified person or replace the cable assembly as necessary. • Inspect all connectors for damage or moisture. Straighten bent pins. Dry connectors before using.	Every use
General cleaning Ensure the Raster Arm stays relatively clean by wiping off any excess dirt or other contaminants after every use.	Every use

7.2. 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.

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

NOTE: *All components with wiring, cables or electrical connections are splashproof. However, these components are NOT submersible.*

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

TROUBLESHOOTING

Problem	Possible cause	Solution
Gives an 'Excessive motor loading' error.	Load on carriage too high, possibly due to:	
	Probe pressure too high.	Reduce probe pressure
	Too many probes.	Use a maximum of 2 probes.
	Probe(s) too heavy.	
	Obstacle restricting carriage motion.	Clear restrictive obstacle.
	Raster arm too cold	Warm raster arm.
	Linear rail bearings dirty or damaged.	Contact manufacturer *(see "Jireh Industries Ltd." on page 1).*
Raster carriage 'drifts' towards one end and repeatedly strikes the end of travel stop.	Internal components need repair or replacing.	Contact manufacturer *(see "Jireh Industries Ltd." on page 1).*

Problem	Possible Cause	Solution
2 Axis Scan Setup Error messages *(Fig. 157) or (Fig. 158).*	The desired position is outside the mechanical range of travel.	Check zero position, current position and desired position. *(see "2 Axis Scan Setup Screen" on page 79 for additional details).*

Fig. 157 - Index B error message

Fig. 158 - Index C error message

SERVICE AND REPAIR

CAUTION! DO NOT DISASSEMBLE. No user-serviceable parts. Disassembling any of the components in this product, beyond the instructions in this user manual, could void the regulatory certifications and/or effect the safety of the product.

9.1. Technical Support

For technical support, contact Jireh Industries *(see "Jireh Industries Ltd." on page 1).*

SPARE PARTS

To order accessories or replacement parts for your Motorized Raster Arm *(contact Jireh Industries Ltd. on page 1).*

> ***NOTE:*** *These drawings are for parts order. This is not a list of kit contents.*

10.1. Motorized Raster Arm Module

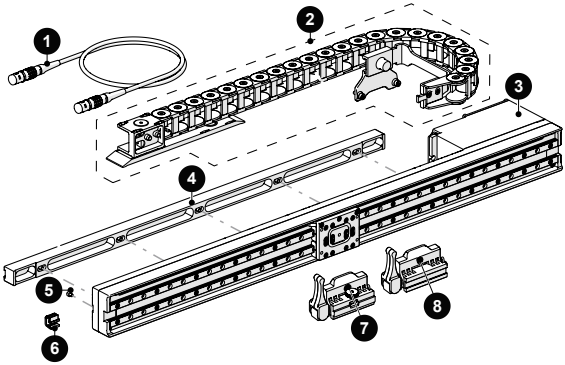
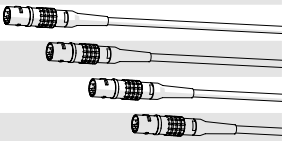


Fig. 159 - Motorized Raster arm parts

BOM ID	Part #	Description
1	*See Raster Arm Cable*	
2	*See Cable Tray*	
3	*See Base Raster Arm*	
4	*See Mounting Rail*	
5	MD049-004	SHCS, M3x0.5 x 4 mm, SST
6	CW0096	Cable Management Clip
7	CWS030	Raster Arm Pivot Nose *(male)*
8	CWS023	Raster Arm Pivot Nose *(female)*
9	*See Raster Arm Case*	

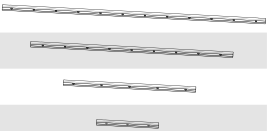
10.1.1. Raster Arm Cable

Part #	Length
UMA020-1.40	140 cm *(55 in)*
UMA020-1.14	114 cm *(45 in)*
UMA020-0.84	84 cm *(33 in)*
UMA020-0.70	70 cm *(28 in)*



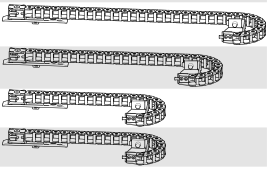
10.1.2. Mounting Rail

Part #	Length
CWS008-1160	1160 mm *(45 in)*
CWS008-0900	900 mm *(35 in)*
CWS008-0600	600 mm *(24 in)*
CWS008-0300	300 mm *(12 in)*



