



Regulators repair and maintenance

*Cressi-sub*

**2<sup>nd</sup> stage Ellipse  
Balanced**





Regulators repair and maintenance

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## 2<sup>nd</sup> stage Ellipse Balanced

### WARNING!

- This manual is intended for use by expert technicians who have already received training in equipment repairs and maintenance from Cressi-sub.
- This manual is intended for use by expert technicians who have already received training in equipment repairs and maintenance from Cressi-sub.
- Avoid performing maintenance and/or repair operations on the equipment without the proper training required to conduct these operations.
- Users must never perform maintenance themselves; all maintenance must be performed **EXCLUSIVELY** by an authorized Cressi-Sub center.
- If the information provided in this document is unclear or not fully intelligible, please contact Cressi-sub before proceeding with any disassembly or maintenance procedures.
- Before proceeding, Cressi-sub recommends that you read the following document carefully to familiarize yourself with all the **tools** and techniques needed to perform proper equipment maintenance and/or repair.
- Use this document as a guide during the various steps of maintaining and/or repairing the equipment.



Regulators repair and maintenance

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## 2<sup>nd</sup> stage Ellipse Balanced

### WARNING!

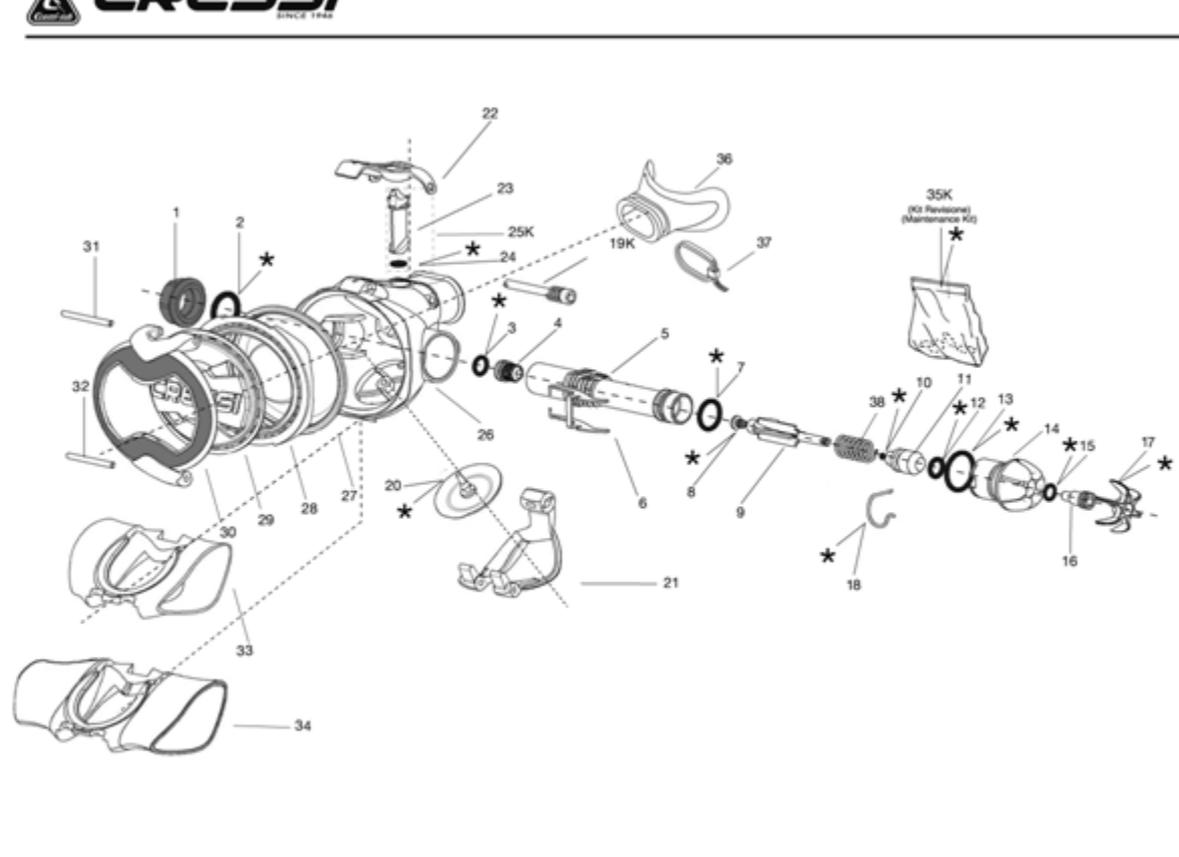
- All operations must be done strictly in the order provided in this document. Failure to do so could cause the equipment to function poorly, or worse, result in an accident.
- To prevent any assembly errors when performing maintenance and/or repairs, we recommend using all the replacement parts provided by Cressi-Sub in every operation.
- Pay special attention to the recommendations provided in the margin of the figures that show the various sequences of equipment maintenance and/or repair in order to avoid any problems that could result in an accident.
- The document below in no way replaces the equipment's instruction manual.
- The procedures described in this document are pertinent to and intended only for the disassembly, maintenance, and assembly of equipment meant for use with air (21% oxygen, 79% nitrogen).
- The instructions provided in this document are based on information referring to the most update equipment available. Cressi Sub reserves the right to make changes at any time.



# Cressi-sub

Regulators repair and maintenance

## 2<sup>nd</sup> stage Ellipse Balanced: spare parts



POS.	CODICE / CODE
1	HZ 820050
2	HZ 820051
3	HZ 810095
4	HZ 810094
5	HZ 820052
6	HZ 820053
7	HZ 820054
8	HZ 820055
9	HZ 820056
10	HZ 820057
11	HZ 820058
12	HZ 820059
13	HZ 820060
14	HZ 820061
15	HZ 820062
16	HZ 820063
17	HZ 820064
18	HZ 820065
19K	HZ 810077
20	HZ 810074
21	HZ 820066
22	HZ 820067
23	HZ 820068
24	HZ 820069
25K	HZ 820070
26	HZ 820071
27	HZ 820072
28	HZ 820073
29	HZ 820074
30	HZ 820075
31	HZ 820076
32	HZ 820077
33	HZ 820078
34	HZ 820079
35K	HZ 820080
* (Kit Revisione/Maintenance Kit)	
36	HZ 790094
37	HZ 730202
38	HZ 820049

2° Stadio Ellipse Balanced regolabile CE / Balanced Adjustable 2<sup>nd</sup> Stage MC9 CE

Ed./Issue	ELL.BAL/A
01/09	N° Tav./Rev.

**Ellipse Balanced 2° stage (HZ 820080) ANNUAL REPLACEMENT KIT CHART (Real Size)**



Regulators repair and maintenance

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**2<sup>nd</sup> stage Ellipse  
Balanced**

- **Kit Ellipse Balanced Annual replacement kit**
  - **Code Nr. HZ 820080**



**ELLIPSE BALANCED 2<sup>nd</sup> STAGE (HZ 820080) ANNUAL REPLACEMENT KIT CHART**

**O-RING Reference Table**



**SPARE PARTS Reference Table**

1 Exhaust Valve  
HZ 810074

1 Poppet LP Seat  
HZ 820055

1 Adjustment Knob Clip  
HZ 820065

1 Adjustment Knob Insert  
HZ 820064

[Go back to](#)

**Use only original Cressi-sub spare parts**

**Note: it is recommended to carry out a complete servicing of the regulator yearly or more frequently in case of intensive use.**



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## 2<sup>nd</sup> stage Ellipse Balanced

- Annual replacement
- Cressi-Sub recommends complete regulator maintenance at least once a year, or more frequently in the case of particularly intense use.
- Maintenance must include replacement of all components provided in the annual equipment maintenance kit.
- The special tools for maintenance of this equipment are illustrated in a section of this document on page 8.
- Metal parts must be washed with hot water and neutral detergent and rinsed in fresh water. Any concretions must be removed using ultrasound cleaning or with diluted acid solutions, always followed by long and thorough rinsing under running water.
- Do not use acids or solvents on rubber components.
- The new ORs must be greased with a thin layer of silicon grease: this procedure reduces to a minimum the risk of damage during assembly.
- The metal threading can be lubricated with grease on the first two rings of threading.



