



## TECHNICAL MAINTENANCE MANUAL



# **mikron**

## **FIRST STAGE**

## CHANGE LOG

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Mikron First Stage Technical Maintenance Manual

## INTRODUCTION

This manual provides factory prescribed procedures for the correct service and repair of the Aqua Lung or Apeks regulator products described in this manual. It is not intended to be used as an instructional manual for untrained personnel.

The procedures outlined within this manual are to be performed only by personnel who have received Factory Authorized training through an Aqua Lung Service & Repair Seminar. If you do not completely understand all of the procedures outlined in this manual, contact Aqua Lung® to speak directly with a Technical Advisor before proceeding any further.

## WARNINGS, CAUTIONS, & NOTES

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



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



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



**NOTES** are used to emphasize important points, tips and reminders.

## SCHEDULED SERVICE

If the regulator is in good working order, it is permissible to overhaul it every other year with an inspection procedure being performed on the "off" years. For example:

**Year #1** : Inspection

**Year #2** : Overhaul

**Year #3** : Inspection

**Year #4** : Overhaul, and so on.

Both Inspections and Overhauls need to be documented in the Annual Service & Inspection Record (this can be printed from the Owner's Manual CD) to keep the Limited Lifetime Warranty in effect.



**NOTE:** A unit that receives heavy or frequent use, such as rental, instruction, or commercial applications, should be serviced at least twice a year - or more often - depending on the conditions of use and the manner in which it is maintained. (Refer to the care and maintenance procedures outlined in the Regulator Owner's Manual.)

## An Official Inspection consists of:

1. A pressurized immersion test of the entire unit to check for air leakage.
2. Checking for stable medium pressure that is within the acceptable range.
3. Checking for opening effort that is within the acceptable range.
4. Checking for smooth operation of the control knob and venturi switch.
5. A visual inspection of the filter for debris or discoloration.
6. A visual inspection of the exhaust valve to see that it is in good shape and that it's resting against a clean surface.
7. A visual inspection of the mouthpiece looking for tears or holes.
8. Follow Hose Inspection document for guidelines.

If a regulator fails item #1, 2, 3 or 4, the entire regulator should be overhauled. If a regulator fails #5, 6, 7 or 8, it will be up to the technician's discretion whether or not a full overhaul is required.

## GENERAL GUIDELINES

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

2. 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 are essential for an efficient repair facility.

3. As the regulator is disassembled, reusable components should be segregated and not allowed to intermix with nonreusable 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.

4. Use only genuine Aqua Lung parts provided in the overhaul parts kit for this product. DO NOT attempt to substitute an Aqua Lung part with another manufacturer's, regardless of any similarity in shape or size.

5. Do not attempt to reuse mandatory replacement parts under any circumstances, regardless of the amount of use the product has received since it was manufactured or last serviced.

6. 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.

7. In order to make the regulator compatible with nitrox up to 40% O<sub>2</sub> (EAN40), the regulator must be properly cleaned, lubricated and assembled using genuine Aqua Lung® or Apeks replacement parts. In addition, assembly must be carried out in a clean environment using powderless, latex gloves or equivalent. For more detailed information, be sure to read **Procedure A: Cleaning and Lubrication** at the back of this manual.

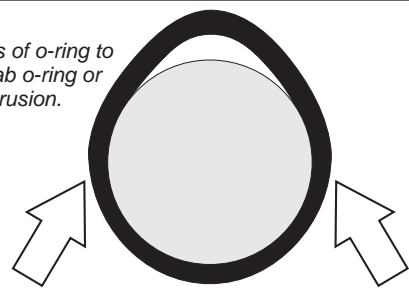
## GENERAL CONVENTIONS

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

1. When instructed to **remove**, **unscrew**, or **loosen** a threaded part, turn the part counterclockwise.
2. When instructed to **install**, **screw in**, or **tighten** a threaded part, turn the part clockwise.
3. When instructed to **remove** an o-ring, use the pinch method (see illustration below) 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 that are removed are discarded and replaced with brand new o-rings.

### Pinch Method

Press upwards on sides of o-ring to create a protrusion. Grab o-ring or insert o-ring tool at protrusion.



4. The following acronyms are used throughout the manual: **MP** is Medium Pressure; **HP** is High Pressure; **LP** is Low Pressure.

5. Numbers in parentheses reference the key numbers on the exploded parts schematics. **For example**, in the statement, "...remove the o-ring (7) from the crown (8)...", the number 7 is the key number to the crown o-ring.

## DISASSEMBLY PROCEDURE

**NOTE:** Before performing any disassembly, refer to the exploded parts drawing, which references all mandatory replacement parts. These parts should be replaced with new, and must not be reused under any circumstances - regardless of the age of the regulator or how much use it has received since it was last serviced.

**CAUTION:** Use only a plastic or brass o-ring removal tool when removing o-rings to prevent damage to the sealing surface. Even a small scratch across an o-ring sealing surface could result in leakage. Once an o-ring sealing surface has been damaged, the part must be replaced with new. **DO NOT** use a dental pick or any other steel instrument.

**1** Using an 9/16" open end wrench, remove the MP regulator hose from the first stage. Follow all the guidelines from the Hose Inspection & Cleaning Technical Maintenance Manual.



