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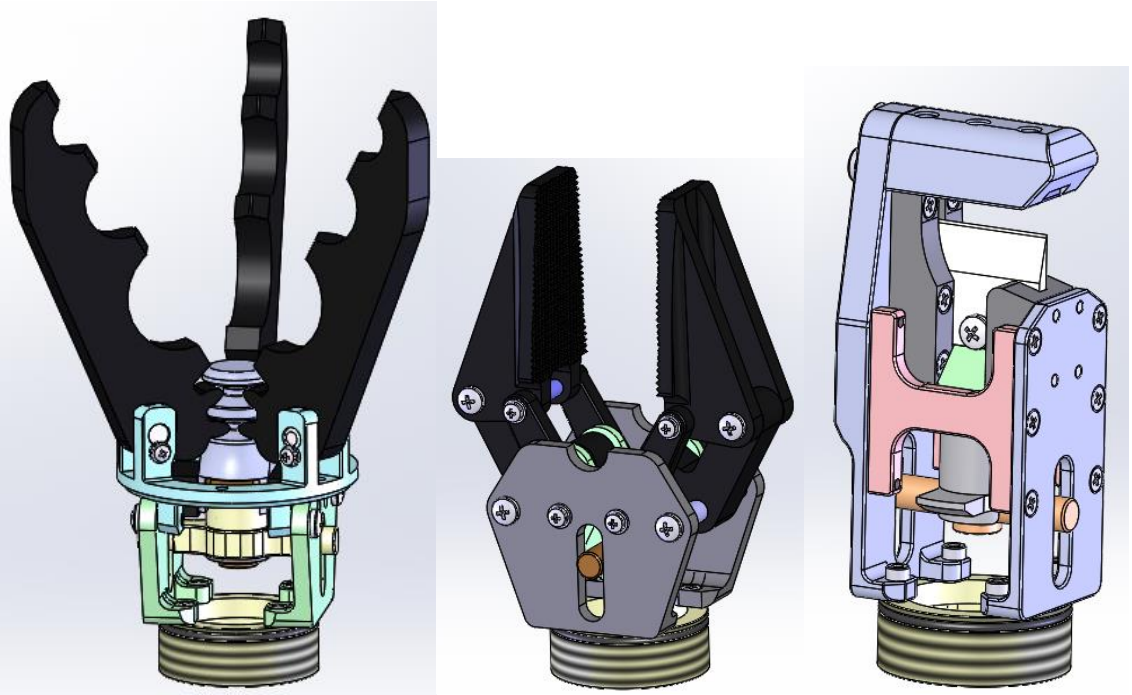

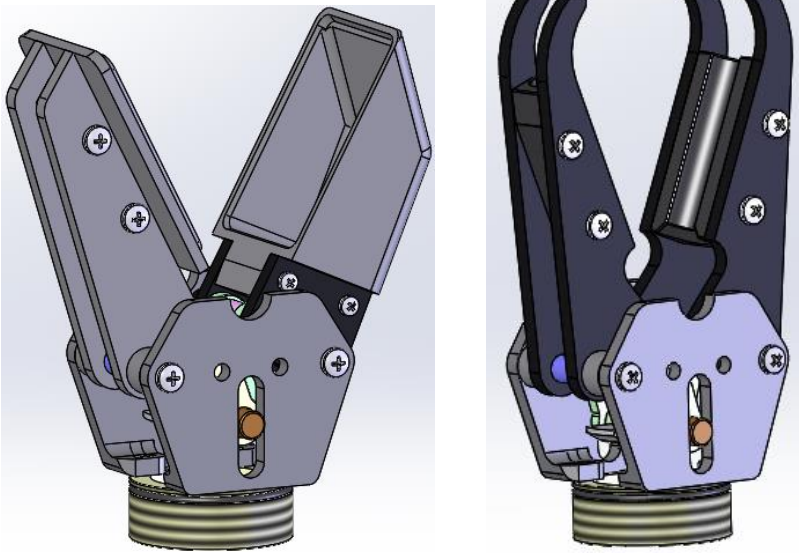

INUKTUN QUICK CONNECT / DISCONNECT JAW SETS FOR ALL 2-FUNCTION MANIPULATORS

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About This Manual

This manual has been prepared to assist you in the operation and maintenance of your Eddyfi Technologies' Inuktun equipment. Correct and prudent operation rests with the operator who must thoroughly understand the operation, maintenance, service and job requirements. The specifications and information in this manual are current at the time of printing.

