



Service and Repair Operative Manual

# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

January 2008 - Rev. ELLBK/1 - Ed. B / 09

ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> Stage



647

2<sup>nd</sup> STAGE ELLIPSE BLACK/OCTOPUS

January 2008 - Rev. ELLBK/1  
Ed. B / 09

**CRESSSI**  
SINCE 1946

# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

## WARNING!

- This manual is intended for use by expert technicians who should attend or 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.
- 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.

# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE



## WARNING!

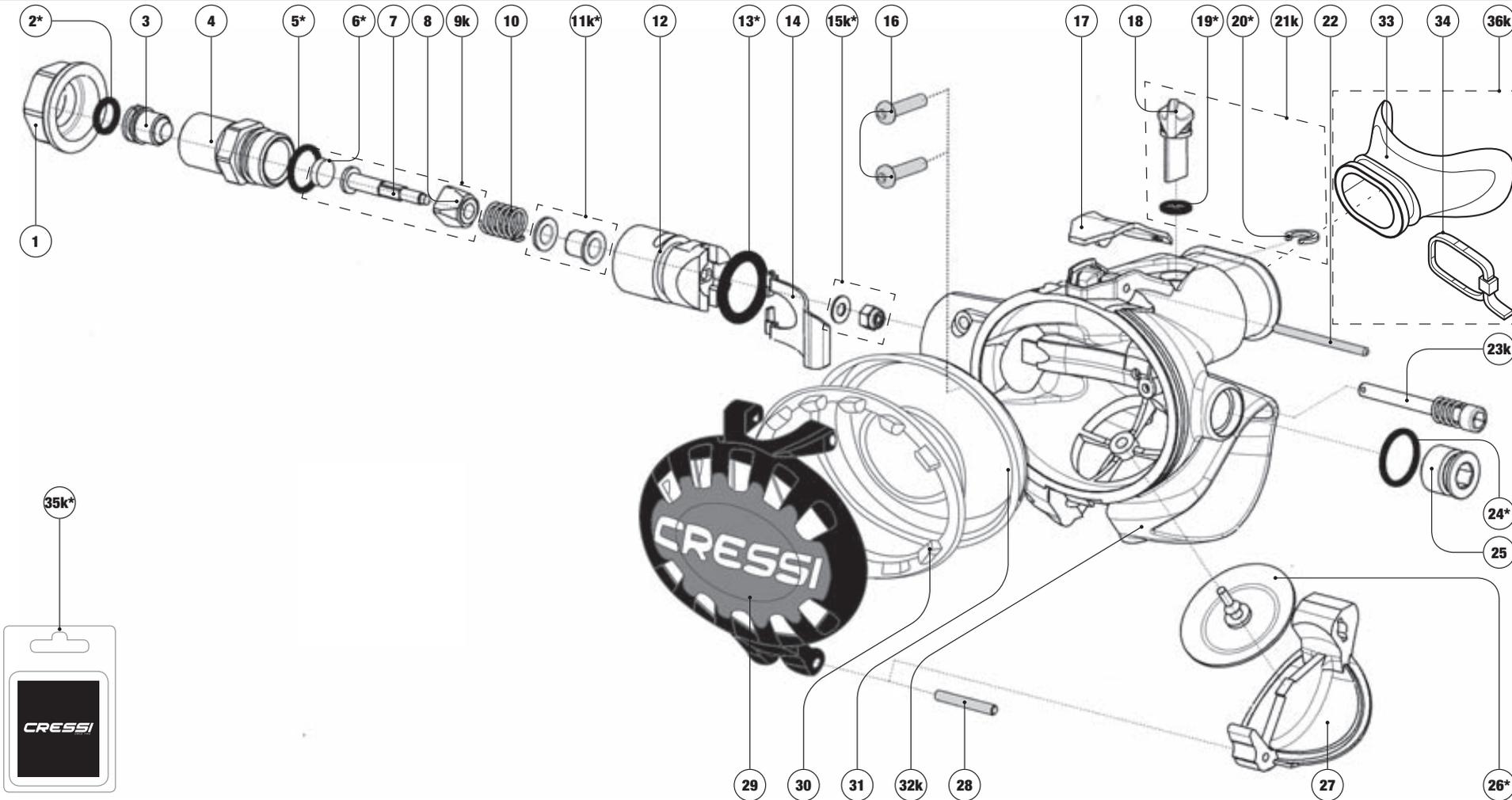
- To prevent any assembly errors when performing maintenance and/or repairs, we recommend using all the replacement parts provided by Cressi-Sub in every operation.
- Pay special attention to the recommendations provided in the margin of the figures that show the various sequences of equipment maintenance 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.
- According to the European Standard, 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 - EEC Countries Only).
- Further information about of lubrication and cleaning of components are shown within the professional area on [www.cressi.com](http://www.cressi.com) website.
- The instructions provided in this document are based on information referring to the most update equipment available before printing. This document was created on the knowledge of the state of the art of the equipment during creation of this documentation. Cressi Sub reserves the right to make changes at any time.

# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

Spare parts

JANUARY2008 - REV.ELLBK1 - ED.B./09

650



Pos	Cod	Pos	Cod
1	HZ810096	20	HZ810080*
2	HZ810095*	21k	HZ810079*
3	HZ810094	22	HZ810078
4	HZ810093	23k	HZ810077*
5	HZ810092*	24	HZ810076*
6	HZ742013*	25	HZ810075
7	HZ810091	26	HZ782097*
8	HZ810090*	27	HZ810073
9k	HZ810089*	28	HZ810072
10	HZ730207	29	HZ810063
11k	HZ810088*	29	HZ810065
12	HZ810087	30	HZ810064
13	HZ810086*	31	HZ810069
14	HZ810085	32k	HZ810068
15k	HZ746094*	33	HZ790094
16	HZ810084	34	HZ730202
17	HZ810083	35k	HZ810067*
18	HZ810082	36k	HZ790094
19	HZ810081*		

**ELLIPSE  
2<sup>nd</sup> STAGES  
(HZ 810067)  
Annual  
Replacement  
Kit**

*HZXXXXXX\* Contenuto nel kit revisione e non disponibile singolarmente. / Only available in maintenance kit; not available individually. / HZXXXXXX non disponibile not available..*

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N°Tav./Rev.	ELLBK1

# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

Ellipse Black/Octopus Cod. N° 810067 Annual Replacement Kit Chart



ELLIPSE 2<sup>nd</sup> STAGE (HZ 810067) ANNUAL REPLACEMENT KIT CHART

O-RING Reference Table



HZ 810086



HZ 810092



HZ 810076



HZ 810095



HZ 810081

SPARE PARTS Reference Table

1 Exhaust Valve HZ 810074	1 Spring Balancing Washer HZ 810088	1 Clip HZ 810080	1 Sliding Thermoplastic Rubber Bush HZ 810088	1 Poppet LP Seat HZ 742013	1 Washer HZ 746094	1 Demand Lever Nut HZ 746094
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REAL SIZE

Use only original  
Cressi-sub spare parts

Go back to

**Note: Cressi-sub recommend a full maintenance of the regulator at least once a year or more in case of intensive use.**

# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Annual replacement*

## 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 device are illustrated on one of next pages.**
- Plastic, rubber and anodized aluminium parts can only be cleaned with hot soapy water using a soft bristled brush, taking care not to scratch or abrade the rubber or plastic parts, especially on their pneumatical seal side. After they are cleaned, they should be immediately rinsed in clean, fresh water and blown dry with low pressure breathing air, then check that there are no deficiencies, cracks or abrasions that do not allow the use”.
- Do not use acid or solvents or ultrasonic baths on rubber or plastic components.
- 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.
- Further information about cleaning procedure and/or repair phases of the equipment can be found in specific documents contained in the section «Professional Area» located inside the site [www.cressi.com](http://www.cressi.com).
- The new ORs must be greased with a thin layer of lubricant: 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.



