

BIOPAK 240 **REVOLUTION**



Facepiece Hydration System User Manual

Biomarine

Biomarine-Ntron, Inc.

456 Creamery Way

Exton, Pennsylvania 19341 U.S.A.

Phone: (610) 524-8800

Fax: (610) 524-8807

Web: www.biopak240R.com

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Cautions and Limitations

- Failure to properly use and maintain this product could result in injury or death.
- Never substitute, modify, add or omit parts. Use only exact replacement parts in the configuration as specified by Biomarine Incorporated.
- The on-going effectiveness and reliability of any protective breathing equipment is dependent upon the user/owner's standard of care in maintaining the equipment; and, the user/owner's expertise in using the equipment.
- The user shall reference and abide by all cautions and limitations provided in the respirator manuals.
- The hydration system is suitable for use only with the Biomarine BioPak 240R respirator and associated AV3000 facepiece.
- The hydration system components have not been evaluated for use in applications involving direct open flame or high radiant heat.
- The hydration system components have not been evaluated for use in applications that may expose the user to chemical, biological, radiological or nuclear agents (CBRN).
- DO NOT attempt to fit the hydration system to any other manufacture or model of respirator or facepiece other than the BioPak 240R.
- The user bears full responsibility for properly maintaining this equipment including inspections, cleaning, maintenance and use.
- The hydration system shall be thoroughly cleaned and disinfected as well as leak checked prior to each use.
- If the respirator is to be utilized without the services of the hydration system it is strongly suggested to remove the interface assembly from the facepiece and re-install the facepiece voice emitter.
- Hydration of a user is critical when working in hot conditions or when experiencing heavy work-loads. Biomarine makes no claim that the use of the hydration system will prevent a user from experiencing over heating of core body temperature or preventing user dehydration.
- It is the sole responsibility of the user to adequately select and utilize the drinking fluid to be placed in the bladder of the hydration system. The hydration system was designed for water-based liquid and was not designed with the intent to handle alcohol-based liquids.

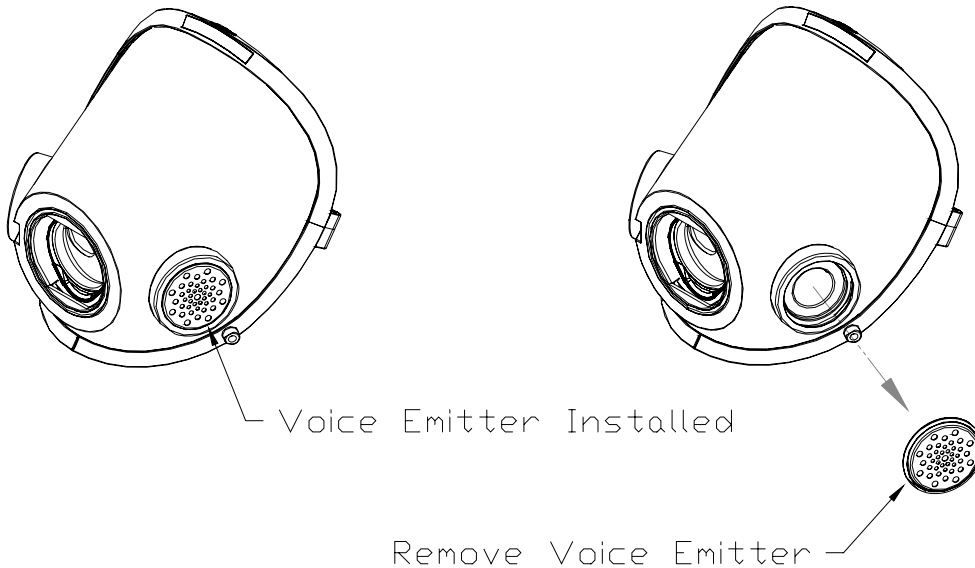
Hydration System Installation

The hydration system will install directly into the BioPak 240R facepiece and onto the BioPak 240R harness waist belt. The user should be aware that use of the hydration system will require the loss of one of two voice emitters from the facepiece.

