



**Macro Technologies**

A RegO® Brand

## CryoMac®3 Operation and Maintenance Manual



### SAFETY INSTRUCTIONS

For your safety and improved service life of the product, please read this Manual before use and follow the safety instructions carefully.



CE EX II 2G c IIA T3 X

**WARNING** Installation, usage and maintenance of this product must be in compliance with all Macro Technologies, LLC Instructions as well as all requirements and provisions of national and local standards, codes, regulations and laws. Inspection and maintenance of a periodic basis is essential. Only qualified personnel should perform installation and maintenance. Be sure all instructions are read and understood prior to installation, operation and maintenance. These instructions must be passed on to the end user of the valve.

Avoiding the inhalation of, or skin contact with Liquefied Natural Gas (LNG) is advised. LNG can cause asphyxiation, freeze burns, fire and explosions which can result in serious injury or death. See the LNG MSDS for specific information regarding safe handling of LNG. Evacuation of LNG must take place in a well-ventilated area to insure dispersion. Keep LNG far from open flames or other sources of ignition to prevent fire or explosion.

**CAUTION: FAILURE TO FOLLOW THE SAFETY WARNINGS MAY RESULT IN SERIOUS INJURY.**



- Whenever operating the LNG quick connect fueling Nozzle, be sure to wear the proper safety clothing consisting of:
  - Full face shield
  - Thermal gloves approved for cryogenic use
  - Cryogenic smock
  - Solid shoes capable of withstanding cryogenic spill
- Read the User's Manual in its entirety before operating this product.
- Make sure the operating space is clear to avoid accidental contact with others.
- Do not use the product in any way not described in this manual
- Only use replacement parts provided by Macro Technologies.
- Do not operate the product if there is any visible damage.
- Stop operation immediately if leakage occurs.
- Follow the maintenance schedule as described on page 4-5 of this manual. Only use Macro Technologies replacement parts when performing maintenance.

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## Key Features

Thank you for purchasing the Macro Technologies CryoMac<sup>®</sup>3 LNG (Liquid Natural Gas) Fueling Nozzle (Part No. CryoMac3-50M and CryoMac3-50M-S). We know that you will find it safe, easy to use and easy to service. Our Patent Pending design solves many of the issues that have plagued competitive LNG Fueling Nozzles.

Macro Technologies offers the highest quality product with new-age technologies to improve safety and ease of use including:



A positive “Vent Position” to release gases trapped between the nozzle and receptacle through the Vent Holes, which improves safety when removing the Nozzle.



Ball bearings to lock the Nozzle in place during fueling. Ball bearings help to guide the nozzle and let it “roll” on and off easily. Light weight design makes the Nozzle easier to handle over long work days and easier to slide onto the receptacle.



Non-metallic bearings, air gaps, and insulation at key points are used to minimize ice issues. Easy access or maintenance of the receptacle end seal, poppet assembly and the poppet seat. No expensive “clamp dogs” to replace.



Reasonable cost while maintaining reliability.



Automatic Shutoff when disconnecting.

## Specifications

**Fluid Compatibility:** Liquid Natural Gas (LNG)  
Methane  
Liquid Nitrogen (LIN)

**Maximum Refueling Pressure:** 500 PSIG / 34.5 BAR

**Maximum System Pressure:** 500 PSIG / 34.5 BAR

**Burst Pressure:** > 1,500 PSIG (103.5 BAR)

**Rated Flow:** 50 GPM @ 250 PSIG (LNG)

**Nozzle Weight:** 10.4 LBS

**Port Size:** 1” Male SAE 37° Flare (SAE J514)  
(1-5/16 -12 Thread)

**Operating Temperature:** -320°F to +140°F  
(-195°C to 60°C)

Meets ISO 12617 requirements.

This product can be used in a EX zone 1 and 2 for LNG.

For Use with Macro Technologies receptacle part numbers 13530, 13615, 13620, 13705, 13990 and 14050.

