



Service and Repair Operative Manual

ELLIPSE BLACK/OCTOPUS 2nd STAGE

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

ELLIPSE BLACK/OCTOPUS 2nd Stage



647

2nd STAGE ELLIPSE BLACK/OCTOPUS

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

CRESSI
SINCE 1946

ELLIPSE BLACK/OCTOPUS 2nd 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 2nd STAGE



WARNING!

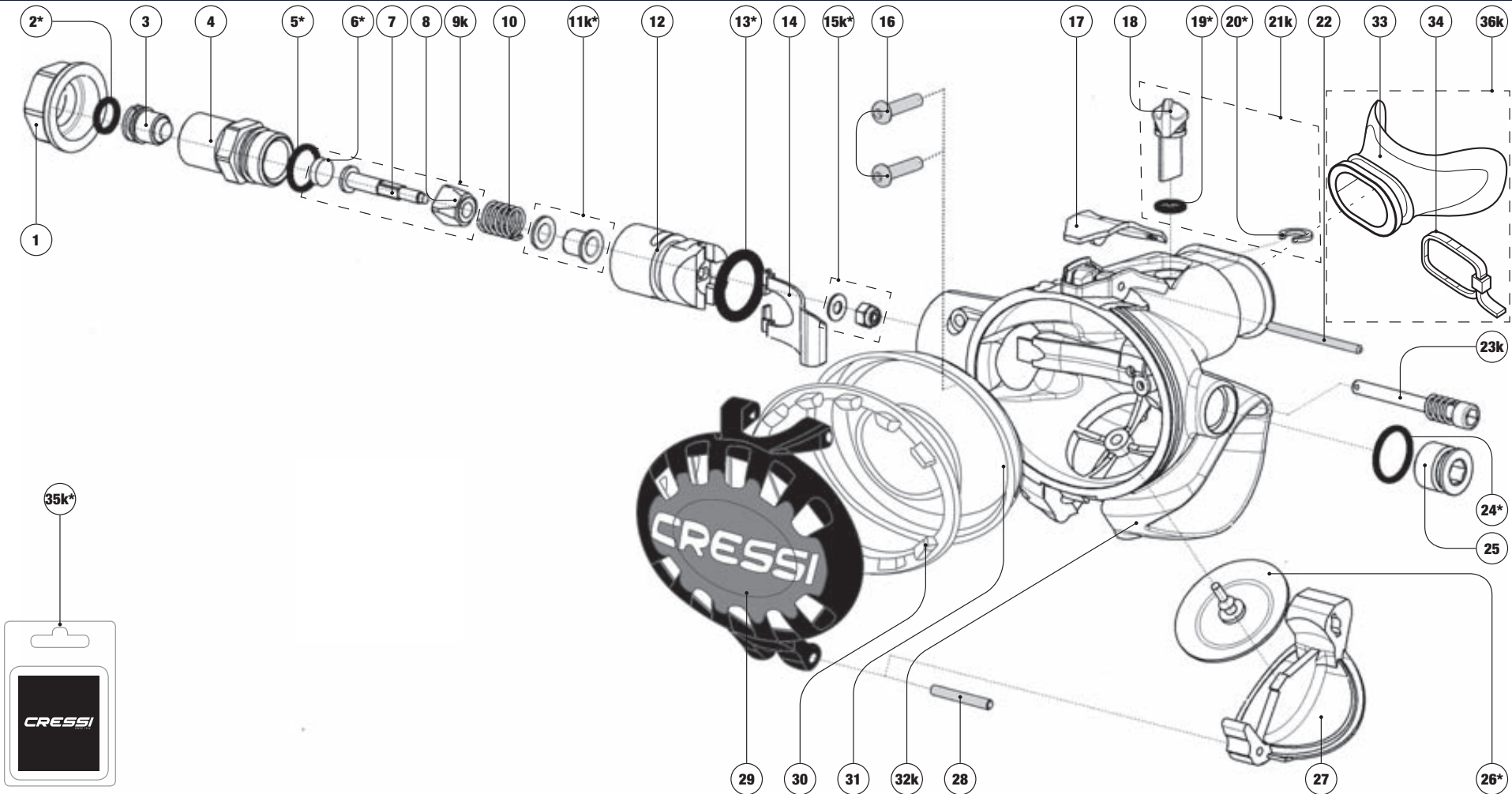
- To prevent any assembly errors when performing maintenance and/or repairs, we recommend using all the replacement parts provided by Cressi-Sub in every operation.
- Pay special attention to the recommendations provided in the margin of the figures that show the various sequences of equipment maintenance 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 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 2nd STAGE

Spare parts

JANUARY 2008 - REV. ELLBK/1 - 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*		

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

**ELLIPSE
2nd STAGES
(HZ 810067)
Annual
Replacement
Kit**

Ed/Issue

A/08

N°Tav./Rev.

ELLBK/1

ELLIPSE BLACK/OCTOPUS 2nd STAGE

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



ELLIPSE 2nd 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

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 2nd 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.
- 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

Use only original
Cressi-sub spare parts

ELLIPSE BLACK/OCTOPUS 2nd STAGE

Special tools



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. 2nd stage
setting tool



HZ 710011
2nd stage
setting gauge

ELLIPSE BLACK/OCTOPUS 2nd 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**

