Manuale d'uso

Direction for use • Manuel d'instructions
Bedienungsanleitung • Manual de istrucciones

MC7 - MC7 Antifreeze
AC10
AC2

Ellipse Titanium
Ellipse Piston
Ellipse
Airtech
XS2

CRESSI

cold water approved

erogatori

regulators • detendeur
atemregler • regulador

Introduction

Congratulations! The product you have chosen is the result of continuous research and development conducted at our Technical Centers, featuring the highest CRESSI-SUB performance and reliability criteria. It's high performance qualities will deliver years of trouble free service.
All Cressi-sub regulators are certified for use to a depth of 50 m (150ft) depth as well as for use in cold water, with temperatures below 10° C, having passed the severe 4° C (+0 -2) test, as required by UNI EN 250:2000 (European) standards, in compliance with EC Directive 89/686. This Directive sets the provisions for the marketing and the essential safety requirements for Personal Protection Equipment (PPE).

Main Components

Regulators reduce the operating pressure of the cylinders to the actual ambient pressure, thus, supplying the diver with breathable air. Regulators consist of a "first stage" for reducing cylinder pressure and a "second stage" for secondary pressure reduction to ambient pressure. The combination of the cylinder, valves, regulator and harness constitutes a SCUBA system, which stands for Self-Contained Underwater Breathing Apparatus.
This User Manual illustrates the different regulator models manufactured by Cressi-sub. It provides easy-to-use information on the performance and maintenance of Cressi-sub regulators. All Cressi-sub regulators are designed to be compatible with other Cressi-sub components.

NOTICE: This User Manual is no substitute for proper dive training! All Cressi-sub Scuba equipment should only be used by properly trained divers who have attained a diving certification from a qualified instructional agency. For your own safety, proper servicing of your Cressi-sub dive equipment should always be done at an Authorized Cressi-sub Service Center.

⚠ ***WARNING:*** **CRESSI-SUB ASSUMES NO RESPONSIBILITY FOR ANY MAINTENANCE WORK CARRIED OUT BY PERSONNEL NOT AUTHORIZED BY CRESSI-SUB.**

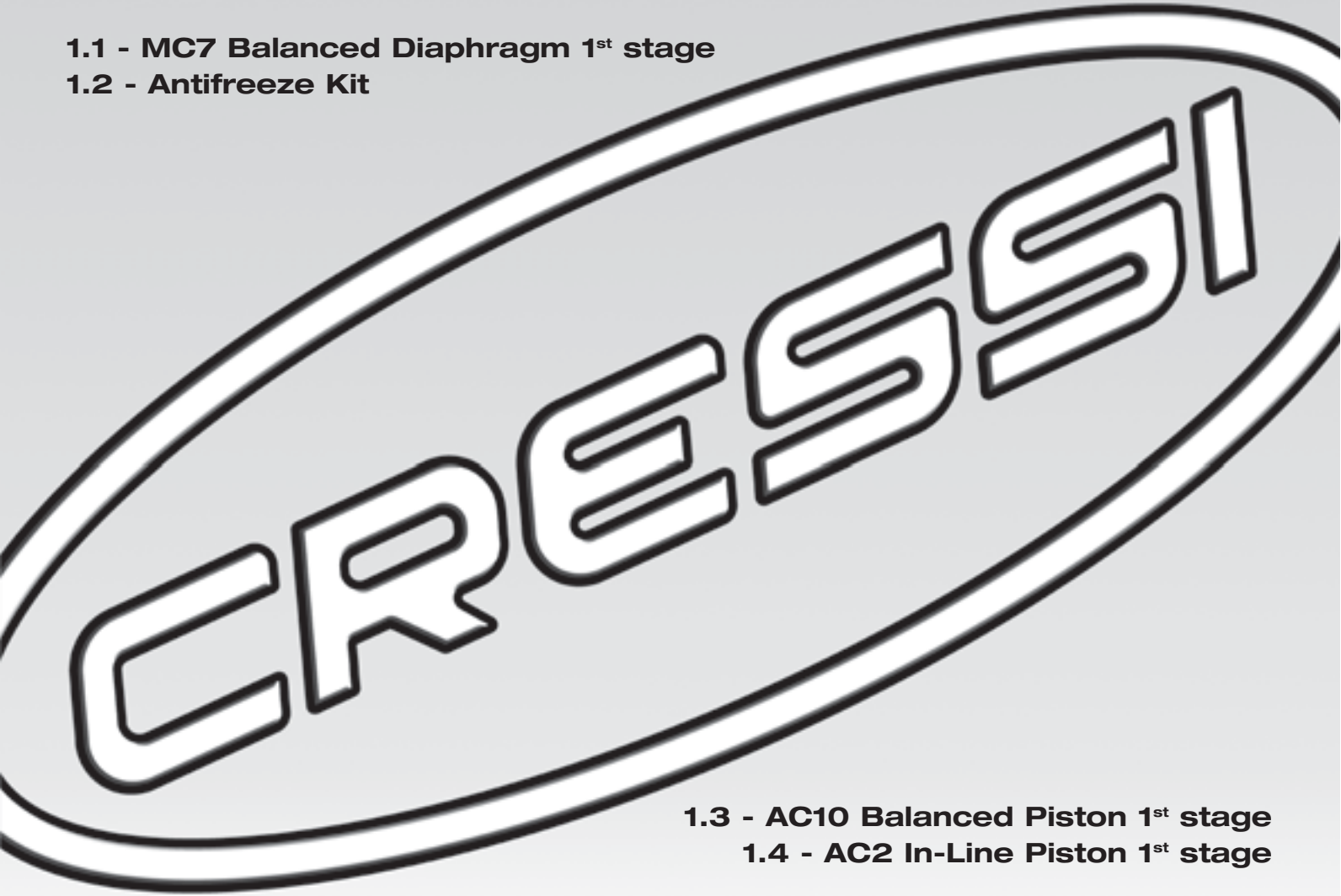
The information supplied by the manufacturer shall contain a:

