



# *Cressi-sub*



## **Service Manual XS2 First Stage**

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## BEFORE STARTING

### WARNING



**This manual is not a training document. It is meant to be a guide for experienced technicians who have also received factory training at a Cressi-sanctioned repair seminar. Do not attempt to repair this or any regulator without the proper training.**

Before starting, Cressi recommends that you read through the entire manual to familiarize yourself with all the required tools and techniques. Use this manual as a guide during the servicing process to avoid missing any critical steps. Make sure the work area is clean and that you work over a cushioned work surface so critical parts do not get damaged.

Pay close attention to all warnings and cautions as they will alert you to any potential hazard that may cause damage or injury. Also, pay attention to the notes as they provide important tips and reminders.

## DISASSEMBLY

1. Remove any hoses attached to the first stage using the appropriate sized wrench. (Note: Hose servicing is covered in the Airplus Second Stage Repair Manual).
2. Using a 4mm hex wrench, remove the remaining port plugs (9 & 11). Remove and discard the O-ring (10 & 12) on each port plug.
3. Unscrew the yoke knob (17)
4. Unweave the dust cap (22) from the yoke. Using an O-ring tool, remove the O-ring located in the face of the dust cap (if equipped).

### CAUTION



**The following steps require that the first stage be secured in a vise. Never secure the first stage directly in the vise as it will damage the body. Instead, thread a vise-mounting tool into the HP port (marked 300 bar/4000 psi), and tighten the mounting tool in the vise. Vise mounting tools are available from third party accessory companies, or you can use the following homemade tool: Thread a high-pressure adapter (3/8" female to 7/16" male) onto an expired CO2 cartridge. Screw the cartridge into the HP port on the first stage. Mount the CO2 cartridge in the vise. DO NOT thread the CO2 cartridge without the adapter into a LP port. If the threads of the CO2 cartridge break off, it will ruin the first-stage body.**

5. Mount the first stage into a vise as described in the previous caution. Using a large adjustable wrench or 1 inch wrench, unscrew the inlet fitting (18) as shown in figure 1. With the inlet fitting removed, lift off the yoke (16). Leave the first stage mounted in the vise.



*Figure 1. Mount first stage in vise and remove inlet fitting*

6. Using a pair of needlenose pliers, squeeze the two “legs” of the filter-retaining clip (21) together and remove the clip (see figure 2). Turn the inlet fitting over and let the filter (20) drop out into your hand. Remove the inside O-ring (19), located underneath where the filter was, and remove the outer O-ring (15) located above the threads.



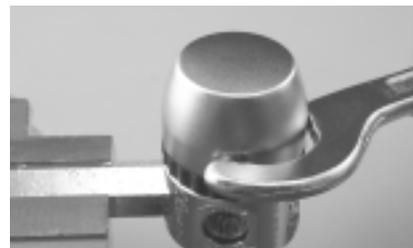
*Figure 2. Remove filter retaining clip*

7. Using the special Cressi IP adjustment wrench, remove the black adjustment ring (14) by hooking the wrench into one of the side slots and turning the ring counterclockwise (see figure 3).



*Figure 3. Remove adjustment ring*

8. Loosen the vise and rotate the first stage so the end cap (1) is facing upward. Take a side spanner wrench and hook it into one of the holes in the end cap. Rotate the end cap counterclockwise and slowly remove it from the first stage body (see figure 4). Remove the black ring (2) and main spring (7).



*Figure 4. Remove end cap*

- Carefully remove the piston (4) from the end cap (see figure 5). Take special care not to drop the piston as it may damage the end that retains the HP seat. Remove the two O-rings (3 & 6) located on the piston head and shaft, respectively. Remove the HP seat (5) by inserting a thin, stiff wire up through the piston shaft and pushing the HP seat from the end of the piston (see figure 6).



Figure 5. Remove piston from end cap



Figure 6. Push out HP seat

- Remove the first stage body from the vise and unscrew the mounting tool from the body. Underneath, where the main spring normally sits is the spring support (8). Turn the body over and let the spring support fall out (see figure 7).



Figure 7. Remove spring support

- Remove the three IP adjustment pins (13) by pushing the pins flush to one side of the body and grasping the exposed end with needlenose pliers (see figure 8).



