

AQUA LUNG®

Maintenance Manual



First step

COUSTEAU/SUPRA

Old version

This version is not an official AquaLung document.
However, it is strongly recommended that all policies and procedures covered in technical seminars and specified in current AquaLung maintenance manuals be followed.

1. Tools needed.

Standard tool:

- socket wrench 14 mm
- socket wrench 16 mm
- wrench 17 mm
- socket wrench 19 mm
- socket wrench 26 mm
- socket wrench 30 mm
- socket wrench 34 mm
- hexagonal wrench 4 mm
- Allen key 8 mm
- flat screwdriver, slot width 2.5 mm
- circlip puller

AQUALUNG special tool:

- slotted screwdriver
- O-ring installation/removal tool (hereinafter referred to as installation tool)

Measuring tool:

- AQUALUNG test pressure gauge 0-16 kgf/cm² (bar)

2. Disassembly Procedure.

Disconnecting the hoses.

Using 14mm and 16mm wrenches, unscrew the high and medium pressure hoses.

Removing port plugs.

Using a 4 mm hex wrench, unscrew the medium pressure port plugs (12) and the high pressure port plugs (14). Remove the o-rings (12) and (27) from the plugs.

Disassembly of the mechanism.

YOKE version

- unscrew the tie bolt (35) of the YOKE connection completely.
 - Using a 26 mm wrench, unscrew the retaining nut (33), thereby releasing the YOKE connection bracket (36). Remove the o-ring (34) from the first stage housing.
 - Use a retaining ring puller to remove the retaining ring (30), fixing conical metal powder filter (31).
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- Using the mounting tool, remove the conical metal powder filter (31) from the retaining nut (33) by pushing down on it with the plastic handle of the tool.
- using the o-ring puller, remove the o-ring (32) from the inner cavity of the retaining nut (33).

DIN version

- using a 4 mm hex wrench, unscrew the metal powder filter stopper (38), remove the filter and O-ring.
- Using a 19 mm open-ended wrench, unscrew the DIN connection (40) together with the O-ring (34) located at its lower end. Then remove the handwheel (41) from the DIN connection (40).
- Remove the o-ring (34) from the DIN connection (40).

Next:

- if the first stage is equipped with a dry chamber, first unscrew the diaphragm lock (27) and remove the diaphragm (26). Next, remove the pusher (25)
- Using an 8 mm hex wrench, remove the adjusting screw (24) and remove the support washer (23) and main spring (22).
- Using a 30 mm wrench (or 34 mm for dry chamber models), unscrew the chamber cover (20) or (21) respectively. Remove the mainspring support washer (19) (22).

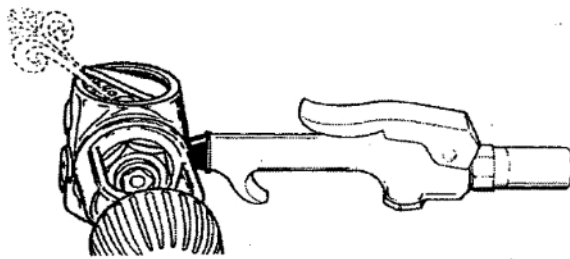


Fig. 1

- Using a ring puller, assembly tool, or other non-hard material tool, carefully pry up on the washer (18) and remove it. Then remove the diaphragm (17). Be careful not to damage the threads and inner walls of the housing, or the diaphragm and washer. A more convenient way to remove the diaphragm is to apply a jet of air at a pressure of about 8 - 10 bar into the port opening of the SD port (see Fig. 1).
- Remove the pushrod (16) and rod (15).
- Using an 8 mm hex wrench, unscrew the end cap (1) together with the O-ring (2). Then remove the spring (3), balance chamber (4), spring (7), and plate (8) of the air valve.

The inner cavity of the balancing chamber (4) must be in good condition. The o-ring (6) and grooved washer (5) must be clean and undeformed. Carefully remove these parts using a ring puller, mounting tool, or other non-hard material tool.

- using the plastic handle of the mounting device, press out the seat (10) of the UA valve by inserting the fixture from the side of the diaphragm body. Remove the o-ring (9) from the seat. (see Fig. 2).

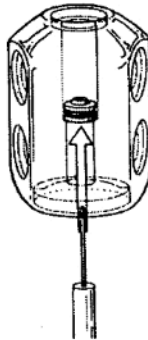


Fig. 2

3. Cleaning and inspection of parts.

ATTENTION: Do not use solvents and aerosols for cleaning plastic, rubber and silicone elements. Failure to observe this rule will result in destruction of the elements.

Cleaning of plastic, rubber and silicone parts.