The hydration system can be installed on either side of the facepiece as per the user's preference. Installation of the system is outlined below.

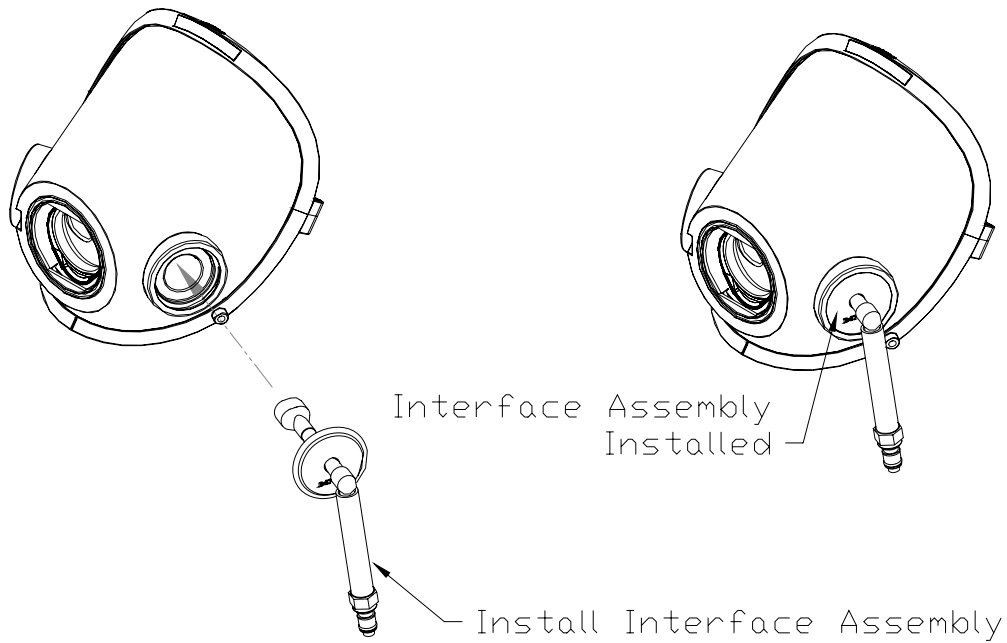
1. Prior to installation, the hydration system should be unpacked, washed and leak tested according to procedures provided in the maintenance section of this manual.
2. Using a blunt pry bar, remove one voice emitter from one side of the facepiece. Note that the hydration system can be installed on either side of the facepiece. Removal is achieved by sliding the end of the pry bar under the voice emitter and gently sliding the depressor around the circumference of the voice emitter while prying out. Save the voice emitter for re-installation back into the facepiece should the hydration system not be utilized during respirator use.

Warning: Do not damage the voice emitter cup of the facepiece during voice emitter removal. Facepiece emitter cup shall not be cut, slit marred or otherwise damaged. A damaged facepiece emitter cup may prevent proper sealing of the installed voice emitter or hydration system.