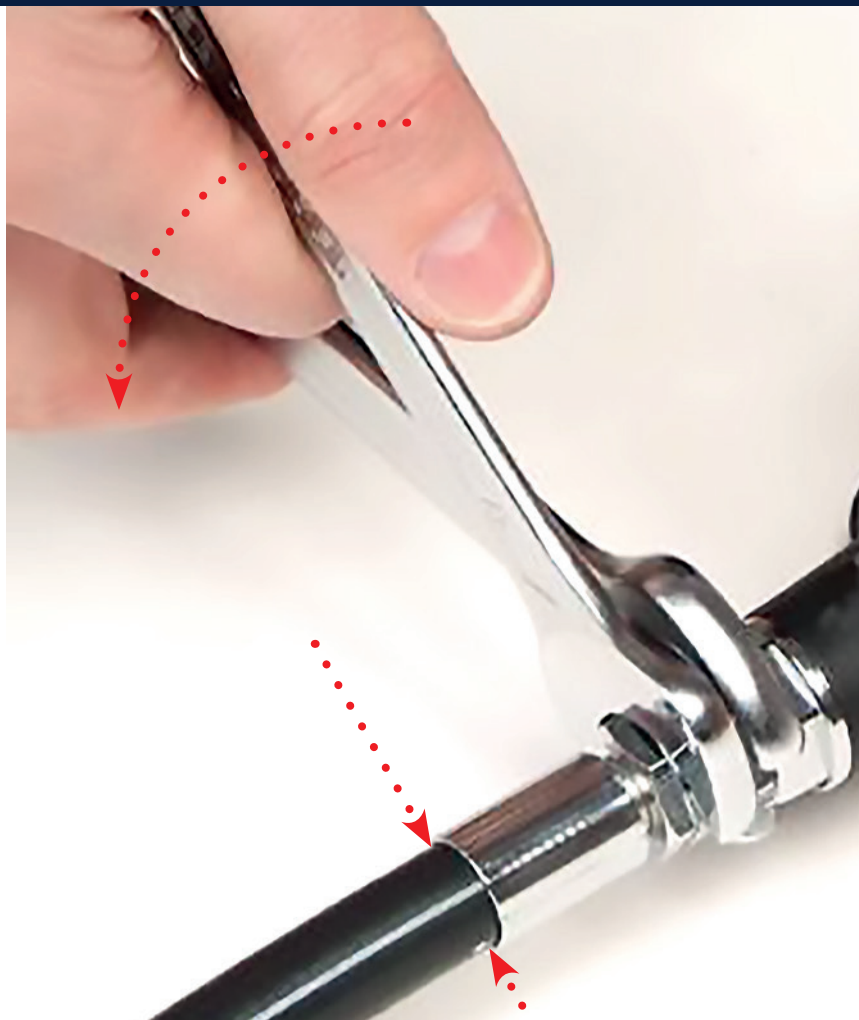
ELLIPSE BLACK/OCTOPUS 2nd STAGE

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.



ELLIPSE BLACK/OCTOPUS 2nd STAGE

Disassembling procedures



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 2nd 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.



ELLIPSE BLACK/OCTOPUS 2nd STAGE

Disassembling procedures



Opening the lid -2-

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



ELLIPSE BLACK/OCTOPUS 2nd STAGE

Disassembling procedures

Removing cap and seal

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



HZ 810069

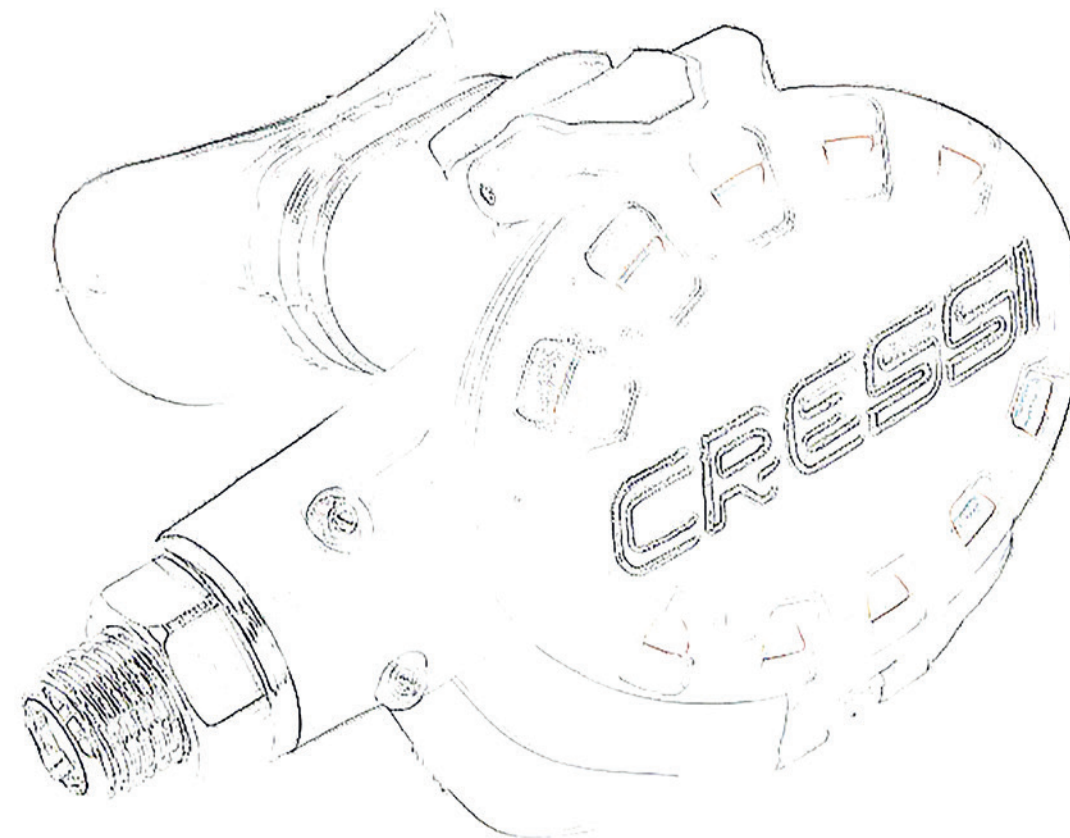


HZ 810064

ELLIPSE BLACK/OCTOPUS 2nd 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 2nd STAGE

Disassembling procedures

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.



HZ 810096

ELLIPSE BLACK/OCTOPUS 2nd STAGE

Disassembling procedures



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.