Regulators repair and maintenance

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## 2<sup>nd</sup> stage Ellipse Balanced

- Annual replacement
- The procedures described in this document are pertinent to and intended only for the disassembly, maintenance, and assembly of equipment meant for use with air (21% oxygen, 79% nitrogen).
- Users must never perform maintenance themselves; all maintenance must be performed EXCLUSIVELY by an authorized Cressi-Sub center.
- You can find your authorized Cressi-Sub center by asking your dealer, or Cressi Sub S.p.A. itself by sending an e-mail to:

info@cressi-sub.it

**•Use only original Cressi-sub spare parts**



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Regulators repair and maintenance

## 2<sup>nd</sup> stage Ellipse Balanced Special tools

Codice HZ 709007  
Allen key 4 mm



Codice HZ 709017  
Extraction plier



Codice HZ 710011  
2<sup>nd</sup> stage setting gauge



Codice HZ 709004  
Extraction point tool



Codice HZ 709011  
Spring push tool



Codice HZ 709016  
Tool to remove the nozzle

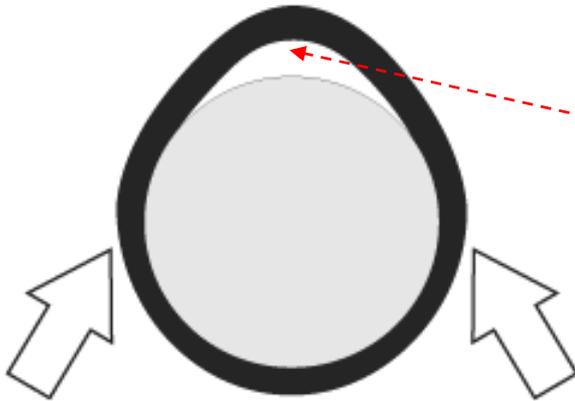




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## 2<sup>nd</sup> stage Ellipse Balanced: disassembling



- Remove and replace all O-rings;
- Use a plastic tool or a round pointed metal one in order not to damage the O-ring seat;
- To replace the O-ring correctly, press its sides to create a bulge inside which to insert the round pointed tool, as shown in the pictures;
- **Attention: USE ONLY ORIGINAL CRESSI-SUB SPARE PARTS**



- Remove the low pressure hose
  - Use a 0,75 in. and a 0,67 in. spanner to remove the low pressure hose, holding the lock nut steady with the former and unscrewing the hose with the latter;
  - By annual replacement it is necessary to replace the O-rings inside the hose;
  - Check the low pressure hose for visible signs of wear, cuts or abrasions, especially next to the threaded connecting parts.





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**2<sup>nd</sup> stage Ellipse Balanced:  
disassembling**



## •Cam-lock – Disassembling the regulator

- Insert a 0,15 in. Allen wrench into the cam-lock seat, press gently and turn by 90 degrees anticlockwise. The inner spring will push the key outwards, and you will be able to take it out easily.



**2<sup>nd</sup> stage Ellipse Balanced:  
disassembling**



- After removing the cam-lock key, press with your fingers the main cap of the baffle, and open it outwards as shown in the picture.



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Regulators repair and maintenance

## 2<sup>nd</sup> stage Ellipse Balanced: disassembling



- Open the cap, holding the regulator casing in your hand, and remove the soft cap (button), the diaphragm ring and the diaphragm.



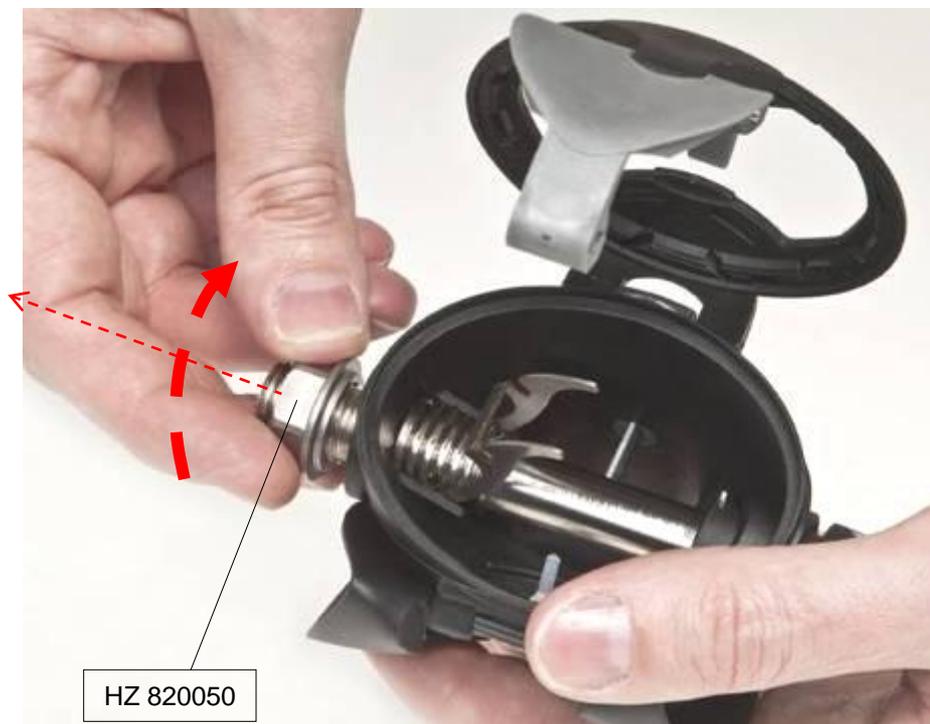
**Cressi-sub**  
Regulators repair and maintenance

**2<sup>nd</sup> stage Ellipse Balanced:  
disassembling**





**2<sup>nd</sup> stage Ellipse Balanced:  
disassembling**



- Use a 0,75 in. spanner to remove the regulator lock nut.



**2<sup>nd</sup> stage Ellipse Balanced:  
disassembling**



- Lower the lever (phase 1), then take out the 2<sup>nd</sup> stage whole device out of the regulator casing (phase 2), as shown in the picture.



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Regulators repair and maintenance

## 2<sup>nd</sup> stage Ellipse Balanced: disassembling



- Remove the valve O-ring out of its seat.



- Remove the baffle out of the regulator casing, pressing its sides as shown in the picture.



- Remove the exhaust valve out of its seat.



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**2<sup>nd</sup> stage Ellipse Balanced:  
disassembling**



- Use a 0,15 in. Allen wrench to unscrew the setting white screw placed inside the adjustment knob, and remove the metal knob cover, as shown in the picture.



