



Operations and Maintenance Manual  
**500 Gallon Reservoir**



**OPERATIONS AND MAINTENANCE MANUAL**

02/15/2018

Date:

500 GALLON RESERVOIR DPT 1200 GALLON BLADDER

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### 1. Introduction

The purpose of this document is to provide a functional description of the 500 Gallon Reservoir and to provide information relating to its Maintenance and Operation.

***It is a requirement that the ROV Operators read this manual thoroughly prior to mobilization for offshore work in order to familiarize themselves with the tooling package and to allow time for fabrication of any mounting hardware required to adapt the tooling to the specific ROV being utilized.***

### 2. System Overview

The 500 Gallon Reservoir provides a 500 gallon cistern for subsea use. The storage bladder is made of reinforced neoprene. Compatible fluids include, Fuel, seawater, and water glycol. The unit is filled from topside and then deployed and set subsea as a stand alone unit for a source of Glycol for Flushing

The 500 Gallon Reservoir includes the following components on the control panel:

- Stab Manifold: A single port 17-H hot stab manifold for fluid delivery.
- Paddle Valve: An ROV manipulated ½" ball valve.

#### 2.1. Abbreviations

GA	General Assembly
OMM	Operation & Maintenance Manual
PN	Part Number
ROV	Remotely Operated Vehicle
FSW	Feet of Sea Water
PSI	Pounds per Square Inch (pressure unit)
M	Meter
Kg	Kilogram
GA	General Arrangement



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### 3. Specification

#### 3.1. System Specs

##### Dimensions of 500 Gallon Bladder Skid

Height:	26 inches
Width:	96 inches
Depth:	96 inches

##### Weights of 500 Gallon Bladder Skid

Weight in Air (Empty):	3300 lbs
Weight in Air (Full w/Water):	7450 lbs

#### 3.2. Component Specs

The 500 Gallon Bladder Skid contains the following sub-systems:

- 3/4" ROV Operable Paddle Valve
- 17-H Single Port Hot Stab
- 17-H Single Port Manifold

##### **3.2.1. Paddle Valve Specification**

Weight in Air:	24 lbs [10.9 kg]
Weight in Seawater:	20 lbs [9.1 kg]
Max. Internal Pressure:	10,000 PSI [689 bar]
Depth Rating:	8,000 fsw [2,438 m]

##### **3.2.2. 17-H Hot Stab**

Weight in Air:	5.7 lbs [2.6 kg]
Weight in Seawater:	4.8 lbs [2.2 kg]
Max. Internal Pressure:	10,000 PSI [689 bar]

##### **3.2.3. 17-H Manifold**

Weight in Air:	7 lbs [3.2 kg]
Weight in Seawater:	6 lbs [2.7 kg]
Max. Internal Pressure:	10,000 PSI [689 bar]

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### 4. Assembly

Install the ROV panel in an upright position as shown below. Be sure to tighten all fasteners to properly secure the panel.



There is a ½" hose located in the Pelican case. This hose should be connected to the JIC adapter coming off of the paddle valve assembly, and the other end will connect to the ½" JIC connection on the bladder. When connecting the hose to the bladder, be sure to use a back-up wrench, as not doing so could lead to damaging the bladder.

When installing the ROV handle, be sure to centre the handle along the "T bar" and tighten all 10 bolts properly.



### 5. Operation Procedures

#### 5.1. Bladder Fill

- Connect the discharge hose from the pump to the QD on the fill port of the bladder
- Open the ROV Paddle Valve connected to the manifold
- Pump fluid until all the air is expelled out of the manifold and the bladder is filled to the desired level.
- Close the ROV Paddle Valve
- Install Provided Pressure relief valve
- Check for leaks



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### 5.2. Pre-Dive Inspection

- Check all lift points, slings, etc. for signs of damage or wear.
- Check tool for obvious signs of damage to the basket, panel, or bladder. Repair as needed.
- Verify all fasteners are tight and that the bladder is properly secured into place with straps.
- Check tubing and connections on the panel for loose connections or damage to tubing (dents, splits, kinks, etc.).
- Check condition of hydraulic hoses. Inspect for cuts, abrasions, kinks, loose connectors, etc.
- Ensure the ROV Paddle Valve is closed prior to diving.
- Ensure the check valve on the top of the bladder is properly installed to not allow water intrusion into the bladder.
- Ensure the bladder is not completely collapsed.
- Ensure the safety straps are properly secure to hold the bladder in place.

### 5.3. Deployment Procedures

- Ensure the reservoir is in reach of the vessel crane before filling.
- Fill the bladder according to the section above.
- The vessel crane line will be secured to the 500 Gallon Bladder via an ROV friendly hook. Before over boarding, ensure the footprint area of skid, where skid will be landed on sea floor, is free and clear of equipment or debris.
- Overboard the 500 Gallon Bladder Skid
- Once over boarded, the 500 Gallon Bladder should be inspected for leaks and or damage from over boarding.
- ROV to follow the 500 Gallon Bladder from inspection at surface to depth.
- Descent of the 500 Gallon Bladder should start at 20 feet per minute. Allow for access air in the bladder to bleed.
- At 300fsw slowly increase speed to 100 ft/min ensuring bladder is being lowered safely and at the correct orientation.