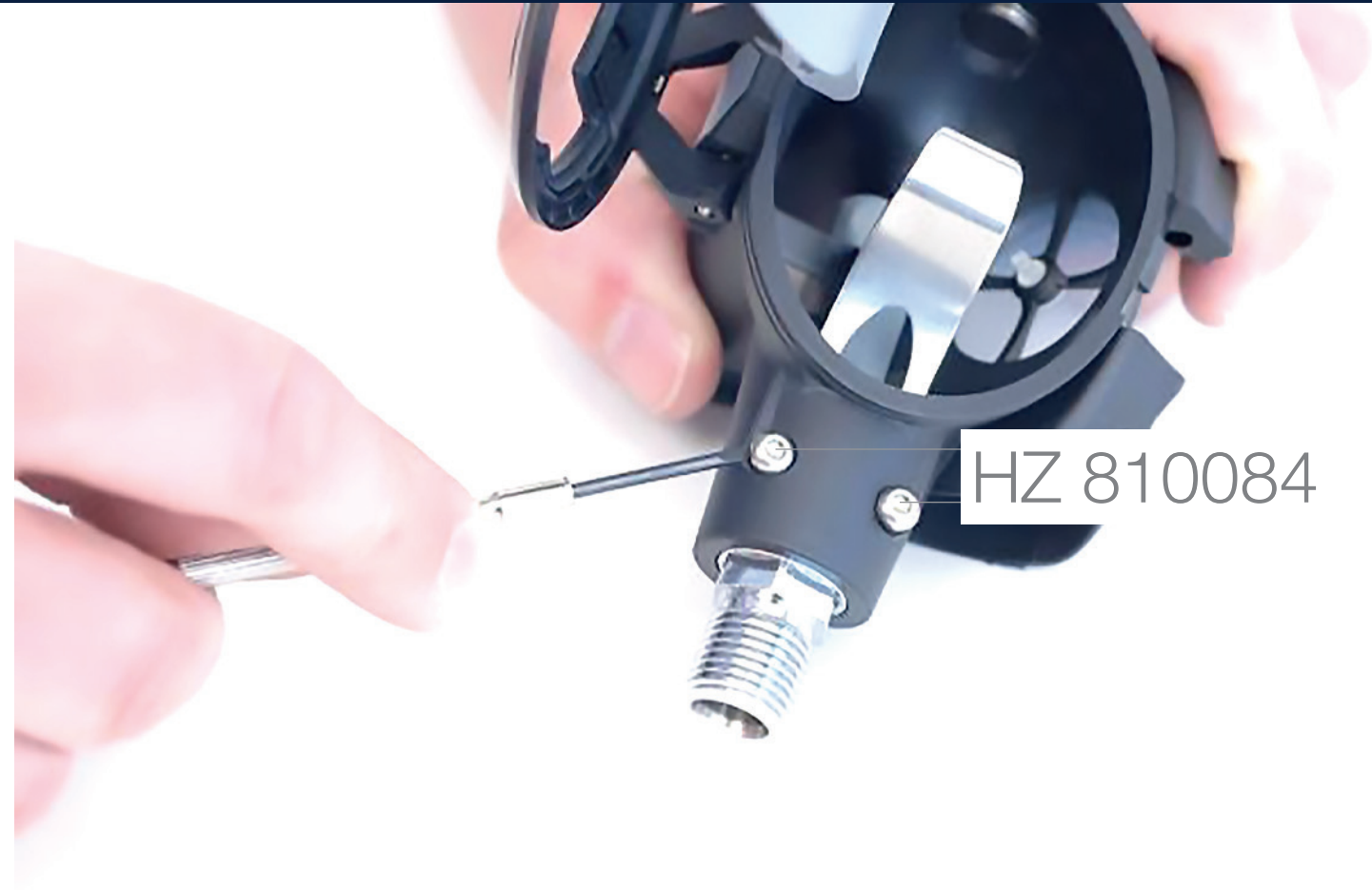


ELLIPSE BLACK/OCTOPUS 2nd STAGE

Disassembling procedures

Removing the conical blocking pins -2-

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



ELLIPSE BLACK/OCTOPUS 2nd STAGE

Disassembling procedures



Removing the 2nd stage mechanism

After removing the conical pins, the 2nd 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 2nd STAGE

Disassembling procedures

Disassembling the flux diverter

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



ELLIPSE BLACK/OCTOPUS 2nd STAGE

Disassembling procedures



Disassembling the flux diverter

Replace and grease
the flux diverter's OR.

