

### SERVICE MANUAL



## MIKRON FIRST STAGE

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#### **INTRODUCTION**

This manual gives the instructions and the recommendations for the disassembly, the cleaning, the checking, the reassembly and the adjustment of an Aqua Lung regulator. This manual is not an instruction manual for unqualified personnel. The procedures described in this manual are intended only for qualified personnel who have been trained

in the servicing of Aqua Lung equipment during a specialised course. If you do not understand certain procedures in this manual

you should contact an Aqua Lung service consultant before undertaking any operation.

#### WARNINGS, ATTENTION, NOTES

Certain icons have been used to facilitate the reading and understanding of this manual. They have the following meanings :



**WARNING:** Indicates situations that could result in serious or fatal accidents if the advice given is not followed correctly.



**ATTENTION:** Indicates a situation or action that could cause serious damage to the product, making it dangerous if the advice given is not followed correctly.



**NOTE :** Notes are used to emphasize important points as well as information which needs to be remembered.

#### MAINTENANCE



**ATTENTION:** Whatever the number of dives carried out during a year, the regulator should receive a complete service each year. If the regulator is used in a chlorinated or aggressive environment the service period should be reduced to six months.

In order to conform with the Aqua Lung Regulator Lifetime Guarantee, all servicing (inspection, servicing and repairs) should be recorded in the Service Record incorporated in the regulator User Manual.

#### **GENERAL INSTRUCTIONS**

- 1. In order to carry out the procedures described in this manual correctly it is important that you follow the steps in the exact order indicated. Read the manual through completely so that you become familiar with all the procedures, the special tools and the replacement parts, before starting to disassemble the product. Keep this manual open near to you so that you can refer to it step by step. Do not rely on your memory.
- 2. All servicing and repair procedures should be carried out in a workshop that is clean, well lit, easy to access and specially fitted for the purpose.
- 3. The regulator body should never be directly held in the jaws of a vice. To hold the body, screw the tool 006230 into the HP port and then grip the tool with the vice.
- 4. Once the regulator has been disassembled, the reusable components should be separated from the components that need to be replaced. Fragile items with seats or crowns with critical sealing surfaces should be separated and protected during servicing in order to prevent any damage.
- 5. Use only spare parts from Aqua Lung service kits. Never replace an Aqua Lung part with one from another manufacturer, even if it appears similar.
- 6. Never re-use regulator parts which should be replaced on the pretext that the regulator has seen little use since its manufacture or since its last service.
- 7. When reassembling, check that the torque used conforms with that shown in Table 4, Torque. Some parts can be irretrievably damaged if the acceptable torque is exceeded.

#### **GENERAL CONVENTIONS**

The conventions described below define the actions to be carried out when an instruction is given.

- 1. **Unscrew**: to unscrew a threaded part, turn it anticlockwise.
- 2. Screw: to screw a threaded part, turn it clockwise.
- 3. **Remove the O-ring**: To remove an O-ring follow the method below, using the special tool provided for this purpose. Any tool that could damage the O-ring should be avoided. In every case, replace the O-ring removed with a new one.

Press simultaneously on the two sides of the O-ring in order to form an 'eye'. . Insert the special tool into this eye to remove the O-ring.



#### Mikron First Stage Service Manual

- The acronyms used: LP: Low Pressure MP: Medium Pressure HP: High Pressure
- 5. Numbers in brackets indicate the part number of the component shown on the exploded view attached.

#### DISASSEMBLY PROCEDURE



**Note**: Before commencing disassembly, consult the exploded view to check the reference numbers of all parts requiring replacement. These parts should all be replaced by new parts and should not be re-used on the pretext that the regulator has seen little use since its manufacture or since its last service.



Attention: Use only the special tool when removing O-rings in order to avoid damaging the seal recess. The slightest scratch on a sealing surface could cause a leak. If a surface should be damaged then this part should be replaced with a new one. Do not use any pointed instrument or metal tool to remove O-rings. 1. Unscrew the hoses from the first stage using the appropriate spanner. Screw the holding tool (116320) into a free HP port and grip the tool in a vice.



2. Disassembly of the yoke connexion.

Unscrew the yoke screw (127805). Using an 8mm Allen key, unscrew the yoke seat (127808).

Remove the filter (129151) and the O-rings (124703).



3. Disassembly of the DIN connexion

Remove the plug (129216). Using a 6mm Allen key, unscrew the DIN seat (127801). Remove the filter (129151) and the O-rings (124703 and

Remove the filter (129151) and the O-rings (124703 and 124709).