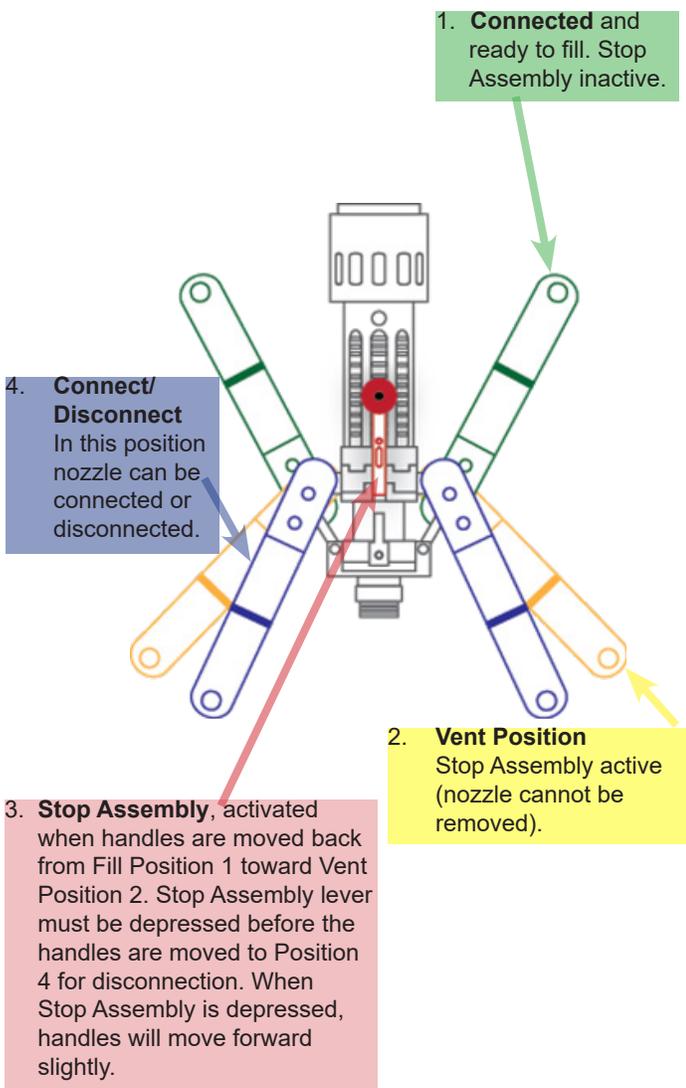
Additionally, the Nozzle has been verified to function well with other manufacturer’s receptacles such as JC Carter receptacle part number 62050 and Parker (Hannifin) Kodiak series receptacles. We cannot guarantee that these or any other manufacturers will continue to make compatible products.

Macro Technologies fully supports the development of National and International Standards. We are active in participating in the development of these standards.

## Product Description

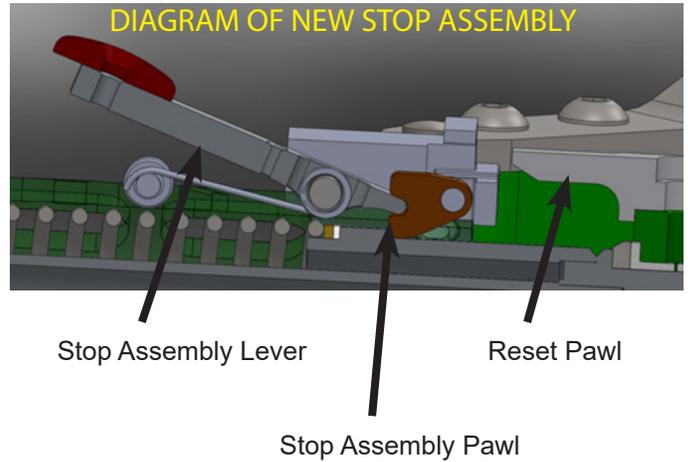
The CryoMac3-50M and CryoMac3-50M-S have three handle positions, Connected, Vent, and Open.

In the Connected Position (position 1 in figure below), the handles are pushed away from the operator and the Nozzle is locked onto the male Receptacle and fueling can commence. When the handles are pulled back to the positive stop, Vent Position (position 2 in figure below), the Nozzle Poppet closes and also allows the mating Receptacle Poppet to close. In this position the gases trapped between the closed poppet's are released through the vent holes – relieving any pressure on the Nozzle. For safety reasons, the Nozzle should not be removed from the Coupling while in the Vent Position. Once all venting has stopped, the Nozzle can safely be moved to the Connect/Disconnect Position (position 4 in figure below). To get from the Vent Position to the Connect/Disconnect Position and remove the Nozzle from the Coupling, you must push the Stop Assembly Lever down. Stop Assembly Lever must be depressed before the handles are moved to Disconnect Position (position 4 in figure below) for disconnection. When Stop Assembly is depressed, handles will move forward slightly. After Stop Assembly Lever has been depressed, handles can be moved to the Connect/Disconnect Position until they stop (the retaining balls should now be visible).



## Features and benefits of the Stop Assembly

The CryoMac®3 Stop Assembly has been re-designed to clear ice from the Stop Assembly area.



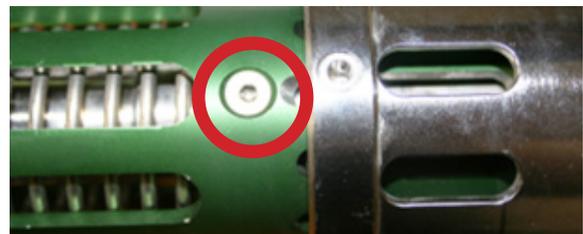
**NOTICE:** When Disengaging the Nozzle, be careful not to pull or force the handles back as this will increase the load applied to the stop pawl making it difficult to depress the stop lever.

The Stop Assembly is inactive when the Nozzle is in the fueling position. The Stop Pawl is always in the ready position and is activated when the pawl catches the Probe Shoulder as the Nozzle moves to the vent position (see Diagram of New Stop Assembly above).

**NOTICE:** When disengaging the Nozzle, if the handles by-pass the vent position, the Stop Assembly and/or Probe Shoulder may be worn. **Immediately stop use and remove the Nozzle from service!** Contact your service department or the manufacturer.