**2** Use a 4mm hex key to remove the HP (22) and MP (24) port plugs. Use an o-ring tool to remove all port plug o-rings (13,21) from the port plugs.



**3** Thread the vise mount tool (p/n 100395) into the HP port.



### DISASSEMBLY (Yoke)

**4** Remove the yoke screw (16) and dust cap (17) from the yoke (18).



**5** Secure the vise mount tool and first stage into a bench vise with the yoke (18) facing up. Using an 8mm hex key, turn the inlet fitting (19) counter-clockwise to loosen. Lift off the yoke assembly and remove the inlet fitting from the yoke.



**NOTE:** In 2013, there was a change to the Mikron body and inlet fitting. This change moved the filter and o-ring placement to the body instead of the inlet fitting. For more information on this change, see Technical Bulletin #38, Feb 1, 2013.

**NOTE:** If the filter and o-ring are mounted in the inlet fitting, proceed directly to step #7.

### 2013> BODY MOUNTED FILTER

**6** Remove the filter (14) and o-ring (13) from inside the inlet area of the body (20).



**NOTE:** After completing step #6, proceed directly to step #13.

### <2012 INLET FITTING MOUNTED FILTER

**7** Use the pointed end of the seat extraction tool (p/n 109437) to push the filter (14) and o-ring (13) out of the inlet fitting (19).



**NOTE:** After completing step #7, proceed directly to step #13.



## DISASSEMBLY (DIN)

- 8 Remove the protective cap (10) from the DIN fitting.



- 9 Secure the vise mount tool and first stage into a bench vise with the DIN assembly facing up. Using an 6mm hex key, turn the DIN fitting (12) counter-clockwise to loosen. Lift off the DIN assembly and separate the DIN fitting from the handwheel (15).



**NOTE:** In 2013, there was a change to the Mikron body and DIN fitting. This change moved the filter and o-ring placement to the body instead of the DIN fitting. For more information on this change, see Technical Bulletin #38, Feb 1, 2013.

**NOTE:** If the filter and o-ring are mounted in the DIN fitting, proceed directly to step #11.

## 2013> BODY MOUNTED FILTER

- 10 Remove the filter (14) and o-ring (13) from inside the inlet area of the body (20).



**NOTE:** After completing step #10, proceed directly to step #12.

## <2012 DIN FITTING MOUNTED FILTER

- 11 Use the pointed end of the seat extraction tool (p/n 109437) to carefully push the filter (14) and o-ring (13) out of the DIN fitting (12).



- 12 Use an o-ring tool to remove the face o-ring (11) from the DIN fitting (12).



- 13 Reposition the body in vise so that the MP side is facing up. Carefully lift and remove the spacer (1) from the spring retainer (6) using the flat brass o-ring tool.



- 14 Using an 8mm hex key, turn the adjustment screw (2) counter-clockwise and remove it from the spring retainer (6).



**15** Using your fingers, remove the washer (3) and spring (4).



**NOTE:** If the washer is not on top of the spring, it can be found stuck on the inside of the adjustment screw.

**16** Using a large, adjustable wrench turn the spring retainer (6) counter-clockwise and remove it from the body (20).



**NOTE:** Diaphragm and spring pad will come away with the spring retainer.

**17** Lift the spring pad (5) out of the spring retainer (6). Using your finger, push the diaphragm (7) out from the top side of the spring retainer.



**18** Rotate the body (20) in the vise so that the HP side is facing up. This will allow the pin support (8) and the pin (9) to fall out into your hand. Separate the pin and the pin support.



**19** Using an 8mm hex key, turn the HP plug (30) counter-clockwise to loosen and remove it from the body (20).



**20** Use an o-ring tool to remove the outer o-ring (31) from the HP plug (30).



**21** Using extreme care, remove the o-ring (28) from the balancing chamber inside the HP plug (30) followed by the back-up ring (29).



**NOTE:** It is highly recommended to use the o-ring tool (pn AT79K) to remove the o-ring and back-up ring from the HP balance plug. Push the hooked end of the tool straight down into the plug and then pull it straight up and out.

**CAUTION:** Care must be taken when removing the o-ring and back-up ring from the HP balancing plug. If the inside wall of the plug is scratched, it can cause a high pressure leak in the first stage and will have to be replaced.

**22** Remove the first stage from the vise. Turn the body (20) over and allow the spring (27) and HP seat (26) to fall out. Remove vise mount tool from the HP port.





**NOTE:** In 2012, a second HP-port was added to the Mikron body. This also included a slight change to the spring retainer and the protective sheath.

**NOTE:** If the body only has one HP-port, proceed directly to step #24.

### REMOVING THE SHEATH TWO HP PORT VERSION

**23** Thread the vise mount tool into a MP port closest to the inlet area. Push down on the two corners of the sheath (32) opposite the vise tool. Push the sheath edge out of the groove on the body (20). Continue to hold that part of the sheath out of the groove, then push down on the sheath next to the inlet area. Continue to push the sheath downward and slide it from the body.



**NOTE:** After completing step #23, proceed directly to step #25.

### REMOVING THE SHEATH SINGLE HP PORT VERSION

**24** Use the flat brass o-ring tool to lift the securing tabs in the inlet area on the sheath (32), slide the sheath off the body (20).