4. Remove the HP protector (127804 or 127831) and the elastomer washer (127837 and 127839)





5. Using an 8mm Allen key, unscrew the adjusting screw (127566).



6. Remove the washer (127568), the MP spring (127567) and the spring pad (127565)



7. Using an 32mm spanner, unscrew the wet chamber (127583)



8. Remove the diaphragm (119159), the pin support (127563) and the pin (127564).



 Using an 8mm Allen key, unscrew the plug (129120). Turn over the body in order to recover the spring (122244) and the valve (124624). Separate the spring from the valve.





10. Remove the O-ring (213714) from the plug. Remove the O-ring (124612) and the anti extrusion washer (119129) inside the plug.





Attention: Before continuing, make sure that you are working on a soft surface in order to avoid damaging the seat (127585) during disassembly.

 Insert the plastic side of the extraction tool (116236) into the body's central hole, on the MP side (the same side as the diaphragm). Make sure that the tool is in contact with the seat. Press down to remove the seat (127585). Remove the O-ring (124704) from the seat.



12. Remove the HP plug (122237) and MP plugs (122233). Remove their O-rings (124703) et (124701).

#### END OF DISASSEMBLY

Before starting to re-assemble the regulator, make sure that all replacement parts have been cleaned and lubricated in accordance with <u>Procedure A : Cleaning and Lubricating</u> on page 14.

#### **RE-ASSEMBLY PROCEDURE**

 Fit a new lubricated O-ring (124704) on the seat (127585). Slide the seat onto the tool (116236), push the seat into the body (HP side) to position the seat and push with the tool.





2. Screw the holding tool (116320) into a port and grip the body in a vice. Fit a new HP seat (124624), with its blue face toward the interior of the body. Check that the seat sits upright inside the body. Position the spring (122244) around the seat.





**Note**: Before continuing, closely examine the antiextrusion washer (119129). 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, as shown in the picture below.



3. Fit a new lubricated anti-extrusion washer (119129) then a new lubricated O-ring (124612) in the plug (129120). Using a small brush add a little grease to the inside of the spring block.



4. Fit a new lubricated O-ring (213714) onto the plug (129120).



 Fit an 8mm Allen key into the plug (129120). Engage the plug into the regulator body. Push on the plug to compress the spring, at the same time screwing the plug into the body until it blocks. Using a torque wrench, tighten the plug to 0.5 m.kg.



6. Turn the regulator over so that the MP side faces you. Insert the pin (127564) into the central hole. Place the pin support (127563) over the pin.



Press several times on the pin support. It should feel like a push-button.



7. Fit a new diaphragm (119159) into the wet chamber (127583). Make sure that the diaphragm is correctly positioned by pressing all around its edge with your finger.



 Screw the holding tool (116230) into a HP port and clamp the tool in a vice, diaphragm upwards. Screw the wet chamber (127583) fully onto the body by hand. Place the tool (122152). Using a torque wrench, tighten the wet chamber to 2.5 m.kg.





**NOTE:** the tightening of the wet chamber on the body SHOULD NOT be done with the MP spring assembled in the wet chamber. Stages 8, 9 and 10 must be respected.

9. Fit the spring pad (127565), the spring (127567) and the washer (127568) on the diaphragm.



 Using an 8 mm Allen key, screw the IP adjusting screw (127566) until coming to up to the wet chamber. Then fit the elastomer washer (127837 or 127839).



11. Fit the HP protector (127804 or 127831) onto the body.



Step #1





**NOTE:** STEP #1: Place the protector's plot into the hole of the HP body. STEP #2: maintaining the plot in position, engage the protector and check that the 2 plots are well under way.

12. For the DIN connexion.

a. Fit a new O-ring (124709) onto the DIN seat (127801). Fit a filter (129151) into the DIN seat and then fit a new lubricated O-ring (124703) around the filter at the bottom of the groove.



b. Unscrew the regulator from the vice and hold it with the entry downwards. Place the seat into the handwheel (127803), and then manually screw the seat fully home into the body. Tighten the holding tool so that the handwheel is uppermost. Using a torque wrench with an 6 mm Allen key, tighten the seat at 2.5 m.kg.



13. For the yoke connexion

a. Fit a filter (129151) into the yoke seat (127808) and then fit a new lubricated O-ring (124703) around the filter at the bottom of the groove.



b. Unscrew the regulator from the vice and hold it with the entry downwards. Place the seat into the yoke (127807), and then manually screw the seat fully home into the body. Tighten the holding tool so that the yokel is uppermost. Using a torque wrench with an 8 mm Allen key, tighten the seat at 2.5 m.kg.



c. Fit the dust cap (124555) around the yoke screw (127805) then screw the yoke screw.