## New Feature Designed to Address Icing Issues

Edges of slots with guide pins designed with ramps to remove ice buildup (see below).



Internal stop ring has been re-machined to breakup frost that forms from within the nozzle barrel.

Reset pawl designed to clear ice from stop assembly area (See Diagram of New Stop Assembly).

# Installation

1. Install hose onto the 1-5/16 UN threaded (SAE 37 degree flare for 1" Tube) connection of the Nozzle. Torque to 108-113 ft-lbs using 30mm wrench and torque wrench.
2. Ensure electrical continuity after making connection.

**NOTICE:** On first use, ensure there are no leaks at flare fitting. No grease or other lubrication should be used when connecting the nozzle to the receptacle.

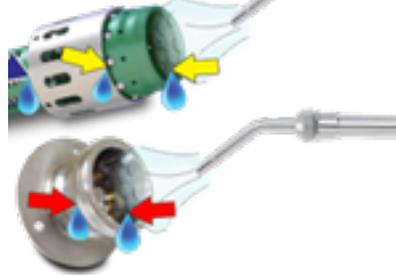
# Operating Instructions

**CAUTION:** Before fueling, be sure to connect the ground cable. This prevents static electricity buildup and possible accidents. Do not attach ground cable to anodized cap or fueling Nozzle. Ground cable must be connected to a conductive spot on the vehicle.

## Coupling Nozzle for Fueling

1. Using dry compressed air or nitrogen, blow out all water and frost buildup, paying special attention to:

Figure 1



- A. Interior and exterior of retaining ball area.
- B. Male receptacle (clear off any moisture or debris that could be present).
- C. Slots just behind the stainless sleeve (see Figure 2).

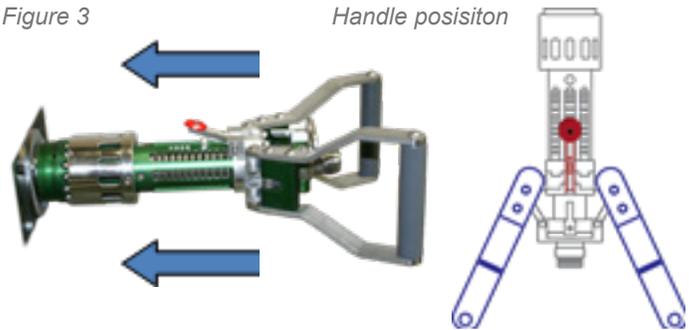


**CAUTION:** Failure to fully remove moisture from both the Nozzle and Receptacle can cause ice to form INSIDE THE FUEL SYSTEM once the Nozzle is connected and LNG is present. This ice can cause dangerous leakage as it can block the poppet assemblies or damage the seals.

**NOTICE:** No grease or other lubrication should be used when connecting the Nozzle to the Receptacle.

2. Push Safety Stop level down to ensure handles are completely back, then slide the Nozzle fully onto the male Receptacle.

Figure 3



**NOTICE:** Frost build up in the slot area (red circled areas) may prevent Nozzle attachment and removal. If Nozzle does not go onto Receptacle, release the handles, depress the Stop Assembly Lever, and then pull back the handles. For the Nozzle to slide onto the Receptacle, the slots must be fully covered. (See images below). For more information, see Trouble Shooting Guide.

### Slots Exposed

Depress release lever, then pull handles back for connect/disconnect position.



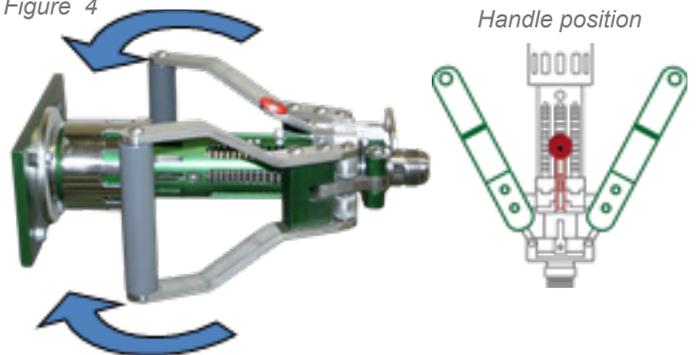
### Slots Fully Covered

Ready to be placed on Receptacle.



3. Push the handles toward the receptacle as far as they will go, the fueling process can begin once the handles are fully forward.

Figure 4



## Uncoupling Nozzle after Fueling

- When fueling is complete, pull handles back to Vent Position 2, in which vent holes are exposed. Hold this position until venting stops (usually just a few seconds).

If gases continue to vent for a prolonged period of time, check to make sure handles are fully back and both the Nozzle and Receptacle seal poppet's are closed and LNG is no longer flowing.