This product is continually being updated and improved. Therefore, this manual is meant to explain and define the functionality of the product. Furthermore, schematics or pictorials and detailed functionality may differ slightly from what is described in this manual.

Eddyfi Technologies reserves the right to change and/or amend these specifications at any time without notice. Customers will be notified of any changes to their equipment.

Information in this manual does not necessarily replace specific regulations, codes, standards, or requirements of others such as government regulations.

Description

The Inuktun 2-Function Manipulator was designed as a deep-sea articulating gripper with an array of interchangeable jaw sets. The device is capable of high closing forces and provides an additional rotation feature to position the jaws in relation to the work piece. The pressure compensated housing allows the manipulator to dive to the depths of the ocean, and anodized aluminum and stainless steel 316 parts and fasteners allow it to thrive there. Individual jaw set functions are listed below.

Cutter	Cut nearly any material from plastic pipes, natural and synthetic ropes, even electrical cables.
Trident	For hard to hold objects, the trident grips sample from three equally spaced directions around the jaw's axis.
V Jaw	With a wide maw, the V jaw handles large objects with ease.
Parallel	Hard to hold and delicate objects are easily held in the jaw's always parallel top and bottom fingers.
Sampler	Take virtually any type of sample from silt and sediment to sea life and flora.

Specifications

Drive Unit	
Maximum Voltage	24VDC
Maximum Continuous Current	1.0A

Maximum Peak Current	1.7A
Maximum actuator axial shaft force	90 kgf (200 lbf)
Maximum Rotation Speed	14 RPM
Maximum Depth (Sea Water)	5000 m (16,000 ft)
Dry weight	0.9 kgf (2.0 lbf)
Wet Weight (Sea Water)	0.6 kgf (1.4 lbf)
Working Temperature	0 °-50 °C (32 °-122 °F)

Jaw Set	Closing Force (kgf)[lbf]				Weight (kgf)[lbf]				Max Work piece Size (cm)[in]	Time Open/ Close (s)
	Min		Max		Dry		Wet (SW)			
Cutter	82 [180]				0.346	[0.763]	0.25	[0.55]	2.0 [0.78]	7
Trident	7	[15]	20	[45]	0.310	[0.683]	0.180	[0.397]	Ø 11.4 [4.5]	5
V Jaw	5	[10]	18	[40]	0.317	[0.699]	0.202	[0.445	17.0 [6.7]	7
Parallel	11	[25]	23	[50]	0.325	[0.717]	0.207	[0.456]	5.6 [2.2]	7
Sampler	5	[10]	18	[40]	0.330	[0.728]	0.193	[0.425]	45ml [1.5oz]	7

**Min and Max closing forces are at the tip and base of the jaws, respectively.*

Safety

- All personnel operating or maintaining this equipment must read and understand the operations and maintenance manual prior to system operation.
- All personnel operating or maintaining this equipment must be competently trained.
- Appropriate personal protective equipment (PPE) must be worn while operating and maintaining the equipment.
- Under no circumstances should this equipment be used in a potentially explosive atmosphere.
- If the equipment is powered from a source other than an Eddyfi Technologies provided controller, the power supplied to the product must have reinforced isolation from the mains with no reference to earth ground.
- **Mechanical Pinching Hazard.** All the interchangeable jaw sets have enough force to seriously injure one's fingers, and the cutter attachment could easily sever a human digit. Always power down the manipulator while someone is working on or near the jaws.
- **NEVER** operate the manipulator without a jaw set attached. Operating without a jaw set may result in jamming of the actuator drive unit.

Caution: Disconnect the power source before servicing the product; otherwise, damage may result.