Figure 8. Remove adjustment springs

## **PARTS CLEANING AND LUBRICATION**

### **CLEANING METAL PARTS**

#### **CAUTION**



**Keep the piston separate from the other parts while cleaning. If the end of the piston is damaged, you will not be able to install the HP seat and the piston will have to be replaced.**

1. Wash all the metal parts in a hot, soapy water solution. Use a soft bristle toothbrush to clean the threads and remove any flaky corrosion.
2. After washing in the hot, soapy water, rinse all the parts in fresh water.
3. Place the metal parts in an ultrasonic cleaner with an appropriate cleaning solution. Avoid using harsh acids such as muriatic acid in ultrasonic cleaners. Clean the parts for 5 to 15 minutes, depending on the amount of corrosion.
4. Remove the parts from the ultrasonic cleaner and rinse them in fresh water. Blow-dry the parts using low-pressure filtered air.

### **CLEANING COMBINATION METAL/PLASTIC PARTS**

Some parts have plastic and metal molded together, such as the adjustment ring (14) and yoke screw (17). In general, avoid cleaning these parts in an ultrasonic cleaner with an acidic cleaning solution. Doing so may chemically attack the plastic. The yoke screw threads may be held in the ultrasonic cleaner, but do not submerge the plastic yoke knob.

1. Wash the parts in a hot, soapy water solution. Use a soft bristle toothbrush to clean the threads and remove any flaky corrosion.
2. After washing in the hot, soapy water, rinse all the parts in fresh water.
3. Blow-dry the parts using low-pressure filtered air.

### **CLEANING PLASTIC-ONLY PARTS**

Avoid placing plastic parts in an ultrasonic cleaner with an acidic cleaning solution. To properly clean plastic parts, perform the same steps listed above.

## LUBRICATION

### *Types of Lubricant*

Cressi recommends using only food-grade silicone grease or, more preferably, Christo-lube MCG 111.

### CAUTION



**DO NOT use spray silicones as the aerosol propellants may chemically attack the rubber compound.**

### *O-rings*

All O-rings should be treated with a thin film of lubrication. Do not over-lubricate the O-rings with large amounts of grease. Simply place a small amount of grease between your thumb and forefinger and run the O-ring between them.

### *Threaded parts*

You may lightly lubricate first two threads. As you tighten parts together, the lubricant will spread to the other threads.

### *Adjustment pins*

Lubricate the three adjustment pins (13) with a light film of grease.

## REASSEMBLY

1. Install a new, lubricated O-ring (3) on the piston head and a new O-ring (6) on the piston shaft.
2. Inspect the new HP seat (5) to determine which side has the molding dimple. Press the new HP seat into the end of the piston with the dimple facing inward (see figure 9).
3. Press the piston all the way into the end cap (see figure 10). Install the black spacer ring (2) onto the end of the end cap. Set this assembly aside.



*Figure 9. Press new HP seat into end of piston*



*Figure 10. Press piston into end cap*

4. Place the spring support (8), flat side facing downward, into the first stage body (see figure 11). Place the main spring (7) on top of the spring support (see figure 12).



*Figure 11. Install spring support*



*Figure 12. Install main spring*

5. Take the piston/end-cap assembly and slowly and carefully pass the piston shaft through the center of the main spring and thread the end cap onto the body until hand tight (see figure 13).



*Figure 13. Install end cap*

6. Insert the three adjustment pins (13) into the three holes around the inlet boss (see figure 14). Orient the adjustment ring (14) with the flat side facing up. Thread the adjustment ring onto the inlet boss until hand tight (see figure 15).



*Figure 14. Install adjustment pins*



*Figure 15. Install adjustment ring*

7. Place a new, lubricated O-ring (15) into the groove located above the inlet fitting threads (18) as shown in figure 16. Install a new O-ring (19) into the groove located inside the inlet fitting. Make sure the O-ring is pressed all the way in place (see figure 17). Pass the conical end of a new filter (20) through the front of the inlet fitting (see figure 18). Install a new filter-retaining clip (21) over the top of the filter. Using a blunt dowel, press the ring into place until it “clicks” into place (see figure 19).



Figure 16. Install inlet O-ring

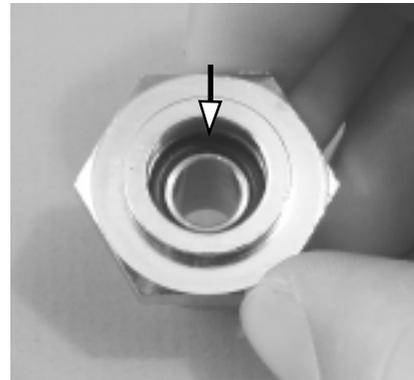


Figure 17. Install filter O-ring



Figure 18. Install filter



Figure 19. Compress clip to ensure it is securely in place

8. Pass the threaded end of the inlet fitting through the yoke and screw the inlet fitting into the first stage body until finger tight (see figure 20).