**25** Use a small dowel to carefully push the crown (25) out of the body (20).



**CAUTION:** Perform this step over a padded surface. Any damage to the crown orifice can cause a HP leak to result.

**26** Carefully remove the o-ring (23) from the crown (25). Inspect the crown sealing surfaces for any signs of damage. Replace the crown if any damage is found).



**CAUTION:** Care must be taken not to scratch the sealing surfaces of the crown orifice or a HP leak could result. Use brass or plastic o-ring tools only.

## THIS CONCLUDES DISASSEMBLY

**NOTE:** Before beginning reassembly, perform parts cleaning and lubrication in accordance with **Procedure A: Cleaning and Lubricating.**



## REASSEMBLY PROCEDURE

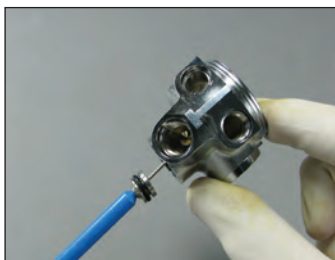
**NOTE:** Before performing any reassembly, it is important to inspect all parts, both new and those that are being reused, to ensure that every part and component is perfectly clean and free of any dust, corrosion, or blemishes. Before dressing each o-ring with Christo-Lube®, check to ensure it is clean, supple, and free of any blemish.

**WARNING:** Use only genuine Aqua Lung® parts, sub-assemblies, and components whenever assembling any Aqua Lung® product. DO NOT attempt to substitute an Aqua Lung® part with another manufacturer's, regardless of any similarity in shape, size or appearance. Doing so may render the product unsafe, and could result in serious injury or death.

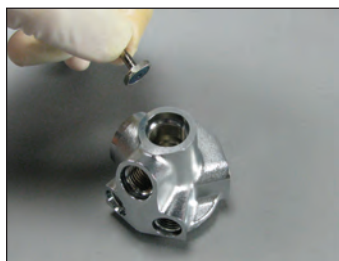
- 1 Install a well lubricated o-ring (23) onto the crown (25).



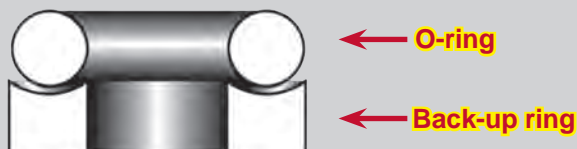
- 2 Using the seat installation tool (p/n 109437), place the raised area of the crown (25) against the plastic handle. Push the crown into the HP side of the body (20). Make sure the crown is seated evenly inside the body.



- 3 Install the HP seat (26) so that the blue side rests against the sealing edge of the crown (25). Place the spring (27) over the HP seat.



**NOTE:** Before continuing, closely examine the back-up ring (29). You will note that it has a flat side and a concave side. For correct assembly, the concave side should be against the o-ring (28), as shown in the picture below.



- 4 Install back up ring (29) into HP plug (30) with concave side facing out. Place a well lubricated o-ring (28) into the HP plug so that it sits evenly on top of the back up ring.



- 5 Install the HP plug o-ring (31) on the HP plug (30).



- 6 Place HP plug (30) into the body (20). Using an 8mm hex key, compress and turn the HP plug clockwise until snug.



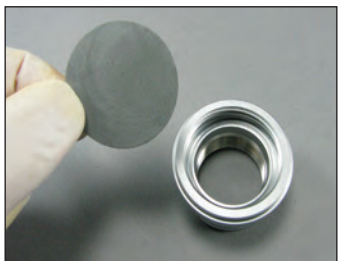
- 7 Install vise mount tool (p/n 100395) into HP port of the body (20). Position the body in a vise so that the HP side is facing up. Using a torque wrench and an 8mm hex key adapter, torque the HP plug (30) clockwise to 45 in-lbs (4.9 Nm).



- 8 Rotate the body (20) so that the MP side is facing up. Insert pin (9) into the center hole. Place the pin support (8) onto the pin. Push down on pin support and you should feel spring tension.



- 9** Press a new diaphragm (7) into the spring retainer (6). Make sure the diaphragm is seated evenly in the spring retainer.



- 10** Install the spring retainer (6) onto the body (20). Turn the spring retainer clockwise by hand until snug.



- 11** Using a torque wrench with the spring retainer socket (p/n 122152), torque the spring retainer (6) clockwise to 18 ft-lbs (25.4 Nm)



- 12** Place the spring pad (5) with the raised edge facing up, into the spring retainer (6). Place the spring (4) over the raised edge of the spring pad. Place the washer (3) directly on the top of the spring (4).



- 13** Put the adjustment screw (2) over top of the washer and spring. Using an 8mm hex key, turn the adjustment screw clockwise until it is flush with the spring retainer (6).



- 14** Align the flat edge of the spacer (1) with the flat edge on the spring retainer (6). Slide the spacer onto the spring retainer in that position.



### INSTALLING THE SHEATH TWO HP PORT VERSION

- 15** Remove the body (20) and vise mount tool from the vise. Line up the sheath (32) in the proper orientation. Place the vise mounting tool through the side of the sheath and then slide the sheath onto the body.