System Setup

Working Environment

The Manipulator is designed for use on land or down deep in fresh/salt water (5000m max). Before using the manipulator, make sure all parts are moving freely and there are no obstructions to the jaw set attached. All metallic parts were designed to withstand a harsh salt water environment, but it is recommended that the unit be thoroughly washed down with fresh water after every use. Use only standard line pressures; **pressure washing may damage O-ring seals.**

Connector Handling

Regarding to system reliability, connectors are very important to maintaining a fully functioning system. A damaged connector can represent significant costs in downtime and re-termination which could easily have been prevented. To this end, Eddyfi Technologies recommends the following steps to help prevent damage to connectors.

When plugging in a connector:

1. Inspect for dirt in both sides of the connectors. Do not plug in a dirty or damaged connector.
    a. Inspect for bent or burnt pins.
    b. Visually align the locating flat first before plugging in. **Do not blindly jam and twist.**
    c. Fully tighten or engage a connector. Never use a connector partly plugged or screwed in. Contacts left partly open may be subject to leaking, arcing or burnout.
2. Regularly apply 3M silicone spray, or equivalent, to the connectors to keep them from seizing.

The Manipulator has only one connector on the back end of the drive unit. 24VDC max and communications are supplied through this connector with the pin configuration shown below – note that the view is looking at the face of the connector on the drive unit, **not the connecting whip**.

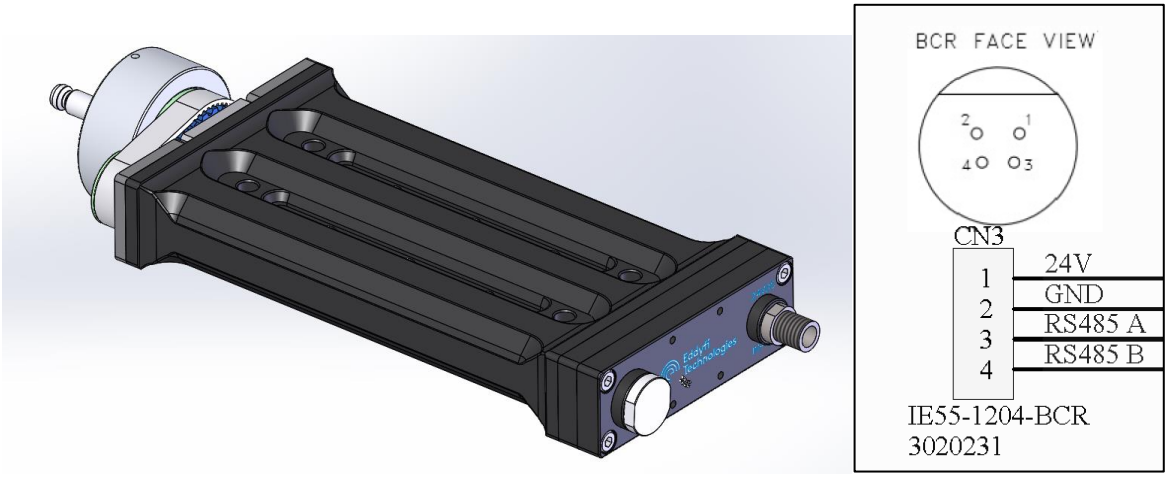


FIGURE 1: MANIPULATOR CONNECTOR

Changing Jaw Sets

The Manipulator has five (5) standard jaws from which to choose. All offer unique characteristics and advantages for different operating requirements. The jaws are easily interchangeable without using any tools using a toolless quick connect mechanism. To remove the V Jaw, Parallel Jaw, Sampler Jaw, and the Cutter, follow the steps listed below. Installation of the replacement jaw is just the reverse procedure.

1. Close the jaws to approximately halfway of its stroke as shown in Figure 2**a** below. If for any reason no jaw is attached to the manipulator, position the drive shaft approximately 30mm [1.2 inch] from the knurled nut as shown in Figure 2**b**.