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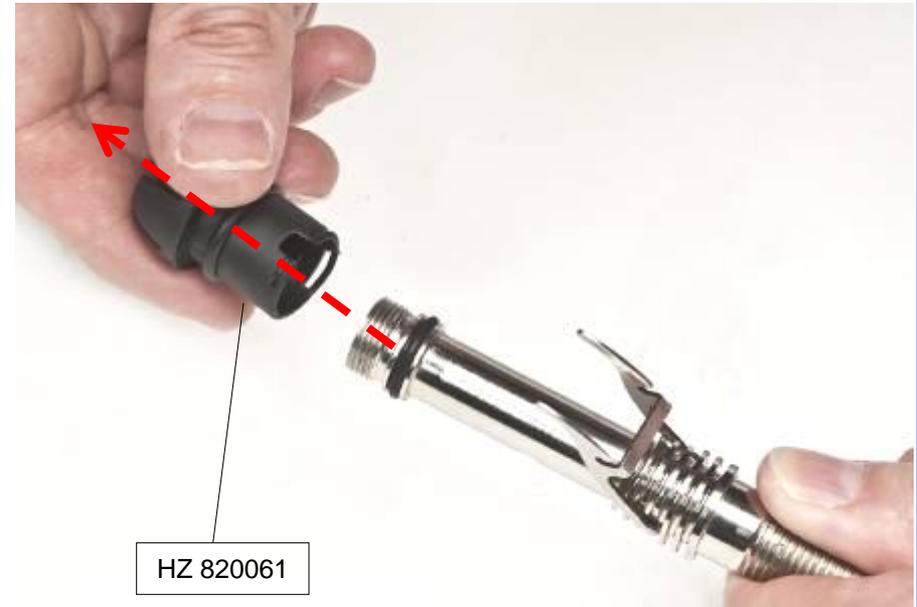
**2<sup>nd</sup> stage Ellipse Balanced:  
disassembling**



- Insert bird beak pliers into the knob opening and remove the clip out of its seat, as shown in the picture.



**2<sup>nd</sup> stage Ellipse Balanced:  
disassembling**



- Unscrew the knob fully and take it out of the valve body.



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Regulators repair and maintenance

## 2<sup>nd</sup> stage Ellipse Balanced: disassembling



- Remove the knob O-ring out of its seat.



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## 2<sup>nd</sup> stage Ellipse Balanced: disassembling

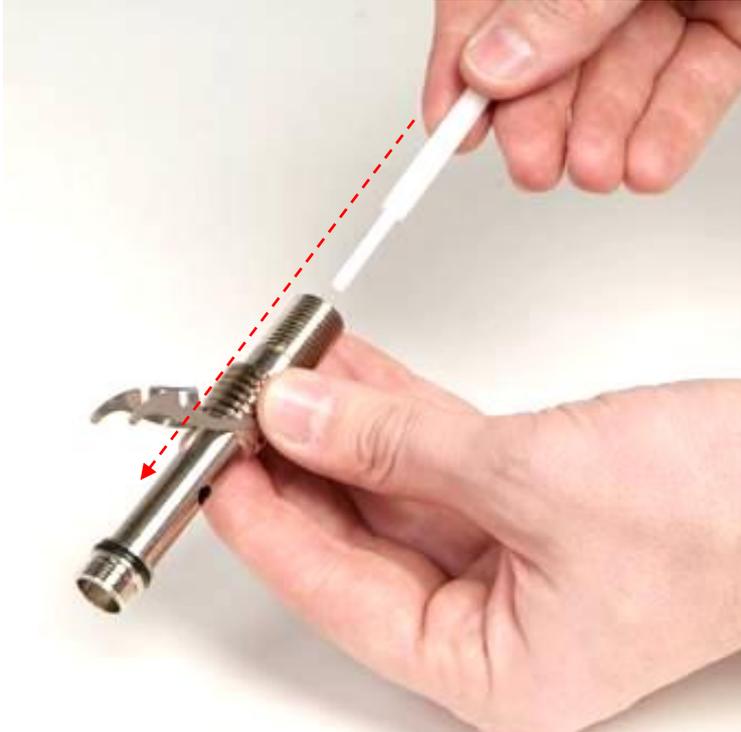


- Use a 0,15 in. Allen wrench to fully unscrew the setting screw lying inside the setting knob (phase **1**);
- Now use the tool HZ 709011 to remove the screw out of the knob: push it in the direction shown by the picture, to overcome the friction induced by the O-ring onto the knob side (phase **2**);
- Remove the setting screw O-ring.



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Regulators repair and maintenance

**2<sup>nd</sup> stage Ellipse Balanced:  
disassembling**



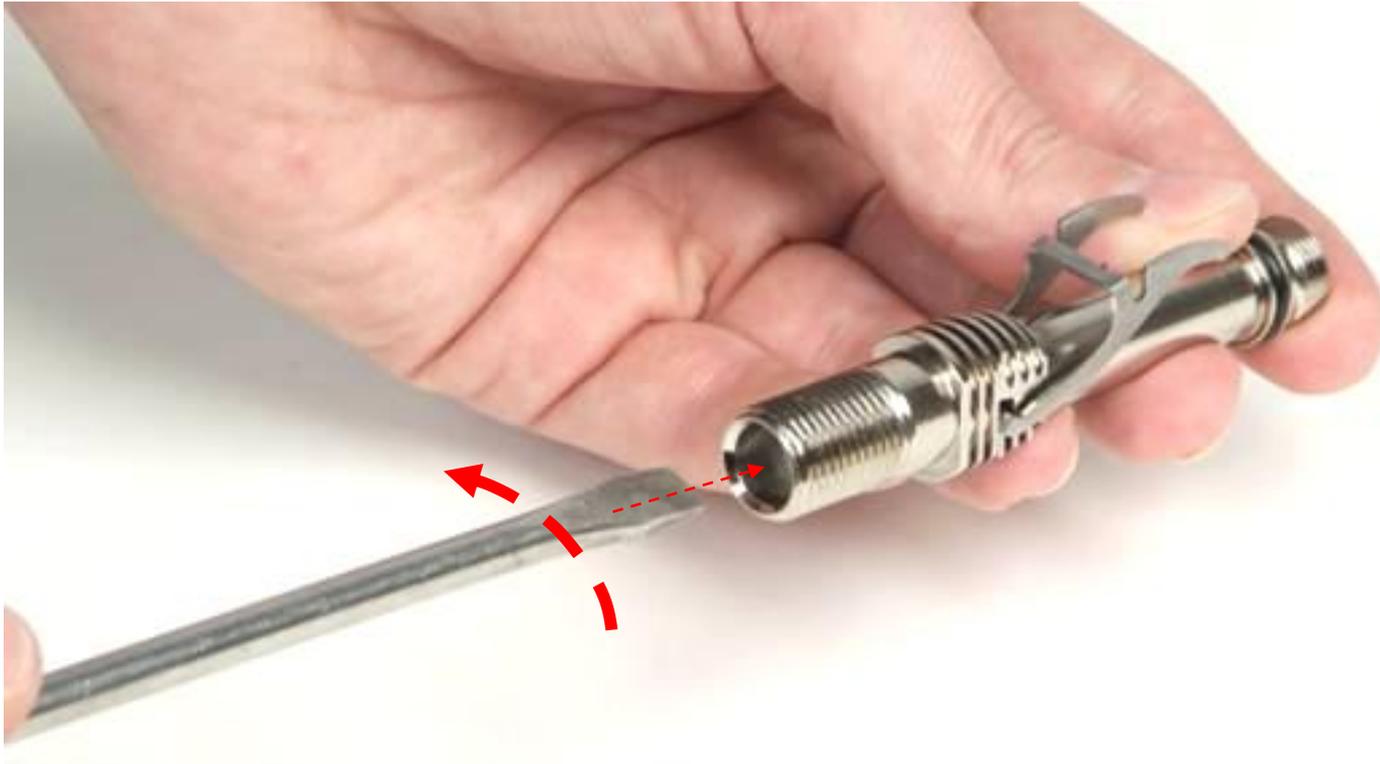
Use the tool HZ 709011 to remove the piston including spring and balancing chamber out of the valve body, as shown in the picture;  
**NOTE:** push with a certain amount of strength to overcome the friction induced by the balancing chamber O-ring onto the valve body side, until the whole valve comes out.



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**2<sup>nd</sup> stage Ellipse Balanced:  
disassembling**



Use a screwdriver to fully unscrew the adjustable nozzle.  
It will be shown later how to remove it out of its seat.