## Annual replacement

- According to the European Standard, 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 - EEC Countries Only).
- Users must never perform maintenance themselves; all maintenance must be performed EXCLUSIVELY by an authorized Cressi-sub center.
- Cressi sub declines all responsibility for any maintenance and/or repairs carried out by personnel not authorized by the company;
- 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.com](mailto:info@cressi.com)

Use only original  
Cressi-sub spare parts

# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Special tools*

JANUARY2008 - REV.ELLBK1 - ED.B./09

654



HZ 709004  
extration  
point tool



HZ 709016  
tool to remove  
the orifice



HZ 709011  
push tool



HZ 709006  
allen key  
6 mm



HZ 709007  
allen key  
4 mm



HZ 709009  
5,5 mm  
screwdriver



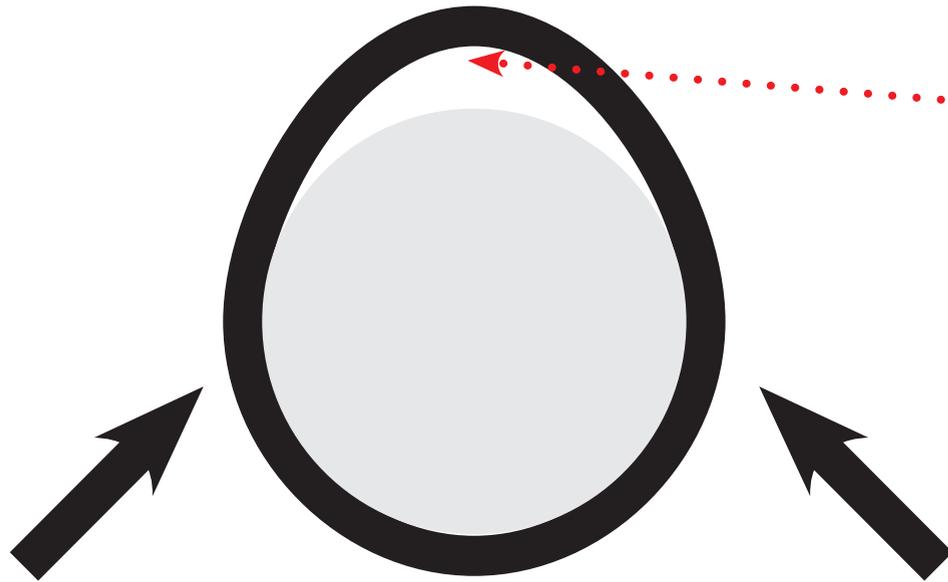
HZ 709010  
ell. 2<sup>nd</sup> stage  
setting tool



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

# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Disassembling procedures*



- 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**

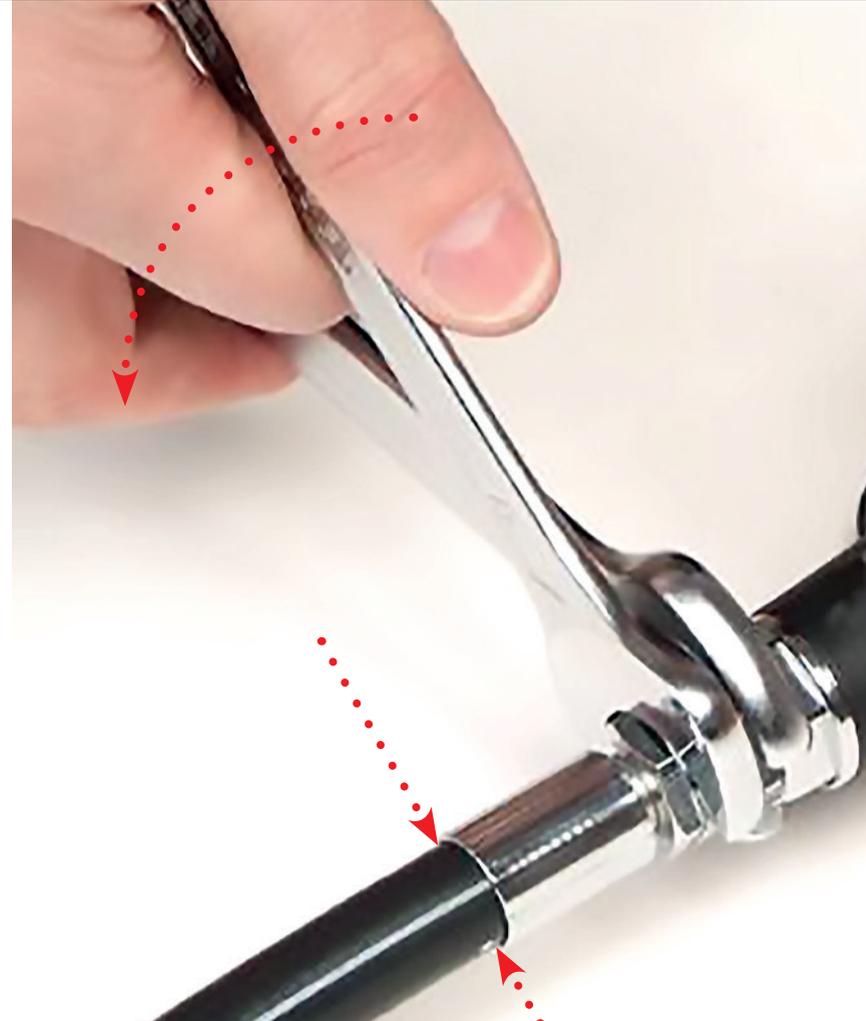
# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Disassembling procedures*

## Disassembling the low-pressure hose

Using a 19 mm and a 17 mm spanner, remove the low-pressure hose, holding the set nut with the former and unscrewing the shaft with the latter.

The OR inside the hose must be replaced yearly.





## Cam-lock -disassembling the regulator

Insert a 4 mm. Allen wrench in the cam-lock, slightly press and turn 90° anticlockwise. The inside spring will push out the key, so that it may be easily taken out.



# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Disassembling procedures*

## Opening the lid -1-

After removing the cam-lock key, use two fingers to press outwards: the central lid will open, as shown in the picture.





## Opening the lid -2-

Holding the regulator in one hand, open the cap with the other.



# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Disassembling procedures*

JANUARY2008 - REV.ELLBK1 - ED.B./09

660

## Removing cap and seal

After opening the cap, remove the semirigid cap and seal.



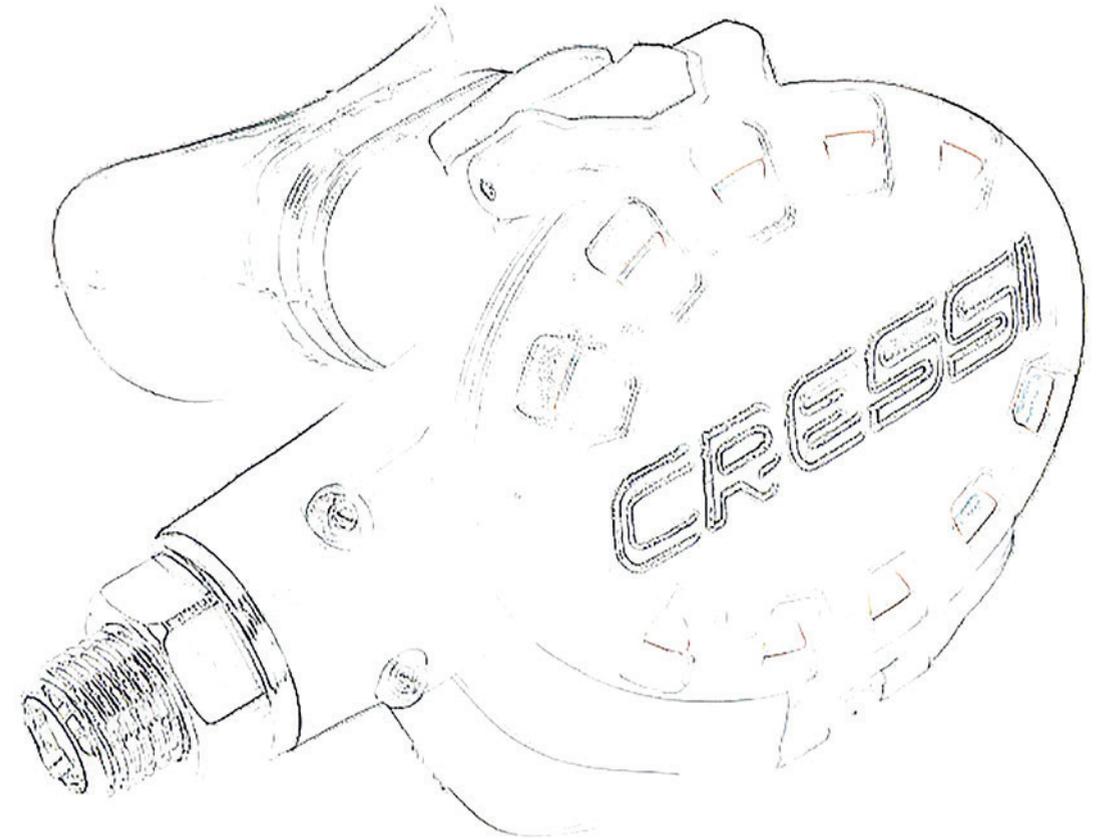
HZ 810069

HZ 810064

# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE



**NOTE:** the following disassembling and assembling phases are the same for all versions of Ellipse regulators. Therefore, although the pictures refer to “Ellipse Titanio” version, they have to be considered valid as well for “Ellipse Black” version, which the present manual refers to.



# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Disassembling procedures*

JANUARY2008 - REV.ELLBK1 - ED.B./09

## Removing the blocking set nut

Use a 19 mm spanner to remove the blocking set nut.

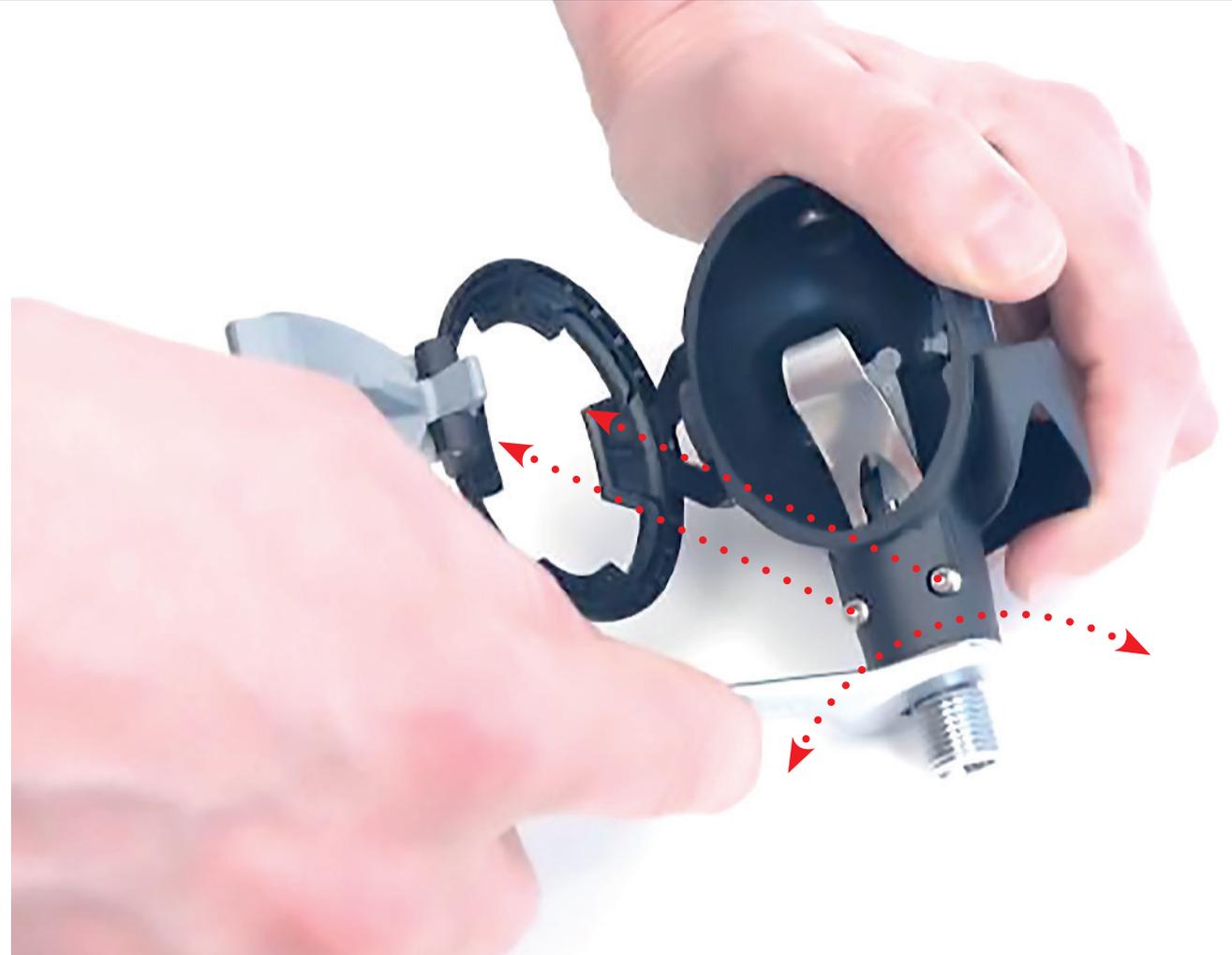
Please note how the set nut form reduces the obstructions around the adjustable orifice seat.