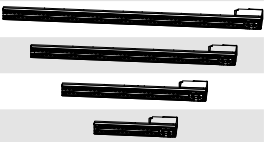
10.1.3. Cable Tray

Part #	Length
CWS018-1160	1160 mm *(45 in)*
CWS018-0900	900 mm *(35 in)*
CWS018-0600	600 mm *(24 in)*
CWS018-0300	300 mm *(12 in)*



10.1.4. Base Raster Arm

Part #	Length
CWA006-1160	1160 mm *(45 in)*
CWA006-0900	900 mm *(35 in)*
CWA006-0600	600 mm *(24 in)*
CWA006-0300	300 mm *(12 in)*



10.1.4.1 Cable Tray Parts

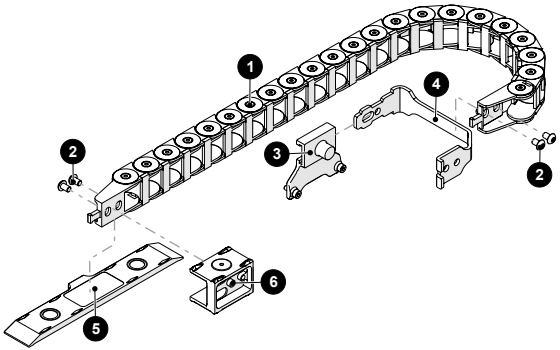
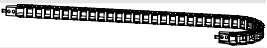
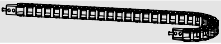
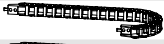


Fig. 160 - Cable tray parts

BOM ID	Part #	Description
1	*See Cable Carrier*	
2	MD074-008	BHCS, M5x0.8 x 8 mm, SST
3	CWS014	Carriage Bracket
4	CWS015	Cable Tray Bracket
5	CWS016	Magnetic Base
6	CWS017	Magnetic End

10.1.4.2 Cable Carrier

Part #	Length	
GA048	1160 mm *(45 in)*	
GA046	900 mm *(35 in)*	
GA041	600 mm *(24 in)*	
GA043	300 mm *(12 in)*	

10.1.4.3 HydroFORM Cart

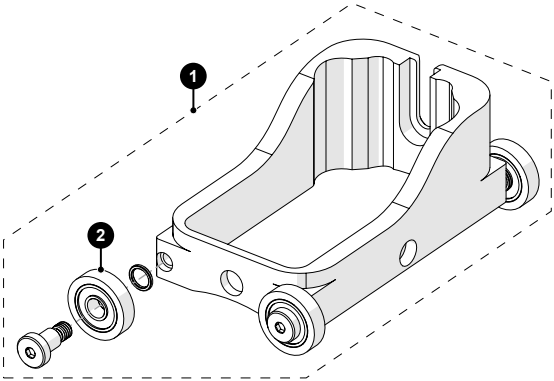


Fig. 161 - HydroFORM cart

BOM ID	Part #	Description
1	PHS044	HydroFORM Cart
2	CA119	Urethane Molded Wheel Bearing