HZ 810082

HZ 810081

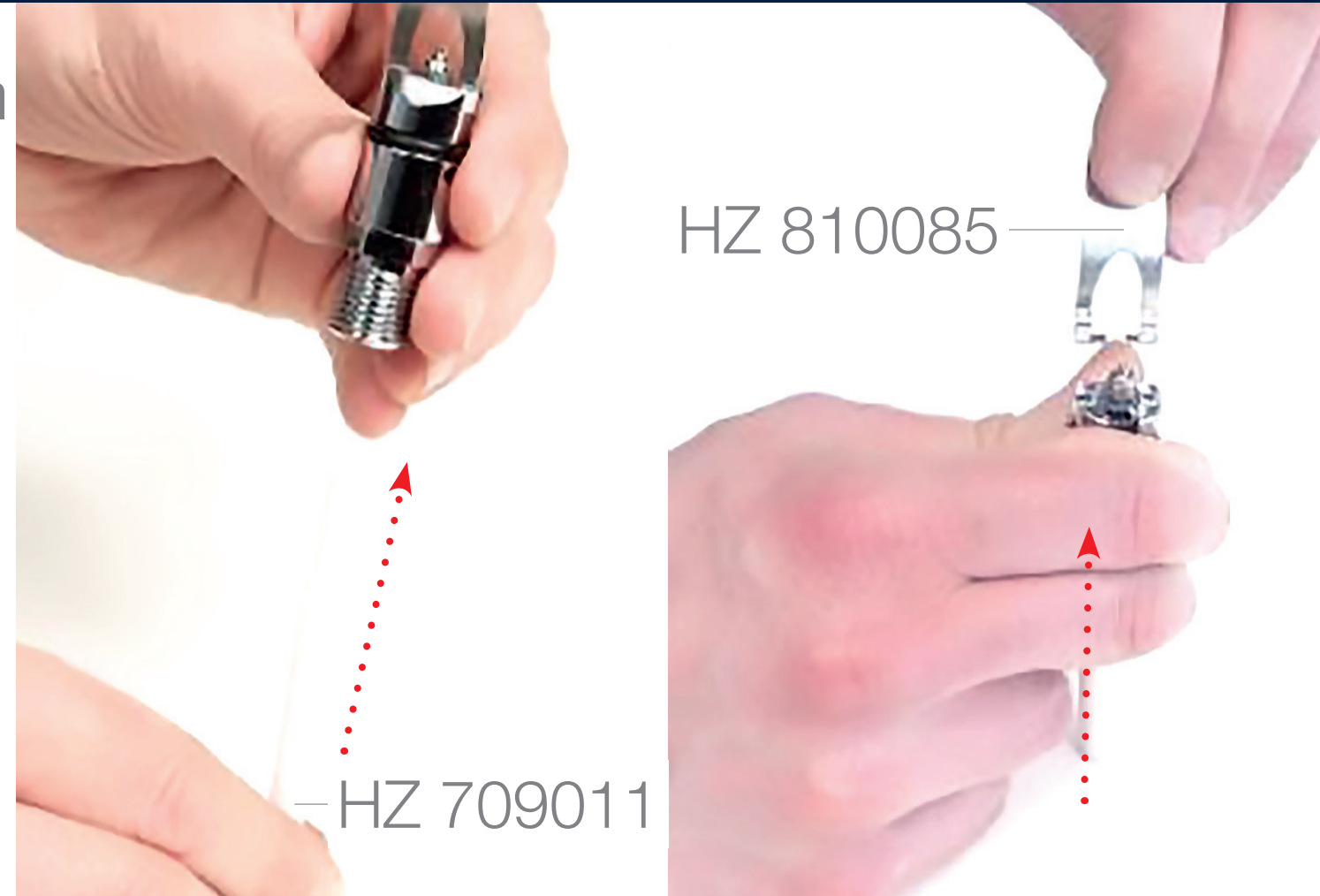


ELLIPSE BLACK/OCTOPUS 2nd STAGE

Disassembling procedures

Disassembling the 2nd stage mechanism

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



ELLIPSE BLACK/OCTOPUS 2nd STAGE

Disassembling procedures



Disassembling the 2nd stage mechanism

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



ELLIPSE BLACK/OCTOPUS 2nd STAGE

Disassembling procedures

Disassembling the 2nd stage mechanism

To remove the 2nd 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**.