**NOTE:** After completing step #15, proceed directly to step #17.

### INSTALLING THE SHEATH SINGLE HP PORT VERSION


- 16** Rotate the body (20) in the vise so that the HP side is facing up. Line up the sheath (32) in the proper orientation and slide it onto the body. Confirm that the securing tabs on the sheath fit into the inlet area correctly.



**CAUTION:** If the tabs on the sheath are not fitted correctly, it will cause the yoke or DIN assembly to leak air when installed.



## REASSEMBLY (Yoke)

 **NOTE:** If the filter and o-ring are mounted in the inlet fitting, proceed directly to step #19.


### 2013> BODY MOUNTED FILTER

**17** Using the vise mount tool, place the body (20) in the vise with the inlet opening facing upward. Using your finger, press the **“UNLUBRICATED”** o-ring (13) into the o-ring groove in the inlet area on the body. Carefully push the large end of the filter (14) into the o-ring so that the filter is lightly supported upright by the o-ring.



**18** Put the inlet fitting (19) through the yoke (18). Holding the yoke, carefully lower the inlet fitting down onto the filter using caution not to dislodge the filter (14) & o-ring (13). Turn the inlet fitting clockwise by hand until snug.



 **CAUTION:** Make sure when lowering the inlet fitting onto the filter that the fitting remains perfectly vertical. Damage can occur to the filter/o-ring if care is not taken resulting in a HP leak.

 **NOTE:** After completing step #18, proceed directly to step #21.

### <2012 INLET FITTING MOUNTED FILTER

**19** Place the filter (14) into the back side of the inlet fitting (19). Install an **“UNLUBRICATED”** o-ring (13) into the groove around the filter.



**20** Insert the inlet fitting (19) through the yoke (18) being careful not to dislodge the o-ring (13) and filter (14). With the inlet area of the body (20) facing down, thread the inlet fitting clockwise up into the body by hand until snug.



 **CAUTION:** Preliminary installation of the inlet fitting requires the filter/o-ring to be facing up and the body inlet area facing down. This will keep the filter/o-ring from dislodging and becoming damaged. Damage to the filter or o-ring can result in a HP leak.

**21** If needed, rotate the first stage in the vise so that the yoke is facing up. Using a torque wrench with a long 8mm hex key adapter, torque the inlet fitting (19) clockwise to 18 ft-lbs (24.5 Nm).



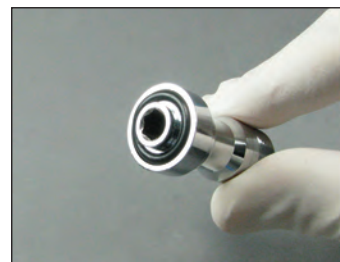
**22** Remove the first stage from the vise. Unthread the vise mount tool. Install the yoke screw (16) and dust cap (17).




 **NOTE:** After completing step #22, proceed directly to step #30.

## REASSEMBLY (DIN)

**23** Place an **“UNLUBRICATED”** o-ring (11) into face of the DIN fitting (12).



 **NOTE:** If the filter and o-ring are mounted in the DIN fitting, proceed directly to step #26.


### 2013> BODY MOUNTED FILTER


**24** Using the vise mount tool, place the body (20) in the vise with the inlet opening facing upward. Using your finger, press the **"UNLUBRICATED"** o-ring (13) into the o-ring groove in the inlet area on the body. Carefully push the large end of the filter (14) into the o-ring so that the filter is lightly supported upright by the o-ring.



**25** Put the DIN fitting (12) through the DIN handwheel (15). Holding the handwheel, carefully lower the DIN assembly down onto the filter (14) using caution not to dislodge the filter & o-ring (13). Turn the DIN fitting clockwise by hand until snug.



 **CAUTION:** Make sure when lowering the DIN fitting onto the filter that the fitting remains perfectly vertical. Damage can occur to the filter/o-ring if care is not taken resulting in a HP leak.

 **NOTE:** After completing step #25, proceed directly to step #28.


### <2012 DIN FITTING MOUNTED FILTER

**26** Place filter (14) into the back-side of the DIN fitting (12). Install an **"UNLUBRICATED"** o-ring (13) into the groove around the filter (14).



**27** Place the DIN fitting (12) through the DIN handwheel (15) being careful not to dislodge the o-ring (13) and filter (14). With the inlet area of the body (20) facing down, thread the DIN fitting clockwise up into the body by hand until snug.



 **CAUTION:** Preliminary installation of the DIN fitting requires that the filter side to be facing up; keeping the o-ring and filter from dislodging and becoming damaged. Damage to the filter or o-ring can result in a HP leak.

**28** If needed, rotate the body so that the DIN assembly is now facing up. Using a ft-lb torque wrench and a 6mm hex key adapter, torque the DIN fitting clockwise to 18 ft-lbs (24.5 Nm).



**29** Remove the first stage from vise. Unthread the vise mounting tool and replace protective DIN cap (10).



**30** Install o-rings (13 & 21) onto port plugs (22 & 24). Using a 4mm hex key, turn the port plugs clockwise until snug. Leave one MP port open for testing.