Figure 5

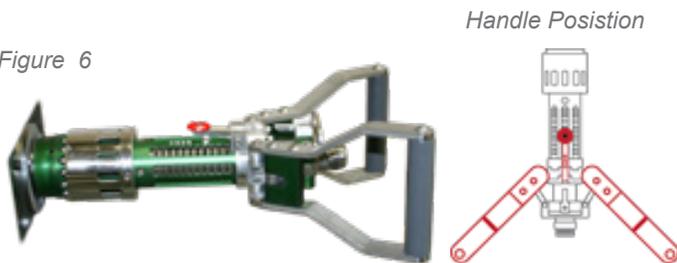


- Once gas has stopped venting out of the holes, press the Stop Assembly Lever.

**CAUTION: DO NOT pull the handles back while pressing the Stop Assembly Lever.**

**NOTICE: If you experience difficulty depressing the Stop Assembly Lever see Trouble Shooting Guide.**

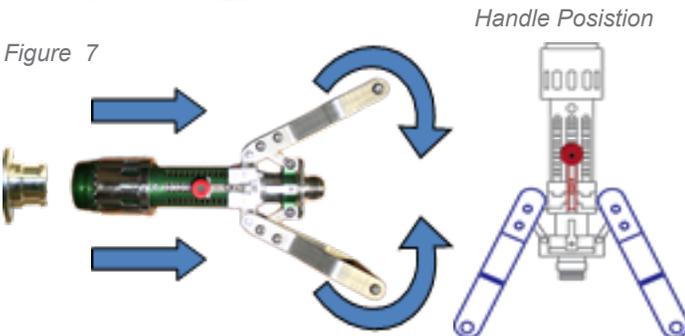
Figure 6



- Pull handles all the way back and toward you to release the Nozzle from the Receptacle. Remove the Nozzle and hang or store in a safe place. Protect the front end of the Nozzle and keep it clean.

**NOTICE: Important to note that the nozzle operator must maintain control of the handles during connecting and disconnecting of the Nozzle and Receptacle. Failure to do so will result in shortened service life of the Nozzle.**

Figure 7



## Product Maintenance and Part Replacement

### Maintenance Schedule

All Macro Technologies Products are thoroughly tested to prevent injury and malfunctions during use. The following schedule is provided as a recommended maintenance guideline to ensure operator safety and continued smooth and proper Nozzle operation.

#### Each Fueling

Before and after each fueling, thoroughly clean the Nozzle and Receptacle openings of any debris or contamination with clean filtered dry compressed air or dry nitrogen.

**Every 8,000 Fills or recommended that station operator establish service interval for their specific operating conditions**

Replace the Receptacle Interface Seal (p/n 14591). The part normally should last through thousands of cycles depending on various environmental factors which can impact seal life. Always use clean fuel and take care to blow off with dry nitrogen or dry compressed air, both mating parts inside the Receptacle and inside and around the nose of the Nozzle.

**Every 3rd Receptacle Interface Seal Replacement or As-Needed (if leakage occurs while disconnected)**

Replace the Seat Assembly and Poppet Assembly (p/n's 14225 and 13960). These parts normally should last through thousands of cycles unless excessive amounts of dirt, grit or contaminants are present. Always use clean fuel and take care to blow off with dry nitrogen or dry compressed air, both mating parts inside the Receptacle and inside and around the nose of the Nozzle.

**As-Needed (if By-Passing the Vent Position)**

Contact your service department or the manufacturer about repair options. The Stop Assembly and Probe Shoulder are mechanical devices that will eventually become inoperative due to wear, corrosion and aging of components. The environment and conditions of use will determine the safe service of life of these parts. Periodic inspection and maintenance are essential to avoid serious injury and property damage.

**NOTICE:**

- Dirt, grit or contaminants will cause premature wear and leakage.
- The vent holes in some manufacturer's receptacles may be sharp and/or contain burrs, if so, they may cause premature seal failures.
- NO lubrication should be used on the Nozzle. If lubrication is used, it could impair the operability of the Nozzle.
- If the Stop Assembly does not function properly, contact Macro Technologies and arrange to have the CryoMac®3 returned and repaired.

## CryoMac®3 Inspection Schedule Checklist

| Inspection  | Each Fueling | Daily |
|---|--------------|-------|
| Before, during and after fueling check for any leaks  | ✓            |       |
| Visually inspect items listed below:  |              | ✓     |
| Cleanliness of Stop Assembly area<br>(See Features and Benefits of the Stop Assembly)   |              | ✓     |
| Check Sleeve for wear<br><div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p style="color: green;">OK</p>  </div> <div style="text-align: center;"> <p style="color: red;">Replace</p>  </div> </div> <p>(See Replacement of Sleeve Assembly)</p> |              | ✓     |
| Check if Spring rest is Present<br> <p>If Spring Rest is missing see Trouble Shooting Guide Issue #1.</p>   |              | ✓     |
| Dry Cycle onto Receptacle and Check items listed below:   |              | ✓     |
| Check Stop Assembly function<br>(See Features and Benefits of the Stop Assembly and Trouble Shooting Guide Issue #9 - Bypassing the vent Position)  |              | ✓     |
| Check hinge pins for free movement<br>(See trouble Shooting Guide Issue #10 - Difficulty Operating Handles)   |              | ✓     |

## Replacement of Poppet Assembly and Seat/Seal Assembly

If the Nozzle is leaking only while connected to the receptacle you may replace the Seat/Seal Assembly (p/n 14255) without replacing the Poppet assembly (p/n 13960). The current poppet assembly can be used with the new Seat/Seal Assembly if the nozzle does not leak when disconnected. If the nozzle experiences any leakage while disconnected, both the Poppet and Seat/Seal Assemblies need to be replaced.



