



**D3 DIN Environmental Sealed
First Stage
(Version 2 Fixed Hard Seat Model)**

**Authorized Technician
Service Manual**



WARNING

Improper servicing can lead to serious injury or death.

Use of this manual is solely at your own risk.

Possession of this guide does not certify or qualify any individual to service Edge-Hog regulators. This manual is only to be used as a guide by Authorized Edge-Hog Technicians who have successfully completed the TDI or Edge-Hog Equipment Service Training courses.

For more information about taking the Edge-Hog Equipment Service Clinic course and becoming an authorized Edge-Hog Technician, visit Edge-Hog Gear at <http://www.edge-gear.com> or email edgediving.operations@gmail.com

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Introduction

This manual provides procedures for the service and repair of the HOG D3 DIN Environmentally Sealed first stage regulator utilizing the fixed internal hard orifice (Version 2). It is not intended to be used as an instructional manual for untrained personnel. The procedures outlined within this manual are to only be performed by personnel who have successfully completed the TDI or Edge-Hog Equipment Service Courses. If you do not completely understand all the procedures outlined in this manual and you are an authorized repair technician, contact Edge-Hog Dive Gear to speak directly with a Technical Advisor before proceeding any further.

Edge-Hog Repair Support

Edge-Hog Dive Gear is committed to providing as much technical support as possible to all individuals who are Edge-Hog Dive Gear authorized repair technicians. To this end, Edge-Hog Dive Gear maintains a Dropbox folder of Edge-Hog Servicing Resources that are actively kept up to date and willingly shared with approved individuals and dealers. Please note: Due to liability and insurance concerns, Edge-Hog Dive Gear will not provide any service resources or technical support to any unauthorized party attempting any repair or service. In addition, any service or repairs performed by non-approved parties can result in the forfeiture of the product warranty.

The Edge-Hog Servicing Resources Dropbox folder is the primary reference source for all technical materials the service technician may require. It is also the location where technical bulletins, notices of running changes, and product update information will be posted. Authorized service technicians should always access this resource and verify that they have the most recent information prior to beginning any service process. If a resource is not available in the Dropbox folder, the approved service technician is encouraged to contact Edge-Hog Dive Gear Technical Support at 1-888-810-4811 where they will be given any assistance needed.

Access to the Dropbox is free and mandatory to maintain your status as an authorized technician.

How to gain access to the Edge-Hog Servicing Resources Drop box:

1. If you are a dive facility repair technician wishing to gain approval as an Authorized Edge-Hog Repair Technician, please contact Edge-Hog Technical Services for further information.
2. If you are an end user who has completed the TDI Edge-Hog Service Technician Course, please complete the following steps:
 - a. After you successfully complete the TDI course, send an email to edgediving.operations@gmail.com with the following:
 - i. A copy of the certification card or TDI Certification Validation Letter showing:
 1. Full name as it appears on your TDI certification card
 2. Your Instructors name
 3. The date you completed the class

4. Your TDI certification number
 - ii. Email Address for receipt of Dropbox access invitation email.
- b. Accept the Edge-Hog Dive Gear Drop box invitation when you receive it, you will need to have or set up a free Dropbox account to join the shared folder.
- c. Contact Edge-Hog Technical Support for:
 - i. Purchase of service parts
 - ii. Technical Questions
 - iii. Warranty Repairs or Support

Warnings, Cautions & Notes

Pay special attention to information provided in warnings, cautions, and notes that are accompanied by any of these symbols:

WARNING

Indicates a procedure or situation that may result in serious injury or death if instructions are not followed correctly.

CAUTION

Indicates any situation or technique that will result in potential damage to the product, or render the product unsafe if instructions are not followed correctly.

NOTE

Is used to emphasize important points, tips, and reminders.

Nitrox Use

The D3 first stage, when properly cleaned and assembled is certified by Edge-Hog Dive Gear for use with Enriched Air Nitrox (EAN) up to 40% at no greater than 3500 psi, and for use with 80% oxygen at no greater than 3000 psi or up to 100% oxygen at no greater than 2400 psi. Under no circumstances should this regulator be exposed to a partial pressure of oxygen more than 165 atmospheres.

The service procedures in this manual are sufficient for continued use with pre-mixed EAN40 up to pressures as high as 3500 psi.

WARNING

Special Oxygen servicing procedures, not used or provided in this manual, are required during servicing to safely use this regulator with gas mixtures greater than EAN40 at pressures greater than 3500 psi. Failure to use appropriate Oxygen servicing procedures and using high concentration Oxygen mixtures can result in dangerous results including equipment damage, personal injury, or even death.

Scheduled Service

Edge-Hog regulators have a required service interval of no more than 100 dive hours, a maximum of 2 years, or as needed by any degradation of performance. To maintain the factory warranty, any time service is performed all parts provided in the annual service parts kits are required to be replaced and the provided new parts to be utilized. Use of any parts not provided by Edge-Hog Dive Gear is not authorized, will void all warranties, and may result in regulator damage, malfunction, or being made unsafe for use. Regulators in commercial or heavy use should be inspected regularly and may require more frequent service.

General Guidelines

To correctly perform the procedures outlined in this manual, it is important to follow each step precisely and in the order given. Read the entire manual to become familiar with all procedures before attempting to disassemble the regulator, and to learn which specialty tools and replacement parts will be required. Keep the manual open beside you for reference while performing each procedure. **WARNING Do not rely on your memory.**

All service and repair should be carried out in a work area specifically set up and equipped for the task. Adequate lighting, cleanliness, and easy access to all required tools and testing equipment are essential for efficient and safe work.

The regulator body may need to be secured in a vise when removing or installing certain threaded parts. **WARNING: Never secure the regulator directly in the jaws of a vise.** Always install a vise mounting tool or regulator servicing handle into a high pressure port then secure the vise mounting tool into vise jaws.

As the regulator is disassembled, reusable components should be segregated and not allowed to intermix with non-reusable parts or parts from other units. Delicate parts, including inlet fittings and crowns which contain critical sealing surfaces, must be protected and isolated from other parts to prevent damage during the cleaning procedure.

Use only genuine Edge-Hog Dive Gear parts provided in the first-stage overhaul parts kit. **DO NOT** attempt to substitute an Edge-Hog part with another manufacturer's, regardless of any similarity in shape, size, or intended use.

DO NOT attempt to reuse mandatory replacement parts under any circumstances.

When reassembling, it is important to follow every torque specification prescribed in this manual using a calibrated torque wrench. Most parts are made of either marine brass or plastic, and can be permanently damaged by undue stress if excessive torque is applied to them.