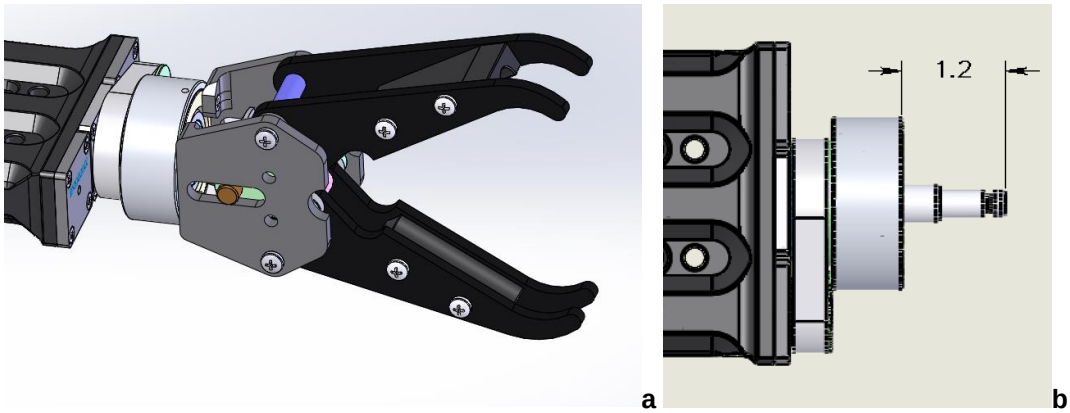


FIGURE 2: JAWS / DRIVE SHAFT POSITION

2. Push up all the way on both slider tabs to release quick connect mechanism as shown in Figures 3**a** & **3b**. While holding the attachment in position, open the jaws all the way as shown in Figure 3**c.**

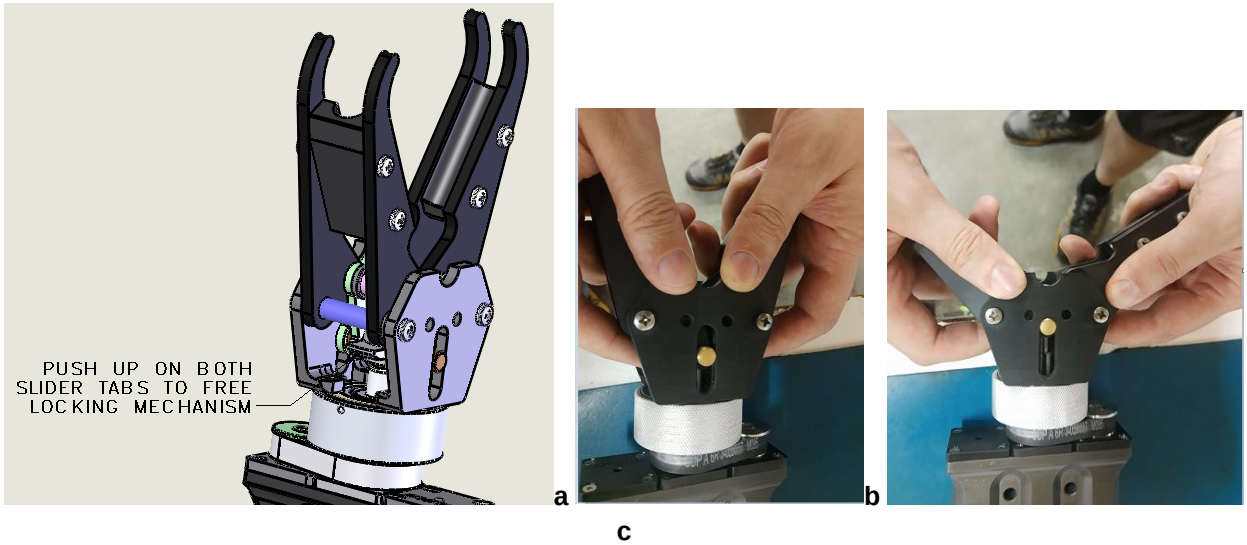


FIGURE 3: RELEASING JAWS QUICK CONNECT MECHANISM

3. Unscrew the knurled nut while lightly pulling up on the attachment until it lifts off the drive unit.

4. Remove the jaw assembly from the drive unit by gently sliding it off the actuator shaft.

5. When installing the replacement attachment, make sure the dog clutch between the drive unit and attachment is aligned (keyed in) before tightening the nut. **DO NOT Lubricate the O-ring.** The friction of the O-ring and mating parts prevents the Jaws from loosening during the rotate operation. See Figure 4 below.