⚠ ***WARNING:*** that SCUBA complyng with EN 250 are not intended for more than one user to breathe from at the same time.

The information supplied by the manufacturer shall contain a:

⚠ ***WARNING:*** that if SCUBA are configured and used by more than one diver at the same time, then the cold water and breathing performance may not fulfil the requirements of EN 250.

1.1 - MC7 Balanced Diaphragm 1st stage
1.2 - Antifreeze Kit



1.3 - AC10 Balanced Piston 1st stage
1.4 - AC2 In-Line Piston 1st stage

1.1 - MC7 Balanced Diaphragm 1st stage

The MC7 Balanced Diaphragm 1st stage ensures constant performance under all sport diving conditions. The unique feature of this light and compact balanced system is that it provides consistent high performance airflow at all tank pressures and at all sport diving depths. Intermediate pressure remains the same, regardless of tank pressure or depth. Generally, the performance of regulators deteriorate as tank pressure is reduced or as the diver descends to a deeper depth. This is not the case with the MC7 regulator. Performance is maintained, regardless of pressure and depth. This unique **"hyper-balancing"** feature was made possible by an "on line" system and by an accurate internal surface design. Regulator performance is consistent throughout the dive, offering top performance at all stages of the dive, as well as during the important critical ascent phase.

Within the 1st stage is a flexible diaphragm (15) that both protects and seals the internal mechanism, while transmitting water pressure changes to the high pressure seat (8).

For this reason, the MC7 Balanced Diaphragm 1st stage is a better choice for diving in water with a high content of suspended matter or dissolved mineral salts. The MC7 balanced diaphragm 1st stage is recommended for cold water use (with water temperatures below 10 °C), with the addition of an Antifreeze Kit (20K) (see chapter 1.2). The addition of the Antifreeze Kit ensures that the 1st stage is completely sealed, with freezing related problems eliminated.
MC7 balanced diaphragm first stage features a compact, chrome-plated brass body with internal components made of stainless steel, chrome-plated brass, and thermoplastic resins. The first stage is supplied with 4 low pressure (LP) 3/8" ports, arranged at proper angles to avoid interference with other connected equipment, and 2 high pressure (HP) 7/16" ports with 0.2 mm restricted airflow vents, allowing for maximum safety in the event of accidental damage to the high pressure hose, thus, resulting in a potential rapid depletion of tank pressure.

fig. 1

⚠ ***WARNING:*** *It is necessary to connect either a pressure gauge or a pressure-measuring computer to one of the 1st Stage HP ports. Since cylinders do not feature a reserve device, an underwater pressure gauge must to be connected to the regulator 1st Stage in order to monitor air consumption while diving.*
Diving without a pressure gauge is dangerous since you cannot check air consumption, and should you suddenly run out of air while diving, you can put your life at risk.