General Conventions

Unless otherwise instructed, the following terminology and techniques are assumed:

- When instructed to remove, unscrew, or loosen a threaded part, turn the part counterclockwise.
- When instructed to install, screw in, or tighten a threaded part, turn the part clockwise. Tighten to hand tight then further tighten to torque specifications provided.
- When instructed to remove an o-ring, use the finger pinch method if possible, or use a brass or plastic o-ring removal tool. Avoid using hardened steel picks, as they may damage the o-ring sealing surface. All o-rings provided in the service kit that are removed should be discarded and replaced with the provided new o-rings. O-rings not provided in the service kit should be inspected and replaced with new as wear and the inspection indicate.
- The following acronyms are used throughout the manual: HP is High Pressure (Supply Pressure); IP is Intermediate Pressure (First Stage Output Pressure).
- Numbers in parentheses indicate the parts reference number on the schematic. For example, in the statement, "...remove the o-ring (17) from the...", the number (17) is the reference number to the HP plug o-ring in the schematic parts list table.

Preliminary Inspection

Periodically and prior to each service, a preliminary inspection should be made to determine as much as possible about the condition of the regulator and any problems that may need to be addressed.

1. A pressurized water immersion test of the entire unit to check for air leakage (bubbles in the water).
2. On 1st Stages:
 - a. Check for stable intermediate pressure that is within the acceptable range.
 - i. 135psi +/- 5 psi at 500psi and 3000psi supply pressure
 - ii. No creep greater than 5 psi maximum. Creep should not occur more than 15 seconds after pressurization.
 - b. Visually inspect the inlet filter and other exterior surfaces for debris, discoloration, or corrosion.
3. On 2nd Stages:
 - a. Using a Magnahelic Gauge, check for cracking effort that is within the acceptable range.
 - i. Primary 2nd stages= 1.1-1.5 inches of inhalation vacuum.
 - ii. Octo/Safe 2nd stages = 1.5-2.0 inches of inhalation vacuum.
 - b. Check for adequate air flow when purge button is depressed.
 - c. With the Venturi Flow Vane in the + position, determine if the regulator free-flows when the purge button is depressed fully. Placing your hand over the mouthpiece should stop the free-flow.
 - d. Check for smooth operation of the control knob and venturi switch.

- e. Visually inspect the exhaust valve to see that it is in good shape and that it's resting against a clean surface.
- f. Visually inspect the mouthpiece looking for tears or holes.
- g. Pull back hose protectors and check that the hoses are secure in the hose crimps and look for any tears, bulges, or other hose failures at the crimp.

First Stage Disassembly

NOTE

Before beginning disassembly, refer to the schematic which lists all mandatory replacement parts. These parts should be replaced with new parts and must not be reused under any circumstances.

CAUTION

Use the pinch method wherever possible to remove O-rings. If a tool must be used, plastic or brass should be used. **NEVER** use a dental pick or any other steel instrument to remove O-rings. Even a tiny scratch on a sealing surface can result in leakage and failure of the regulator; once a sealing surface has been damaged the part must be replaced with new to restore functionality.

1. Note the position of all hoses on the first stage for ease of reassembly.
2. Remove all hoses from the first stage using an appropriate open-end box wrench or adjustable wrench. Remove all HP and LP Port Plugs from the first stage using an appropriate sized hex key and remove all port plug o-rings. Set port plugs and O-rings aside.
3. Insert a First Stage Handle Tool (ScubaTools SKU 20-115-100 or similar) securely in a high-pressure port. Be careful not to cross thread the port – if you do, the body must be replaced.



⚠ CAUTION ⚠

Most of the steps listed below will need to be accomplished using a vise handle threaded into a HP or LP port. Use a handle tool to make your servicing easier and to prevent regulator damage. Placing the regulator body directly in a vise may result in the crushing or distortion of the body, rendering it inoperable or unsafe to use.

4. Position the main body so the DIN Inlet Connection opening is facing up.



5. Remove the DIN Retainer O-ring 112-04 (2) from the DIN Retainer Cap (3) and discard.
6. Use a 6mm or ¼ inch (use the size that provides tightest fit) hex key to unscrew the DIN Retainer Cap (3) from the DIN Housing (6). Remove the DIN Retainer O-ring 012-04 (4) from the DIN Retainer Cap and discard. Set the DIN Retainer Cap aside for cleaning.



NOTE

If the entire DIN assembly comes off in one piece, it can be disassembled by inserting a 7mm hex key in the bottom side of the DIN Housing (6) and a 6mm or ¼ inch hex key (use that which fits best) in the top of the DIN Retainer Cap and unscrewing.

7. Remove the DIN Hand Wheel (5) from the DIN Housing (6) and set the hand wheel aside.



- Using a six-sided 13/16 deep wall socket and ratchet wrench, unscrew the DIN Housing (6) from the Main Body (10). Set the Plastic Saddle (9) aside for cleaning.



- Remove the O-ring 011-04 (8) and Sintered Filter (7) from the bottom of the DIN Housing (6) and discard. If needed, you can push out the sintered filter and O-ring with the blunt end of a pick from the DIN Retainer Cap side of the housing.



- Position the 1st stage with the swivel turret down. Use a ScubaTools #5 hook spanner with a .140 pin and gentle pulling motion (DO NOT JERK) to loosen the Environmental Sealing Cap (35) from the Diaphragm Retainer Cap (32). Remove the sealing cap by hand and set aside for cleaning.

NOTE: You can place an old diaphragm or other piece of thin rubber under the hook spanner to prevent damage to the cap finish.



11. Remove the Silicone Environmental Sealing Disk (34) and the plastic Pressure Transfer Piston (33) from the regulator and set aside.

12. Using a 6mm hex key, unscrew the IP Spring Adjuster Screw (31) fully removing it from the Diaphragm Retainer Cap (32). Lift out the Intermediate Pressure Setting Screw (30) and set both it and the IP Setting Spring (31) aside for cleaning.



13. Position the 1st stage with the swivel turret down. Use a ScubaTools #5 hook spanner with a .140 pin and gentle pulling motion (DO NOT JERK) to loosen the Diaphragm Retainer Cap (32) the Main Body (10). Remove the retainer cap by hand and set aside for cleaning.

NOTE: You can place an old diaphragm or other piece of thin rubber under the hook spanner to prevent damage to the cap finish.



14. Remove the Intermediate Pressure Spring Seat (28) and clear or white IP Spring Isolation Washer (29) and set aside. An additional Isolation Washer should be inside the Adjuster Screw body (31), remove this washer as well and set aside.