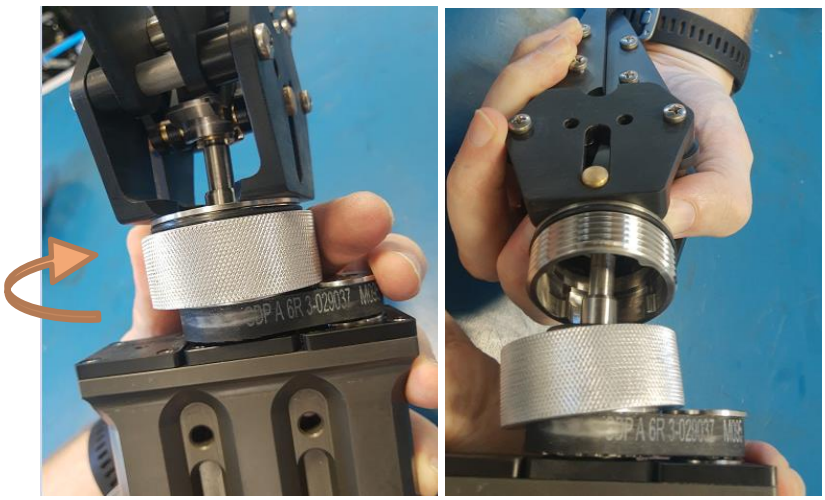
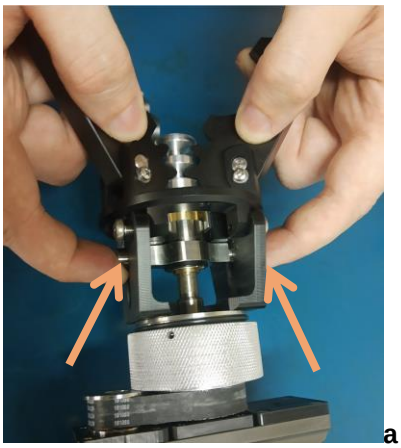


FIGURE 4: TAKING TRIDENT OFF THE MANIPULATOR DRIVE UNIT

TRIDENT JAWS:

The quick connect mechanism for the Trident Jaws is slightly different from the other Jaw sets but the procedure is similar. Pull up on the two tabs protruding from the side plates to release the quick connect mechanism as shown in Figure 5**a**. While holding the jaw in this position, open the jaws all the way by hand to disconnect the dog clutch. Unscrew the knurled nut while lightly pulling the Trident Jaws off the drive unit as show in Figure 5**b**.


a


b

FIGURE 5: RELEASING TRIDENT JAWS QUICK CONNECT MECHANISM

Maintenance

Cleaning

In order to ensure the Manipulator functions well, it should always be thoroughly cleaned after every use. Always use fresh water at standard line pressure (700kPa/100psi max). Always make sure to drain any water from the bellows port (small hole) on the front of the housing. Failure to clean properly could result in premature corrosion of components.

Cutter Blades

Post-Deployment

The cutter blades are made from specially coated steel that will resist corrosion in salt water. However, due to the extremely corrosive nature of seawater on even the noblest materials, the blades should be properly cared for after use:

1. Cleanse with freshwater after every use.
2. Dry the blade and apply machine oil or grease to all surfaces.

Failure to care for the blade as described above will result in premature degradation.

Sharpening

If the cutter blades need to be re-sharpened, they can be sharpened numerous times using standard methods. Always make sure to leave a perfectly straight edge – irregularities or loss of perpendicularity could result in compromised cutting ability. For replacement blades contact your Eddyfi Technologies representative.

Compensation Oil

The Manipulator unit is pressure compensated with light, food safe oil to ensure reliable operation at depth. If a new manipulator has been sitting on the shelf for an extended period of time, or has recently been shipped via air, it is possible some of this oil may "weep" out of the o-ring grooves. This can be alarming as it will appear as though the unit is leaking; in most cases, though, it is nothing to worry about.