ELLIPSE BLACK/OCTOPUS 2nd STAGE

Disassembling procedures



Disassembling the 2nd stage mechanism

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

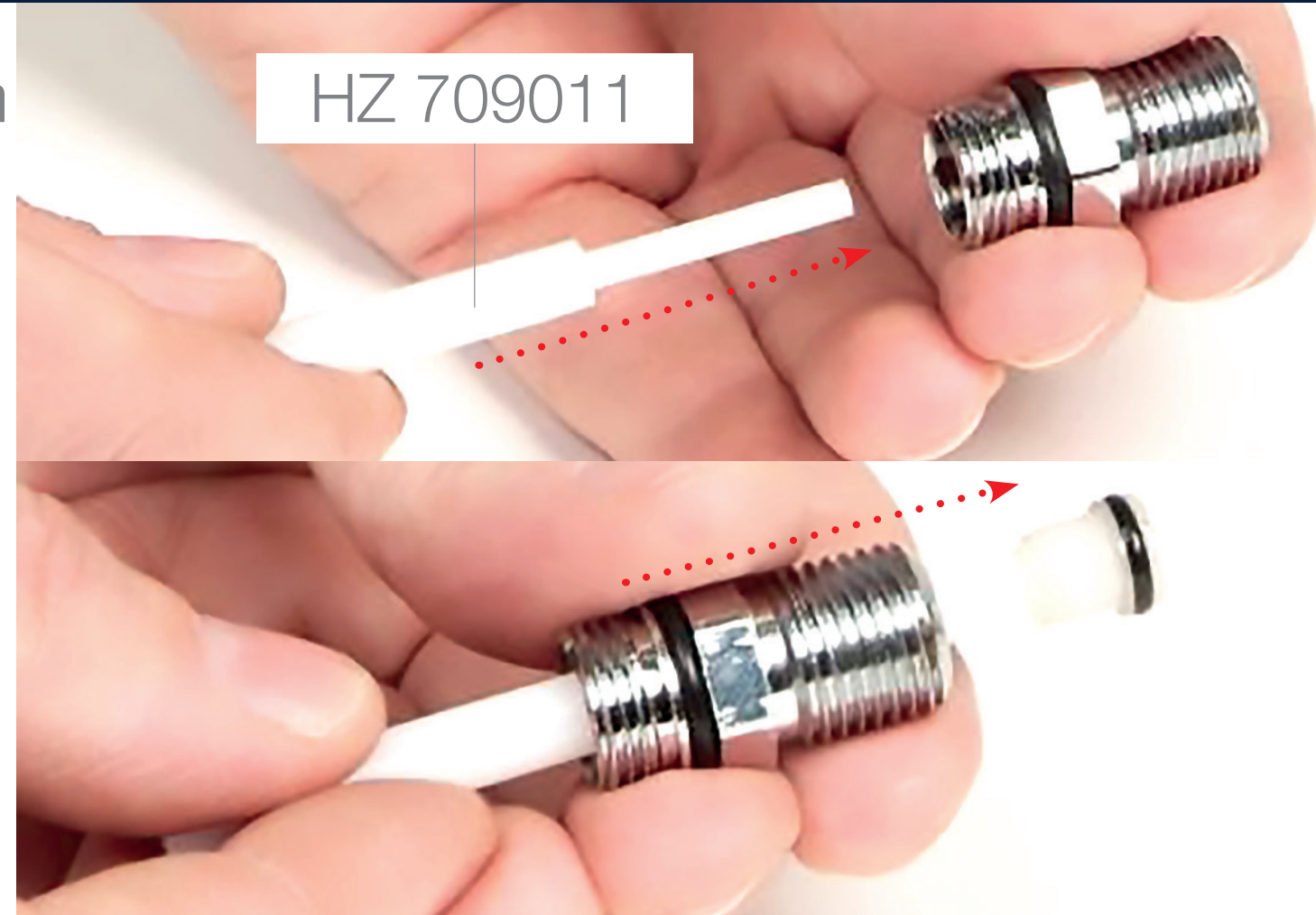


ELLIPSE BLACK/OCTOPUS 2nd STAGE

Disassembling procedures

Disassembling the 2nd stage mechanism

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



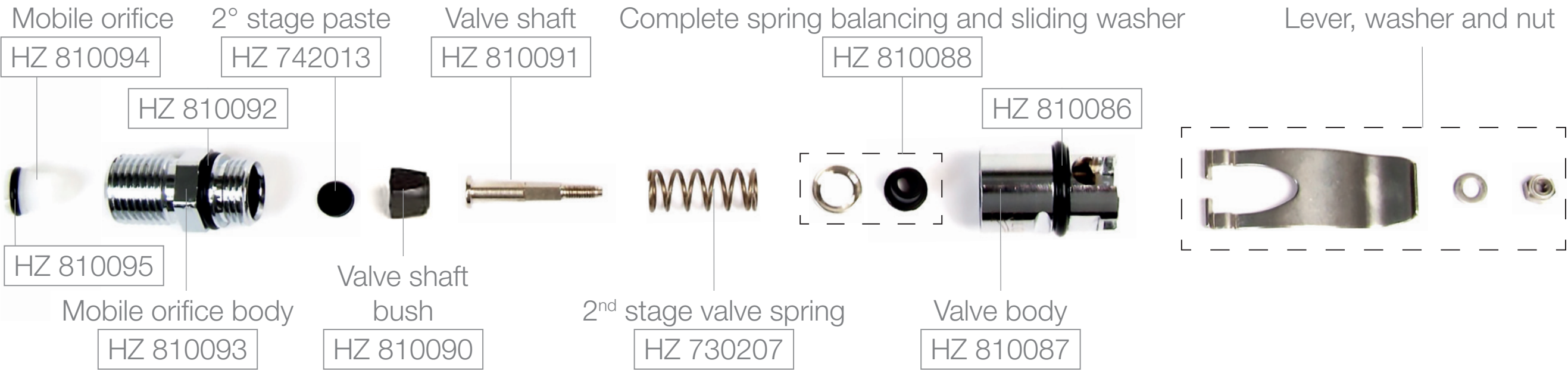
ELLIPSE BLACK/OCTOPUS 2nd STAGE

Disassembling procedures



Removing the 2nd stage mechanism

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



ELLIPSE BLACK/OCTOPUS 2nd STAGE

Assembling procedures

JANUARY 2008 - REV. ELLBK/1 - ED. B./09

674



ELLIPSE BLACK/OCTOPUS 2nd STAGE

Assembling procedures



Assembling the 2nd 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 2nd STAGE

Assembling procedures

Assembling the 2nd stage mechanism

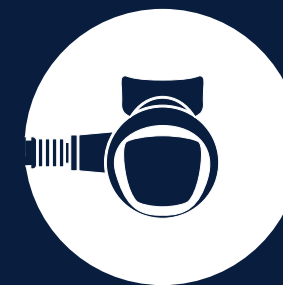
Insert the teflon washer in the thermoplastic rubber washer.



HZ 810088

ELLIPSE BLACK/OCTOPUS 2nd STAGE

Assembling procedures



Assembling the 2nd stage mechanism

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



HZ 810088

HZ 730207

ELLIPSE BLACK/OCTOPUS 2nd STAGE

Assembling procedures

Assembling the 2nd stage mechanism

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



ELLIPSE BLACK/OCTOPUS 2nd STAGE

Assembling procedures



Assembling the 2nd stage mechanism

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



HZ 810089

ELLIPSE BLACK/OCTOPUS 2nd 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 2nd STAGE

Assembling procedures



Assembling the 2nd stage mechanism

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

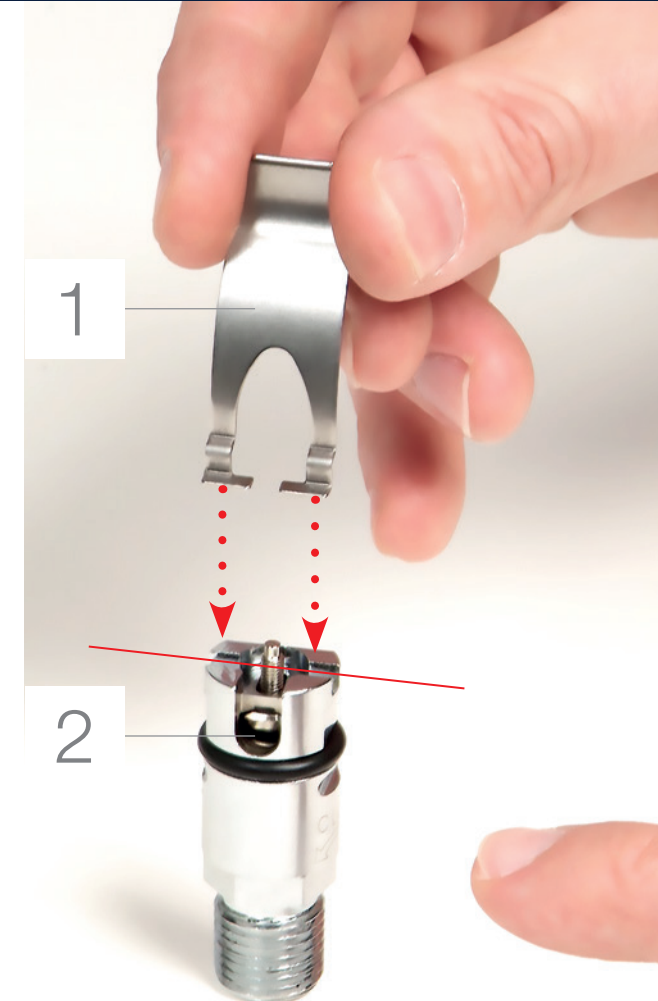


ELLIPSE BLACK/OCTOPUS 2nd STAGE

Assembling procedures

Assembling the 2nd 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 2nd STAGE

Assembling procedures



Assembling the 2nd stage mechanism

Now insert washer and nut.



ELLIPSE BLACK/OCTOPUS 2nd STAGE

Assembling procedures

Assembling the 2nd 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.