**THIS ENDS REASSEMBLY**



## ADJUSTING

### ADJUSTING MEDIUM PRESSURE (MP)

1 Thread the male end of the MP regulator hose clockwise into the open MP port. Use a 9/16" open end wrench to tighten until snug. Next, install the MP gauge (p/n 111610) onto the hose swivel. **Open the bleed valve on the gauge.** If your test gauge does not have an bleed valve, then it is vital that a properly adjusted second stage is attached to the first stage to act as an overpressure relief valve in the event of a HP leak.



**WARNING:** Be certain not to install a MP hose into the HP port via an adapter. Doing so may cause the hose to rupture when pressurized, and could result in serious personal injury.

2 Attach the first stage to a fully charged 3000 psi (206 bar) cylinder. While closely monitoring the MP test gauge, slowly open the cylinder valve to pressurize the regulator. Then slowly turn the knob of the bleed valve clockwise until it is completely shut.



**CAUTION:** Before pressurizing the first stage, it is important to have a properly adjusted second stage attached to the first stage. This will provide a safety relief valve if the MP exceeds 145 psi (10 bar). Failure to relieve increasing MP may result in damage to the test gauge or the MP hose.

**WARNING:** If the pressure gauge rapidly exceeds 145 psi (10 bar), there is a HP leak. Quickly close the cylinder valve and purge the second stage, or reopen the bleed valve of the test gauge and close the cylinder. Failure to do so may cause a rupture to the MP hose and/or MP gauge, which in turn can lead to personal injury. Refer to *Table 1: Troubleshooting Guide* for corrective guidelines and specific procedures.

3 If no leaks are detected, use a 8mm hex key to adjust the MP by turning the adjustment screw: Turning the adjustment screw clockwise increases the MP; turning the adjustment screw counter-clockwise decreases the MP. Turn the adjustment screw in 1/8th turn increments and cycle the bleed valve or second stage purge button several times after each adjustment. Set the MP to 130-145 psi (9-10 bar). After cycling, watch the gauge needle. The first stage MP should "lock-up" and be stable at the desired setting. Make any further adjustments as necessary. Leave the regulator under pressure for several minutes and check that the MP remains stable. If the MP rises more than 5 psi (0.3 bar), this indicates a leak. Refer to *Table 1: Troubleshooting Guide* for corrective guidelines and specific procedures.



## FINAL TESTING

### EXTERNAL LEAK TEST

1 With the Mikron still pressurized, submerge unit in a tub of water. Observe for leaks; troubleshoot accordingly.





**NOTE:** Do not confuse bubbles from trapped air with a true leak. If there is an air leak, bubbles will come out in a constant stream.

## THIS CONCLUDES SERVICING OF THE MIKRON FIRST STAGE















**TABLE 1: TROUBLESHOOTING GUIDE**

| SYMPTOM  | POSSIBLE CAUSE   | TREATMENT                                 |
|--|--|---|
| <b>High or Unstable MP</b>   | 1. The HP seat (26) is worn or damaged                   | 1. Replace the HP seat                    |
|  | 2. The crown (25) is damaged                             | 2. Replace the crown                      |
|  | 3. The crown o-ring (23) is worn or damaged.             | 3. Replace the o-ring                     |
|  | 4. The body to crown sealing surface is damaged          | 4. Replace the body                       |
|  | 5. The HP plug o-ring (31) is damaged                    | 5. Replace the o-ring                     |
|  | 6. The HP plug (30) internal wall is weakened or damaged | 6. Replace the HP plug                    |
|  | 7. The HP o-ring (28) is worn or damaged                 | 7. Replace the o-ring                     |
|  | 8. The HP back-up ring (29) is installed upside down     | 8. Replace the back-up ring               |
|  | 9. The HP spring (27) is weakened or damaged             | 9. Replace the spring                     |
|  | 10. The first stage is improperly adjusted               | 10. Readjust the adjustment screw (2)     |
| <b>External Air Leak</b>   | 1. The port plug o-rings (13 and 21) are worn or damaged | 1. Replace the o-rings                    |
|  | 2. The diaphragm (7) is worn or damaged                  | 2. Replace the diaphragm                  |
|  | 3. The diaphragm seating surface is damaged              | 3. Replace the body                       |
|  | 4. Spring Retainer (6) is loose                          | 4. Re-torque the Spring Retainer          |
|  | 5. Inlet/DIN fitting o-ring (13) is worn or damaged      | 5. Replace the o-ring                     |
| <b>Restricted air flow or high inhalation resistance through entire system</b> | 1. The cylinder valve is not completely open             | 1. Open valve and check cylinder pressure |
|  | 2. The cylinder valve needs service                      | 2. Try another cylinder                   |
|  | 3. The filter (14) is clogged                            | 3. Replace the filter                     |

 **NOTE:** This is a partial list of possible problems and recommended treatments. For more information, refer to the second-stage troubleshooting guide, or contact Aqua Lung Technical Service Department for assistance with problems not described here.

 **CAUTION:** Recommended treatments which require disassembly of the regulator must be performed during a complete overhaul, according to the prescribed procedures for scheduled, annual service. Do not attempt to perform partial service.