- Using a pair of needle nose pliers, grasp the outer edge of the translucent Diaphragm Thrust Washer (25) pulling it out and away from the shoulder of the Main Body (10). Cautiously, using a brass pick lift and pull the Diaphragm (26) out from the shoulder of the Main Body (10).



! WARNING !

Take extreme care not to scratch or damage any surfaces of the diaphragm shoulder with your pick, doing so can cause the diaphragm to leak or become unseated in a dangerous way.

- Turn the Main Body over and the Seat Lifter Pin (25) will fall out. Alternatively lift it out of the Main Body and set aside.



17. Using the ScubaTools #3 hook spanner with a .140 pin, loosen the Swivel Turret Union Body (21) from the Main Body (10) and set the Swivel Turret aside.



18. Remove the O-ring 024-03 (19) from the main body.
19. Using a 4mm or 5/32 Hex Key (use the size that provides tightest fit) unscrew the Balance Chamber Plug (17) from the Main Body (10).

NOTE: The Balance Chamber Plug is under a small amount of spring pressure.



20. Remove the HP Seat (13) and Valve Spring (14) from the Balance Chamber Plug and set both aside.



⚠ WARNING ⚠

Take Extreme Caution when removing the 006-04 O-ring from the inner chamber of the Balance Chamber Plug (17). Scratches to the inner sealing surfaces of the Balancing Chamber will result in creeping or unstable intermediate pressure requiring replacement of the Balance Chamber Plug.

22. Remove the O-ring 905-04 (16) from the Balance Chamber Plug (17). Using a soft pick, remove O-ring 006-04 (15) from the small inner chamber of the Balance Chamber Plug (17).



23. Unthread the First Stage Handle Tool (Scubatools SKU 20-115-100) or similar device from the HP port on the Main Body (10) and thread it into one of the LP side ports on the 5 Port Swivel Turret (24)



24. Insert a 8mm Hex Key into the Swivel Turret Retaining Screw (18) and unscrew the retaining screw from the 5 Port Swivel Turret (24).



25. Pull apart the Swivel Turret Union Body (21) and 5 Port Swivel Turret (24). Remove the Swivel Turret Thrust Washer (20), O-ring 016-03 (22) and O-ring 021-03 (23) from the 5 Port Swivel Turret (24).



26. This Concludes Disassembly of the D3-DIN Environmentally Sealed First Stage. Proceed to 1st stage cleaning.



First Stage Cleaning



Do not place plastic and rubber parts in acidic solutions. Doing so can alter the physical properties of the component, causing it to prematurely degrade and fail or break. If an acid solution is used, parts should be rinsed and soaked in a base solution, such as baking soda mixed with water, to neutralize the acid.

Cleaning Brass and Stainless Steel Parts

Pre-clean all parts in hot, Dawn dish detergent water (a mixture of liquid dishwashing detergent and hot water) using a nylon bristle tooth brush. Remove as much soil and old lubricant as possible.

After pre-cleaning, clean brass and stainless steel parts in an ultrasonic cleaner filled with detergent and water; if there are stubborn deposits, household white distilled vinegar (acetic acid) in an ultrasonic cleaner will work well. DO NOT place plastic, rubber, silicone or anodized aluminum parts in vinegar. The recommended detergent for ultrasonic cleaning is Cole Palmer Micro-90. This is an excellent oxygen compatible degreasing and corrosion removing detergent.

Remove parts from the ultrasonic cleaner and rinse with hot fresh water. If tap water is extremely "hard," place the parts in a bath of distilled water to prevent any mineral residue. Agitate lightly, and allow to soak for 5-10 minutes. Remove and blow dry with low pressure (25 psi) filtered air, and inspect closely to ensure proper cleaning and like-new condition.

If no ultrasonic cleaner is available, parts should be hand washed again in a tub with a fresh detergent solution. Be prepared for the process to take significantly longer and to require hand cleaning with a toothbrush.

Cleaning Anodized Aluminum, Plastic & Rubber Parts

Anodized aluminum parts and parts made of plastic or rubber, such as cases, dust caps, etc., may be soaked and cleaned in a solution of hot water mixed with mild dish detergent. Use only a soft nylon toothbrush to scrub away any deposits. Rinse in fresh water and thoroughly blow dry, using low pressure filtered air. DO NOT place plastic, rubber, silicone or anodized aluminum parts in vinegar or other acidic cleaning solutions.

Cleaning Hoses

If buildup of corrosion is severe, it is permissible to soak only the hose fittings in the ultrasonic cleaner as needed, and not allow any solution to enter the hose. Rinse in fresh water and allow to dry with the cleaned ends hanging down. Dry them completely by blowing filtered air through them prior to installing onto the regulator.

Oxygen Servicing

Oxygen servicing is not a casual thing. Before attempting oxygen cleaning, you should seek training through a recognized agency. The TDI Oxygen Service Technician course is designed to provide you with the knowledge, skills and experience to safely and effectively oxygen clean regulators. The process for servicing a HOG D3 for oxygen service is two-fold: make sure all trace hydrocarbons are removed from all parts and use only oxygen compatible components

! WARNING !

DO NOT ATTEMPT OXYGEN CLEANING WITHOUT PROPER TRAINING. NO MATTER WHAT YOU'VE READ ON THE INTERNET, IT IS STRONGLY RECOMMENDED THAT PRIOR TO ATTEMPTING OXYGEN SERVICE OF A REGULATOR YOU TAKE THE TDI OXYGEN SERVICE TECHNICIAN COURSE.

SELF-IGNITION AND CATASTROPHIC FAILURE OF THE REGULATOR MAY OCCUR IF ALL HYDROCARBONS ARE NOT REMOVED PRIOR TO EXPOSURE TO HIGH-OXYGEN CONTENT GAS, RESULTING IN SERIOUS INJURY OR DEATH.