ELLIPSE BLACK/OCTOPUS 2nd STAGE

Assembling procedures



Assembling the 2nd stage mechanism

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



ELLIPSE BLACK/OCTOPUS 2nd STAGE

Assembling procedures

Assembling the 2nd 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 2nd STAGE

Assembling procedures



Assembling the 2nd 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 2nd STAGE

Assembling procedures

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.



ELLIPSE BLACK/OCTOPUS 2nd STAGE

Assembling procedures



Assembling the flux diverter

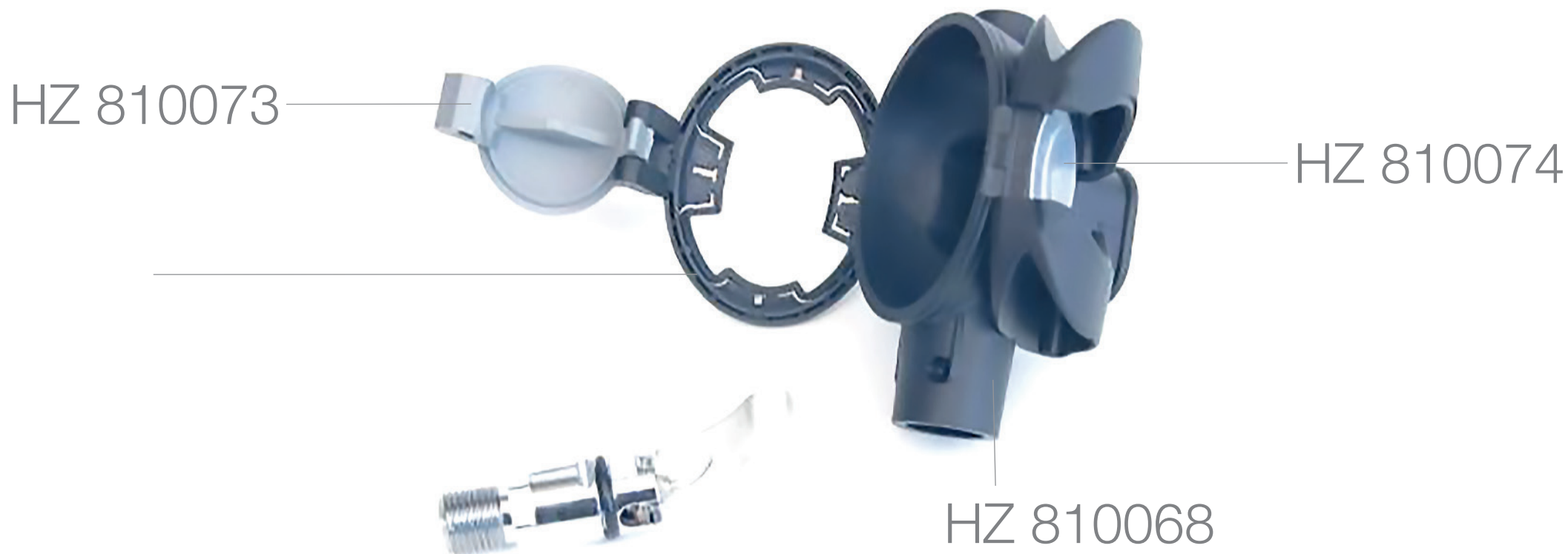
Use a flat point to push back the flux switch's seal ring into its housing.



ELLIPSE BLACK/OCTOPUS 2nd STAGE

Assembling procedures

Assembling the mechanism in the body



ELLIPSE BLACK/OCTOPUS 2nd STAGE

Assembling procedures



Assembling the mechanism in the body

Insert the previously assembled and lubricated 2nd 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 2nd STAGE

Assembling procedures

Assembling the mechanism in the body



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



ELLIPSE BLACK/OCTOPUS 2nd STAGE

Assembling procedures



Assembling the mechanism in the body

Insert the conical pins in their seats.