**TABLE 2: TOOL LIST & SERVICE KITS**

| PART # | DESCRIPTION  | APPLICATION   |
|--------|--|---|
| 111610 | MP Gauge<br>0-400 psi<br>                 | MP testing  |
| 944022 | Brass O-ring<br>Tool Set<br>              | Removal and installation of o-rings                                   |
| 103102 | O-ring Tool<br>(Plastic)<br>              |   |
| AT79K  | O-ring Tool<br>                           | Removal of HP o-ring (28) & back-up ring (29)                         |
| N/A    | Small Dowel<br>                           | Crown (25) removal  |
| 109437 | Seat Extraction<br>Tool<br>               | Crown (25) installation   |
| 100395 | Vise Mounting<br>Tool<br>                 | Holding first stage body (20) in vise.                                |
| N/A    | Large<br>Adjustable<br>Wrench<br>         | Loosen/Tighten/Adjust parts   |
| N/A    | Torque Wrench<br>                        | Apply torque to parts listed in <b>Table 3: Torque Specifications</b> |
| 122152 | Spring Retainer<br>Socket<br>           | Apply torque to parts listed in <b>Table 3: Torque Specifications</b> |
| N/A    | Hex Key Adapter<br>(6mm & 8mm long)<br> | Apply torque to parts listed in <b>Table 3: Torque Specifications</b> |
| N/A    | 9/16" Open<br>End Wrench<br>            | Loosen/Tighten/Adjust parts   |
| N/A    | Hex Key<br>(4mm,6mm,8mm)<br>            | Loosen/Tighten/Adjust parts   |
| N/A    | Magnifier w/ Light<br>                  | Inspection of small parts   |
| N/A    | Bench Vise   | Disassembly/Reassembly  |
| N/A    | Ultrasonic Cleaner   | Brass and stainless steel parts cleaning                              |
| N/A    | Powderless Latex Gloves or Finger Cots   | Keep finger oils off of parts   |
| N/A    | Test Bench   |   |
| 900014 | Mikron First Stage Service Kit   |   |

**TABLE 3: TORQUE SPECIFICATIONS**

| PART #        | DESCRIPTION/KEY ITEM # | TORQUE              |
|---------------|------------------------|---------------------|
| 127874/127583 | Spring Retainer (6)    | 18 ft-lbs (24.5 Nm) |
| 129251/127801 | DIN Fitting (12)       | 18 ft-lbs (24.5 Nm) |
| 129253/127808 | Inlet Fitting (19)     | 18 ft-lbs (24.5 Nm) |
| 129120        | HP Plug (30)           | 45 in-lbs (4.9 Nm)  |



**TABLE 4: TEST BENCH SPECIFICATIONS**

| PART #    | DESCRIPTION/KEY ITEM #    | TORQUE  |
|-----------|---------------------------|---|
| Leak Test | Inlet 3,000 psi (206 bar) | No leaks allowed  |
| MP        | Inlet 3,000 psi (206 bar) | 130-145 psi (9-10 bar)  |
| MP Creep  | Inlet 3,000 psi (206 bar) | 5 psi (0.3 bar) max between 5 to 15 seconds after cycling regulator (purge) |





**TABLE 5: RECOMMENDED CLEANERS & LUBRICANTS**

| LUBRICANT/CLEANER  | APPLICATION   | SOURCE   |
|--|---|--|
| <b>Christo-Lube® MCG 111</b><br><br><b>PerflouroLube 20/1</b>  | Lubricant for all o-rings   | Aqua Lung, PN 820466,<br>or<br>Lubrication Technologies<br>310 Morton Street<br>Jackson, OH 45640<br>(800) 477-8704<br><br>Performance Fluids<br>Ste 101 Lomeshaye Business Park<br>Turner Road<br>Nelson Lancashire BBP 7DR     |
|  <b>CAUTION:</b> Silicone rubber requires no lubrication or preservative treatment. DO NOT apply grease or spray to silicone rubber parts. Doing so may cause a chemical breakdown and premature deterioration of the material. |   |  |
| <b>White distilled vinegar</b><br>(diluted with water)   | Bath for reusable stainless steel and brass parts.  | “Household” grade  |
|  <b>CAUTION:</b> Do not use muriatic acid for the cleaning of any parts. Even if strongly diluted, muriatic acid can harm chrome plating and may leave a residue that is harmful to o-ring seals and other parts.              |   |  |
| <b>Oxygen Compatible Solution</b><br><br><b>Promoclean TP108</b><br><br><b>Janitol Plus</b>  | Nitrox/O2 Cleaning  | As Per Training<br><br>INVENTEC PERFORMANCE<br>CHEMICALS SA.<br>20, Rue de bourgogne<br>BP 211<br>69802 SAINT-PRIEST cedex<br><br>JOHN LAWSON DIST.<br>SCOTSHAW BROOK HOUSE<br>BRANCH ROAD<br>LOWER DARWEN<br>LANCASHIRE BB3 0PR |
|  |   |  |
| <b>Liquid Dishwashing Detergent</b><br>(diluted with warm water)   | Degreaser for brass and stainless steel parts; general cleaning solution for plastic and rubber | “Household” grade  |