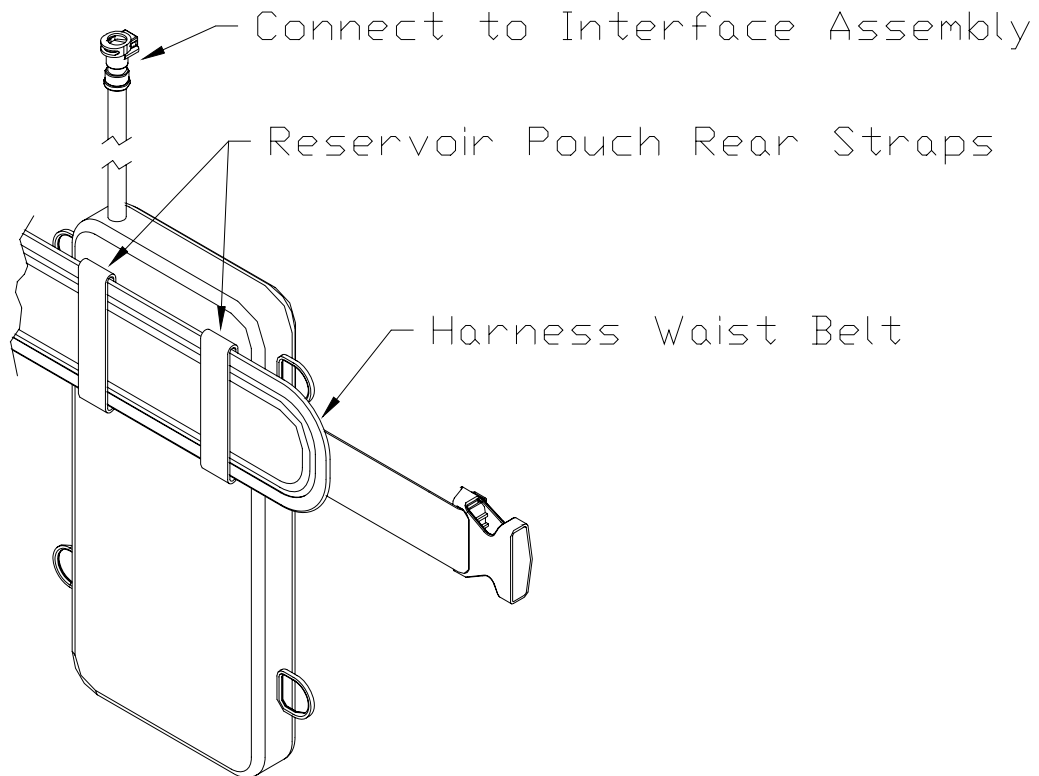
3. Install the interface assembly of the hydration system into the voice emitter cup of the facepiece. Slide the pry bar under the lip of the pocket and gently slide the depressor around the circumference of the interface disk to pry the cup edge over the disk. Make sure that the disk is fully seated within the cup.

Warning: Do not damage the voice emitter cup of the facepiece during hydration system installation. Facepiece emitter cup shall not be cut, slit marred or otherwise damaged. A damaged facepiece emitter cup may prevent proper sealing of the installed voice emitter or hydration system.



4. Slide the waist belt of the BioPak harness through the straps on the rear of the reservoir pouch. Installation should be made onto the side of the waist belt that is located directly below the interface assembly on the facepiece.

Caution: If the respirator is to be utilized without the services of the hydration system it is strongly suggested to remove the interface assembly and re-install the voice emitter into the facepiece. This will keep the interface assembly end connector from becoming filled with dirt and will remove the hanging tube of the interface from the facepiece.



Hydration System Fitting

The hydration system is factory-supplied with a long tube exiting the top of the reservoir assembly pouch. The user must first determine the desired routing of this tube up to the facepiece and fit the tubing length to the specific user. The following procedure will guide the user through hydration system fitting.

Required Equipment (not provided):

- * Marking Pen
 - * Razor Knife
1. Don the BioPak as per directives in the BioPak User Manual.
 2. Don the BioPak facepiece as per directives in the BioPak User Manual but do not connect the respirator hoses to the facepiece.
 3. Mount the reservoir to the right or left side respirator waist harness. The reservoir should be located on the same side that the interface assembly of facepiece is mounted.
 4. Route the tubing from the reservoir up to the interface assembly connection as desired. It is suggested that the tubing be routed up the back of the user so that it will not interfere with the user during use.
 5. Once the tubing has been routed determine the required length of the tubing. It is best to turn the head away from the reservoir location and mark the tubing to fit this distance.
 6. Doff the Biopak and facepiece and remove the reservoir assembly from the waist belt.
 7. Cut the reservoir tube to length as marked in step 5.
 8. Carefully extract the fitting from the cut length of tubing and reinstall it into the end of the reservoir tube.
 9. Don the BioPak and facepiece and connect the reservoir tube to the facepiece interface assembly.
 10. Test head movement to verify that the hydration system does not restrict movement or place the tubing into a position that could interfere with the user.
 11. Connect the BioPak breathing hoses to the facepiece and turn on the oxygen supply as per directives in the BioPak User Manual. Verify that the hydration system is positioned as desired, that the hydration system does not restrict head movement and the that the hydration system will not interfere with the user in an adverse manner.
 12. Turn off the oxygen in the BioPak and doff the respirator and facepiece as per directives in the BioPak User Manual.
 13. Submit the hydration system to leak testing and cleaning as per the matinenance procedures of this manual.