Figure 20. Pass inlet through yoke and screw into body

9. Install the vise-mounting tool into the HP port and secure the tool in a vise with the end cap facing upward. Using the spanner wrench, tighten the end cap until it stops (see figure 21).



*Figure 21. Tighten end cap*

10. Loosen the vise and turn the regulator so the yoke is facing upward. Attach a 1-inch crows-foot to a foot-pound torque wrench. Tighten the inlet fitting to a torque of 20 foot-pounds (see figure 22). Remove the first stage from the vise and remove the mounting tool from the first stage.



*Figure 22. Torque inlet fitting*

11. Thread the yoke screw (17) into the yoke (16). If equipped, place a new O-ring into the face of the dust cap (22). Weave the dust cap onto the yoke.

## ADJUSTMENT PROCEDURE

1. Install new O-rings (10 & 12) on the LP and HP port plugs. Install only two LP port plugs (9) and the HP port plug (11). Leave the other two LP ports open for the testing procedure to follow.
2. Attach a second stage to one of the open LP ports. This will act as an over pressure valve in case of a high-pressure leak. Attach a LP test gauge (0-400 psi) to the other open LP port. (Note: A test gauge with a relief valve is highly recommended.)
3. Attach the first stage to a fully charged cylinder (2500 to 3000 psi). Crack open the relief valve on the test gauge and slowly open the cylinder valve. After the cylinder valve is fully open, close the test gauge relief valve. The intermediate pressure (IP) should be  $140\pm 5$  psi.
4. If the IP does not fall within this range, use the Cressi IP adjustment wrench to turn the adjustment ring (14). Turning clockwise increases IP, turning counterclockwise decreases IP. After making an adjustment, cycle the regulator by purging the second stage several times and recheck the IP. After IP is set, continue to observe it to make sure IP remains constant.

## FINAL ASSEMBLY AND TESTING

1. Close the cylinder valve and purge the air from the regulator system. Remove the first stage from the cylinder and remove the second stage and test pressure gauge, and the port plugs if necessary.
2. Install the customer's second stages, inflator hose(s) and pressure gauge back into the first stage, using the same configuration as when you received the regulator in for service.
3. Reattach the first stage to the cylinder and slowly open the cylinder valve to pressurize the regulator. Dip the entire first stage into a bucket of water and watch for leaks. Any streaming bubbles means there is a leak somewhere. Note the location of the leak and refer to the troubleshooting guide for possible remedies. If there are no leaks, close the cylinder valve, purge the regulator, and remove from the valve.
4. Dry off the first stage. Blow out any moisture in the dust cap with low-pressure air. Place the dust cap over the inlet fitting and tighten the yoke screw to secure the dust cap in place.

## TABLE 1 - TROUBLESHOOTING

<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
Air leak from end cap	<ul style="list-style-type: none"> <li>a. O-ring (3) worn or damaged</li> <li>b. O-ring (6) worn or damaged</li> <li>c. Piston shaft scratched</li> <li>d. Piston O-ring groove scratched</li> <li>e. Inside wall of end cap scratched</li> <li>f. Inside wall of body scratched</li> </ul>	<ul style="list-style-type: none"> <li>a. Replace O-ring</li> <li>b. Replace O-ring</li> <li>c. Replace piston</li> <li>d. Replace piston</li> <li>e. Replace end cap</li> <li>f. Replace body</li> </ul>
High Pressure Creep	<ul style="list-style-type: none"> <li>a. HP seat worn or damaged</li> <li>b. HP sealing crown damaged</li> </ul>	<ul style="list-style-type: none"> <li>a. Replace HP seat</li> <li>b. Replace Body</li> </ul>