All the above mentioned parts, which do not need to be replaced during repair, should be washed in soap solution (other non-aggressive household detergent). Special care should be taken to thoroughly rinse the parts of soapy water residue. Use a brush with soft synthetic bristles (e.g. a toothbrush) to follow the cleaning procedure.

Cleaning of metal parts.

After complete disassembly of the first stage, all metal parts should be washed in a soapy water solution using a synthetic bristle brush. After rinsing, make sure that there are no traces of scale, deposits or dirt.

Maximum cleaning quality can be achieved with an ultrasonic cleaning bath. If an ultrasonic cleaning bath is not available, good quality can be achieved by rinsing in a 10% vinegar solution. Soak the parts for about half an hour in the warm solution and then rinse thoroughly under running water.

WARNING: When using ultrasonic cleaning baths for cleaning, parts must be thoroughly rinsed in running, non-rigid water. After rinsing, parts should be blown out with compressed air and dried completely.

The parts listed in the following list are required to be replaced during routine service:

YOKE version			DIN version		
Detail	No	Packs	Detail	No	Packs
Bushing ring	213714	1	Bushing ring	213714	1
Grooved washer	H28005	1	Grooved washer	H28005	1
Bushing ring	124612	1	Bushing ring	124612	1
plate valves VD	122336	1	plate valves VD	122336	1
Bushing ring	840163	1	Bushing ring	840163	1
Bushing ring	116174	2	Bushing ring	116174	2
Bushing ring	116881	4	Bushing ring	116881	4
Diaphragm	119159	1	Diaphragm	119159	1
Washer	119143	1	Washer	119143	1
Bushing ring	850219	1	Bushing ring	228157	1
Bushing ring	116614	1	Bushing ring	850219	1
Filter	121139	1	Filter	113616	1

Parts inspection.

- Check the condition of all o-rings. O-rings must be free of cuts, cracks, splits and abrasions.
- All metal parts must be free of damage, dents and corrosion.
- All threaded parts must be free of damage, signs of corrosion or damage to the chrome plating. Damaged parts must be replaced.
- The mating surfaces of moving parts must be smooth, free of scratches, gouges and corrosion marks.
- Plastic parts must not be deformed or show signs of breakage.

Special inspection.

- **The valve plate** (8) must be replaced every time the valve is serviced. Even minor surface defects on the valve plate are the cause of a loose fit between the plate and the seat.
- **The YOKE** coupler bracket (36) must not be bent or deformed. Replace the bracket if necessary.
- Check the condition of the tapered surfaces of the **UA valve seat** (10). They must be smooth and even. No signs of corrosion or deformation are acceptable.
- Check the **balancing chamber** (4) for signs of corrosion, deformation and wear. If there are any, the guide should be replaced.

- Inspect the **filter**. The filter is a kind of indicator. A brownish-red color of the filter indicates that there is a large amount of rust in the cylinders.
The black color of the filter indicates that oil from the compressor system is getting into the cylinders.
The presence of white, gray or blue oxides indicates that the protective plug has not been used and the filter has been in contact with an environment containing salts (seawater, humid sea air).

Any solid particles (rust, carbon, salt, etc.) that penetrate through the filter can cause corrosion and failure of the regulator. Therefore, it is important to remove the cause of filter staining as soon as possible.

4. Lubrication of parts before assembly.

Use only grease to lubricate the regulator parts. Do not use aerosol lubricant. Failure to do so will destroy the rubber parts.

After washing and drying, the following parts need to be lubricated:

- All the o-rings.
- Other parts and connections if required by the manual.

Caution: Do not apply grease to the UA valve plate and seat surfaces. The grease forms a film that may interfere with the sealing of the valve plate and seat and cause a constant flow of the regulator.

5. Assembly Procedure.

- Install the stem (15) and pushrod (16) into the regulator body bore (42) on the chamber cover side. Install a new diaphragm (17), carefully tucking its edges in with the plastic end of the mounting hardware, and install a new washer (18).
 - Place the main spring support washer (19) on the diaphragm (17). Screw on the chamber cover (20 or 21 for dry chamber version) and tighten with a 30 or 34 mm wrench to a torque of 25 N/m.
 - Install the main spring (22), making sure it is centered on the back-up washer (19). Install the washer (23). Using the hex wrench on the
 - 8mm, tighten the adjusting screw (24) until its upper plane is level with the beginning of the threads of the chamber cover. (see Fig. 3).
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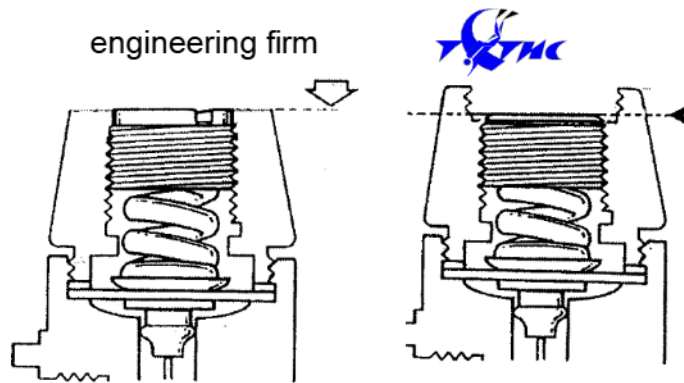