## PROCEDURE A: CLEANING & LUBRICATING

### AQUA LUNG AND APEKS REGULATORS AND NITROX

When it comes to issues of nitrox safety and compatibility, the concerns lie primarily with the regulator's first stage as it is subjected to high inlet pressures. High inlet pressures lead to adiabatic compression or heating of the gas. The Aqua Lung or Apeks regulator product described in this manual, when properly cleaned and assembled, is authorized for use with enriched air nitrox (EAN) that does not exceed 40% (EAN 40). It is authorized because it has undergone adiabatic compression testing and the authorized service kit components and lubricants are compatible in elevated oxygen environments. During cleaning, a mild detergent must be used to remove condensed hydrocarbons (compressor oils) from the inside passageways of the first stage. For the first stage to remain EAN40 compatible, only use hyperfiltered compressed gas (hydrocarbons < 0.1 mg/m<sup>3</sup>). Ordinary compressed breathing air (Grade E) usually does not meet this criterion. Once ordinary breathing air is used, the first stage is no longer EAN40 compatible until it is cleaned and serviced again.

Although regulator second stage components are not exposed to high pressure EAN, Aqua Lung and Apeks recommend that the same cleaning procedures be followed for the complete regulator. This prevents the possibility of cross contamination and guarantees the cleanliness of the entire regulator.

### Cleaning Brass and Stainless Steel Parts

1. Preclean in warm, soapy water\* using a soft nylon bristle brush.
2. Thoroughly clean parts in an ultrasonic cleaner filled with soapy 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.
3. Remove parts from the ultrasonic cleaner and rinse with 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.

### Cleaning Anodized Aluminum, Plastic & Rubber Parts

Anodized aluminum parts and parts made of plastic or rubber, such as box bottoms, box tops, dust caps, etc., may be soaked and cleaned in a solution of warm water mixed with mild dish soap. Use only a soft nylon toothbrush to scrub away any deposits. Rinse in fresh water and thoroughly blow dry, using low pressure filtered air.



**CAUTION:** Do not place plastic and rubber parts in contact with acid solutions. This could alter their physical properties and cause degradation and premature breakdown.

### Cleaning MP Hoses (Air use Only)

**Follow Hose Inspection & Cleaning Guidelines for more detailed information**

1. Hose fittings: Ultrasonically clean with soapy water; Use soft nylon bristle brush. If corrosion is evident, use a brass bristle brush.
2. Run water through hose if needed
3. Thoroughly rinse with fresh water
4. Blow out hose before installing



**CAUTION:** Do not place complete hose length in contact with acid solutions. This could alter their physical properties and cause degradation and premature breakdown.