14. Fit new lubricated O-rings onto all MP and HP plugs. Screw all the plugs and tighten them using an 4 mm Allen key.

#### **ADJUSTING THE FIRST STAGE**

- a. Screw an MP gauge (0-25 bar) into one of the MP ports. If the gauge is not fitted with an over-pressure valve, then it is vital that the second stage is fitted so that it can act as an over-pressure valve in the event of an HP leak.
- Connect the first stage to a cylinder charged to 200bar. Slowly open the cylinder valve to put the regulator under pressure.

c. After checking that there is no leak, adjust the MP by turning the adjusting screw: Screwing in increases the MP, unscrewing reduces the MP.



Attention: if the MP indicated rapidly exceeds 9.5bar then this indicates a HP leak. Close the cylinder valve immediately and purge the regulator. Refer to Table 1. Troubleshooting Guide.

Turn the screw by increments of 1/8 of a turn and purge the regulator several times, using the second stage, after each increment. Adjust the MP (see Table 5).

Once the MP has been adjusted, purge the second stage about ten times. When this is finished check the pressure gauge. The MP should be stable at the desired value (8.5b or 9.5b depending on the regulator). Make any further adjustments that may be necessary. Leave the regulator under pressure for several minutes and check that the MP remains stable. If the MP rises more than 0.3 bar this indicates that there is a leak. Refer to **Table 1. Troubleshooting Guide.** 

15. Close the cylinder valve and completely purge the regulator. Put the regulator under pressure once more and check that the MP is stable.

If the MP is different, repeat steps 3 and 4 until a stable pressure is obtained.

#### END OF REASSEMBLY

#### **TEST IN WATER**

Check that all the MP and HP plugs are in place and that a correctly adjusted second stage is connected to the first stage. Slowly open the cylinder valve to put the regulator under pressure.

Immerse the first stage completely in water to check that there are no leaks.



**Note**: Do not mistake any bubbles that are trapped in the regulator with a leak. If there is a leak there will be a constant stream of bubbles.

When you are sure that there is no leak, close the cylinder valve and purge the regulator. Remove the first stage from the cylinder and refit the dust cap.

If a leak has been detected then note its source and refer to **Table 1. Troubleshooting Guide.** 



#### Table 1. Troubleshooting Guide

SYMPTOM	POSSIBLE CAUSE	TREATMENT
	1. The HP seat (124624) is worn or damaged.	1. Replace the HP seat.
Increase in MP (likely to cause a second stage leak)	2. The crown (127585) is damaged.	2. Replace the crown
	3. The O-ring (124704) is worn or damaged.	3. Replace the O-ring
	4. Groove on the plug (129120) damaged	4. Replace the plug
	5. O-ring (124612) is worn or damaged.	5. Replace the O-ring
	6. O-ring groove on the crown on the body is damaged	6. Replace the body
	1. O-rings on the MP and HP plugs are worn, extruded or damaged.	1. Replace the O-ring(s)
External leak	2. The diaphragm (119159) is worn or damaged.	2. Replace the diaphragm
	3. The sealing face of the diaphragm is damaged.	4. Replace the body
	4. Wet chamber screw (127583) loose.	5. Tighten the dry chamber
	6. Seat O-ring (124709) damaged	6. Replace the O-ring
	7. Filter O-ring (124703) damaged	7. Replace the O-ring
	8. Plug O-ring (213714) damaged	8. Replace the O-ring
	1. Cylinder valve not completely open	1. Open the valve, check the cylinder pressure
Reduced airflow or significant breathing resistance on complete regulator.	2. Cylinder valve requires servicing	2. Try another cylinder
	3. Filter (129151) blocked	3. Replace the filter
	4. The cylinder is empty	4. Charge the cylinder

REF	DESCRIPTION	APPLICATION	US PART NO.
116222	MP pressure gauge complete 0/16B	Checking medium pressure	111610
N/C	O-ring tool	Fitting and removing O-rings	944022
116236	OUTIL DE MONTAGE 116236	Seat assembly/disassembly	109436
116230	Holding tool	For holding 1st stage in vice	100395
122152	Dry chamber socket	Wet and dry chamber tightening socket	n/a
122154	Torque wrench 2.5 m.kg	Seat, dry chamber	n/a
122152	Torque screwdriver	Plugs	n/a
N/C	Extension	Socket extender	n/a
N/C	Spanner	Dry chamber	n/a
N/C	Allen key 4mm	MP and HP plugs	n/a
N/C	Allen key 8mm	MP adjustment, yoke seat	n/a
N/C	Allen key 6mm	DIN seat	n/a
407005			
127862	Mikron first stage Service Kit	For Mikron first stage versions	
127864	Mikron Reg service kit	For Mikron reg versions	