10.1.5. Raster Arm Case

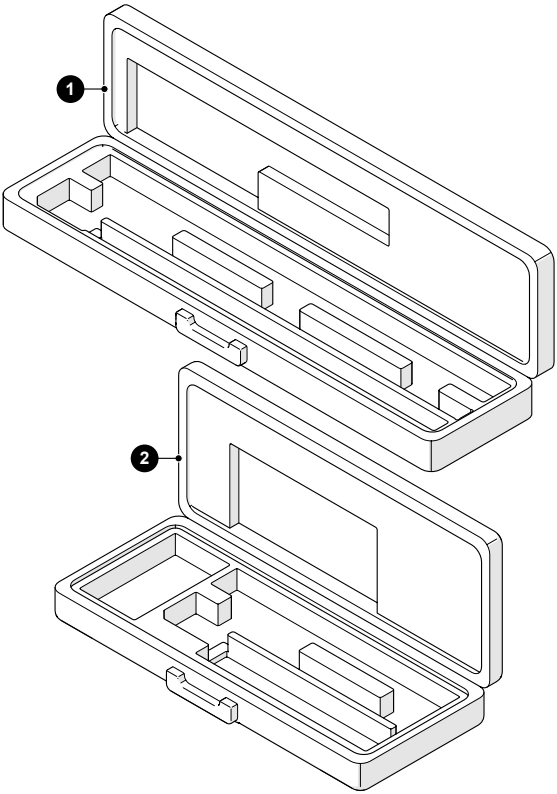


Fig. 162 - Raster arm cases

BOM ID	Part #	Description
1	CWA008	900 / 1160 mm Raster Arm Case
2	CWA009	300 / 600 mm Raster Arm Case

10.2. Vertical Probe Holder

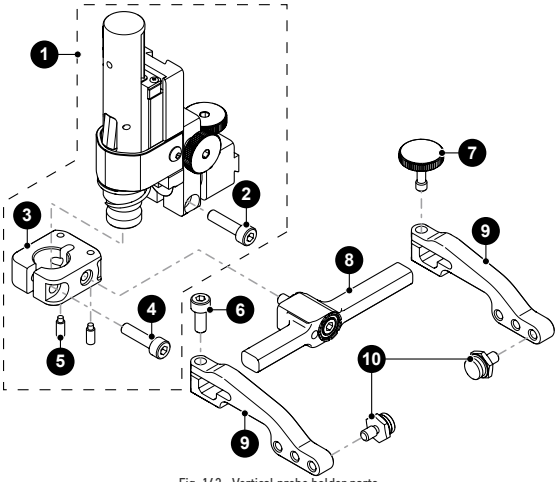


Fig. 163 - Vertical probe holder parts

BOM ID	Part #	Description
1	PHS028	Vertical Probe Holder Subassembly
2	MA307	Screw, M4x16mm High Strength SST SHCS
3	PH0087	Vertical Probe Holder Base
4	MD050-016	SHCS, M4 x 0.7 x 16 mm, SST
5	MA096	Screw, M3x8 mm Dog Point Set, SST
6	MD050-010	SHCS, M4 x 0.7 x 10 mm, SST
7	PH0082	Knurled Knob, M4 x 0.7 x 10 mm, 3 mm stand off, SST
8	*see Yoke Style*	
9	*see Arm Style*	
10	PH0011-X	Pivot Button Style *(see Pivot Button Style)*

10.3. Slip Joint Probe Holder

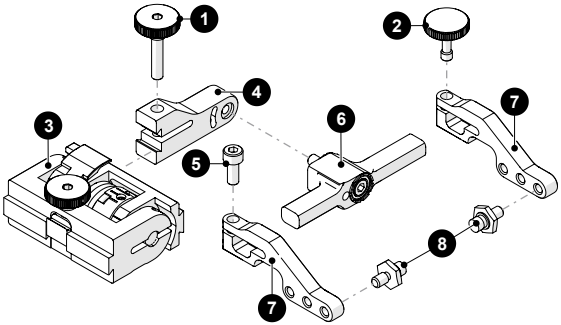


Fig. 164 - Slip joint probe holder parts

BOM ID	Part #	Description
1	PH0104	Knurled Knob, M4 x 0.7 x 18 mm, 4 mm stand off, SST
2	PH0082	Knurled Knob, M4 x 0.7 x 10 mm, 3 mm stand off, SST
3	PHS022	Slip Joint Probe Holder Subassembly
4	*see Swing Arm Style*	
5	MD050-010	SHCS, M4 x 0.7 x 10 mm, SST
6	*see Yoke Style*	
7	*see Arm Style*	
8	PH0011-X	Pivot Button Style *(see Pivot Button Style)*