ELLIPSE BLACK/OCTOPUS 2nd STAGE

Assembling procedures

Assembling the mechanism in the body



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



ELLIPSE BLACK/OCTOPUS 2nd STAGE

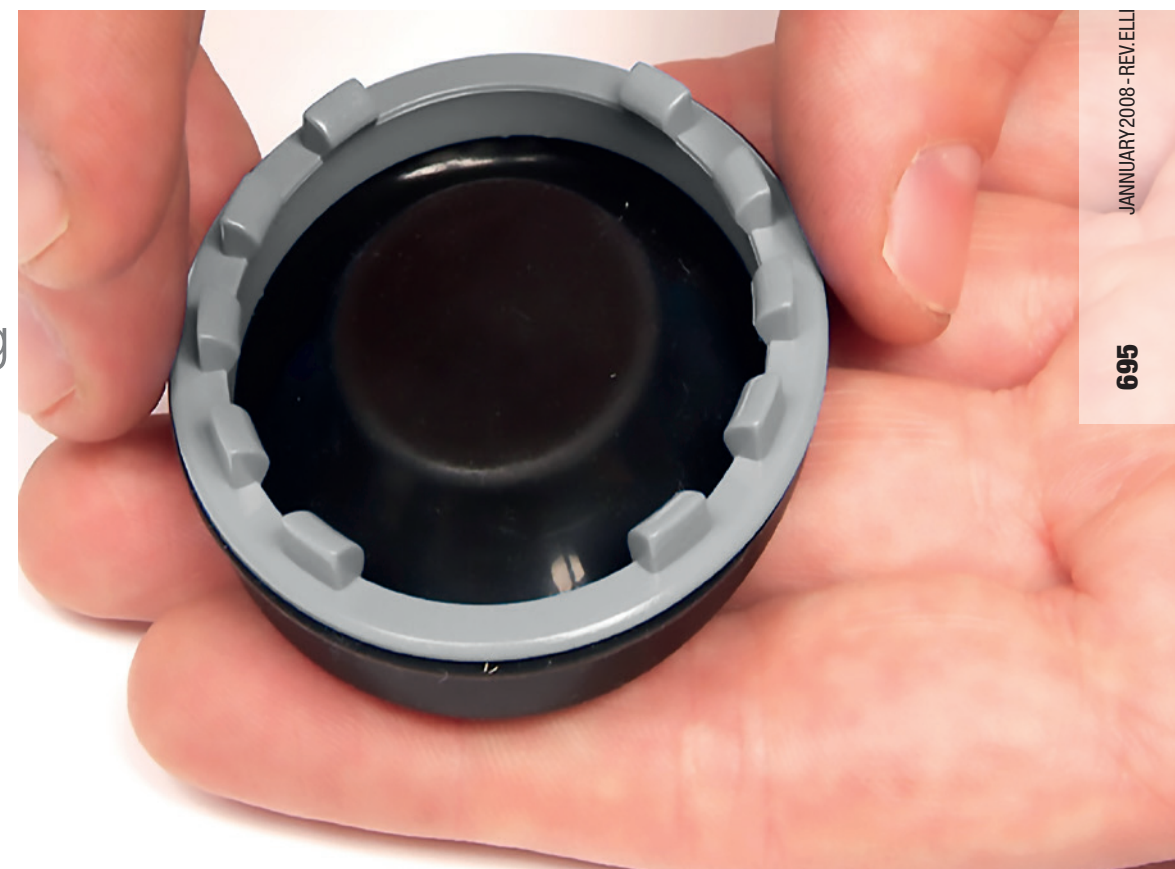
Assembling procedures



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 2nd 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.



ELLIPSE BLACK/OCTOPUS 2nd STAGE

Assembling procedures



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 2nd 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 2nd stage special housing. The latter serves as closing fulcrum of the cap itself.



ELLIPSE BLACK/OCTOPUS 2nd STAGE

Assembling procedures



Closing the regulator's cap

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



ELLIPSE BLACK/OCTOPUS 2nd STAGE

Assembling procedures

Closing the regulator's cap

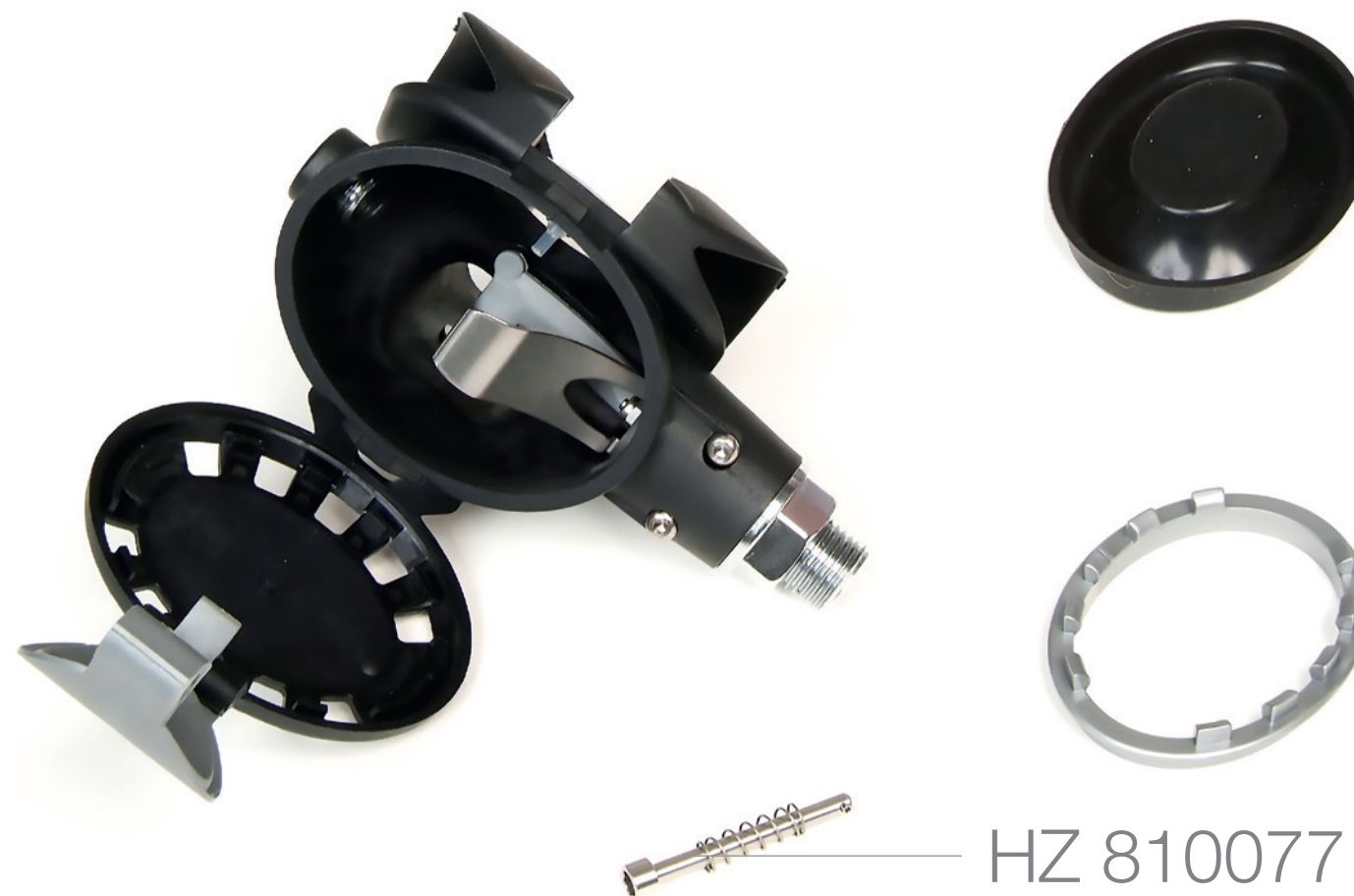
Depress the middle part (grey in the picture) until you hear a small click, proving the regulator is perfectly closed.