Removing trace hydrocarbons can be difficult to accomplish and even harder to verify so careful and thorough cleaning is required. After pre-cleaning, cleaning and rinsing the first stage parts (as outlined previously) the following steps should be meticulously followed:

1. The entire wash station and work area should be broken down and washed down with detergent and water, rinsed well with clean water, then allowed to dry. The work area should be covered with clean, lint-free towels or plastic sheeting.
2. Tools should be carefully cleaned, either in a dishwasher or by hand-washing.
3. Powder-free exam or surgical gloves should be worn at all times to avoid getting body oils on any parts or surfaces.
4. Used detergent solutions should be discarded and fresh solutions prepared. Only "clean" detergents free from perfumes and coloring agents (such as Crystal Simple Green) should be used.
5. All parts, especially the first stage high-pressure parts and including the replacement parts, should be re-cleaned in an ultrasonic cleaner or carefully hand scrubbed with a detergent solution. Examine each part to make sure there is no visible lubrication residue or corrosion present. If necessary, repeat the cleaning process. Permanent corrosion which can not be removed renders the part unsuitable for oxygen service.
6. Rinse all parts thoroughly with clean hot water. Allow the parts to stand in the rinse water for at least 15 minutes to remove any residue. Rinse water should be changed immediately before use and frequently during the cleaning.
7. After careful cleaning and thorough rinsing, all parts should be subjected to a water break test to look for hydrocarbon or detergent residue. In the water break test, the parts are submerged in a tub of clean water, agitated and allowed to stand for at least five minutes. At the end of five minutes, a bright light is turned on over the water and the surface of the water is carefully examined for any oily or colored sheen. If you see rainbow colors or anything floating on the surface of the water, steps 1 through 7 must be repeated.



8. Only low-pressure hyper-filtered (OCA) air should be used to blow dry parts after cleaning to avoid contamination by standard Grade E air.
9. All of the parts in the HOG annual service kit are oxygen compatible, within the limits specified by the manufacturer. Remember, rubber (Buna or Nitrile) is not suitable for oxygen service, only Viton or EPDM is acceptable.

First Stage Pre-assembly Inspection

All parts should be closely inspected prior to reassembly. Close inspection is best accomplished by using strong magnification under bright lighting. Pay particular attention to the following:

1. First Stage Main Housing: Inspect all cavities for any cracks, nicks, scratches, pitting, or any defects in the plating. Pay particular attention to the sealing edge of the HP sealing orifice and the diaphragm seating shoulder.
2. Main Spring & Valve Spring: Inspect for signs of permanent corrosion, including pitting or cracks in the surface of the metal.
3. First Stage Ambient and Environmental Chamber Bodies: inspect the interior sealing area and o-ring sealing groove for any nicks, scratches, pitting, or any defect of the chrome plating.
4. First Stage DIN Housing and DIN Retainer Cap: Examine the condition of the threads and the o-ring sealing groove at the base for any nicks, scratches, pitting, or any defect of the chrome plating.
5. First Stage DIN Hand Wheel: Examine the condition of the threads for any signs of damage.
6. First Stage Balance Chamber: Carefully examine the interior sealing area under the o-ring for any nicks, scratches, pitting, or any defect of the chrome plating.

If any parts show damage or excessive wear, they must be replaced with new.

First Stage Lubrication and Dressing

Wear powder-free exam or surgical gloves when handling and lubricating o-rings. Keeping internal parts free from skin oils and other contaminants is important when running enriched air nitrox through a first stage. All o-rings should be lubricated with an oxygen compatible lubricant such as Christo-Lube® MCG-111, Tribolube® 66 or 74, or Krytox® GPL 205.

Lubricate all o-rings with a very light film of grease and remove any visible excess by running the o-ring between thumb and forefinger. Avoid applying excessive amounts of grease, as this will attract particulate matter that may cause damage to the o-ring.

First Stage Assembly

1. Position the Main Body so the portion with the interior threads is facing upwards. Insert the Seat Lifter Pin (25) into the center hole in the Main Body (10).



! WARNING !

DO NOT LUBRICATE ANY PART OF THE MAIN BODY INTERIOR, DIAPHRAGM RESTING SHOULDER, DIAPHRAGM, DIAPHRAGM THRUST WASHER OR THE DIAPHRAGM RETAINING CAP BOTTOM EDGE. LUBRICATION AT THIS JOINT CAN CAUSE THE DIAPHRAGM TO DISLodge, CREATING A CATASTROPHIC FAILURE OF THE FIRST STAGE WHICH COULD CAUSE SEVERE PERSONAL INJURY OR DEATH.

2. Carefully insert the Diaphragm (26) in the main housing and carefully seat it on the diaphragm shoulder.

WARNING: DO NOT push or drag the Diaphragm across any threads of the Main Body.

Use your finger or a blunt pick to gently work the diaphragm into position, taking care not to scratch the sealing surface or the threads.

WARNING: DO NOT lubricate any portion of the Diaphragm.



3. Insert the Diaphragm Thrust Washer (27) on top of the Diaphragm (26) and carefully seat it fully under the Main Body threaded shoulder. Use your finger or a blunt pick to gently work the diaphragm into position, taking care not to scratch the sealing surface or threads.



4. Place the Intermediate Pressure Spring Plastic Seat (28) smooth side down and centered against the Main Diaphragm (26).



5. Lightly lubricate only the coarse threads of the Diaphragm Retainer Cap (32).

Warning: DO NOT lubricate the bottom flat edge or any other portion of the Diaphragm Retainer Cap.

Hand thread the Diaphragm Retainer Cap (32) fully onto the Main Body (10) then using the Scuba Tools #5 hook spanner with a .140 pin fully thread the Diaphragm Retainer Cap (32) onto the Main Body (10) until no further movement or tightening can be achieved.

NOTE: It may be necessary to use a rubber mallet and light tapping on the hook spanner handle to fully tighten the Retainer Cap (32) to the Main Body (10). Take Caution not to let the spanner pin slip out of the Diaphragm Retainer Cap while applying force or tapping the hook spanner.



6. Drop the Intermediate Pressure Setting Spring (30) through the center opening of the Diaphragm Retainer Cap (32) making sure it is positioned squarely in the center of the Intermediate Pressure Spring Plastic Seat (28)



7. Thread the IP Spring Adjustment Screw (31) into the Diaphragm Retaining Cap (32) until the top of it is 1-3 threads below the center threaded edge of the Diaphragm Retainer Cap (32). (Approx 3-5 full revolutions)

NOTE: If the IP Screw Isolation Washer is missing from the IP Spring Adjustment Screw, place a small layer of lubricant on the spring flats to isolate the metal of the spring from the metal of the receiver portion of the IP Spring Adjustment Screw.

WARNING: Failure to screw the IP Spring Adjustment Screw in far enough can cause the HP Seat to be severely damaged during installation of the Balance Chamber Plug (17)



8. Turn the Main Body (10) over so the externally threaded side is facing up. Install the O-ring 024-03 (19) onto the Main Body (10).



- Place a small bead of lubrication on the interior sealing surface of the Balance Chamber Plug (17). Dynamically lubricate the 006-04 O-ring (23) and, pinching it between your fingers, insert it into the receiver of the balance chamber plug. Use a thin plastic dowel or the stem of your old used HP Seat to make sure the o-ring seats fully and squarely inside the balance chamber.

WARNING: This must be a 90 durometer o-ring for proper operation.