## Removing the conical blocking pins -1-

Use a 15 mm spanner to turn slightly the hexagonal seat of the adjustable orifice in both directions, in order to get the removal of both conical pins of the regulating mechanism easier.



# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Disassembling procedures*

JANUARY2008 - REV.ELLBK1 - ED.B./09

664

## Removing the conical blocking pins -2-

Remove both conical pins inserting a pointed tool under their sides.



# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Disassembling procedures*



## Removing the 2<sup>nd</sup> stage mechanism

After removing the conical pins, the 2<sup>nd</sup> stage mechanism may be taken out of the regulator, without removing any other component, therefore without varying the regulator setting: such is a unique patented feature, offering as many advantages to divers!



# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Disassembling procedures*

## Disassembling the flux diverter

Use a flat pointed tool to remove the flux diverter seal ring, pushing it outside.





## Disassembling the flux diverter

Replace and grease the flux diverter's OR.

HZ 810082

HZ 810081



HZ 810079

HZ 810080

# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Disassembling procedures*

## Disassembling the 2<sup>nd</sup> stage mechanism

After taking out the 2<sup>nd</sup> stage mechanism, insert the special tool in the valve and push it inside, to let the lever easily get out.





## Disassembling the 2<sup>nd</sup> stage mechanism

Remove the setting nut and its metal washer, using a 5.5 mm screwdriver.



HZ 746094

# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Disassembling procedures*

## Disassembling the 2<sup>nd</sup> stage mechanism

To remove the 2<sup>nd</sup> stage mechanism, insert a 15 mm spanner in the valve outside seat and another 15 mm spanner in the orifice hexagon.

Unscrew clockwise, since the thread between orifice seat and valve is **LEFT**.





## Disassembling the 2<sup>nd</sup> stage mechanism

After disconnecting valve body and orifice seat, use a screwdriver to remove the adjustable orifice out of its seat.



# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Disassembling procedures*

## Disassembling the 2<sup>nd</sup> stage mechanism

- Use the plastic spring pusher
- designed to prevent the edge from being damaged
- to remove the orifice out of its seat.



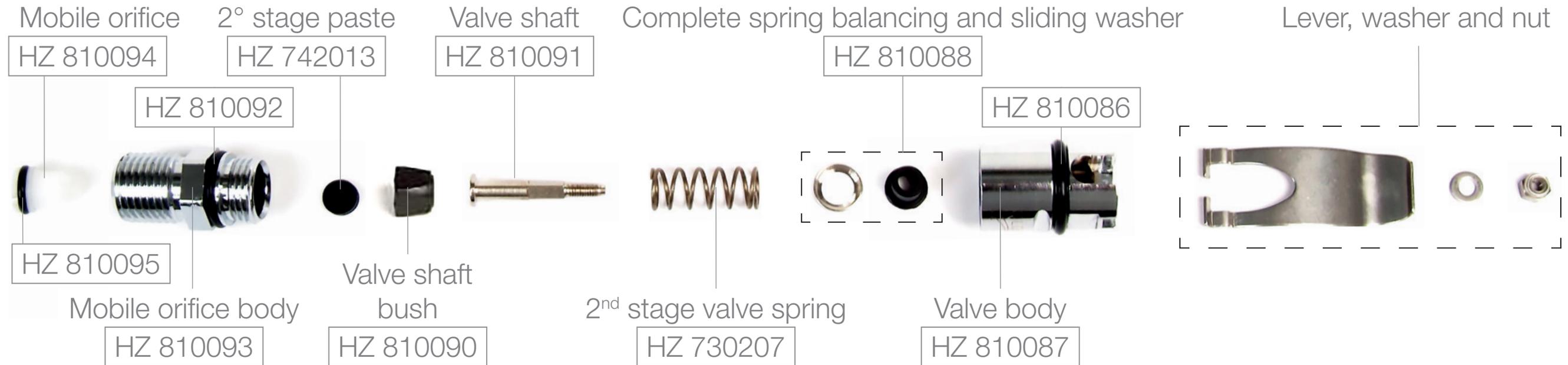
# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

Disassembling procedures



## Removing the 2<sup>nd</sup> stage mechanism

Now, here we have on our bench all elements composing the 2<sup>nd</sup> stage Ellipse Black mechanism.



# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Assembling procedures*

JANUARY2008 - REV.ELLBK1 - ED.B./09

674





## Assembling the 2<sup>nd</sup> stage mechanism

Connect the valve with the regulator and insert the previously removed pad back into the valve shaft bush. Note: use the old pad in order to prevent the fresh one to be damaged by the orifice cutting edge, as will be seen later.



# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Assembling procedures*

## Assembling the 2<sup>nd</sup> stage mechanism

Insert the teflon washer in the thermoplastic rubber washer.



HZ 810088



## Assembling the 2<sup>nd</sup> stage mechanism

Insert the whole sliding washer in the valve's spring.



HZ 810088

HZ 730207

# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Assembling procedures*

JANUARY2008 - REV.ELLBK1 - ED.B./09

## Assembling the 2<sup>nd</sup> stage mechanism

Insert the whole spring and washer in the valve body, getting sure it is correctly placed.





## Assembling the 2<sup>nd</sup> stage mechanism

Insert the whole shaft including the old pad into the spring, making sure its square stem gets into the sliding washer.



# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Assembling procedures*

## Cam-lock -disassembling the regulator



After greasing the O-rings, insert and push the orifice into its seat up to the beginning of the thread. Now turn it into its seat for two whole turns, and keep it so until the regulator is assembled and set.



# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Assembling procedures*



## Assembling the 2<sup>nd</sup> stage mechanism

Tighten both assembled parts:  
remember **the thread between them is LEFT**.