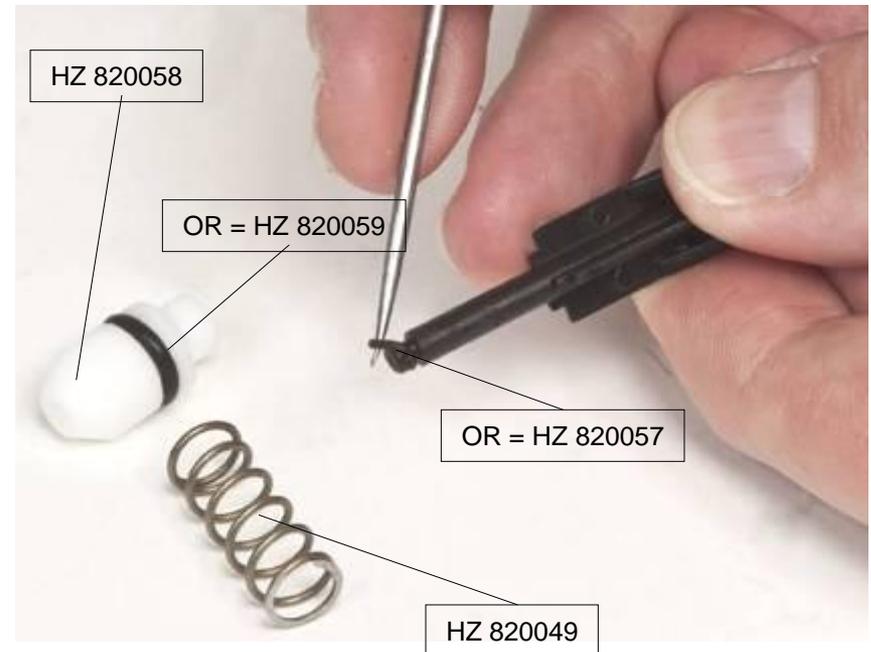
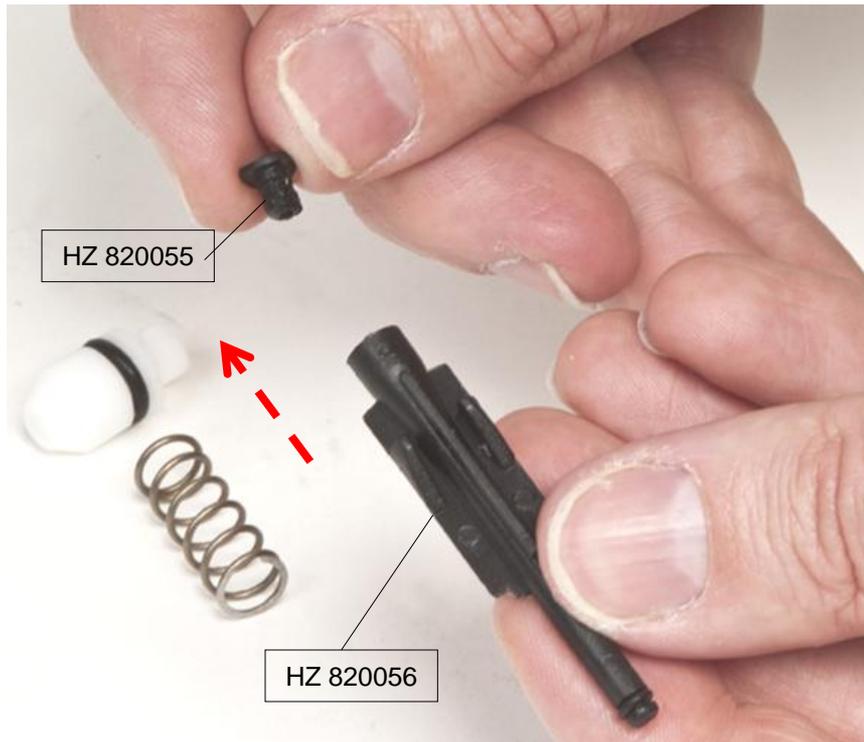
**2<sup>nd</sup> stage Ellipse Balanced:  
disassembling**



- Remove the nozzle out of the regulator valve body using the tool HZ 709011 (designed to prevent the edge from being damaged) as shown in the picture;
- NOTE: push with a certain amount of strength to overcome the friction induced by the O-ring onto the valve body side, until the nozzle comes out.
- Remove the nozzle O-ring.



**2<sup>nd</sup> stage Ellipse Balanced:  
disassembling**



- Remove the 2<sup>nd</sup> stage piston pad, the piston spring and the balancing chamber out of their seat.
- Remove the piston O-ring.



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## 2<sup>nd</sup> stage Ellipse Balanced: disassembling



- Levering on their sides, lift and remove the upper mask hookings out of the casing, as shown in the picture.



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**2<sup>nd</sup> stage Ellipse Balanced:  
disassembling**



HZ 820076

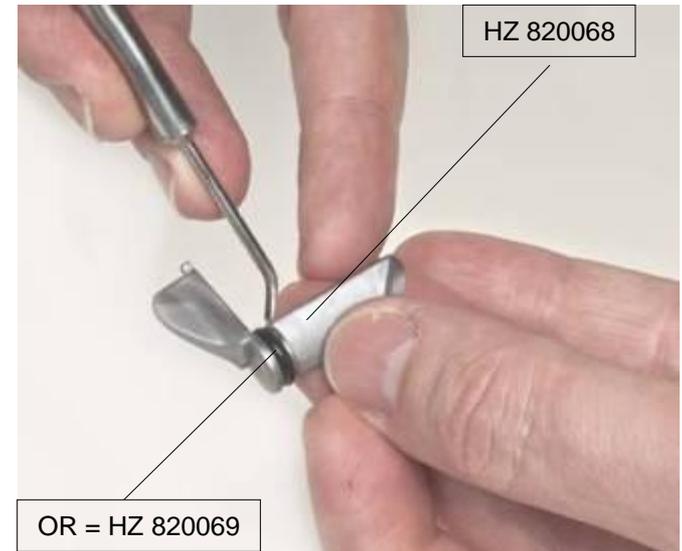
Use a 0,08 in. pin pusher to remove the cap titanium upper pin out of its seat: please push in the direction shown by the picture.



- Remove the upper mask out of its seat as shown in the picture.