**NOTICE:** If purchased separately, the Receptacle interface seal must be assembled with the brass retainer according to Macro Technologies instructions using the proper seal repair tool kit, p/n 14590.

1. Remove all items from their shipment packaging taking care in handling them so that they are not damaged. Carefully inspect parts to ensure that all sealing surfaces are clean, free of dirt and contamination.
2. Place the wrench in the vise and secure the end of the Nozzle.
3. Align Socket tool (T-2961) with Seat/Seal Assembly hex and place 1" socket wrench onto Socket tool and turn counterclockwise to remove the Seat/Seal Assembly. Once the Seat/Seal Assembly is fully unscrewed, the spring behind the poppet Assembly will push the Poppet Assembly out of the Nozzle.

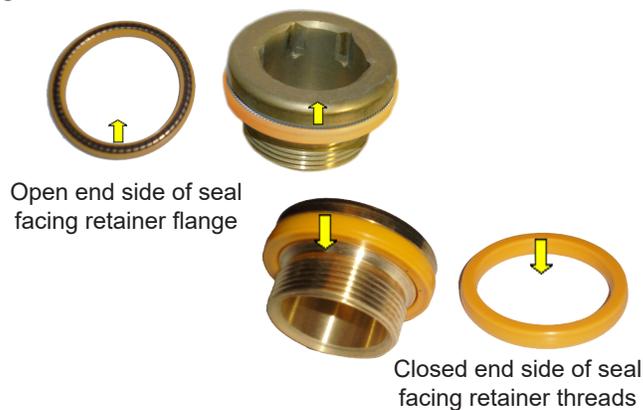
**NOTICE:** Make sure the removal tool is all the way pushed into the mating Seat/Seal Assembly hex or you could possibly strip the retainer. Use care when removing the retainer. If not removed carefully, the poppet may pop out of the Nozzle, potentially causing personal injury and damage to parts.

4. Remove the old Poppet Assembly and Seat/Seal retainer. If the Nozzle is only leaking while connected, the current poppet Assembly does not need to be replaced. However, it should still be carefully inspected to ensure that all sealing surfaces are clean and undamaged.

Inspect Seat/Seal Assembly (p/n 14255) to confirm that receptacle interface seal has been positioned correctly. The seal should be positioned with the open side facing the retainer flange. The closed side should be facing towards the retainer threads.

**CAUTION:** If assembled backwards, the seal will fail prematurely.

Figure 8



If purchased separately, the Receptacle Interface Seal must be assembled with the brass retainer according to Macro Technologies instructions using the proper seal repair tool kit: p/n 14590. See replacement of Interface seal if you are repairing the Receptacle Interface Seal separately.

5. Use the Socket Tool (p/n T-2961) to carefully align Poppet Assembly and Seat/Seal Assembly.
6. Place the Poppet assembly, Seat/Seal Assembly, and Socket Tool on the spring with the tool facing away from the nozzle.

**NOTICE:** Use of socket tool T-2961 is important and critical in order to properly guide all components into place. Failure to properly guide components into place with socket tool, may result in misalignment on critical sealing surfaces. If not aligned correctly, the seal on the Poppet Assembly and/or the seal of the Seat/Seal Assembly may become damaged.

7. Push the Poppet assembly down by hand while threading the Seat/Seal Assembly clockwise onto the Nozzle. Once you feel the assembly threading into the Nozzle, you can remove the pressure.
8. Attach the Socket Wrench and torque to 45 - 50 Ft-Lbs. When tightening with torque wrench, the final turns will exhibit higher levels of torque than by hand. This indicates the thread locking system is engaging.

**CAUTION:** Improper torque will cause failure!

## Replacement of Interface Seal

If the Nozzle is leaking only while Connected to the receptacle you may replace the receptacle interface seal without replacing the entire Seat/Seal assembly (p/n 14255) and the Poppet assembly (p/n 13960). The current Seat assembly can be used if carefully inspected to ensure that all sealing surfaces are clean and undamaged. It is recommended to change the Seat Assembly every 3<sup>rd</sup> interface seal replacement. The current poppet assembly can be used with the new Seat/Seal Assembly if the Nozzle does not leak when disconnected. If the Nozzle experiences any leakage while disconnected, both the Poppet and Seat/Seal Assemblies need to be replaced.



At this point, the old Poppet assembly and Seat/Seal Assembly have been removed from the Nozzle. See Replacement of Poppet Assembly and Seat/Seal Assembly.