10.4. Heavy Duty Vertical Probe Holder

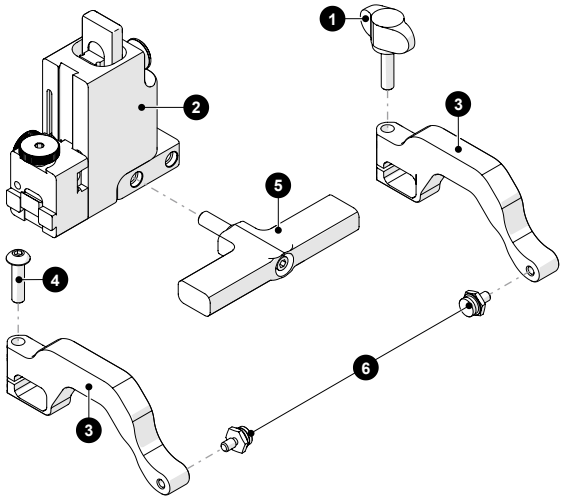


Fig. 165 - Heavy duty vertical probe holder parts

BOM ID	Part #	Description
1	EA154	Probe Holder Arm Adjustment Knob
2	PHS049	Heavy Duty Probe Holder Subassembly
3	PH0165	Heavy Duty Probe Holder Arm, Standard, Drop
4	MD074-020	BHCS, M5 x 0.8 x 20 mm, SST
5	*See Heavy Duty Yoke Style*	
6	PH0011-X	Pivot Button Style *(See Pivot Button Style)*

10.5. Corrosion Thickness Probe Holder

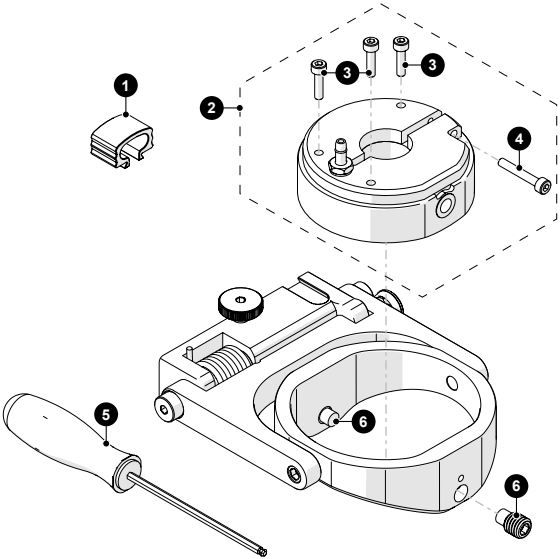


Fig. 166 - Corrosion thickness probe holder parts

BOM ID	Part #	Description
1	BG0091	Cable Clip
2	*See Probe Holder Receptacle and Wear Plate*	
3	MD049-012	SHCS, M3x0.5 x 12 mm, SST
4	MD049-020	SHCS, M3x0.5 x 20 mm, SST
5	EA599	2.5 mm (0.098 in) Hex Driver
6	MA264	SHSS, M8 x 1.25 x 12 mm, dog point, SST

10.6. Raster Arm Actuated Probe Lift

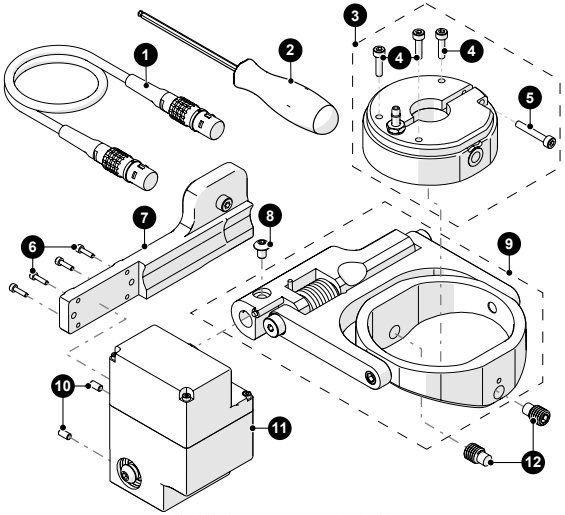


Fig. 167 - Raster arm actuated probe lift

BOM ID	Part #	Description
1	*See Auxiliary Cables*	
2	EA599	2.5 mm *(0.098 in)* hex driver
3	*See Probe Holder Receptacle and Wear Plate*	
4	MD049-012	SHCS, M3x0.5 x 12 mm, SST
5	MD049-020	SHCS, M3x0.5 x 20 mm, SST
6	MD047-008	SHCS, M2x0.4 X 8 mm, SST
7	DY0061	Raster Mounting Bracket
8	MD073-006	BHCS, M4x0.7 X 6 mm, SST
9	PHS073	Actuated Probe Lift Arm Assembly
10	MA240	PIN, Ø3 mm (h7) x 6 mm 440C Dowel