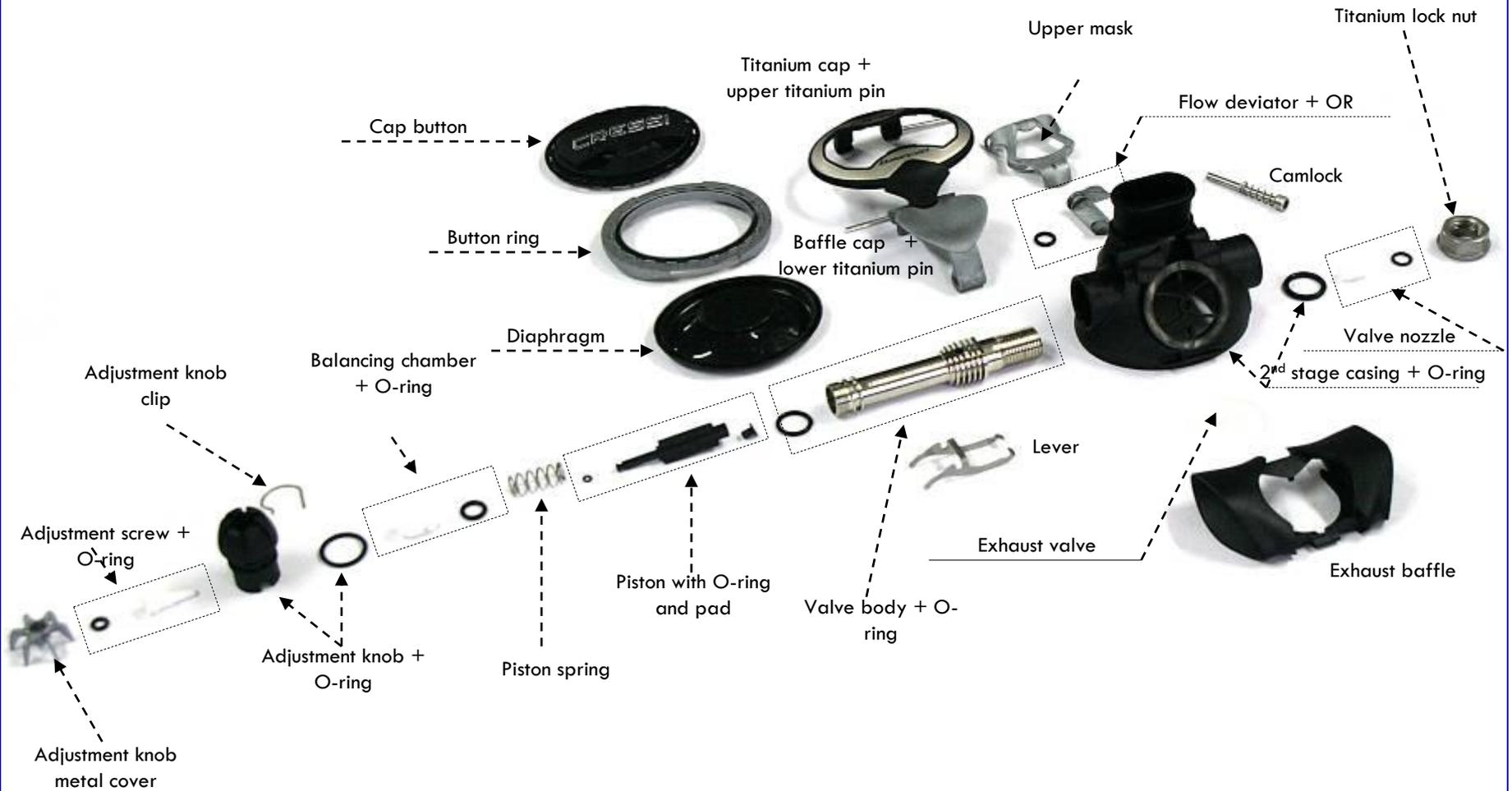
**2<sup>nd</sup> stage Ellipse Balanced:  
disassembling**



- Remove the flow deviator out of it seat as shown in the picture.



**2<sup>nd</sup> stage Ellipse Balanced:  
components**





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## 2<sup>nd</sup> stage Ellipse Balanced: assembling



- After replacing and lubricating its O-ring, insert the flow deviator into its seat as shown in the picture.



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Regulators repair and maintenance

## 2<sup>nd</sup> stage Ellipse Balanced: assembling



- Place the upper mask onto the 2<sup>nd</sup> stage casing, then press its sides to hook it to the casing as shown in the picture.



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Regulators repair and maintenance

**2<sup>nd</sup> stage Ellipse Balanced:  
assembling**



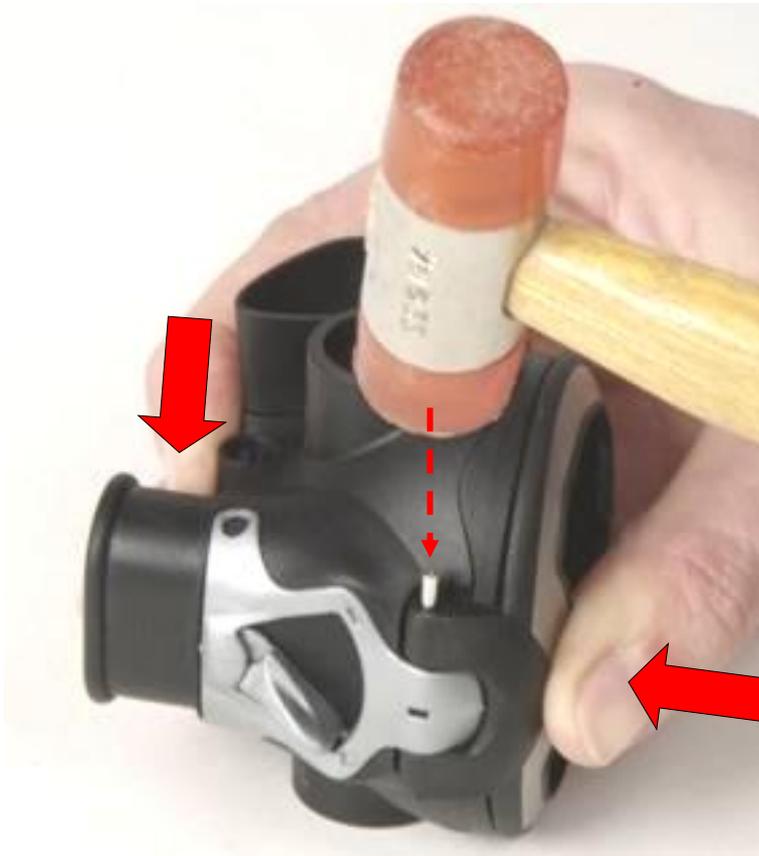
- Insert the upper pin into the cap in the direction shown in the picture.
- Place the cap hookings into their seats in the 2<sup>nd</sup> stage casing, as shown in the picture.



Regulators repair and maintenance

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## 2<sup>nd</sup> stage Ellipse Balanced: assembling



- Seat one side of the regulator case onto a hard surface, as shown in the picture;
- Now hold the case in one hand firmly and tap with a plastic hammer on the upper pin to push it into the corresponding seat in the second stage case, as shown in the picture;
- The pin is placed correctly if its both ends line up with the case, so as to allow the cap to swing freely.



Regulators repair and maintenance

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## 2<sup>nd</sup> stage Ellipse Balanced: assembling



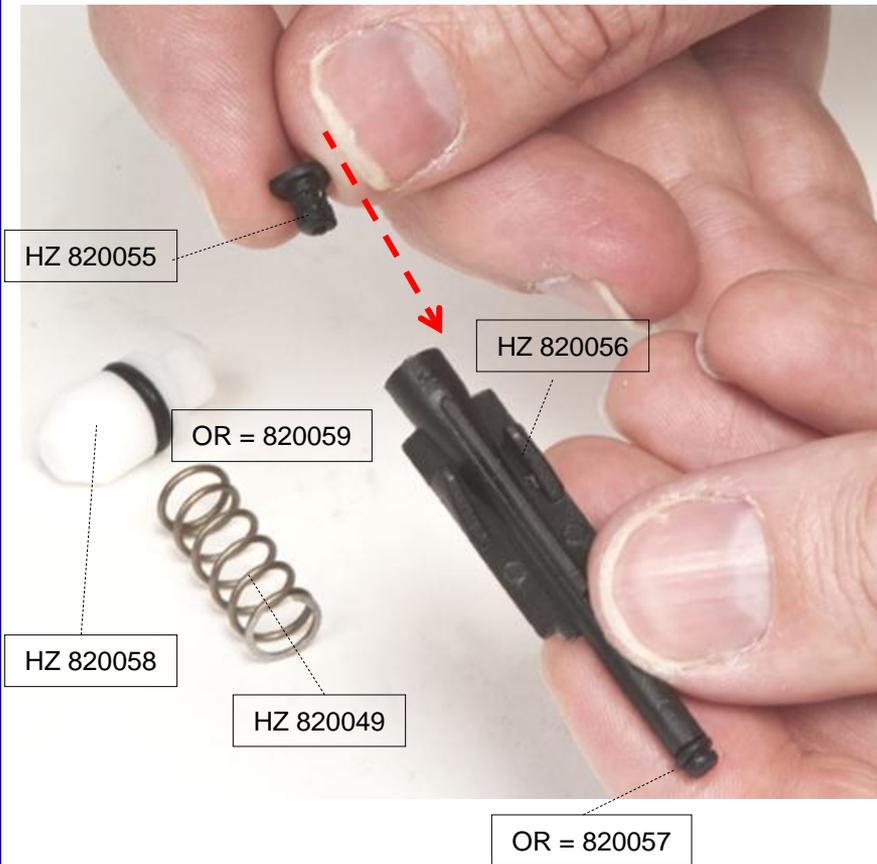
- Insert the exhaust valve, taking care to place correctly the shaft into its seat, by pulling it from the inside of the regulator.