1. Remove all items from their shipment packaging taking care in handling them so that they are not damaged. Carefully inspect parts to ensure that all sealing surfaces are clean, free of dirt and contamination.
2. Remove the old interface seal with care not to scratch the retainer sealing surfaces.
3. On a clean, flat surface, place the retainer with the threads up.
4. Carefully slide the larger end of the seal guide tool over the threads until the guide bottoms out on the shoulder of the retainer.
5. Slide the interface seal over the guide so the open (spring) end of the seal is facing down towards the retainer. Let it rest on the shoulder of the guide.
6. Slide the seal ring onto the guide and let it rest on the seal.
7. While holding the ring/seal combination as level as possible, press the seal firmly over the shoulder of the guide and all the way down to the seal's final resting place on the shoulder of the seal retainer.
8. Remove the seal ring then the guide from the assembly and store the seal ring and guide tools fitted together such that the sedges that interface the seal will not get damaged. Damage to these surfaces can cause damage to new seals on future repairs. The Seat/Seal Assembly is now complete.

**CAUTION:** Failure to follow the safety warnings may result in serious injury.

## Replacement of Sleeve Assembly



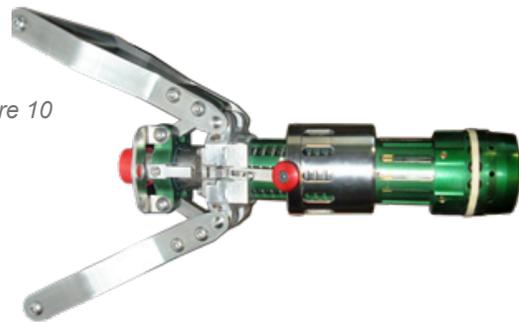
1. Remove the Nozzle from service. Place the Nozzle with the handles down and in the Connect/Disconnect Position 4. Get the required tools (5/32" and 1/8" Allen Wrench) and the parts (Kit Part Number 14103 containing a sleeve, nose piece, 16 balls, 6 guide pins, and a rubber band).
2. Place a rubber band around the balls to prevent them from falling out during replacement.

Figure 9



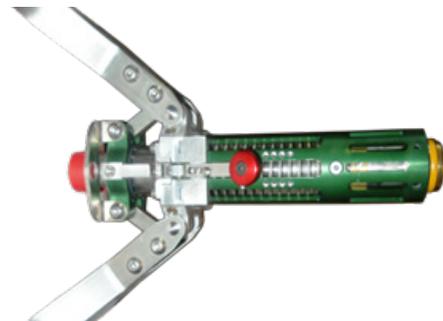
3. Remove the four pins from the stainless Sleeve using the 5/32" Allen Wrench and store them in a safe place, these pins will be re-used later.
4. Lower the stainless steel Sleeve so it sits on the Handle Mounts.

Figure 10



5. Remove the six pins from the Ball cage using a 1/8" Allen Wrench. Discard old pins.
6. Lift the Ball Cage off the Nozzle.
7. Lift the stainless steel Sleeve off the Nozzle.

Figure 11



8. Slide the new stainless steel Sleeve onto the Nozzle and set it on the handle mounts.

9. Slide the new Ball Cage onto the Nozzle.
10. Place a rubber band around the Ball Holes to prepare to put the balls in.

Figure 12



11. Place the Balls in the holes one by one by lowering the rubber band, sliding the ball in, and then raising the rubber band back to hold the ball in place.
12. Once all the balls are in, align the holes in the nozzle with the holes in the ball housing and screw in the six new pins using the 1/8" Allen Wrench. Torque to 30-40 in-lbs. Use Loctite 242 on pins.

13. Align the four holes so that they are visible through the slots in the Nozzle.

Figure 13



14. Raise the Sleeve and screw the four pins (that were saved in Step 3) into place with the 5/32" Allen Wrench. Torque pins to 145-155 in-lbs. Use Loctite 242 on pins.
15. Remove the rubber band.

#### NOTICE

Macro Technologies, LLC warrants products and repair kits manufactured by it to be free from defects in materials and workmanship under normal use and service for a period of 12 months from the date of installation or operation or 18 months from the date of shipment from the factory, whichever is earlier. If within thirty days after buyer's discovery of what buyer believes is a defect, buyer notifies Macro Technologies, LLC thereof in writing, Macro Technologies, LLC, at its option, and within forty-five days, will repair, replace F.O.B. point of manufacture, or refund the purchase price of that part or product found by it to be defective. Failure of buyer to give such written notice within thirty days shall be deemed an absolute and unconditional waiver of any and all claims of buyer arising out of such defect.

This warranty does not extend to any product or part that is not installed and used in accordance with Macro Technologies, LLC printed instructions, all applicable state and local regulations, and all applicable national standards, such as those promulgated by NFPA, DOT, CGA, and ANSI. This warranty does not extend to any product or part that has been damaged by accident, misuse, abuse or neglect, nor does it extend to any product or part which has been modified, altered, or repaired in the field.

Except as expressly set forth above, and subject to the limitation of liability below, Macro Technologies, LLC makes NO OTHER WARRANTY, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, with respect to its products and parts, whether used alone or in combination with others. Macro Technologies, LLC disclaims all warranties not stated herein.