Hydration System Use

The hydration system consists of the interface assembly and the reservoir assembly. The interface assembly will provide the pass through into the facepiece to admit liquid from the reservoir. The reservoir assembly will hang from the waist belt of the BioPak harness and will hold up to 1.5-liters of liquid. The two assemblies are connected together during use via the feed tubing. Each assembly contains a valved connector on the end of the tubing. The valved connectors will permit disconnection of the assemblies in the field without fear of liquid spilling or internal BioPak atmosphere leakage.

Reference the illustrated parts list for system component identification.

Preparing for Use

1. In an atmosphere known to be free of toxins, fill the reservoir bag with up to 1.5-liters of liquid. Filling is achieved by opening the reservoir pouch, unscrewing the bladder cap, filling the bladder, replacing the bladder cap and closing the pouch. Make sure that the bladder lid is securely tightened.

Caution: Do not overfill the bladder of the reservoir. Overfilling to volumes larger than 1.5-liters may cause bladder rupture or weakening.

2. Don the BioPak as per instructions in the BioPak User Manual. If the reservoir is not positioned on the waist belt of the Biopak place it into position now and buckle the waist belt.
3. Perform the facepiece check valve test as detailed in the BioPak User Manual. This test will also insure that the interface disk of the hydration system is fully seated in the facepiece.
4. Route the tubing from the reservoir up to the interface assembly and connect. Note that the tubing can be routed through and around the harness components of the BioPak to keep the tubing from getting in the way of the user or from presenting a snag hazard. Do not kink the tubing during routing.

➤ **HINT:** *The tubing lengths can be adjusted by the user by removing one end, trimming the tubing to the desired length and reattaching the tubing. Always perform a hydration system leak test before use after trimming tubing lengths.*

5. Lightly tug on the tubing connection between the reservoir and interface assemblies to verify that it is fully connected and secure.
6. Once connected the tubing run will be open. Push in on the interface assembly tube to push the bite-valve of the assembly into the mouth. Bite the bite-valve while sucking in to draw liquid into the mouth. This will verify that the bite-valve is properly installed and that the tubing run is open.
7. Withdraw the interface assembly tube to move the bite-valve out of the way.
8. The user is now ready to enter into the mission.

Mission Use

1. Drinking liquid from the reservoir can be achieved at any time by pushing in on the interface assembly tube to push the bite-valve into the user's mouth. Once the bite-valve is positioned in the user's mouth lightly bite down and suck to draw liquid into the mouth.
2. When it is not desired to drink the user should pull out on the interface assembly tube to withdraw the bite-valve from interfering with the user. The interface has a positive stop to prevent the user from pulling the tube completely out of the facepiece during operation.
3. If at any time during the mission the hydration develops a leak, the user should immediately retire to a safe location to remove the hydration system and BioPak. Leakage of the hydration system may result in rapid loss of internal breathing atmosphere from the BioPak.

After Use

1. Retire to a safe location known to be free of toxins and adequately supplied with oxygen.
2. Disconnect the tubing run between the reservoir and interface assemblies by pushing in the connector release button and pulling the tubing runs apart.
3. Close the oxygen bottle of the BioPak and doff the BioPak as per instructions in the BioPak User Manual.
4. Submit the hydration system to maintenance for cleaning, drying and testing.