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## 2<sup>nd</sup> stage Ellipse Balanced: assembling



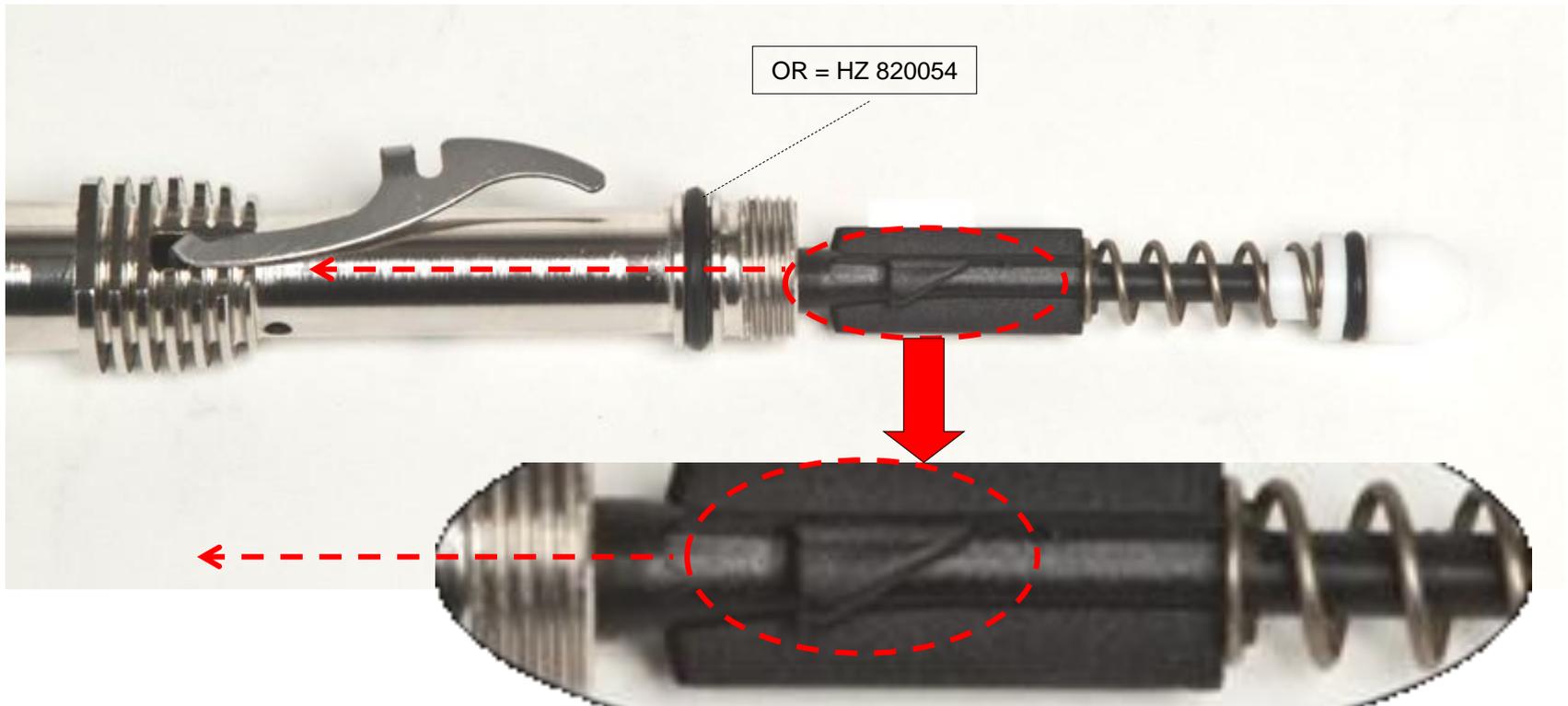
- Check the piston hole is NOT blocked with impurities.
- Insert the fresh pad pushing it into its seat in the piston. Please note the two bulges on its shaft, which allow its full connection with the piston.
- Replace and lubricate the piston and balancing chamber O-rings.
- NOTE: a thorough lubrication is unavoidable to make the regulator work perfectly.



Regulators repair and maintenance

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## 2<sup>nd</sup> stage Ellipse Balanced: assembling



- While inserting the assembled valve, as will be described on next page, please pay attention to hold its fulcrum as shown in the picture (feet downwards with respect to the lever).
- Replace and lubricate the inner knob O-ring and assemble it as shown in the picture.



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Regulators repair and maintenance

## 2<sup>nd</sup> stage Ellipse Balanced: assembling



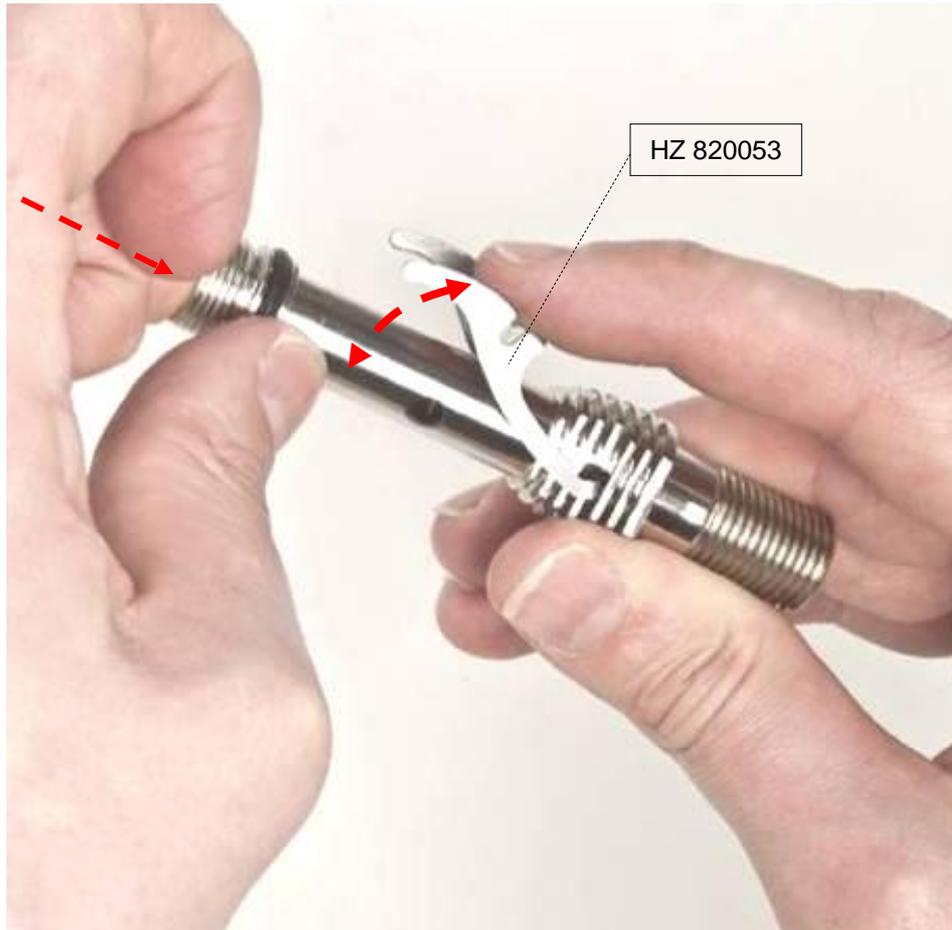
- Raising the lever, insert the assembled valve inside its body, as shown in the picture.