11	CXA026	Rotary Actuator Assembly
12	MA264	SHSS, M8 x 1.25 x 12 mm, dog point, SST

10.6.1. Auxiliary Cable

Part #	Raster Arm Compatability	
UMA017-1.5	600 mm	
UMA017-1	300 mm	

10.7. Probe Holder Components

10.7.1. Arm Style

	Arm Style	Part #	
A	Standard, Flat	PH0090	
B	Short, Flat	PH0089	
C	Long, Flat	PH0099	
D	Standard, Drop	PH0093	
E	Short, Drop	PH0092	
F	Long, Drop	PH0094	
G	Standard, Extra-Drop	PH0096	
H	Short, Extra-Drop	PH0095	
I	Extra-Short, Flat	PH0159	
J	Extra-Short, Drop	PH0161	

10.7.2. Yoke Style

	Yoke Style	Part #	Length	
S	Standard	PHS052	6.3 cm *(2.47 in)*	
W	Wide	PHS063	7.9 cm *(3.06 in)*	

10.7.3. Swing Arm Style

Swing Arm Style	Part #	Length	
Short	PH0069	4.1 cm *(1.61 in)*	
Long	PH0100	4.6 cm *(1.81 in)*	

> ***NOTE:*** *Short swing arm only compatible with standard yoke style.*

10.7.4. Heavy Duty Yoke Style

	Yoke Style	Part #	Length	
S	Standard	PHS048	8.3 cm *(3.26 in)*	
W	Wide	PHS047	12.2 cm *(4.79 in)*	

10.7.5. Pivot Button Style

	Pivot Hole Size	Wedge Type	
01	8.0 mm (0.315 in)	Olympus PA	
02	5.0 mm (0.197 in)	Olympus TOFD	
03	2.7 mm (0.106 in)	Sonatest DAAH PA	
04	9.5 mm (0.375 in)		
06	3.0 mm (0.118 in)		
07	2.3 mm (0.09 in)		
08	Conical Head		
09	5 mm (0.197 in) Internal	Zetec PA/TOFD	
11	3 mm (0.118 in) Internal		
14	4 mm (0.157 in)		

> ***NOTE:*** *Additional probe holder pivot button types are available.*
> *(contact Jireh Industries Ltd. on page 1)*

10.8. Probe Holder Receptacle and Wear Plate

Part #	Wear Plate	Wedge Type	
PHS066-A	Curved	9.53 mm *(0.375 in)* dia.	
PHS066-B	Curved	12.7 mm *(0.5 in)* dia.	
PHS066-C	Curved	19 mm *(0.75 in)* dia.	
PHS066-E	Curved	25.4 mm *(1 in)*	
PHS067-A	Flat	9.53 mm *(0.375 in)* dia.	
PHS067-B	Flat	12.7 mm *(0.5 in)* dia.	
PHS067-C	Flat	19 mm *(0.75 in)* dia.	
PHS067-D	Flat	Technisonic	
PHS067-E	Flat	25.4 mm *(1 in)*	

10.9. Variable Components

10.9.1. Frame Bar

Part #	Length	
BG0038-05	5 cm *(1.9 7 in)*	
BG0038-10	10 cm *(3.94 in)*	
BG0038-15	15 cm *(5.91 in)*	
BG0038-20	20 cm *(7.87 in)*	
BG0038-25	25 cm *(9.84 in)*	
BG0038-30	30 cm *(11.81 in)*	
BG0038-35	35 cm *(13.78 in)*	
BG0038-40	40 cm *(15.75 in)*	
BG0038-45	45 cm *(17.72 in)*	
BG0038-50	50 cm *(19.69 in)*	
BG0038-55	55 cm *(21.65 in)*	

DISPOSAL

WEEE Directive

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

LIMITED WARRANTY

WARRANTY COVERAGE

Jireh Industries warranty obligations are limited to the terms set forth below: Jireh Industries Ltd. ("Jireh") warrants this hardware product against defects in materials and workmanship for a period of THREE (3) YEARS from the original date of purchase. If a defect exists, at its option Jireh will (1) repair the product at no charge, using new or refurbished replacement parts, (2) exchange the product with a product that is new or which has been manufactured from new or serviceable used parts and is at least functionally equivalent to the original product, or (3) refund the purchase price of the product. A replacement product/part assumes the remaining warranty of the original product or ninety (90) days from the date of replacement or repair, whichever provides longer coverage for you. When a product or part is exchanged, any replacement item becomes your property, and the replaced item becomes Jireh's property. When a refund is given, your product becomes Jireh's property.