Maintenance Procedures

In order to keep the hydration system in peak condition it should be cleaned, dried and tested after each use. This will alert the benchman of any damage, insure leak-free operation and prevent the growth of mold or bacteria within the system.

Washing

1. Remove the reservoir assembly from the BioPak waist belt.
2. Open the pouch, remove the bladder and unscrew the bladder cap. Dump any remaining liquid from the reservoir.
3. Fill the bladder with ½ to 1-liter of warm water and add one cleaning tablet, B2-06-6001-74-0.
4. Replace the cap back onto the bladder and wait 15-30 minutes. During the waiting period shake the bladder often and allow some of the water to travel up into the tube.
5. After the 15-30 minute period, open the bladder cap and discard the treated water. Rinse the bladder well with fresh water and insure that no remnants of the tablet remain in the bladder.
6. Allow the bladder assembly to air dry.
7. The interface assembly, installed in the facepiece, can be cleaned as per the standard cleaning and disinfecting procedure for the facepiece as outlined in the Biopak Benchman Manual.
8. Reinstall the bladder back into the reservoir pouch.

Testing

1. Inspect all of the components of the hydration system and replace any component that appears to worn, damaged or appears suspect.
2. Remove the bite-valve from the interface assembly and connect the large diameter tubing end of the Leak Test Fixture, B6-02-5002-60-0, to the open end of the interface assembly feed tube where the bite-valve installs. The reservoir should be disconnected from the interface assembly for this test.
3. Connect the small diameter tubing end of the Leak Test Fixture to the barbed fitting of the BioPak Test Kit so that it is connected to the pressure gauge of the test kit.
4. Use the hand pump of the Leak Test Fixture to pump the internal volume of the hydration system up to 6-8 inches water column pressure as read on the test kit gauge.

Hand Pump Operation: The following will provide details on operation of the hand pump.

- A. Squeeze the large bulb while depressing on both sides of the “S” button to push air into the assembly.
- B. Depress both sides of the “A” button to admit additional air into the pump bulb.
- C. Repeat steps A and B multiple times until the proper pressure level is achieved.
- D. Once the proper pressure level is achieved tightly close the pinch clamp located on the short tubing run of the leak test fixture to hold the pressure in the assembly. Do not rely upon the check valves of the hand pump to hold the pressure in the assembly.
- E. To depressurize the assembly, open the pinch valve then pull the connection tube off the assembly.

5. Note the pressure reading of the test kit gauge and allow the assembly to sit undisturbed for a 1-minute period. The pressure reading shall not drop by more than 0.40 inches water column in the 1-minute period to be considered leak-tight.
6. Use Leak-Tek leak detection fluid from the test kit to identify leaking areas should the assembly fail the leak test. Note that the entire assembly can also be submerged in water to identify leak points. Repair or replace components that show evidence of leakage.
7. If the assembly passes the leak test then remove all equipment and place back onto the BioPak or into storage until the next use.
8. Remove the reservoir from the pouch and fill with clean water. Close the fill cap of the reservoir once filled.
9. Verify that water has traveled up the connection tube and that the connection tube port on the reservoir bag is submerged. Observe the quick disconnect of the connection line and reservoir bag tube fitting port and verify that no water is leaking from either of these locations. Leaks from these locations will require replacement of the reservoir or the quick disconnect fitting.
10. Once testing has completed, dump the water from the reservoir and allow to fully dry before storing.

Specifications

Warning: The hydration system described in this manual is suitable only for use with the Biomarine BioPak 240R and its associated facepiece. Use of this hydration system with any other respirator or facepiece will void the warranty and may place the user in a hazardous situation that could lead to injury or death.