- Install the 905-04 O-ring (16) onto the wide shoulder of the Balance Chamber Plug.

WARNING: This must be a 90 durometer o-ring for proper operation.



- Lightly lubricate the flat ends of the Valve Spring (14) and insert one open end of the spring over the narrow tip end of the Balance Chamber Plug (17).

- Lubricate the stem of the HP Seat (13) and insert it through the Valve Spring (14) into the O-ring sealed receiver of the Balance Chamber Plug (17). Press lightly up and down on outer edges of the HP Seat to make sure it moves smoothly in and out of the balance chamber.



⚠ CAUTION ⚠

WHEN INSERTING THE BALANCE CHAMBER PLUG INTO THE MAIN BODY HOUSING, IT IS CRITICAL THAT YOU MAINTAIN A STRAIGHT ALIGNMENT UNTIL THE BALANCE CHAMBER PLUG IS SCREWED TIGHTLY IN PLACE. FAILURE TO MAINTAIN ALIGNMENT CAN RESULT IN DAMAGE TO THE HIGH PRESSURE SEAT OR DAMAGE TO THE MAIN BODY KNIFE EDGE REQUIRING REPLACEMENT OF ONE OR BOTH PARTS.

13. Holding the Main Body (10) so the external threads are facing down and using a 4mm or 5/32 Hex Key (use the size that provides tightest fit) insert the Balance Chamber Plug (17) assembly up into the center threaded receiver opening of the Main Body (10) and begin threading the plug into the receiver tightening until the plug is fully threaded into the Main Body.

NOTE: If you did not screw the IP Adjustment Screw in at least 3-5 full turns in Step 7 you run the risk of cutting the HP seat during this installation step, ruining the HP Seat and causing unstable IP.



⚠ WARNING ⚠

USE A CALIBRATED QUALITY TORQUE WRENCH TO TIGHTEN THE BALANCE CHAMBER PLUG IN PLACE. FAILURE TO CORRECTLY TIGHTEN THE BALANCE CHAMBER PLUG CAN RESULT IN IT COMING LOOSE, RESULTING IN A CATASTROPHIC FAILURE WHICH CAN RESULT IN SEVERE INJURY OR DEATH. OVERTIGHTENING THE BALANCE CHAMBER CAN RESULT IN THE BRASS THREADS STRIPPING RESULTING IN SEVERE DAMAGE TO THE REGULATOR CAUSING A CATASTROPHIC FAILURE WHICH CAN RESULT IN SEVERE INJURY OR DEATH.

14. Turn the Main Body over so the Balance Chamber Plug side is facing down. Using a 6mm Hex Key unscrew the IP Spring Adjuster Screw (31) from the Diaphragm Retainer Cap (32) until 1-2 threads on the IP Spring Adjuster Screw are showing above the internal edge of the Diaphragm Retainer Cap.
Set the Main Body aside.



15. Dynamically lubricate and install the O-ring 016-03 (22) and O-ring 021-03 (23) onto the 5 Port Swivel Turret (24).



16. Maintaining a straight alignment, push the 5 Port Swivel Turret (24) and Swivel Turret Union Retainer Body (21) together. Be sure neither O-ring on the 5 Port Swivel Turret extrudes or is pinched and that the turret swivel freely within the union body.



17. Position the assembled swivel turret and union body so the widest open end is facing upwards. Place the White Swivel Turret Screw Thrust Washer (20) into the recessed groove of the Swivel Turret Union Body (21).



⚠ WARNING ⚠

USE A CALIBRATED QUALITY TORQUE WRENCH TO TIGHTEN THE SWIVEL TURRET RETAINER SCREW IN PLACE. FAILURE TO CORRECTLY TIGHTEN THE RETAINER SCREW CAN RESULT IN IT COMING LOOSE, RESULTING IN THE TURRET DETACHING FROM THE SWIVEL UNION BODY IN A CATASTROPHIC FAILURE WHICH CAN RESULT IN SEVERE INJURY OR DEATH. OVERTIGHTENING THE RETAINER SCREW CAN RESULT IN THE BRASS THREADS STRIPPING RESULTING IN SEVERE DAMAGE TO THE REGULATOR OR IN THE TURRET DETACHING FROM THE MAIN BODY IN A CATASTROPHIC FAILURE WHICH CAN RESULT IN SEVERE INJURY OR DEATH.

18. Insert the Swivel Turret Retainer Screw (18) and using an 8mm Hex Key fully tighten the Retainer Screw securing the 5 Port Swivel Turret (24) and Swivel Turret Union Body (21) together. Use a calibrated torque wrench and 8mm Hex Socket to torque the Retainer Screw to 90 inch pounds.



19. Using the Scuba Tools #3 hook spanner with a .140 pin, thread and tighten the Swivel Turret Assembly (18,21,24) onto the Main Body (10) until fully tight.



⚠ WARNING ⚠

USE A CALIBRATED QUALITY TORQUE WRENCH TO TIGHTEN THE DIN CONNECTION COMPONENTS IN PLACE. FAILURE TO CORRECTLY TIGHTEN THE DIN CONNECTION COMPONENTS CAN RESULT IN THEM COMING LOOSE, RESULTING IN THE DIN CONNECTOR DETACHING FROM THE MAIN BODY IN A CATASTROPHIC FAILURE WHICH CAN RESULT IN SEVERE INJURY OR DEATH. OVERTIGHTENING THE DIN CONNECTION COMPONENTS CAN RESULT IN THE BRASS THREADS STRIPPING RESULTING IN SEVERE DAMAGE TO THE REGULATOR OR IN THE DIN CONNECTION COMPONENTS DETACHING FROM THE MAIN BODY IN A CATASTROPHIC FAILURE WHICH CAN RESULT IN SEVERE INJURY OR DEATH.

20. Position the DIN Housing (6) so the threaded end is facing up. Drop the Sintered Cone Filter (7) narrow end down into the DIN Housing (6).

Install the O11-40 O-ring (8) onto the narrow lip around the exposed wide end of the Sintered Filter seated in the DIN Housing.

NOTE: This must be a 90 durometer o-ring for proper operation.

NOTE: This o-ring can be easily dislodged from its appropriate installation point.



21. Continuing to hold the DIN Housing so the threaded side is facing upwards. Place the Plastic Saddle (9) over the top of the DIN Housing with the flat side facing down.



22. Continuing to hold the DIN Housing with the installed Saddle so the threaded part is upwards, position the assembled regulator above the DIN Housing and hand thread the two together. Adjust the Saddle as needed to allow the DIN Housing to be fully threaded onto the Main Body.