#### Table 2. List of Tools and Service Kits



#### Table 3. Recommended cleaners and lubricants

LUBRICANT / CLEANER	APPLICATION	SOURCE	
Christolube MCG 111	All O-rings	Aqua Lung, ref. 480025	
Attention: Silicone parts do not require lubrication. Do not grease them. Greasing silicone parts can change their molecular construction and cause premature degradation of the material.			
Oakite #31	Acid bath for cleaning brass and stainless steel parts.	Oakite Products, Inc.	
NETALU	Acid bath for cleaning brass and stainless steel parts.	Aqua Lung, ref. 455001	
Diluted white vinegar	Acid bath for cleaning brass and stainless steel parts.	Household stores	
Attention: Do not use hydrochloric acid for cleaning parts. Hydrochloric acid, even when well diluted, attacks the coating of metal parts and leaves a corrosive deposit that damages plastic parts and O-rings.			
Washing-up liquid (diluted with hot water)	Degreases brass and stainless steel parts; general cleaning of plastic and rubber parts.	Household stores	
Disinfectant STERANIOS 2%	Disinfectant for all plastic and metal parts.	Aqua Lung ref : 382062	

#### Procedure A Cleaning and Lubricating (All Aqua Lung Regulators)

#### Cleaning brass and stainless steel parts.

- 1. Pre-clean by soaking in NETALU diluted to 25%.
- 2. Cleaning in an ultra-sonic bath filled with a mixture of washing-up liquid + hot water. If some resistant deposits remain then fill the ultrasonic bath with white vinegar and repeat. DO NOT put plastic, rubber, silicone or anodised aluminium parts in contact with vinegar.
- 3. Rinse in demineralised or fresh water to avoid calcium deposits. Soak for 10 minutes. Dry with filtered low pressure air and then check that their condition is now suitable for re-use.

#### Cleaning plastic, rubber and anodised aluminium parts.

For anodised aluminium parts : soak in a « NETALU diluted to 25% ». Rinse in fresh water and dry with low-pressure filtered air. For plastic parts. (casings, plugs..) : clean in an ultrasonic bath containing a mixture of washing-up liquid and hot water. Use only a toothbrush with nylon bristles to remove any deposits. Rinse in fresh water and dry with low-pressure filtered air



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

#### Disinfecting parts .

For disinfection, leave plastic and metal parts to soak for 20 minutes in a bath of STERANIOS 2% ref. 382062 (ready to use). Rinse the parts thoroughly after soaking. Toxic product, follow the instruction for its use.

#### Cleaning parts for Nitrox/O2 use.

- 1. Metal parts : Pre-clean by soaking in NETALU diluted to 25%.
- 2. Ultrasonic cleaning in Promoclean TP108 diluted at 5% .
- 3. Rinse in demineralised water. Soak for 10 min.
- 4. Dry in the open air in a clean and dust-free atmosphere. Place the parts on a white cloth, allow to dry and check after drying that the cloth shows no grease deposits and that the condition of the parts is appropriate for re-use with Nitrox/O2.

#### Cleaning hoses.

If there is significant corrosion then it is permissible to soak only the ends in an ultrasonic bath, avoiding any possibility of the solution entering the hose. Rinse in fresh water and allow to dry with the connections hanging down. Dry the inside with filtered compressed air before reconnecting the hose to the regulator.

#### Wiping.

To wipe parts, use a white filter paper, a pure cotton cloth or any other material that does not produce fluff.

#### Inspection.

Visually check under a white light (day light or artificial light). The parts are completely free of any traces of :

- 1. organic materials (oil, grease, paint, rust...)
- 2. cleaning agents
- 3. dust
- 4. humidity

#### Lubrication.

When handling O-rings wear unpowdered latex gloves. It is important not to allow contact between the internal components and the skin or any other source of contamination when the regulator is being prepared for Nitrox use. All seals should be lubricated with Christolube MCG111. Cover the seals with a light film of grease and remove any excess by rolling the seal between finger and thumb. Do not use an excess of grease; this can have the effect of accumulating particles that could damage the O-rings.



#### Table 4. Torque values

REFERENCE N°	DESCRIPTION	FORCE
127583	Wet chamber nut	2.5 m.kg.
127808	Yoke seat	2.5 m.kg.
127801	DIN seat	2.5 m.kg.
129120	Plug	0.5 m.kg

#### Table 5. Checking specifications

TEST	INSTRUCTIONS	SPECIFICATIONS
Leak Test	160 bar < Working pressure < 200 bar	No leak
Medium Pressure	160 bar < Working pressure < 200 bar	MP at 9.5 bar ± 0.5 bar
MP Variation	160 bar < Working pressure < 200 bar	After purging the regulator several times, the MP should not increase by more than 0.3 bar in 5-15 seconds.

Maintenance Notes.

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#### Exploded View of First Stage Mikron Yoke Lady.



#### Exploded View of First Stage Mikron DIN Lady.









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