Reservoir Capacity:	1.5-liters
Reservoir Bag Dimensions:	165 x 356 x 51 mm (6.5 x 14.0 x 2.0 inches)
Reservoir Bag Weight, Empty:	368 grams (13 ounces)
Reservoir Bag Weight, Full of Water:	1.9 kg (4.2 pounds)
Interface Assembly Weight:	36 grams (1.3 ounces)
Operational Temperature Range:	2 to 43°C (35 to 110°F)
Storage Temperature Range:	-40 to 49°C (-40 to 120°F)

Materials of Construction:

Interface Assembly:	Plastic: Flame-Rated Polycarbonate O-Ring Seals: EPDM Rubber Tubing: Silicone Rubber Bite-valve: Silicone Rubber Connector Fitting: Acetal C-Ring Stop: Stainless Steel
Reservoir Assembly:	Pouch: Nylon, Acetal, Steel Bladder: Proprietary CXC Film Tubing: Silicone Rubber Connector Fitting: Acetal

Features:

- Bladder provides zero residual taste or smell.
- Super-tough bladder construction results in maximum abrasion resistance.
- Quick connect hose assembly means easy-on, easy-off when swapping out bladders or cleaning components.
- Bladder protected by an antimicrobial formula, Aquaguard®
- Large 80mm **Rapid Fill™** bladder cap.
- Bladder in compliance with FDA notification No. 193.
- Bladder EPA Approved.

Rapid Fill™ is a trademark of Nalgene.

Warranty

Biomarine warrants, subject to the terms below, that the goods will be free from defects in design, materials, and workmanship for a period of three (3) years from the date that the goods are purchased by buyer, with the exception of rubber components. Rubber and silicone rubber components are similarly warranted for a period of one (1) year from the date of purchase. THIS WARRANTY DOES NOT APPLY TO OXYGEN CYLINDER HYDROSTATIC TESTING FOR PERIODIC RECERTIFICATION OF THE PRESSURE VESSEL.

THE SOLE LIABILITY OF BIOMARINE FOR ALL PURPOSES SHALL BE TO REPLACE, AT THE SOLE OPTION OF BIOMARINE, DEFECTIVE PARTS APPEARING WITHIN THE THREE OR ONE-YEAR PERIOD AS APPLICABLE. BIOMARINE SHALL PROVIDE PARTS AT ITS OWN EXPENSE BUT ALL LABOR SHALL BE AT THE EXPENSE OF THE BUYER. BIOMARINE SHALL HAVE NO OBLIGATION FOR REPLACEMENT UNLESS:

1. BIOMARINE HAS RECEIVED WRITTEN NOTICE OF THE ALLEGED DEFECT WITHIN THIRTY (30) DAYS FOLLOWING THE DISCOVERY OF THE DEFECT OR THIRTEEN (13) MONTHS FROM THE DATE OF PURCHASE, WHICHEVER OCCURS SOONER; AND
2. THE BUYER SUBMITS PROOF OF DATE OF PURCHASE WITH INVOICE OR EQUIVALENT DOCUMENTATION; AND
3. THE DEFECTIVE GOODS ARE PROMPTLY RETURNED BY BUYER, AT THEIR SOLE EXPENSE TO BIOMARINE AT: 456 CREAMERY WAY, EXTON, PA 19341 USA; AND
4. THE EQUIPMENT HAS NOT BEEN ALTERED; AND
5. THE DEFECT OCCURS UNDER CIRCUMSTANCES OF PROPER USE IN ACCORDANCE WITH ALL INSTRUCTIONS AND MANUALS PROVIDED TO THE BUYER.

It shall be the responsibility of the buyer to read carefully and abide by all instructions provided to the buyer in the instruction manual or elsewhere. If buyer, and the employees of the buyer, did not abide by such instructions, then the alleged defect shall not be deemed to have arisen under circumstances of proper use. The instructions for use of the goods reflect the opinion of experts based on field use and tests. The instructions should be followed carefully. It is impossible, however, to eliminate all risks inherently associated with the use of the goods. Unintended consequences may result because of factors as weather conditions, the presence of other materials, or the use or manner of application of the goods, all of which are beyond the control of Biomarine. The buyer shall assume all such risks.