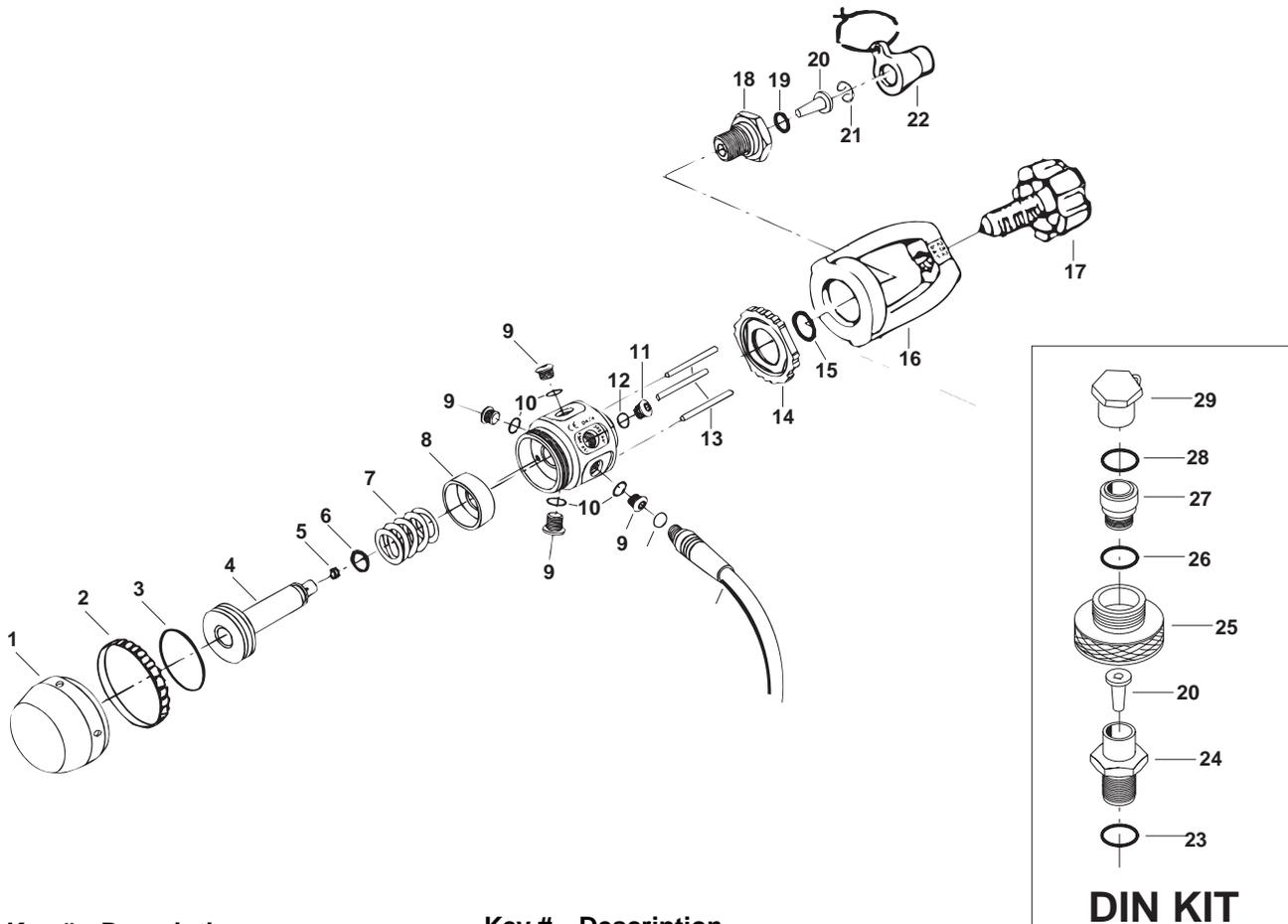
## TABLE 2 - REQUIRED TOOLS

### *Tool Description*

### *Used for*

- |                                  |   |
|----------------------------------|---|
| 1. One inch open end wrench      | Removing inlet fitting (18)                         |
| 2. Needlenose pliers             | Removing filter retainer (20); adjustment pins (13) |
| 3. O-ring tool                   | Removing O-rings                                    |
| 4. Side spanner wrench           | Removing/installing end cap (1)                     |
| 5. 3/8"-7/16" vise mounting tool | Mounting first stage into vise                      |
| 6. 4mm hex wrench                | Removing/installing all port plugs                  |
| 7. Torque Wrench                 | Tightening inlet fitting (18)                       |
| 8. 1-inch crows-foot             | Used with torque wrench                             |
| 9. Straight, stiff pin           | Removing HP Seat                                    |
| 10. Cressi IP Adjustment Wrench  | Turning adjustment ring (14)                        |

# EXPLODED PARTS DIAGRAM



Key #	Description
1.	End Cap
2.	Spacer
3.	<b>O-ring</b>
4.	Piston
5.	<b>HP Seat</b>
6.	<b>O-ring</b>
7.	Main Spring
8.	Spring Support
9.	LP Port Plugs
10.	<b>O-ring</b>
11.	HP Port Plug
12.	<b>O-ring</b>
13.	Adjustment Pins
14.	Adjustment Ring
15.	<b>O-ring</b>
16.	Yoke

Key #	Description
17.	Yoke Screw
18.	Inlet Fitting
19.	<b>O-ring</b>
20.	<b>Filter</b>
21.	<b>Retaining Clip</b>
22.	Dust Cap

**Parts in bold are to be replaced during each overhaul**



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**PROFESSIONAL UNDERWATER EQUIPMENT**

1 Charles Street, Westwood, NJ 07675

Tel: 800-338-9143 Fax: 800-493-2680