To verify if there is a leak in the unit, perform the following procedure (this same process should be repeated annually to ensure the integrity of the housing seals):

1. Wash the Manipulator body with hot soapy water (dish detergent work best) and heat the body up to 40°C to 50°C (Approx. 104°F - 122°F). The soap will remove any oil, and the hot water should help with moving the oil from the cracks.
2. Allow the unit to dry.
3. Place the dried unit on a facial tissue (or similar) in a warm area; if oil marks or slicks appear on the tissue within a few minutes it could indicate a failure of one of the housing seals. Contact your customer service representative to arrange for repairs.

At least once a year, check the quality of the oil by completing the following steps.

1. Insert an M3x25 socket cap screw into the bellows piston through the bellow port (see Figure 7 below) such that it *gently* seats on the front cap. ***Failure to do this will result in loss of oil.***
2. With the drive unit held back up and jaws down, gently unscrew the oil plug on the back of the unit; if the oil level is not near the top of the opening there could be a leaking seal and you should contact your customer service representative.
3. Gently dip your finger in (do not splash out too much oil) and test the quality. The oil should have a slick feel and should not be gritty or excessively dirty. If the oil is extremely degraded or dirty, contact your customer service representative for an oil change or to receive a kit to change the oil.
4. Before replacing the oil plug, top up the oil so that it is filled to the brim – use Schaeffer's ISO 22 food safe hydraulic oil. ***Failure to top up the oil can result in air inside the housing, loss of pressure compensation and failure at depth.***

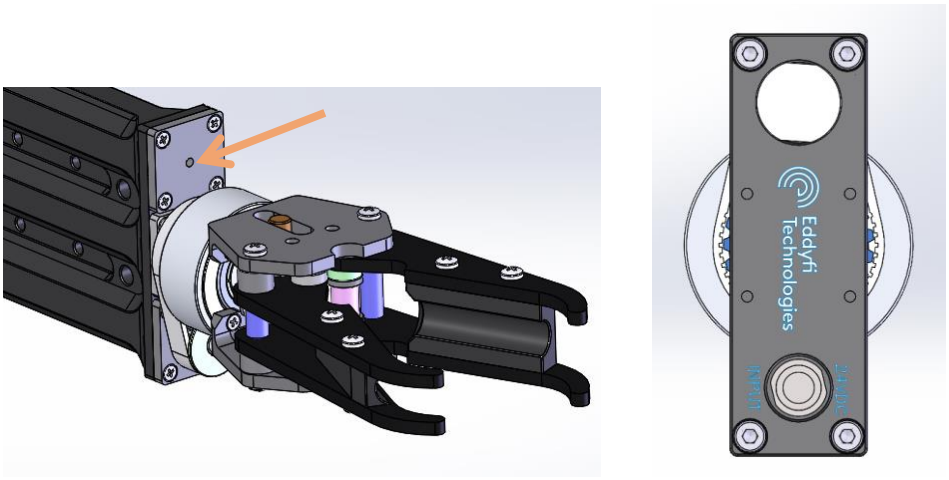


FIGURE 5: BELLOWS PISTON AND OIL PORT

Dislodging The Centre Actuator

NEVER operate the Manipulator without a jaw-set attached. If it has been operated without a jaw-set attached and the center actuator has become jammed and cannot be moved with maximum power from the controller, the following procedure can be undertaken which **may** solve the issue.

While Extended

If the center actuator is jammed in the fully extended position, without a jaw-set attached, try to close the actuator with full force from the controller while gently tapping on the tip of the rod with a light hammer. Make sure the housing is secured to a table or surface to provide stability.