Buyer shall be responsible for insuring that the goods are functioning properly at all times and shall not use any goods, which are not functioning properly. If buyer uses goods when they are not functioning properly, then buyer agrees to defend, indemnify and hold Biomarine harmless against all losses, damages, and injuries to persons or property as a result of the use of the malfunctioning goods.

These warranties do not extend to the goods if they have been subjected to misuse, neglect, or accident, including extended exposure to direct flames and/or caustic chemical products, after its delivery to buyer, nor does it extend to any item that was modified or altered after its delivery to buyer.

IN NO EVENT WILL BIOMARINE BE LIABLE FOR ANY LOSS OR DAMAGE DIRECTLY OR INDIRECTLY ARISING FROM THE DEFECTS OR FROM THE USE OF THE GOODS OR FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, WHETHER IN CONTRACT, TORT, OR OTHERWISE, OR FOR PERSONAL INJURY OR PROPERTY DAMAGE OR ANY FINANCIAL LOSS.

Any description of the goods contained in any documents to which these warranty provisions related, including any quotations or purchase orders relating to the goods being delivered to buyer, are for the sole purpose of identifying the goods, and any such description, as well as any sample or model which may have been displayed to or seen by buyer at any time, have not been made part of the basis of the bargain and have not created or amounted to any warranty, express or implied, that the goods would conform to any such description or any such sample or model.

EXCEPT AS SPECIFICALLY SET FORTH IN THESE WARRANTIES, BIOMARINE MAKES NO WARRANTIES, EXPRESS OR IMPLIED, WHETHER ARISING BY LAW, CUSTOM, CONDUCT OR USAGE OF TRADE, INCLUDING WARRANTIES AS TO MERCHANTABILITY, OR AS TO THE FITNESS OF THE GOODS FOR ANY PARTICULAR USE OR PURPOSE, AND ANY WARRANTIES INCLUDING WARRANTIES AS TO MERCHANTABILITY AND FITNESS FOR PARTICULAR USE OR PURPOSE AND THE RIGHTS AND REMEDIES PROVIDED HEREIN ARE EXCLUSIVE. THESE WARRANTIES SHALL RUN TO THE BUYER ONLY AND SHALL NOT BE CONSTRUED AS A CONDITION.

Biomarine does not warrant that the goods are free from the rightful claim of any third person by way of infringement or patents or other proprietary information or disclaims any warranty against such infringement.

The terms of these warranties shall apply to the product sold by Biomarine, except absorbent, filters and anti-fog lens inserts which are considered "consumable item", and as such are not covered by the terms of these warranties. No waiver, alteration, or modification of the terms of these provisions shall be valid unless in writing and signed by an executive officer of Biomarine.

These warranties shall not apply to accessories or devices purchased by Biomarine and attached to or made part of the goods except that Biomarine warrants the (i) the installation of such items in the completed product shall so conform to the installation instructions of the manufacturers thereof as not to invalidate such applicable warranties on such items as are obtained by Biomarine from such manufacturers, and (ii) the workmanship incorporated in such installation shall be free from defects.