Regulators repair and maintenance

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## 2<sup>nd</sup> stage Ellipse Balanced: assembling



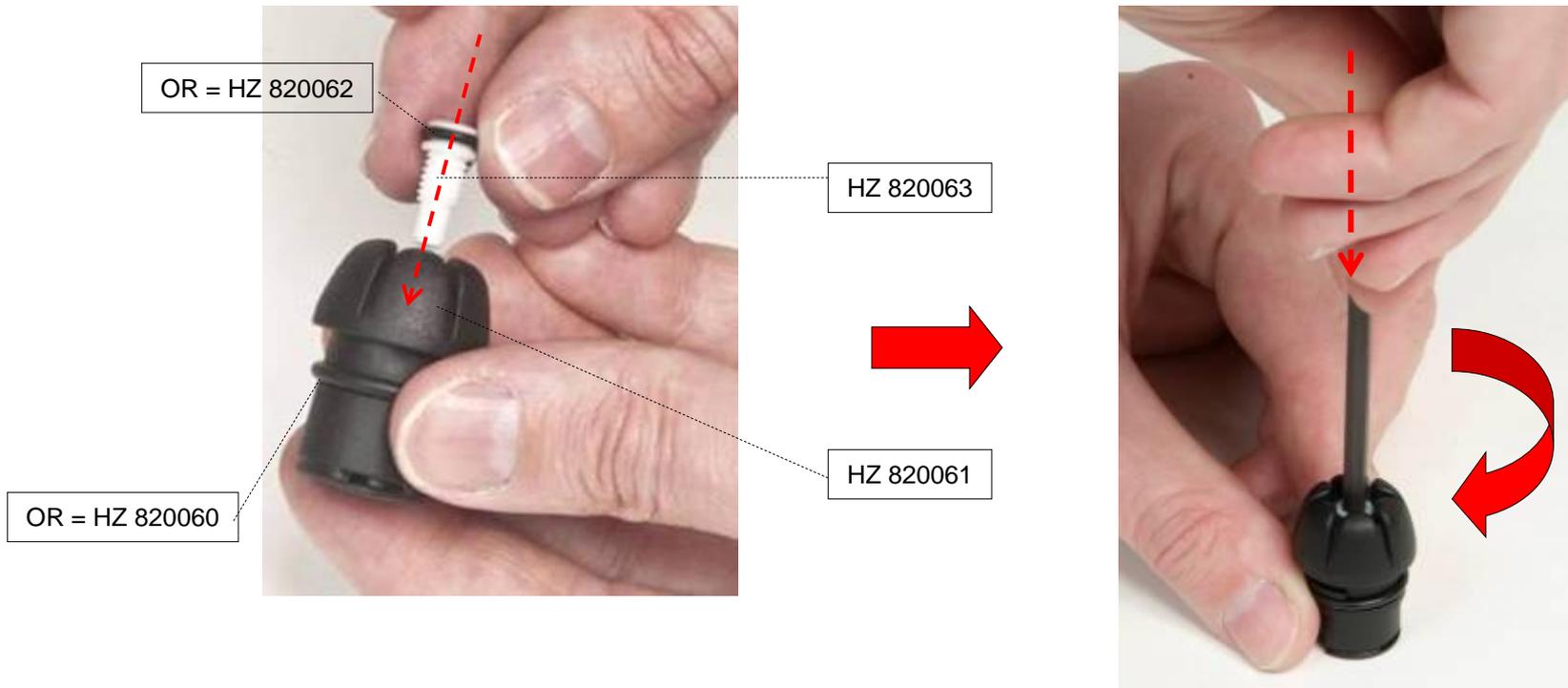
- Check the lever works perfectly by pressing it more times: it has to swing freely and go back every time to its vertical position automatically.



Regulators repair and maintenance

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## 2<sup>nd</sup> stage Ellipse Balanced: assembling



- After replacing and greasing the O-ring, turn the setting screw into its seat using a 0,15 in. Allen wrench with a certain amount of strength to overcome the friction induced by the O-ring onto the knob side;
- Turn the setting screw up, ***then make one full turn back:*** keep it so until the regulator is finally set.



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Regulators repair and maintenance

## 2<sup>nd</sup> stage Ellipse Balanced: assembling



- Push the adjustment knob into its seat, overcoming the friction induced by the O-ring on the valve body side.
- Screw the knob including the screw into the valve body, paying particular attention to line up the plastic thread perfectly with the metal one of the valve body: **do not** insert the knob inclined in order not to damage the plastic connecting thread.

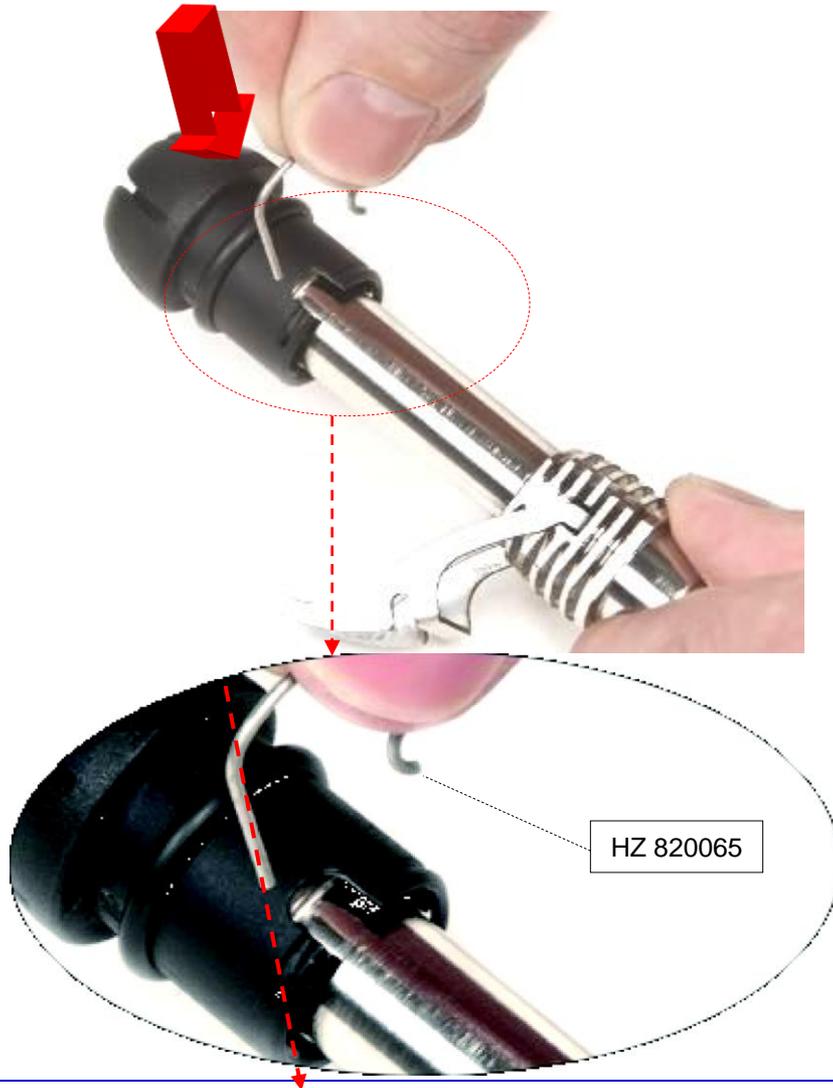
Note: the adjustment knob thread, placed between the two O-rings, proves **watertight**. A rich lubrication ensures an easy smooth longlasting working of the knob.



Regulators repair and maintenance

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## 2<sup>nd</sup> stage Ellipse Balanced: assembling



- After screwing the adjustment knob for some turns, insert the clip straight side into the hole placed on the left of the knob opening, just exactly as shown in the picture.



Regulators repair and maintenance

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**2<sup>nd</sup> stage Ellipse Balanced:  
assembling**



- Push the clip until its straight side comes out of the opposite hole on the knob.
- In such way the clip bent side will be automatically placed perfectly into its seat on the knob, as shown in the picture.