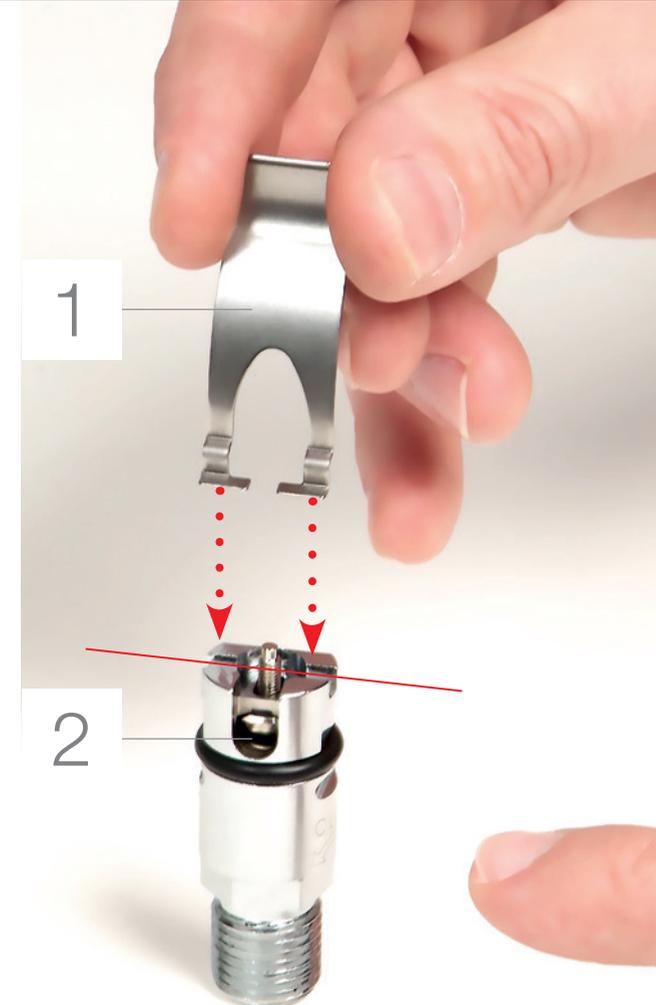


# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Assembling procedures*

## Assembling the 2<sup>nd</sup> stage mechanism

Insert the lever into the valve body slot in the direction shown in the picture (lever 1 opposite injector hole 2).



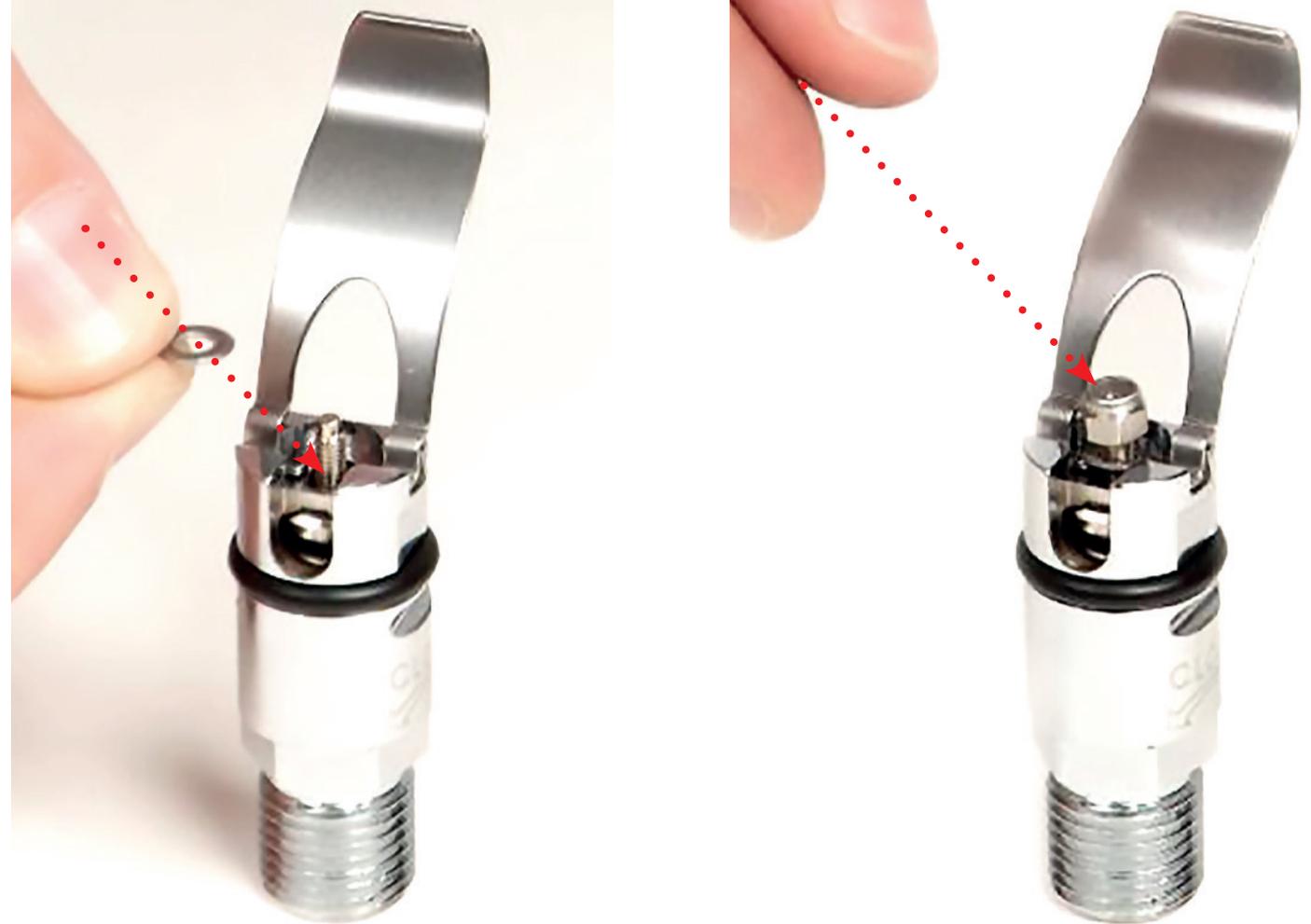
# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Assembling procedures*



## Assembling the 2<sup>nd</sup> stage mechanism

Now insert washer and nut.



# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Assembling procedures*

## Assembling the 2<sup>nd</sup> stage mechanism

HZ 810085



HZ 746094

Use a 5,5 mm screwdriver to turn the nut for a couple of threads, so as to keep the lever vertically, and keep it so until the regulator is assembled and set.





## Assembling the 2<sup>nd</sup> stage mechanism

Fully unscrew the orifice seat out of the valve body clockwise, since the coupling thread is LEFTHAND



# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Assembling procedures*

## Assembling the 2<sup>nd</sup> stage mechanism

Remove the pad out of the valve shaft and replace it with the fresh one supplied in the annual service kit.