WARNING: Binding or resistance experienced while threading the DIN Housing into the Main Body is likely the result of the 011-04 O-Ring (8) slipping off its shoulder and being pinched between the Main Body and the DIN Housing. Should this occur, unthread the DIN Housing, replace the O-ring, and reattempt the above steps. Using any damaged O-ring in this position may result in leaks or possibly a significant and dangerous loss of air.

NOTE: This must be a 90



durometer o-ring for proper operation.

23. Using a calibrated torque wrench and six sided 13/16 deep wall socket thread the DIN Housing (6) onto the Main Body (10) and torque to 225-250 inch pounds.



24. Place the DIN Handwheel (5) flat side towards the main body over the DIN Housing (6) with the threads facing away from the main housing (10).



25. Install the O-ring 012-04 (4) onto the threaded stem of the DIN Retainer (3) and seat it against the wide underside of the DIN Retainer (3)

Note: This must be a 90 durometer o-ring for proper operation.

26. Install the O-ring 112-04 (2) into the wide groove on the face of the DIN Retainer (3).

Note: Do not Lubricate this O-ring or the groove it is seated in.

Note: This must be a 90 durometer o-ring for proper operation.



27. Thread the DIN Retainer (3) into the DIN Housing (6) and using a calibrated torque wrench torque to 125-150 inch pounds.



28. Install the O-rings 012-04 (4) and 011-03 (37) onto the HP and LP Port Plugs (36) and (38) and install the plugs into the open ports on the Main Body and 5 Port Swivel as Desired.

Note: HP Port Plug O-rings must be a 90 durometer o-ring for proper operation.



**The D3 DIN Environmental First Stage is now assembled and ready for adjusting.
The D3 DIN ENV First Stage must be adjusted and tuned before final assembly can be completed.**

PROCEED TO ADJUSTMENT

29. The D3 Environmental Sealing Cap (35), Silicone Sealing Disk (34), and Plastic Pressure Transmitter (33) are not installed until after the D3 Environmental 1st Stage Regulator IP has been adjusted and set. Set them aside until 1st stage tuning and testing has been completed.



First Stage Adjustment

Final Adjustment and Testing Procedures

1. Connect the intermediate pressure test gauge to the first state to be tested. Methods of connection include by a quick-disconnect inflator hose, or a female fitting of a second stage LP hose. Final connection method will be dependent on the connection of the test gauge. Check to ensure there are no open ports and that all hoses are securely connected at both ends, with no open fittings.

WARNING

Before testing intermediate pressure, it is important to connect the first stage to a fully assembled and properly adjusted second stage. This will provide a safety relief valve if the intermediate pressure exceeds 155 psi. If a properly adjusted second stage is not available, be sure to open the bleed valve of the test gauge before pressurizing. Failure to relieve intermediate pressure in excess of 250 psi may result in damage to the test gauge, LP hose, and possible injury to the technician.

2. Check to ensure that the first stage IP Spring Adjuster Screw (31) is correctly set to its preliminary adjustment; this should be with 1-2 threads showing above the level point with the internal shoulder of the Diaphragm Retainer Cap (32).
3. Connect the first stage to a filtered air source of 500 psi, with the safety bleed valve open or the purge button of your attached second stage depressed slowly pressurize the first stage. Closely monitor the IP test gauge to ensure that the intermediate pressure does not rise above 130 psi, slowly turn the knob of the bleed valve clockwise until it is shut or release the second stage purge button and observe intermediate pressure does not rise above 155psi.

CAUTION

If a second stage is not connected to the first stage and the intermediate pressure rises above 200 psi, immediately reopen the bleed valve of the test gauge and shut off the air supply. Refer directly to the Troubleshooting section, and remedy as needed before proceeding further.

CAUTION

Failure to depressurize the regulator during adjustment can result in a false reading of the intermediate-pressure. Failure to depressurize the regulator during adjustment can result in HP Seat Damage.

4. If the intermediate pressure has stabilized above 125 psi, apply a 6mm Hex Key to the IP Spring Adjustment Screw (31) and with the first stage depressurized turn the screw counter clockwise in small increments. Re-pressurize and check intermediate pressure between adjustments until a stable intermediate pressure of 135 psi has been achieved.

Note: De-pressurization of the first stage to make the necessary adjustments can be achieved by pushing the purge button on any connected second stages hence opening the valve and initiating air flow or by opening the safety bleed valve hence opening the first stage valve and initiating air flow.

5. If the intermediate pressure has stabilized below 125 psi, apply a 6mm hex key to turn the spring adjuster clockwise in small increments of adjustment. While turning the spring adjuster, it is important to simultaneously push the purge of the second stage or briefly turn the test gauge bleed valve open to lift the seat off of the hard seat. Monitor the test gauge while adjusting in this manner until the intermediate pressure locks up between 130-135 psi.

Note: When turning the adjuster screw in clockwise always turn inward in small increments turning past your desired stopping point, turn the screw counterclockwise 1/32nds of a turn to unload the IP set screw. This is critical to achieve a consistent and stable IP reading.

6. When the intermediate pressure has been determined to be stable at 135 psi \pm 5 psi, increase the inlet pressure to 3,000 psi while checking the IP test gauge once again to ensure that the intermediate pressure does not rise above 135 \pm 5 psi. Intermediate pressure up to 10 psi below the 500 psi Intermediate set point is acceptable. If the intermediate pressure rises above 135 psi, immediately purge the second stage, or re-open the bleed valve of the test gauge, and shut off the air supply. Refer to the Troubleshooting section, and remedy as needed.



Failure to depressurize the regulator during adjustment can result in a false reading of the intermediate-pressure. Failure to depressurize the regulator during adjustment can result in HP Seat Damage.

7. Repeat the adjustment procedure in step 4 to adjust the first stage intermediate pressure to exactly 135 psi. Repeatedly purge the second stage, or open and shut the test gauge bleed valve at least 100 times to ensure that the intermediate pressure locks up consistently and remains stable at 135 \pm 5) psi, with no signs of creeping or fluctuation at 500 psi.

D3 Environmental Seal Final Assembly

1. While the regulator is still pressurized with 3,000 psi, insert the stem of the Plastic Pressure Transmitter (33) into the hex opening of the Intermediate Spring Adjuster Screw (31).



2. Lay the Environmental Sealing Disk (34) over the exposed top of the Plastic Pressure Transmitting Disk (33) and tamp it down to ensure that it seats evenly against the internal sealing surface of the Diaphragm Retainer Cap (32).