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Regulators repair and maintenance

## 2<sup>nd</sup> stage Ellipse Balanced: assembling



- After placing the adjustment knob clip into its seat, fully unscrew the knob thread corresponding with the clip.



Regulators repair and maintenance

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## 2<sup>nd</sup> stage Ellipse Balanced: assembling



HZ 810094

- Replace and lubricate the nozzle O-ring.
- Screw the nozzle for some turns into the valve body keeping the 2<sup>nd</sup> stage lever pressed, to prevent the sharp edge from damaging the piston pad.
- The regulator will be set when fully assembled.



Regulators repair and maintenance

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## 2<sup>nd</sup> stage Ellipse Balanced: assembling



- After replacing and properly lubricating the knob O-ring, lower the lever (1) and introduce (2) the regulator mechanism into the casing, exactly as shown in the picture.



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Regulators repair and maintenance

## 2<sup>nd</sup> stage Ellipse Balanced: assembling



- Replace and lubricate the valve body O-ring, then place it into its seat as shown in the picture;
- After screwing it, a tooth placed on the closing side of the titanium lock nut will put the O-ring correctly into its seat on the 2<sup>nd</sup> stage.



Regulators repair and maintenance

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## 2<sup>nd</sup> stage Ellipse Balanced: assembling



- Use a 0,75 in. spanner to screw the titanium lock nut.
- Check the lever is in parallel to the casing.



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Regulators repair and maintenance

## 2<sup>nd</sup> stage Ellipse Balanced: assembling



- Assemble the second stage baffle, inserting and pushing it into the seats in the casing as shown in the picture.



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Regulators repair and maintenance

## 2<sup>nd</sup> stage Ellipse Balanced: assembling



- Place the diaphragm onto the ring as shown in the picture;
- Now check their correct coupling, as shown in the picture.



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Regulators repair and maintenance

## 2<sup>nd</sup> stage Ellipse Balanced: assembling



- Insert the ring including the correctly placed diaphragm into the second stage case, making sure all the ring vertices line up perfectly with the case, as shown in the picture.



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Regulators repair and maintenance

## 2<sup>nd</sup> stage Ellipse Balanced: assembling



- While holding the ring in your hand tightly, pull gently the diaphragm plate outwards, to check its perimeter sits perfectly in the regulator case.



Regulators repair and maintenance

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**2<sup>nd</sup> stage Ellipse Balanced:  
assembling**

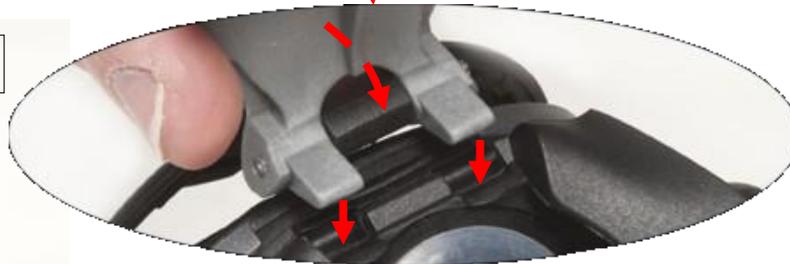


Insert the button into the ring, making sure all the ring teeth connect with the corresponding holes in the button.

The picture show how they are correctly coupled.



**2<sup>nd</sup> stage Ellipse Balanced:  
assembling**





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Regulators repair and maintenance

## 2<sup>nd</sup> stage Ellipse Balanced: assembling



- Bend the swinging cap towards the exhaust valve seat.



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Regulators repair and maintenance

## 2<sup>nd</sup> stage Ellipse Balanced: assembling



- When closing it, make sure the teeth shown in the picture are free to **lie and rotate** only in their seats. These latter serve also as closing fulcrum of the cap.



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Regulators repair and maintenance

## 2<sup>nd</sup> stage Ellipse Balanced: assembling



- Keep rotating the swinging cap until the regulator is fully closed.



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Regulators repair and maintenance

## 2<sup>nd</sup> stage Ellipse Balanced: assembling



- Press the baffle main cap (grey in the picture) and close the regulator.
- It will be fully locked after inserting the safety cam-lock key.



**2<sup>nd</sup> stage Ellipse Balanced:  
assembling**



- Place the “Cam-lock” as shown in the picture, insert an Allen wrench into its seat and press gently, while turning by 90 degrees clockwise.
- The “Cam-lock” inner spring will push the key into its position to lock the regulator, as shown in the picture.



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Regulators repair and maintenance

## 2<sup>nd</sup> stage Ellipse Balanced: assembling



- Insert the knob metal part into its seat.
- NOTE: push it with a certain strength in order to place it correctly in its seat.



Regulators repair and maintenance

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## 2<sup>nd</sup> stage Ellipse Balanced: setting

### Ellipse Balanced second stage setting: valve nozzle setting (page 66)

- **Screw the second stage to the setting gauge (HZ 710011) connected with a middle pressure hose to a correctly set MC9 first stage (10 bars - 200 bars tank) ;**
- **Unscrew the second stage knob fully;**
- **Connect the regulator (including first and second stages) with a 200 bars pressurized tank or with an equally pressurized workbench, then open the air tap gently, while pressing the second stage air outlet button**
- **If the regulator supplies air slightly, push and turn clockwise (+) the setting gauge ring (HZ 710011) until the air stops flowing; in this way, the valve cutting edge should hardly touch the closing pad making it work correctly.**
- **Now turn the nozzle a little more than one half turn;**
- **After checking the correct set of the valve nozzle, the gauge will read the correct set of the first stage (10 bars);**
- ***NOTE:* take care not to turn the valve nozzle too tight, unless the closing pad might bend too much and increase the inhalation effort, due to the exceeding compression of the valve spring.**



Regulators repair and maintenance

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## 2<sup>nd</sup> stage Ellipse Balanced: setting

- Ellipse Balanced second stage setting: lever height setting

- Since the setting screw has been adjusted during the assembly phases (page 43) and the valve nozzle has been correctly set, the regulator is now set;
- The second stage is correctly set when its lever idles for about 0,04 in. as to the diaphragm plate;
- The setting must be carried out on *pressurized regulator*;
- The final setting can also be carried out by adjusting the lever height as to the diaphragm plate;
- This must be carried out on pressurized regulator as well, using a 0,15 in. Allen wrench to turn the setting screw clockwise until the regulator starts supplying air slightly;
- Now turn the setting screw anticlockwise until the air stops flowing, then turn a little more, until the lever idles for about 0,04 in. as to the diaphragm plate.



**2<sup>nd</sup> stage Ellipse Balanced:  
setting**





Regulators repair and maintenance

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## 2<sup>nd</sup> stage Ellipse Balanced: checking

- After setting the regulator, keep it pressurized with a properly set 1<sup>st</sup> stage MC9, and carry out following final checking:
- Put the second stage gently under water with its mouthpiece upwards and its Venturi checking lever in the position Dive "+", without letting water enter the mouthpiece;
- After about 0,08 and 1,16 in. of H<sup>2</sup>O, the regulator must start letting air flow, until the second stage does so autonomously;
- Check the correct working of the Venturi flow deviator, turning the lever in the position "-": the continuous flow **must** stop;
- Put the regulator completely under water with its flow deviator in the position pre-dive (-);
- Wait for about one minute, then check for any leakage, shown by bubbles columns (not to be misunderstood with outflow of the air enclosed in the 2<sup>nd</sup> stage);
- In case of leakage, please refer to the handbook description of the setting phase.





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Regulators repair and maintenance

**2° stadio Ellipse Balanced:  
Service records**

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**Maintenance / Service Record**

MODEL	SERIAL NUMBER	DATE	DEALER NAME	TECHNICIAN'S NAME	NOTES ON PROCEDURES (Date of the next scheduled maintenance)	SIGNATURE