#### LIMITATION OF LIABILITY

Macro Technologies, LLC total liability for any and all losses and damages arising out of any cause whatsoever shall in no event exceed the purchase price of the products or parts in respect of which such cause arises, whether such cause be based on theories of contract, negligence, strict liability, tort or otherwise.

Macro Technologies, LLC shall not be liable for incidental, consequential or punitive damages or other losses. Macro Technologies, LLC shall not be liable for, and buyer assumes liability for, all personal injury and property damage connected with the handling, transportation, possession, further manufacture, other use or resale of products, whether used alone or in combination with any other products or material.

If Macro Technologies, LLC furnishes technical advice to buyer, whether or not at buyer's request, with respect to application, further manufacture or other use of the products and parts, Macro Technologies, LLC shall not be liable for technical advice and buyer assumes all risks of such advice and the results thereof.

NOTE: Some states do not allow the limitation or exclusion of incidental or consequential damages, so the above limitations or exclusions, wholly or partially, may not apply. The portions of this limited warranty and limitation of liability shall be considered severable and all portions which are not disallowed by applicable law shall remain in full force and effect.

#### WARNING

All Macro Technologies, LLC products are mechanical devices that will eventually become inoperative due to wear, corrosion and aging of components made of materials such as rubber, etc. The environment and conditions of use will determine the safe service life of these products. Periodic inspection and maintenance are essential to avoid serious injury and property damage.

Many Macro Technologies, LLC products are manufactured components which are incorporated by others on or in other products or systems used for storage, transport, transfer and otherwise for use flammable and explosive liquids and gases. Such substances must be handled by experienced and trained personnel only, using accepted governmental and industrial safety procedures.

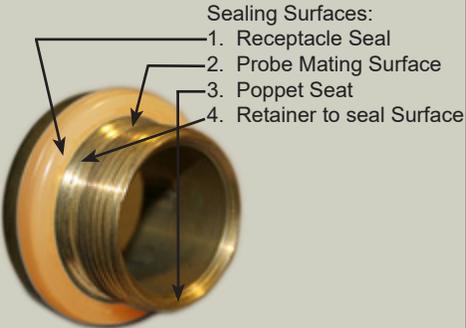
#### NOTICE TO USERS OF PRODUCTS

The Limited Warranty stated above is a factory warranty to the first purchasers of Macro Technologies, LLC products. Since most users have purchased these products from Macro Technologies, LLC distributors, the user must within thirty (30) days after the user's discovery of what user believes is a defect, notify in writing the distributor from whom he purchased the product/parts. The distributor may or may not at the distributor's option, choose to submit the product/parts to Macro Technologies, LLC pursuant to its Limited Warranty. Failure by buyer to give such written notice within thirty (30) days shall be deemed an absolute and unconditional waiver or buyer's claim for such defects. Acceptance of any alleged defective product/parts by Macro Technologies, LLC's distributor for replacement or repairs under the terms of Macro Technologies, LLC's Limited Warranty in no way obligates Macro Technologies, LLC to the terms of the above warranty.



Printed in the U.S.A. REV B  
Instruction Sheet CRYOMAC-350

## Trouble Shooting Guide

| Issue   | Possible Cause  | Remedy  |
|---|---|---|
| 1. Difficulty depressing Stop Assembly                | Ice buildup on Stop Assembly or Spring Rest is missing.   | Using dry compressed air or nitrogen, blowout all water and frost buildup. One can also move the handles back and forth between the vent position and fill position. If Spring Rest is missing contact your service department or manufacturer. |
| 2. Difficulty Connecting                              | Nozzle handles are in the vent position.  | Depress the Stop Assembly Lever (without pulling on handles), release Stop Assembly Lever then pull handles all the way back to the disconnect position.  |
| 3. Difficulty Connecting/Disconnecting                | Loose Guide Pins on the Sleeve.   | Torque pins to 145 -155 in-lbs.   |
| 4. Difficulty Disconnecting                           | Ice buildup on nozzle Stop Assembly and/or Guide Pin slots  | Using dry compressed air or nitrogen, blow out all water and frost buildup. Move the handles back and forth between the vent position and fill position.  |
| 5. Leak while Nozzle is disconnected                  | Scratched or scored sealing surface on Poppet Assembly  | Replace Poppet Assembly (p/n 13690).  |
| 6. Leak while nozzle is connected                     | Scratched or scored sealing surface on Poppet Assembly<br><br> | Replace Seat Assembly (p/n 14255)   |
| 7. Leak between fueling hose and nozzle Flare Fitting | Damaged sealing surface on flare fitting.   | Contact Macro Technologies for brass cone washer to place between make flare fitting threads and hose fitting.  |
| 8. Excess venting after fueling                       | Handles are not pulled all the way back (position 3).<br><br>Nozzle and/or Receptacle Seal Poppet's are not closed properly.                      | Pull handles all the way back until they reach a positive stop.<br><br><b>Stop operation if leakage occurs.</b>   |
| 9. Bypassing the vent position                        | Stop Assembly and/or Probe Shoulder are worn.   | <b>Stop operation and remove nozzle from service.</b><br><br>Contact your service department or the manufacturer.   |
| 10. Difficulty moving handles                         | Damaged or missing hinge pins.  | <b>Stop operation and remove Nozzle from service.</b><br><br>If any of the hinge pins on the Nozzle fall off or are missing this will jeopardize the alignment of the prober and incur costly damage to the unit.                               |