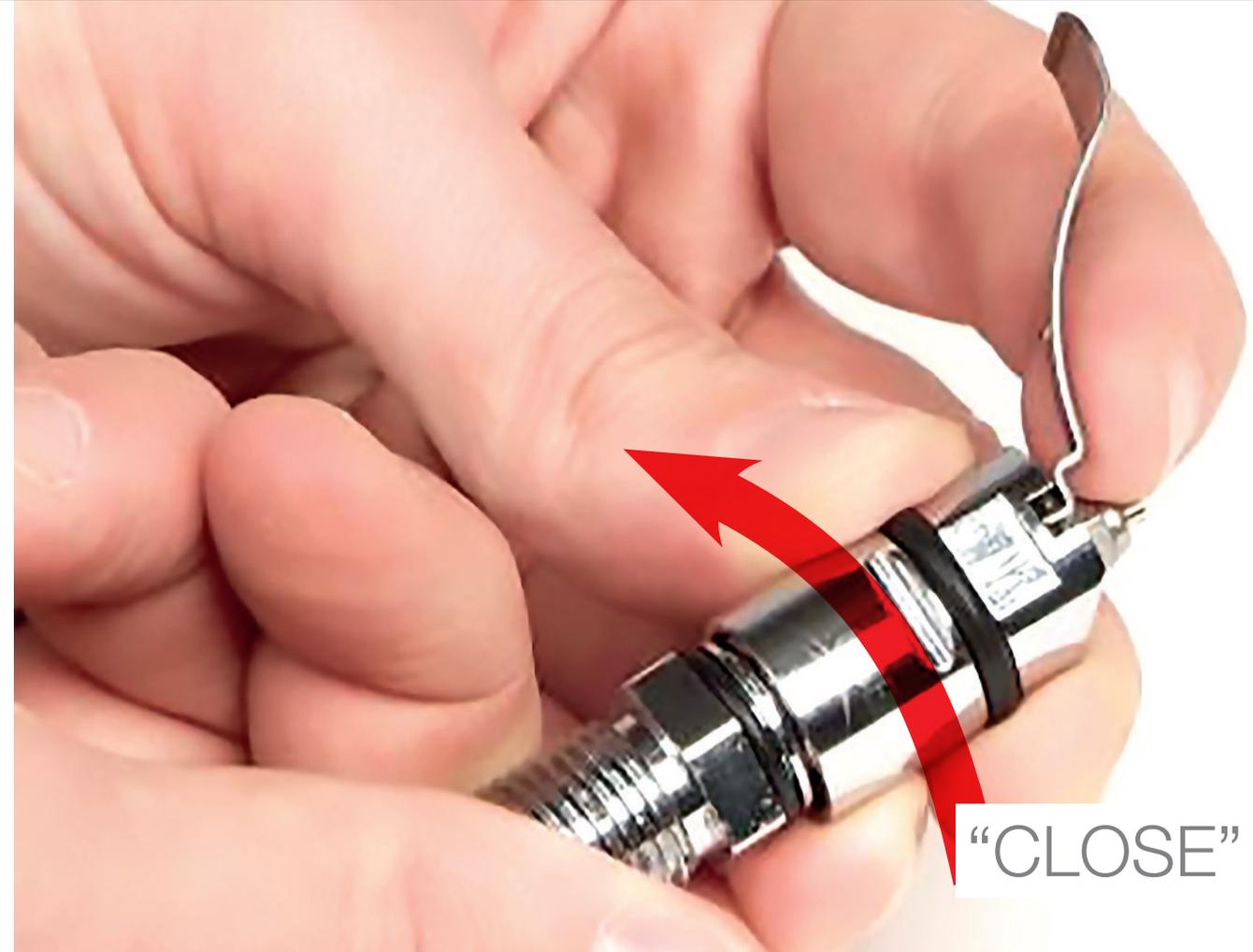
# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Assembling procedures*



## Assembling the 2<sup>nd</sup> stage mechanism

Remember: the coupling thread is **LEFT**, turn the orifice seat in the direction written on the valve body (“close”), at the same time keeping the lever depressed, so as not to damage the pad with the orifice sharp edge, as shown in the picture.



# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Assembling procedures*

JANUARY2008 - REV.ELLBK1 - ED.B./09

688

Use two 15 mm spanners respectively in the orifice seat hexagonal frame and the profiling under the lever and tighten both, taking care to keep the lever pressed so as not to damage the pad with the orifice cutting edge, as shown in the picture.





## Assembling the flux diverter

Use a flat point to push back the flux switch's seal ring into its housing.



# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Assembling procedures*

## Assembling the mechanism in the body





## Assembling the mechanism in the body

Insert the previously assembled and lubricated 2<sup>nd</sup> stage mechanism into the regulator's case: make sure the air outlet hole under the lever's washer is placed against the injector's top, inside the body.



# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Assembling procedures*

## Assembling the mechanism in the body

JANUARY2008 - REV.ELLI

692



Insert the regulator mechanism: to make the operation easier, depress the thermoplastic injector top with your thumb.





## Assembling the mechanism in the body

Insert the conical pins in their seats.



HZ 810084

# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Assembling procedures*

## Assembling the mechanism in the body



Use a 19 mm hexagonal spanner to tighten the regulator 2<sup>nd</sup> stage set nut.





## Assembling the mechanism in the body



Place the ring on the seal, making sure its perimeter lies perfectly all over the seal external surface.



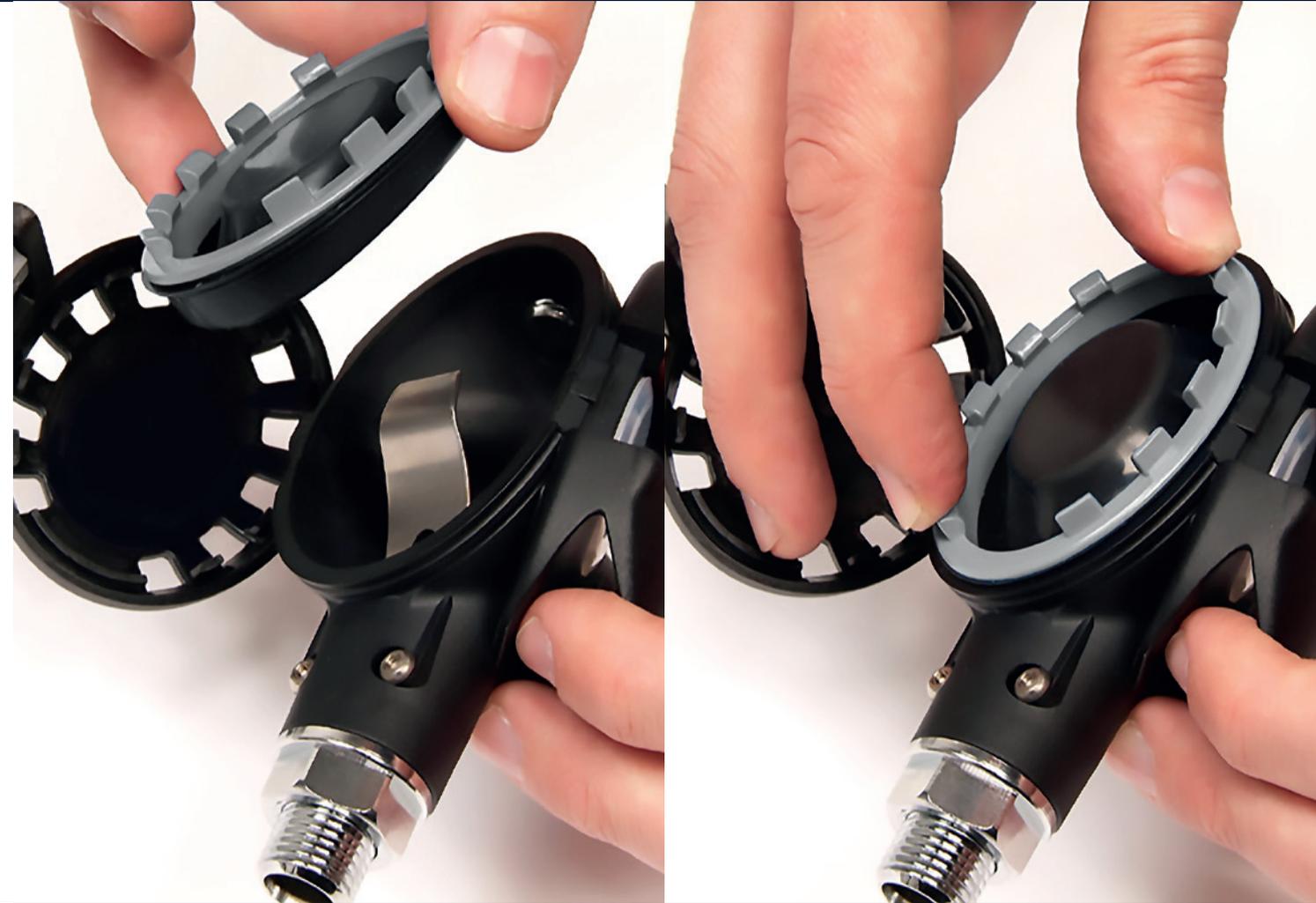
# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Assembling procedures*