3. Thread the Environmental Sealing Cap (35) onto the Diaphragm Retainer Cap (32) and turn it clockwise by hand until snug. Apply the ScubaTools #5 Hook Spanner with a 1.40 pin to tighten the Environmental Sealing Cap until it is completely snug and flush with the diaphragm cap.



4. Cycle the regulator to ensure that the intermediate pressure has not dropped below 135 psi. If necessary, depressurize the regulator and disassemble the environmental kit to reset the intermediate pressure, and repeat steps 1-4.

5. After performing the second stage overhaul and adjustment procedures, connect the first and second stage regulators to perform the following tests:

External Leak Test – Connect the regulator **to** a cylinder which contains 2,500 - 3,000 psi, and open the cylinder valve to pressurize the system. Submerge the cylinder and regulator in a test tank of fresh water, and observe closely for five minutes to check for escaping bubbles. If a steady stream of bubbles is present, the system must be disassembled to check sealing surfaces, assembly sequence, and component positioning to correct as needed.

Subjective Breathing Test – Depress the second stage purge to ensure that the volume of airflow is adequate to clear the second stage. Then, breathe deeply from the mouthpiece. A properly serviced and adjusted regulator should deliver a smooth, uninterrupted airflow upon deep inhalation; without excessive effort, hesitation, or free flow. If any problems occur, refer to the troubleshooting section



Before disassembling to correct any leaks, rinse the entire regulator thoroughly

with fresh water and blow out all residual moisture with filtered, low-pressure (30 psi) air. Disassemble and remedy the problem, referring to the troubleshooting section.

This concludes the annual service procedures for the HOG D3-DIN Environmentally Sealed first stage regulator.

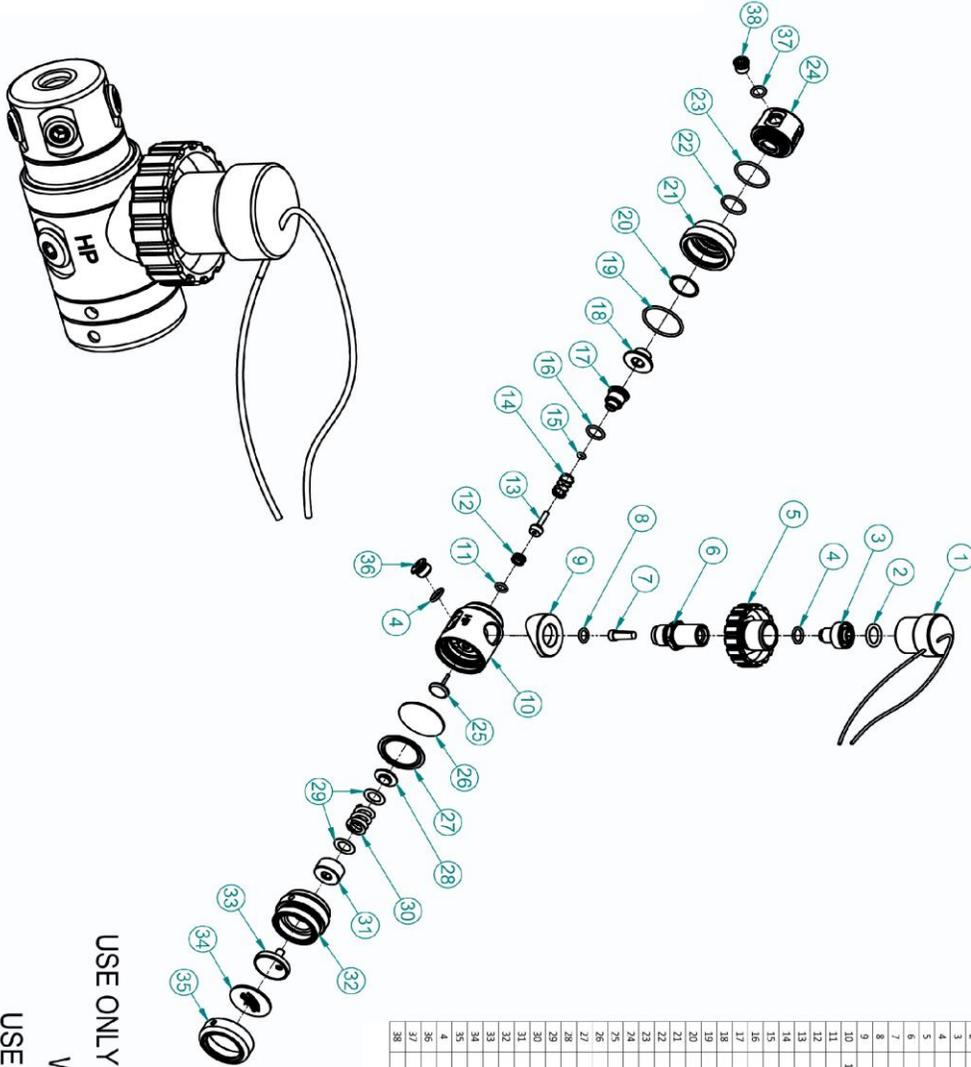
Troubleshooting – First Stage		
SYMPTOM	CAUSE	ACTION REQUIRED
Restricted airflow/ high inhalation resistance through entire system.	<ol style="list-style-type: none"> 1. Cylinder valve not completely opened. 2. Cylinder valve requires service. 3. Filter is contaminated. 4. Insufficient intermediate pressure 	<ol style="list-style-type: none"> 1. Open valve, check fill pressure. 2. Connect to a different cylinder. 3. Replace with new. 4. See below.
External air leakage 1. (Immersion Test) -or-hydrostatic diaphragm is abnormally distended or burst	<ol style="list-style-type: none"> 1. Turret plug loose. 2. HP Plug loose. 3. LP Plug loose. 4. DIN connector loose. 	<ol style="list-style-type: none"> 1. Replace the static 013 O-Ring and tighten again 2. Replace the static 904 O-Ring and tighten the plug again 3. Replace the static 903 O-Ring and tighten the plug again 4. Replace static 0110-Ring and tighten again.
IP Drift (Creep)	<ol style="list-style-type: none"> 1. Lockup but over 5 psi drift 2. Non-lockup 	<ol style="list-style-type: none"> 1. Replace the HP Seat and check the Internal Hard Orifice edge for damage. 2. Replace the Dynamic 010 O-Ring, HP seat and check the HP cone.
High or unstable intermediate pressure	<ol style="list-style-type: none"> 1. First stage improperly adjusted. 2. HP valve seat damaged or worn. 3. HP balance plug o-ring damaged or worn. 4. HP balance plug damaged or worn. 5. HP valve body sealing surface damaged or worn. 6. Valve spring damaged or weakened. 	<ol style="list-style-type: none"> 1. Readjust spring adjustment. 2. Replace HP valve seat. 3. Replace o-ring. 4. Replace balance plug. 5. Replace main housing. 6. Replace valve spring.
Low intermediate pressure	<ol style="list-style-type: none"> 1. First stage improperly adjusted. 2. Main spring damaged or weakened. 3. DIN inlet loose. 	<ol style="list-style-type: none"> 1. Readjust spring adjustment. 2. Replace main spring. 3. Check for tight – re-torque if needed.