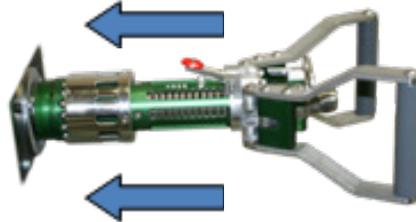
# CryoMac<sup>®</sup>3 LNG Fueling Nozzle - One Page Guide

## Coupling the Nozzle for fueling

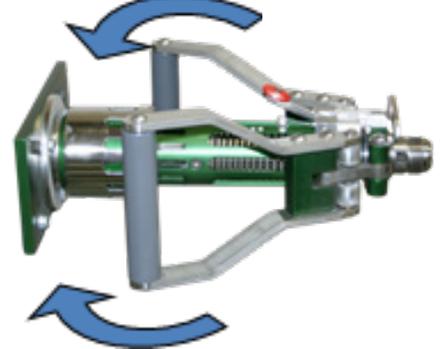
**Step 1)** Blow moisture off Nozzle and Receptacle using dry compressed air or nitrogen.



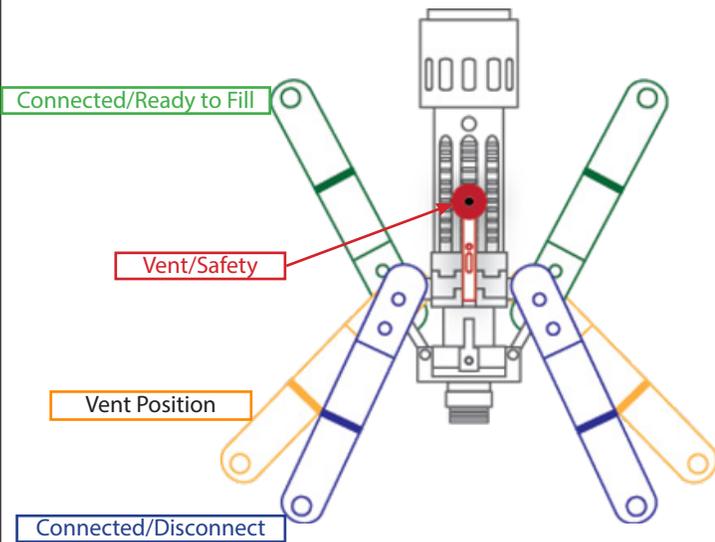
**Step 2)** Push Safety Stop Lever down to ensure handles are completely back, then slide the Nozzle fully into the male Receptacle.



**Step 3)** Push handles toward the Receptacle as far as they will go, the fueling process can begin once the handles are fully forward.

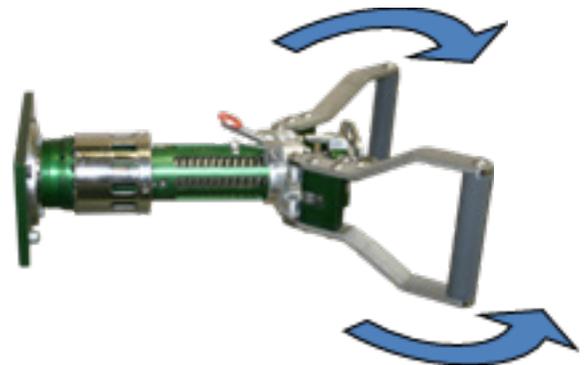


## Handle Positions

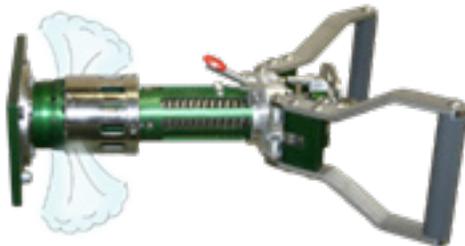


## Uncoupling the Nozzle after fueling

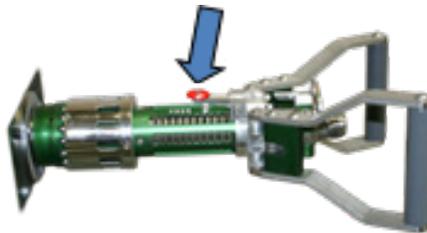
**Step 4)** Once fueling has finished, pull the handles backward, away from the Receptacle until they will not move any further.



**Step 5)** Let the gases vent out of the Nozzle from the exposed vent holes until the venting stops (usually just a few seconds).



**Step 6)** Once the gas has stopped venting, press the Stop Assembly Lever. **DO NOT pull the handles back while pressing the Stop Assembly Lever.**



**Step 7)** Pull the handles all the way back and toward you to release the Nozzle from the Receptacle.