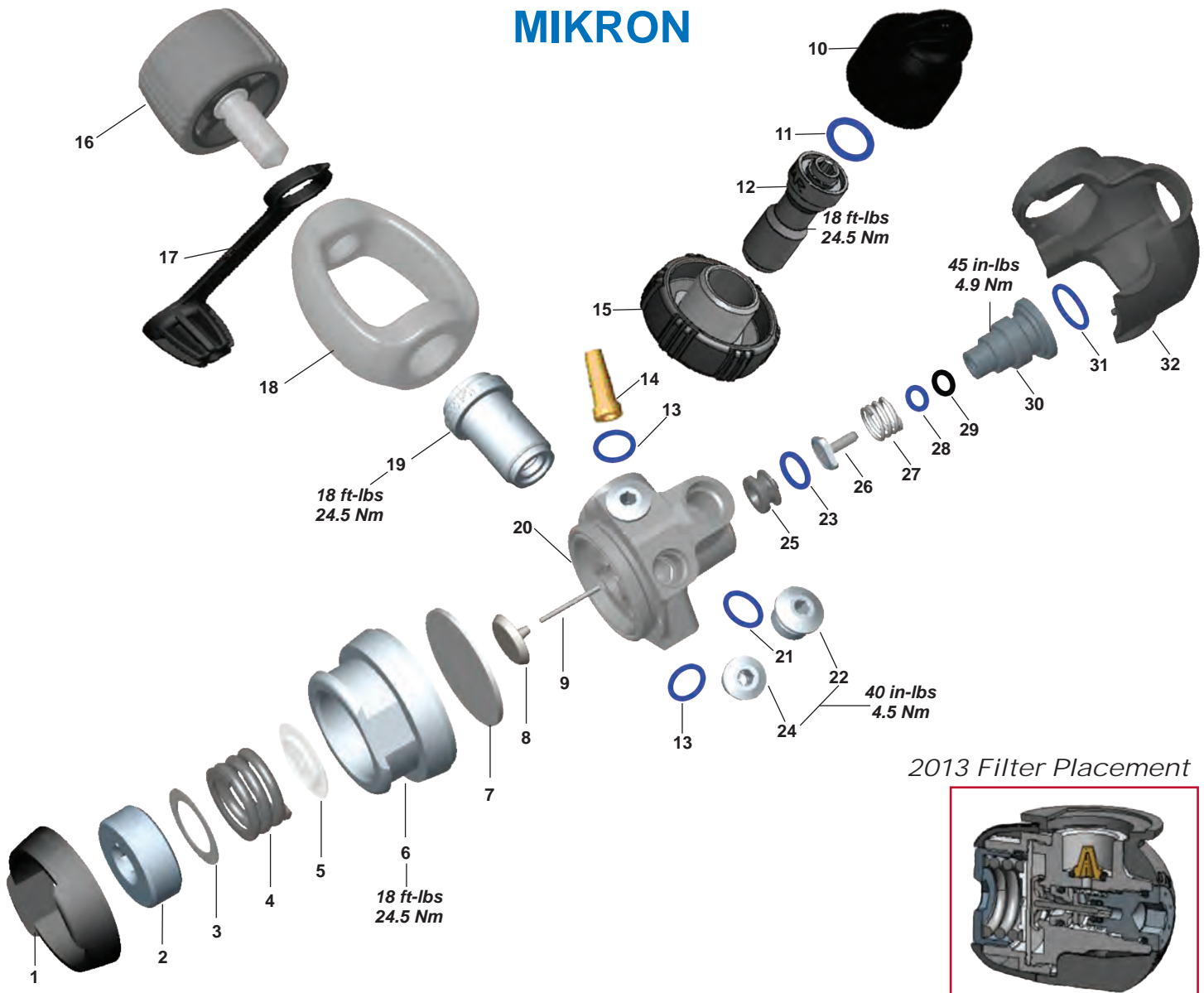
### Lubrication and Dressing

Wear powderless, latex 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 Christo-Lube® MCG-111. Dress the 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 Christo-Lube grease, as this will attract particulate matter that may cause damage to the o-ring.

\*Soapy water is defined as "household" grade liquid dishwashing detergent diluted in warm water.

# MAINTENANCE NOTES

## MIKRON



| Key # | Part # | Description |
|-------|--------|-------------|
|-------|--------|-------------|

|       |               |   |
|-------|---------------|---|
| ..... | 129022        | DIN Adapter Kit, (2013>)                  |
| ..... | 127865        | DIN Adapter Kit, (<2012)                  |
| ..... | <b>900014</b> | <b>Overhaul Parts Kit, (Yoke and DIN)</b> |

|                |                |                              |
|----------------|----------------|------------------------------|
| 1.....         | 127888         | Spacer, Black/Blue           |
| .....          | 127878         | Spacer, Black/Pink           |
| .....          | 127872         | Spacer, Black/Green          |
| .....          | 127837         | Spacer, Black/Red            |
| .....          | 127839         | Spacer, Vanilla              |
| 2.....         | 127566         | Adjustment Screw             |
| <b>3.....</b>  | <b>127568</b>  | <b>Washer</b>                |
| 4.....         | 127567         | Spring                       |
| 5.....         | 127565         | Spring Pad                   |
| 6.....         | 127874         | Spring Retainer (2-HP Ports) |
| .....          | 127583         | Spring Retainer              |
| <b>7.....</b>  | <b>119159</b>  | <b>Diaphragm</b>             |
| 8.....         | 127563         | Pin Support                  |
| 9.....         | 127564         | Pin                          |
| 10.....        | 124665         | Din ACD Cap                  |
| <b>11.....</b> | <b>820094P</b> | <b>O-ring (20 pk)</b>        |
| 12.....        | 129251         | DIN Fitting, 2013            |
| .....          | 127801         | DIN Fitting                  |
| <b>13.....</b> | <b>820011P</b> | <b>O-ring (25 pk)</b>        |
| <b>14.....</b> | <b>129151</b>  | <b>Filter</b>                |

| Key # | Part # | Description |
|-------|--------|-------------|
|-------|--------|-------------|

|                |                |                             |
|----------------|----------------|-----------------------------|
| 15.....        | 127803         | DIN Handwheel               |
| 16.....        | 127805         | Yoke Screw                  |
| 17.....        | 124555         | Dust Cap                    |
| 18.....        | 127807         | Yoke                        |
| 19.....        | 129253         | Inlet Fitting, 2013         |
| .....          | 127808         | Inlet Fitting               |
| 20.....        | 129244         | Body, 2013                  |
| .....          | 127873         | Body (2-HP Ports), <2012    |
| .....          | 127844         | Body (1-HP Port)            |
| <b>21.....</b> | <b>820072P</b> | <b>O-ring (20 pk)</b>       |
| 22.....        | 103137         | Plug, HP Port, 7/16"        |
| <b>23.....</b> | <b>820038P</b> | <b>O-ring (20 pk)</b>       |
| 24.....        | 122233         | Plug, MP Port, 3/8"         |
| 25.....        | 127585         | Crown                       |
| <b>26.....</b> | <b>105940</b>  | <b>HP Seat</b>              |
| 27.....        | 122244         | Spring                      |
| <b>28.....</b> | <b>820080P</b> | <b>O-ring (25 pk)</b>       |
| <b>29.....</b> | <b>119129</b>  | <b>Back-up Ring</b>         |
| 30.....        | 129120         | Plug                        |
| <b>31.....</b> | <b>824407P</b> | <b>O-ring (20 pk)</b>       |
| 32.....        | 127876         | Sheath, Black (2-HP Ports)  |
| .....          | 127804         | Sheath, Black (1-HP Port)   |
| .....          | 127831         | Sheath, Vanilla (1-HP Port) |

Part numbers in **BOLD ITALICS** indicate standard overhaul replacement part.



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**AUTHORIZED TECHNICIAN  
TECHNICAL MAINTENANCE MANUAL  
MIKRON FIRST STAGE**

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