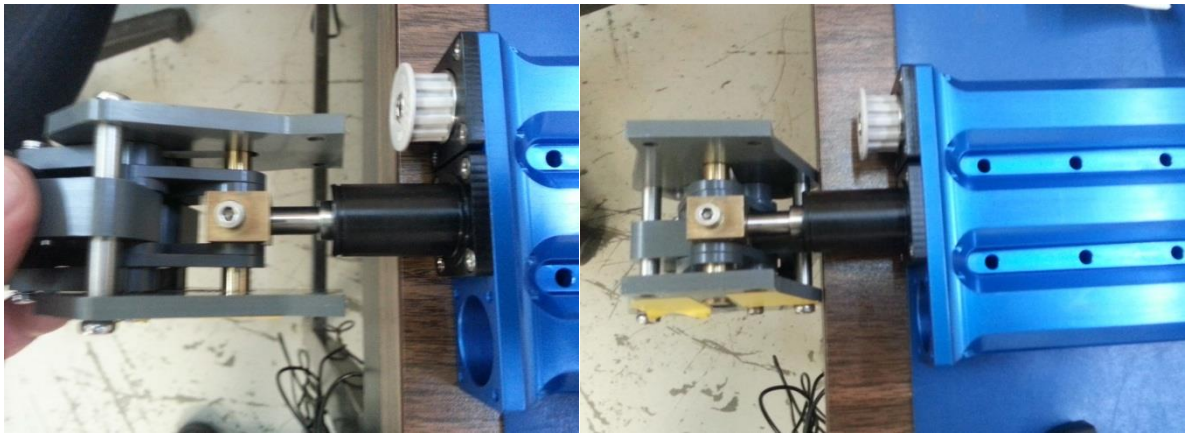
If the actuator is jammed in the closed position, follow one of the following procedures.

Preferred:

1. Locate a flat slotted tool that can fit in the groove at the end of the center actuator. The slot should be 5.3 – 6mm [0.21 – 0.24in] wide, and the tool should have a thickness no greater than 3mm [0.12in].
2. Place the manipulator onto a table.
3. Insert the tool into the actuator end groove and brace it against the edge of the table.
4. While pulling the manipulator against the braced tool (as in trying to pull the actuator out), and applying full open force from the controller, gently tap on the tip of the actuator with a light hammer.

Alternative - If a flat slotted tool cannot be found or made, one of three jaw-sets (Sampler, V- or Parallel Jaws) may be used instead by doing the following:

1. Using one of the jaws, fasten the center actuator end block onto the actuator shaft with the mount clips – do not slide the end block onto the shaft – leaving the smaller shaft diameter exposed. The end block is thus rotated 180° from normal installation.



2. Place the Manipulator onto a table.
3. Pivot the jaw-set 90° and brace the side-plates against the edge of the table.
4. While pulling the Manipulator against the braced jaw-set (as in trying to pull the actuator out), and applying full open force from the controller, gently tap on the front of the end block with a light hammer.

Parts And Repairs

Ordering Parts/Customer Service

Spare and/or replacement parts are available for your product and can be ordered directly from your local office.

When ordering parts, always make sure to quote the sales order acknowledgement (SOA) number and/or the serial number of the system component in question.

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Warranty Repairs

Warranty conditions are specified in the Warranty section. Should any conditions of the manufacturer's warranty be breached, the warranty may be considered void. All returned items must be sent prepaid to Eddyfi Technologies at the above address.

Factory Returns To Canada

Some sub-assemblies of your Eddyfi Technologies product are not field-serviceable and may need to return to the factory for repair. Warranty claims must return to the factory for evaluation.

To return an item for evaluation or repair, first contact Eddyfi Technologies at our toll-free number or e-mail address. Eddyfi Technologies will supply a Return Merchandise Authorization (RMA) number with detailed shipping and customs instructions. Items shipped without an RMA number will be held at Eddyfi Technologies until the correct paperwork is completed. If cross-border shipments are not labelled as per the instructions, the items may be held by customs and issued additional fees.

All returned items must be sent prepaid unless other specific arrangements have been made.

When the product or system is being shipped anywhere by courier or shipping company, it must be packaged in the original packaging it was received in. This measure greatly reduces the consequences of rough handling and subsequent shipping damage.

Eddyfi Technologies cannot be held responsible for damages due to improper packaging. Shipping damage may have significant impact on repair turnaround times.

Product/System Drawing Package Availability

Mechanical assembly and electrical wiring diagram drawing packages for your equipment are available in PDF format upon request. Printed copies may also be purchased from Eddyfi Technologies. Contact your local sales contact for more information.

Limited Warranty Policy

Refer the Eddyfi Technologies website for warranty terms for this product.
https://www.eddyfi.com/en/salesterms