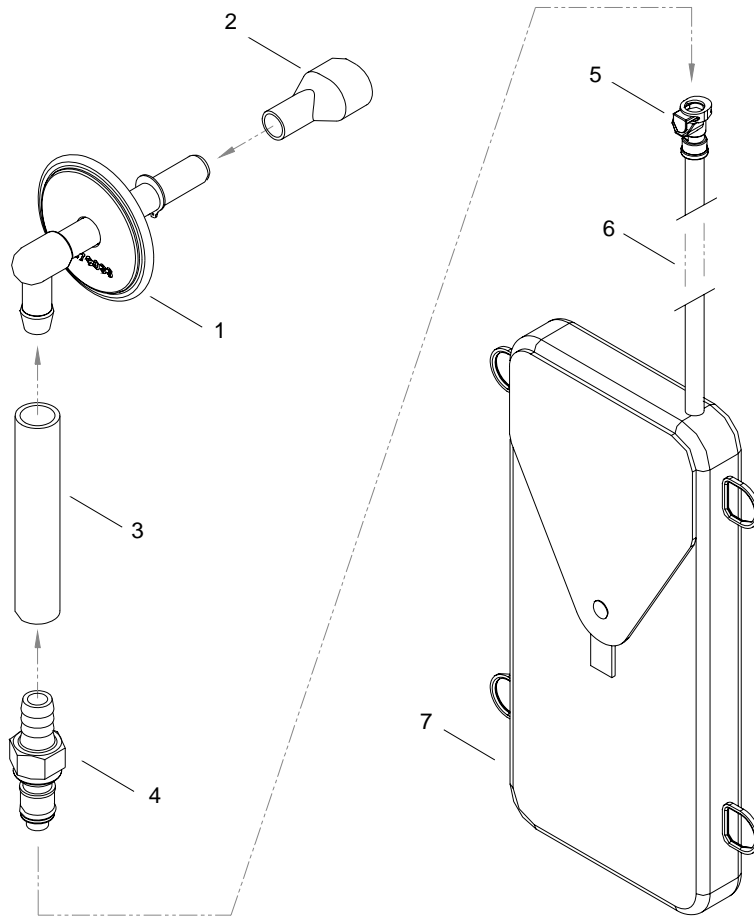
Illustrated Parts List

A. Hydration System

ITEM #	QTY.	PART NUMBER	DESCRIPTION
REF	-	B6-02-5002-52-0	Hydration System-Complete ¹
REF	-	B6-02-5002-70-0	Replacement Reservoir Assembly ²
1	1	B6-02-5002-59-0	Interface Assembly
2	1	B2-06-6001-72-0	Bite-Valve
3	1	B4-02-9563-00-0	Silicone Tubing-SPECIFY 3-INCHES
4	1	B4-03-4404-02-0	Quick Disconnect Fitting Insert
5	1	B4-03-4404-01-0	Quick Disconnect Fitting Body
6	1	B4-02-9563-00-0	Silicone Tubing-SPECIFY 60-INCHES
7	1	B2-02-4001-40-0	Hydration Bladder Pouch
8	1	B2-06-6001-73-0	1.5-Liter Bladder (located internal to pouch)
9	2	B2-06-6001-74-0	Cleaning Tablets, pack of 6 (not depicted)
10	1	B5-06-6000-21-0	User Manual (not depicted)

Note:

- Complete Hydration System includes items 1 through 10 plus Leak Test Fixture B6-02-5002-60-0.
- Replacement Reservoir Assembly includes items 5, 6, 7 and 8.



B. Leak Test Fixture

ITEM #	QTY.	PART NUMBER	DESCRIPTION
REF	-	B6-02-5002-60-0	Leak Test Fixture-Complete
1	1	B2-03-0002-00-0	Hand Pump
2	1	B4-03-5404-02-0	Barb Fitting
3	1	B2-06-6001-75-0	Pinch Clamp
4	1	B4-02-9037-01-0	Polyurethane Tubing-SPECIFY 6-INCHES
5	2	B4-03-4404-03-0	1/8 NPT x 1/4" Male Barb Fitting ¹
6	1	B4-03-4302-00-0	1/8 NPT Tee Fitting
7	1	B4-03-4404-04-0	1/8 NPT x 3/8" Male Barb Fitting ¹
8	1	B4-02-9037-01-0	Polyurethane Tubing-SPECIFY 18-INCHES
9	1	B4-02-9563-00-0	Silicone Tubing-SPECIFY 18-INCHES
10	AR	B5-07-1000-00-0	Teflon Thread Tape

Notes:

1-Indicated fittings require Teflon thread sealing tape on pipe threads during assembly.