Fig.

3Figure 4

- Place the O-ring (9) on the seat (10) of the UA valve and, using a mounting tool, push the seat into the gearbox housing channel until it is fully seated (see Figure 5).

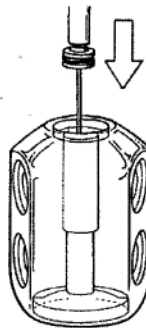


Fig. 5

- Lightly grease the stem of the swashplate (8) of the air valve with a small amount of grease. Slide the plate (8) onto the stem (15). Next, insert the assembly into the center hole of the gear housing and visually verify that it is fully and properly seated through the diameter port hole of the BOD port (see Figures 6 and 7).

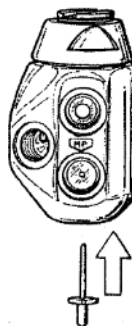
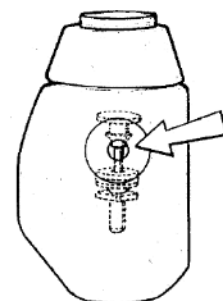


Fig.



6Figure 7

Attention: the grooved washer (5) must face the groove towards the O-ring (6) when installed. This condition is very important for the correct operation of the mechanism.

- Install a new grooved washer (5) and o-ring (6) inside the balance chamber (4) in the following sequence: grooved washer (5) outward first, then o-ring (6).
- Install the spring (7) on the stem of the air valve disc (8), then the balancing chamber (4) and spring (3). Using an 8mm Allen key, screw in the end cap (1) with the O-ring (2) on it and tighten to a torque of 5N/m.
- Using a 4mm hex wrench, torque the SD port plugs (14) with the O-rings (13) installed to 2N/m.
- Using a 4mm hex wrench, tighten the plug of the air port (12) with the O-ring (11) mounted on it to a torque of 2 N/m.

YOKE version

- Slide the o-ring (34) onto the retaining nut (33).
- Place the o-ring (32) in the recess of the retaining nut (33) and place the conical metal powder filter (31) in the same recess.
- Secure the conical filter (31) with the retaining ring (30).
- Install the bracket (36) into the groove of the gear housing (42).
- Using a 26 mm wrench, tighten the retaining nut (33) to torque 25 N/m.
- Replace the protective plug (28) and secure it.