Closing the regulator's cap - Cam-Lock

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



ELLIPSE BLACK/OCTOPUS 2nd STAGE

Assembling procedures

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 2nd STAGE

Setting

JANUARY2008 -REV.ELLBK/1 -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 2nd STAGE

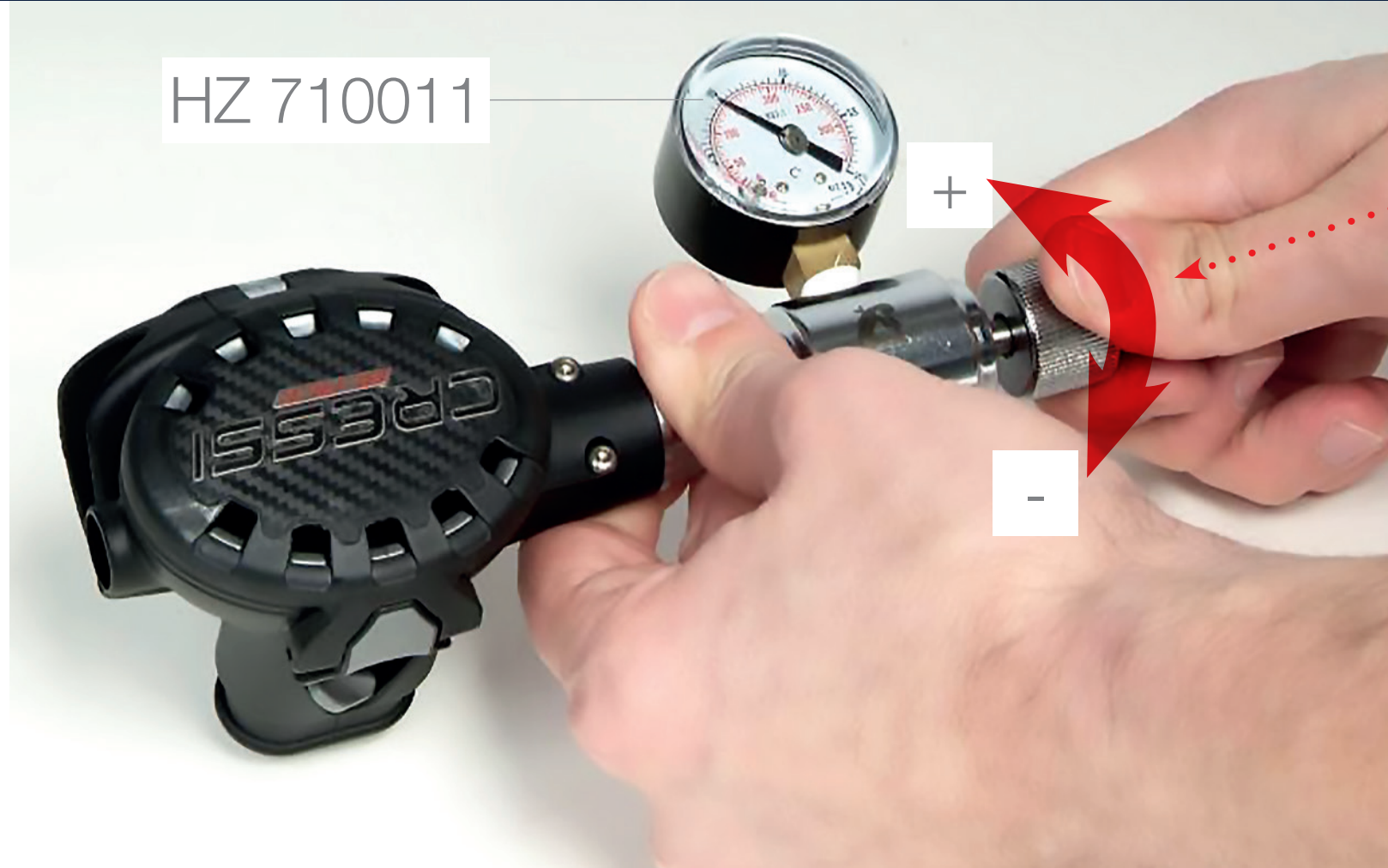
Valve orifice setting (pag 706)



- **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 2nd 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 2nd STAGE

Valve orifice setting



ELLIPSE BLACK/OCTOPUS 2nd 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 2nd 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 2nd STAGE

Lever height setting

HZ 710011



ELLIPSE BLACK/OCTOPUS 2nd 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 2nd STAGE

Final checking

- After setting the regulator, keep it pressurized with a properly set 1st 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 2nd 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.

ELLIPSE BLACK/OCTOPUS 2nd 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.

ELLIPSE BLACK/OCTOPUS 2nd STAGE

CRESSI
SINCE 1940

Service Record

Client: Record n.°

Model: 1st Stage serial number.....
..... 2nd Stage serial number.....

Date of purchase:.....

Stated defect:

Operations performed

<input type="checkbox"/>	Full disassembly of the equipment and any accessories
<input type="checkbox"/>	Removal of previous lubricants
<input type="checkbox"/>	Washing of components in ultrasound machine with specific solution
<input type="checkbox"/>	Washing of components with specific solution
<input type="checkbox"/>	Rinsing and drying
<input type="checkbox"/>	Checking all components subject to wear and/or seal
<input type="checkbox"/>	Replacement of parts in the annual maintenance kit
<input type="checkbox"/>	Replacement of defective, worn or worn-out parts (see list)
<input type="checkbox"/>	Lubrication
<input type="checkbox"/>	Assembly and final check
<input type="checkbox"/>	Washing and cleaning after flooding
<input type="checkbox"/>	Manufacturer's recommended update
<input type="checkbox"/>

Checks and adjustments	Replacement parts
<input type="checkbox"/> Calibration of first stage IP valve.....	a)
<input type="checkbox"/> Adjustment of second stage lever	b)
<input type="checkbox"/> Adjustment of Octopus second stage lever	c)
<input type="checkbox"/> Inhalation force calibration	d)
<input type="checkbox"/> Data check using test bench at different pressures	e)
<input type="checkbox"/> Pressure seal check	f)
<input type="checkbox"/> Valve functioning and seal check	Notes
<input type="checkbox"/>
<input type="checkbox"/> Type of operation performed:	
<input type="checkbox"/> Replacements parts according to the list:	

Store this sheet until the next technical operation.

Location, stamp, and date: The Technician:

Warranty <input type="checkbox"/> YES <input type="checkbox"/> NO Annual Overhaul Special Maintenance Notes 	Date of the next scheduled maintenance.....
------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------

CRESSI
SINCE 1940

[illegible]

Download tab
Service Record table