Test Bench Specifications		
Test	Condition	Range
Intermediate pressure	500 & 3000 psi	135 psi, +/- 5psi
Intermediate pressure creep	Inlet pressure 500 & 3000 psi IP 135 +/- 5 psi	No more than 5 psi in 15 seconds
Vacuum leak test	Inlet blocked – 0 psi	No leaks allowed
Bubble leak test	Inlet pressure 500 & 3000 psi IP 135 +/- 5 psi	No leaks allowed

Torque Specifications		
Part	Description	Torque
FIRST STAGE		
1C-01-005-14 (6)	DIN Housing	225-250 inch pounds
1C-01-007-07-PT (3)	DIN Retainer Screw	125 inch pounds
1C-01-015-02-PT (36) 1C-01-015-01-PT (38)	HP Port Plug LP Port Plug	40 inch pounds
1C-01-017-03 (17)	Balance Chamber Plug	90 inch pounds
1C-01-004-07 (18)	Swivel Turret Retainer Screw	90 inch pounds
1C-01-010-08-PT (32)	Diaphragm Retainer Cap	No Torque Spec. Tighten until any further movement is possible or gap between Diaphragm Retainer Cap and Main Body is present.
1C-01-010-09-PBSC (35)	Environmental Sealing Cap	No Torque Spec. Tighten until no further movement possible.

HOG0395 First Stage Annual Service Kit				
Location	Part Number	Description	Count	Comment
2	1O-AS568-112-04	112-04 O-ring	1	Never Lubricate
4	1O-AS568-012-04	012-04 O-ring	2	Static O-ring
7	1C-01-005-02	Sintered Cone Filter	1	
8	1O-AS568-011-04	011-04 O-ring	1	Static O-ring
13	1B-01-002-02	HP Soft Sealing Seat	1	
15	1O-AS568-006-06	006-06 O-ring	1	Dynamic O-ring
16	1O-AS568-905-04	905-04 O-ring	1	Static O-ring
19	O-AS568-024-03	024-03 O-ring	1	Static O-ring
20	1P-01-004-02	Swivel Turret Retainer Screw Thrust Washer	1	
22	1O-AS568-016-03	013-03 O-ring	1	Dynamic O-ring
23	1O-AS568-021-03	021-03 O-ring	1	Dynamic O-ring
26	1P-01-010-010-01	Main Diaphragm	1	
27	1P-01-005-01	Diaphragm Washer	1	
29	1P-01-005-02	IP Spring Washer	2	
37	1O-AS568-011-03	011-03 O-rings	3	Static O-rings

D3-DIN Environmentally Sealed 1st Stage Regulator Schematic



USE ONLY CRISTOLUBE OR TRIBOLUBE
 WITH VITON O-RINGS!
 USE SERVICE KIT # HOG0395

#	Part Number	Part Description
1	02-10-00089-01	DELIMIN DUST COVER
2	10-A5568-112-04	DIN RETAINER O-RING #2
3	1C-01-007-27-2T	DIN RETAINER - TRIVALENT CHROME
4	10-A5568-012-04	DIN RETAINER O-RING #4
5	1B-01-002-03-8C-4P	DIN HANDWHEEL BLACK PLASTIC - TRIVALENT CHROME
6	1C-01-005-14	DIN HOUSING
7	1-01-005-02	SMITHEED FILTER
8	10-A5568-011-04	DIN HOUSING SEALING O-RING #8
9	1A-01-005-02	E3 SPADULE
10	1C-01-017-201-18SC-CHG	E3 MAIN BODY - TECH BLACK
11	1C-A5568-010-03	E3 FLOW THROUGH ORIFICE SEALING O-RING
12	1C-01-017-02	E3 FLOW THROUGH ORIFICE
13	1B-01-002-02	E3 V-PIECE
14	1B-01-002-02	E3 V-PIECE
15	10-A5568-006-06	BALANCE CHAMBER SEALING HP-TEMA SEALING O-RING
16	10-A5568-005-04	BALANCE CHAMBER FLOD SEALING O-RING
17	1C-01-004-02	E3 BALANCE CHAMBER SCREW
18	10-A5568-004-03	SPRING TURBET RETAINER SCREW SEALING O-RING
19	1C-01-004-02	SPRING TURBET RETAINER SCREW
20	1C-01-012-04-28SC	SPRING TURBET RETAINER LIGNON BODY - TECH BLACK
21	10-A5568-016-03	SPRING TURBET RETAINER LIGNON BODY - TECH BLACK
22	10-A5568-016-03	SPRING TURBET RETAINER LIGNON BODY - TECH BLACK
23	10-A5568-021-03	SPRING TURBET RETAINER LIGNON BODY - TECH BLACK
24	1C-01-004-09-28SC	SIP PORT SWAGE TURBET - TECH BLACK
25	1C-01-017-05	SEAL FILTER PIN
26	1P-01-000-01-00-01	1.407 O-RING
27	1P-01-000-01	DIAPHRAGM THROUST WASHER
28	1C-01-011-07	INTERMEDIATE PRESSURE SPRING PLASTIC SEAL
29	1P-01-005-02	INTERMEDIATE PRESSURE SPRING SEAT SOLUTION WASHER
30	1D-01-011-02	INTERMEDIATE PRESSURE SS SPRING
31	1C-01-017-26-2T	IP SPRING ADJUSTER SCREW - TECH BLACK
32	1C-01-010-08-2T	E3 ENV DIAPHRAGM RETAINER CAP - TRIVALENT CHROME
33	1Z-05-341-0119-4A	E3 PRESSURE TRANSDUCER HYSTON - PLASTIC
34	1A-01-010-01	E3 ENVIRONMENTAL SEALING DISK - HOG EMBOSSED SILICONE
35	1C-01-010-09-28SC	E3 ENVIRONMENTAL SEALING CAP - TECH BLACK
36	10-A5568-012-04	HP PORT FLUG O-RINGS
37	10-A5568-011-03	LP PORT TALLG O-RINGS
38	1C-01-015-01-2T	LP PORT TALLG - TRIVALENT CHROME