### 5.4. Subsea Operations

- The ROV will guide the skid to the seabed and can disconnect it from the winch line after the tension is removed in the rigging.
- The winch line will be recovered to a client specified safe operating depth or to surface as determined for the operations.
- A fluid transfer hose will be available subsea for the ROV. This may be coiled on the skid top or in an ROV friendly rack. The hose will be equipped with a 17H hot stab at both ends.
- The ROV will stab one end into the 500 Gallon Bladder and spread out the hose to



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the other client specified piece of subsea equipment.

- Once at the specified subsea equipment, the ROV will stab the hot stab end into the appropriate receptacle.
- The ROV will return to the skid and open the isolation valve and operate as per client instruction.

#### 5.5. Emergency Disconnections

- To disconnect in case of an emergency, close the ROV paddle valve and remove the 17H hot stab connected to the 500 Gallon Bladder Skid.

#### 5.6. Recovery Operations

(To be used if a 500 Gallon Bladder receives any fluid at depth to be recovered to the surface.)

- ROV to follow the 500 gallon bladder from the job site to as close to the surface as possible.  
**NOTE** – IF AT ANY POINT DURING THE BLADDER RECOVERY THE ROV CREW NOTICES ANY OFFGASSING AN ALL STOP IS TO BE CALLED UNTIL OFFGASSING STOPS THRU VENT
- Once the bladder reaches @ 500 FSW slow the recovery speed down to 20 feet per minute.
- At @ 300 FSW stop the recovery for 5 minutes. Have the ROV monitor the bleed off valve during this stop.  
**NOTE** – If bladder shows any sign of off gassing, stay at @ 300 FSW until bladder equalizes
- Continue recovery at 20 feet per minute to @ 200 FSW.
- Stop recovery for 5 minutes and monitor the bleed off with the ROV.  
**NOTE** – If bladder shows any sign of off gassing, stay at @ 200 FSW until bladder equalizes
- Continue recovery at 20 feet per minute to 150 FSW.
- Stop recovery for 5 minutes and monitor the bleed off with the ROV.  
**NOTE** – If bladder shows any sign of off gassing, stay at @ 150 FSW until bladder equalizes
- Continue recovery at 20 feet per minute to 100 FSW.
- Stop recovery for 5 minutes and monitor the bleed off with the ROV.  
**NOTE** – If bladder shows any sign of off gassing, stay at @ 100 FSW until bladder equalizes
- Continue recovery at 10 feet per minute to 66 FSW.
- Stop recovery for 5 minutes
- Continue recovery at 10 feet per minute to 33 FSW.





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- Stop recovery for 10 minutes
- Continue recovery at 10 feet per minute to deck.

This should allow for the required time to bleed any excess gas. It will add to the recovery time but prevent environmental concerns.

### 5.7. Surface End Operations

- Once the bladder has returned to the surface, it must be made ready for reload or storage.
- If the skid is to be stored, any remaining fluid will have to be kept or disposed of properly.
- If the tank is to be refilled any water must be displaced to prevent fluid contamination.
- If the bladder is to be stored, see “Maintenance and Storage” section 6.0.

**NOTE:** This manual only provides direction on how to operate the various functions at the direction of the client. It does NOT provide an application specific operation procedure.

### 5.8. Transportation

- This reservoir is not intended for chemical transport aboard the vessel. All fluid should be removed to a suitable DOT approved container for transport.

## 6. Maintenance and Storage

### 6.1. Post Dive Maintenance

The following maintenance is required after EVERY dive:

- Once the bladder has returned to the surface, it must be made ready for reload or storage.
- If the skid is to be stored, any remaining fluid will have to be kept or disposed of properly.
- If the tank is to be refilled, any water must be displaced to prevent fluid contamination. Refer to section 5.1 for Refilling procedure.
- If the bladder is to be stored, the bladder should be flushed thoroughly prior to doing so. Detergent will be dependent on bladder’s fluid content. Cleaning company shall only use a surfactant that is compatible with the 500 Gallon Bladder liner. *Flushing Steps may be altered by contractor if approved by Scorpion Subsea.*
- The complete system should be washed down with fresh water to prevent excessive corrosion.



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### 6.2. Storage

Once operations have been completed, the following maintenance must be completed prior to storing the system:

- Thoroughly rinse the system with fresh water.
  - If the bladder is to be stored, it will need to be flushed clean using fresh water. Use 2 to 3 cycles of fresh water to flush out control fluids. Water amounts depend on the vessel's fresh water supply.
  - The complete system should be washed down with fresh water to prevent excessive corrosion.
- Disconnect, clean, and cap/plug all hydraulic fittings.

Proper maintenance of the tool is required to ensure it will function properly before each dive.

Before and after each dive:

- Check all fasteners and fittings.
- Check for structural damage.
- Examine all hoses and fittings and tighten/replace those that are loose and/or leaking.
- Examine all hoses for cuts, tears, kinks, and/or abrasions. Replace as necessary
- Rinse with fresh water and dry.
- Touch-up chipped or missing paint.
- Upon each deployment/recovery, the rigging shall be inspected. Slings to be replaced as needed. Please notify Scorpion Subsea ahead of time so arrangements can be made to replace slings.