## Assembling the mechanism in the body

Now, insert the whole, making sure the seal perimeter edges get perfectly in the regulator's body.

NOTE: In order to ensure proper coupling, it can be helpful to soak the diaphragm before placing it in the body of the regulator.





## Closing the regulator's cap

Depress the halfrigid discharge cap with your finger, and turn the weigh-cap towards the discharge valve seat.



# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Assembling procedures*

## Closing the regulator's cap

To close, place the tooth shown in the picture in such way that it **LIES** on the 2<sup>nd</sup> stage special housing. The latter serves as closing fulcrum of the cap itself.





## Closing the regulator's cap

Turn the weigh-cap until the regulator is perfectly closed.



# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Assembling procedures*

## Closing the regulator's cap

Depress the middle part (grey in the picture) until you hear a small click, proving the regulator is perfectly closed.





## Closing the regulator's cap - Cam-Lock

After opening the cap, remove the semirigid cap and seal.



# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Assembling procedures*

JANUARY2008 - REV.ELLBK1 - ED.B./09

## Closing the regulator's cap - Cam-Lock

Use a 4 mm allen wrench to insert the safety cam-lock in its seat and turn 90° clockwise.





## Closing the regulator's cap - Cam-Lock

If the cam-lock is inserted correctly, it will appear as shown in the picture.



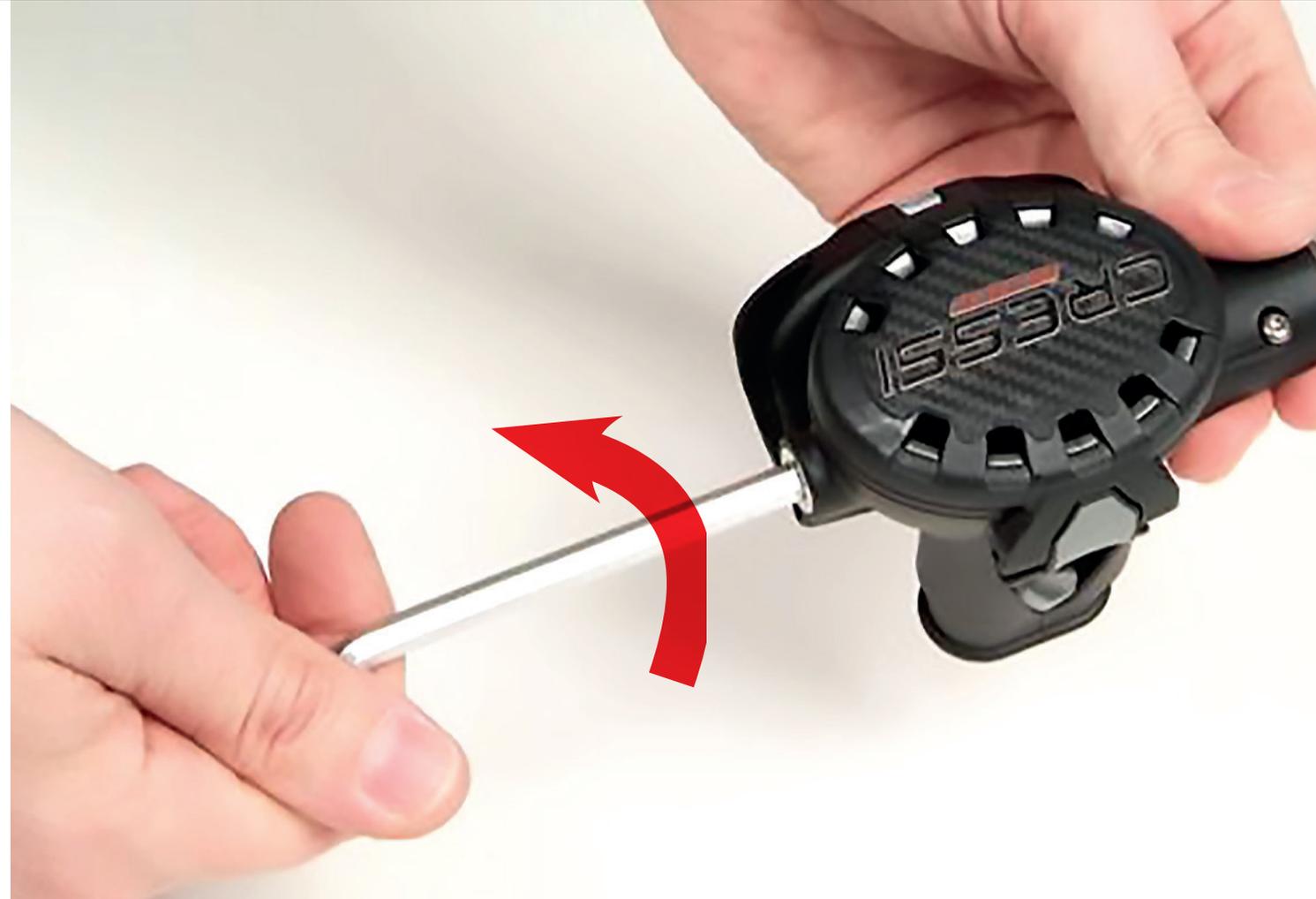
# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

Setting

JANUARY2008 - REV.ELLBK1 - ED.B./09

704

Use a 6 mm allen wrench to unscrew the second stage setting cap, as shown in the picture.



# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

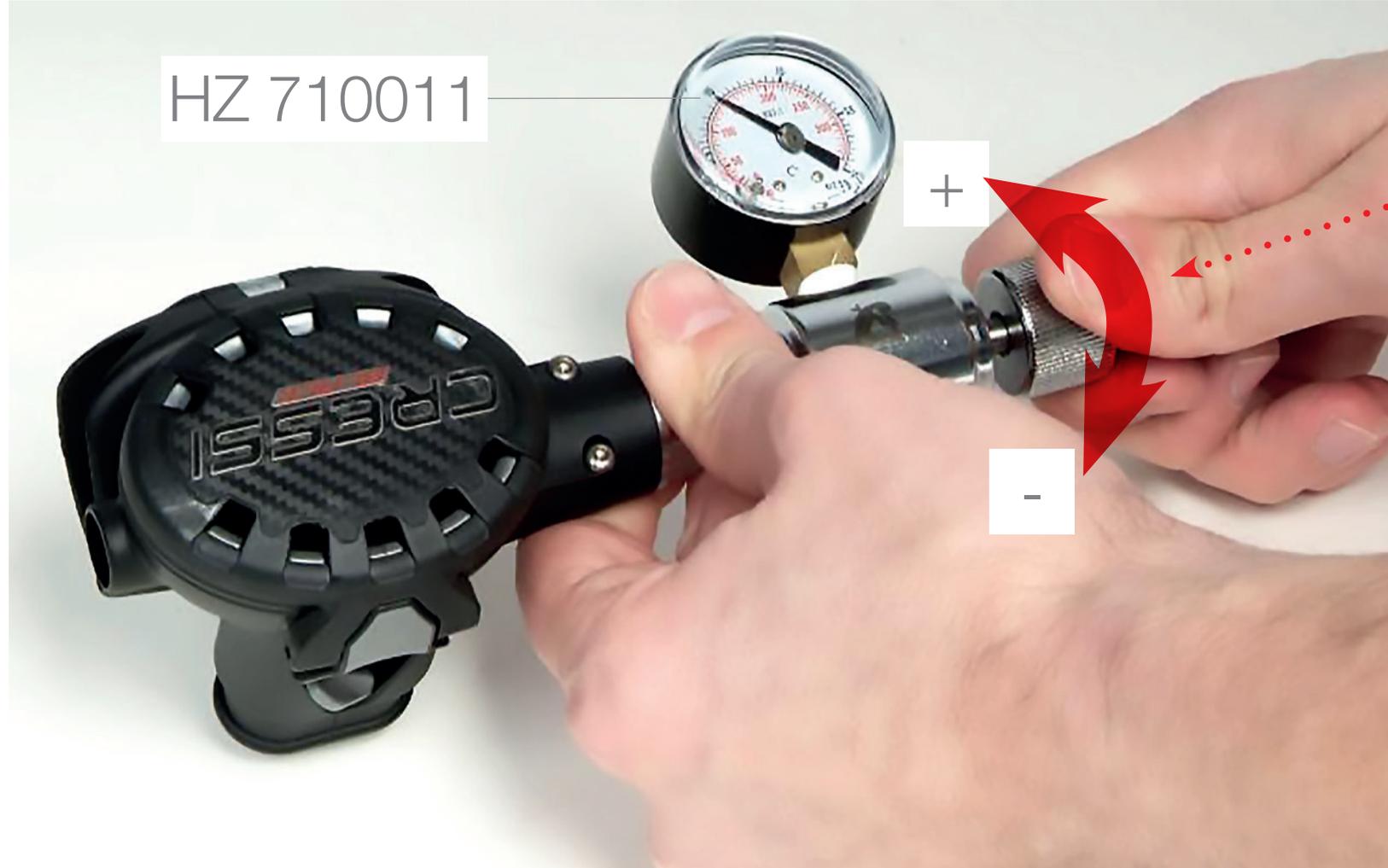
*Valve orifice setting (pag 706)*



- **NOTE: The following calibration and verification phases of the second stage must be performed only with the regulator supplied with air under pressure from a suitably calibrated first stage (intermediate pressure of 146 bar, with a full cylinder at 2920 psir)**
- Screw the 2<sup>nd</sup> stage onto the setting gauge (HZ 710011) connected through a middle pressure hose to a regularly set first stage;
- Connect the whole regulator (first and second stage) to a 2900 PSI pressurized tank or to 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 it stops; in this way, the valve cutting edge should hardly touch the closing pad making it work correctly.
- Now turn the orifice a little more than one half turn (turn 1/4 more for Octopus);
- After checking the correct set of the valve orifice, the gauge will read the correct set of the first stage;
- **NOTE: take care not to turn the valve orifice too tight, or the closing pad might bend too much and increase the inhalation effort, due to the exceeding compression of the valve spring;**

# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Valve orifice setting*



# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Lever height setting (pag 708)*



- After setting the right depth of the valve orifice, the final setting can be carried out, by adjusting the height of the valve lever;
- This must be done on pressurized regulator;
- Insert a 5.5 mm screwdriver (HZ 709009) in the side slot and gently turn the valve nut clockwise (+), until the regulator starts supplying slightly;
- Now turn the valve nut anticlockwise (-) until the regulator stops supplying, turn a bit more, until the lever idles a little;
- The 2<sup>nd</sup> stage Ellipse is correctly set if, with pressurized regulator, its lever idles for about 1.5 - 2 mm (0.06 - 0.08 in) from the diaphragm plate.

# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Lever height setting*

HZ 710011



# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

Setting



After setting the second stage correctly, turn the side screw with a 6 mm. Allen wrench until its head lines up with the case.



# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

## *Final checking*

- After setting the regulator, keep it pressurized with a properly set 1<sup>st</sup> stage, 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 5 cm of water (2 in wg) 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.
- Additional information on the so-called «troubleshooting» of the equipment may be found in specific documents contained in the «Professional Area» section of website [www.cressi.com](http://www.cressi.com).

# ELLIPSE BLACK/OCTOPUS 2<sup>nd</sup> STAGE

*Final checking*



- Then, stop the inflow of air from the valve and take several deep breaths from the mouthpiece to verify the sealing of the diaphragm and the discharge valve;
- During the inspiration phase no air infiltration should be perceived, and you should experience a certain effort when inhaling, reflecting perfect regulator sealing;
- If, following this procedure, you were to notice an infiltration of air, i.e., a continuous flow of air coming in when inhaling after closing the side inlet, see the instructions on the closure of the regulator and the replacement of the discharge valve, carefully checking to make sure that both the diaphragm and the air supply valve do not show any signs of abrasion, cuts, tearing or other damages that could undermine their operation and hence the perfect sealing of the regulator.