DIN version

- install the o-ring (34) on the fitting (40) of the DIN connector.
- Position the flywheel (41) on the groove of the first stage housing (42) and screw the union (40) into the housing, tightening it to a torque of 2 N/m.
- Place the flat metal powder filter (39) into the fitting opening (29) with the rough surface facing outwards and secure with the retaining screw (38) with O-ring (29), tightening with a 4 mm hexagon wrench to a torque of 5 N/m.
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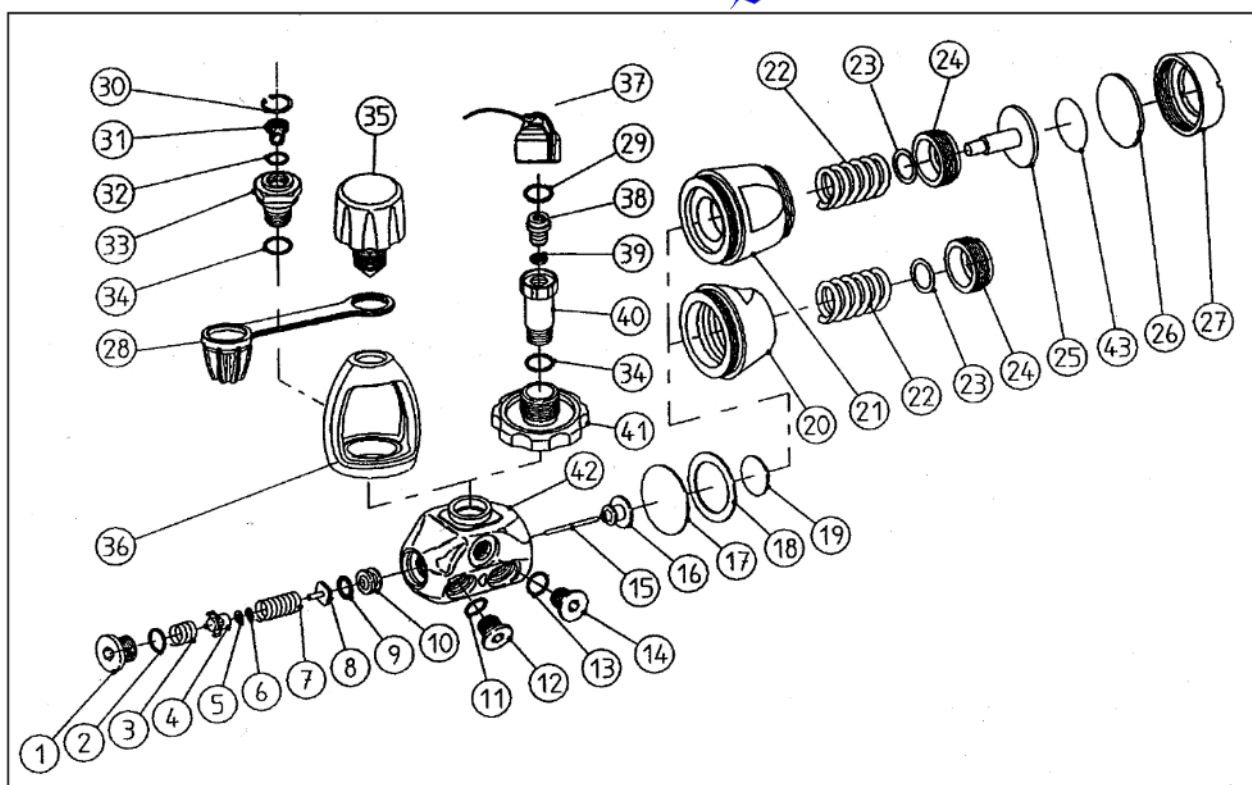
6. Gearbox adjustment

- Place the regulator on a fully charged cylinder and open the cylinder valve.
 - Screw a test pressure gauge with a scale of 0-16 bar into one of the ports of the SD.
 - To increase the setting pressure, tighten the adjusting screw (24), and to decrease it, unscrew it. It is recommended to make each step "close/open" not more than 1/8 turn during adjustment, depressurizing after each step. After each adjustment, close the cylinder valve and bleed air from the regulator by pressing the force feed button. This is necessary to relieve the mainspring. Make sure there is no air bleed.
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- The correctly adjusted set pressure should be in the range of 9.5 +/- 0.5 bar - summer version and 8.5 +/- 0.5 bar - winter version.

If using a dry chamber reducer, the plastic pusher (25) must be reinstalled after adjustment. Next, insert the transparent diaphragm (26) into the diaphragm retainer (27) and screw the retainer (27) fully in place using the slotted screwdriver from the special tool kit.



CAUSTEAU (SUPRA) gearbox parts list

Nº	Code	Title	Nº	Code	Title
1	122239	End cap	22	119156	mainspring
2	213714 / ⁺	O-ring	23	H45097	Washer
3	122243	Spring	24	122805	Adjustment screw
4	122227	Balancing chamber	25	122801	Pusher
5	H28005 / ⁺	Grooved washer	26	122804	Dry chamber diaphragm
6	124612 / ⁺	O-ring	27	122802	Diaphragm retainer
7	122244	Spring	28	124555	Protective plug
8	122336 / ⁺	Air Valve Plate	29	228157 / ⁺	O-ring
9	840163 / ⁺	O-ring	30	H63051	locking ring
10	122224	UA valve seat	31	121139 / ⁺	Cone filter
11	116174 / ⁺	O-ring	32	116614 / ⁺	O-ring
12	122209	VD port plug	33	120140	Fixing nut
13	116881	O-ring	34	850219 / ⁺	O-ring
14	122208	SD port plug	35	124148	Tightening screw
15	122225	Stem	36	124611	staple
16	122236	Pusher	37	124557	Protective plug
17	119159 / ⁺	Diaphragm	38	122318	Filter stop
18	119143 / ⁺	Washer	39	113616 / ⁺	Flat filter
19	119155	Support washer	40	122309	DIN plug
20	122210	Wet chamber cover	41	122308	DIN handwheel
21	122803	Dry chamber cover	42	122203	Case

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For notes