OBTAINING WARRANTY SERVICE

To utilize Jireh's warranty service, you must ship the product, at your expense, to and from Jireh Industries. Before you deliver your product for warranty service, you must phone Jireh and obtain an RMA number. This number will be used to process and track your product. Jireh is not responsible for any damage incurred during transit.

EXCLUSIONS AND LIMITATIONS

This Limited Warranty applies only to hardware products manufactured by or for Jireh Industries. This warranty does not apply: (a) to damage caused by accident, abuse, misuse, misapplication, or non-Jireh products; (b) to damage caused by service (including upgrades and expansions) performed by anyone who is not a Jireh Authorized Service Provider; (c) to a product or a part that has been modified without the written permission of Jireh.

Jireh Industries Ltd.
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Ardrossan AB T8E 2K4
Canada

Phone: 780-922-4534

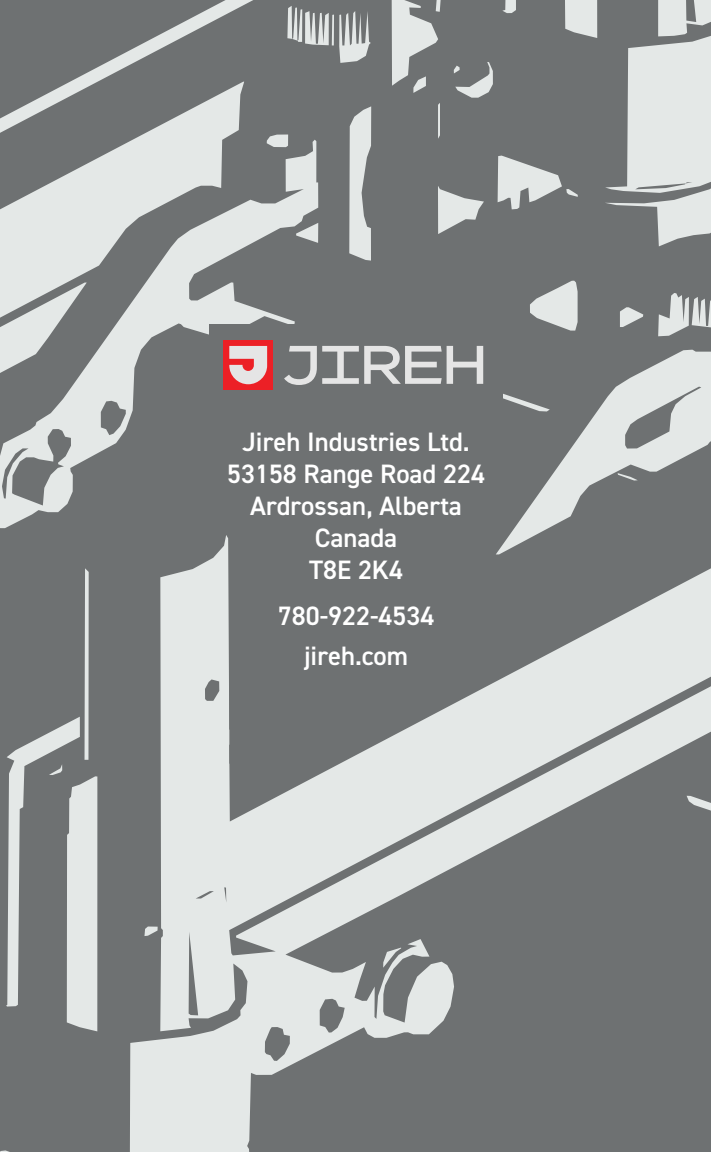
jireh.com

HydroFORM™ is a trademark of Olympus.

All brands are trademarks or registered trademarks of their respective owners and third-party entities.

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

All specifications are subject to change without notice.



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