Air supply into the 1st stage is protected by a *cone shaped sintered filter* (5K) which retains all impurities from the cylinder and the valves.
The 1st stage is connected to the cylinder valves by means of an international YOKE CGA 850 connection using *a newly designed* bracket with an *advanced engineering concept* (2), or by means of a DIN UNI EN 12209-1-2-3 (21K o 22K) *threaded* connection in compliance with UNI EN 250:2000 standards. DIN connections are recommended when cylinders with more than 200 bar (2900 psi) working pressure are used.
The adjusting and setting of the intermediate pressure of this balanced diaphragm first stage is easy, but requires the service of a properly certified technician.

⚠ ***WARNING:*** *The intermediate pressure should only be adjusted by Cressi-sub authorized centers. Changing pre-set values can affect the proper function of the regulator.*

The Cressi-sub MC7 Diaphragm regulator is a technically advanced regulator made with the highest quality materials and workmanship. It is designed to offer years of top performance and reliability.

1.2 - Antifreeze Kit

⚠ ***WARNING:*** Proper training is required in order to safely dive in cold (less than 10°C) water. Before diving under these conditions, Cressi-sub recommends that you attend a specialty, cold water course conducted by qualified instructors. The regulator should not be placed in water prior to use and then exposed to the air (which is likely to be several degrees below zero). Do not operate the purge button, especially when the Venturi knob (Dive / Pre Dive Switch) is in the "dive" position. If possible, keep the regulator in a warm place before use.

The Antifreeze Kit is used to seal off or waterproof the MC7 Balanced diaphragm first stage, thus, preventing water from entering. Additionally, it prevents water from coming in contact with the diaphragm and the main spring, and a water-tight air chamber is created within the first stage, which acts as a thermal barrier. In this way, problems related to contact with cold water are avoided, especially at temperatures less than 10°C.
Sold separately from the regulator, the Antifreeze Kit is easy to install. It features a metal (No 20K) cover with a silicone diaphragm inside. When sensing any ambient pressure change, the diaphragm flexes inward and transmits the movement over to the underlying disk. The latter unit, being in contact with the main diaphragm, acts as a transmission element and transmits pressure change information onto the diaphragm. The main diaphragm protects and seals the inner system mechanism, and transmits the information on water pressure changes to the high pressure seat (8K).

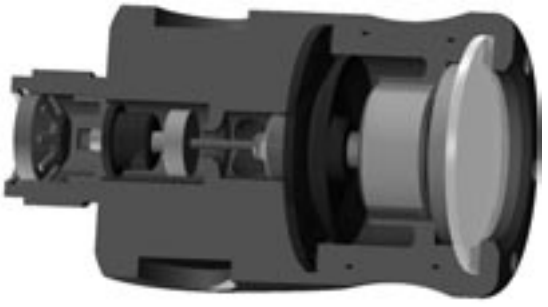


Fig. 2

⚠ ***WARNING:*** *After having mounted the antifreeze kit, the MC7 Balanced Diaphragm 1st Stage must be reset.*

⚠ ***WARNING:*** *The intermediate pressure should only be adjusted by Cressi-sub authorized centers. Changing pre-set values can affect the proper function of the regulator.*

1.3 - AC10 Balanced Piston 1st stage

The AC10 Balanced Piston 1st stage features a 90° angle between 1st stage and air supply. It is constructed of a chrome-plated brass body. All internal components are made of *stainless steel and chrome-plated brass,* with stainless steel springs and NBR O-rings.
Many technical and aesthetic innovations make this first stage different from the previous models and place it at the top of our product line, while maintaining its features of high reliability and durable construction.

The Balanced Piston 1st stage features a revolving turret (no. 5) *with 5 intermediate pressure 3/8"* ports, (one more than in the

previous versions), and all arranged to allow easy connection of all accessories. Intermediate pressure ports have been made larger in order to limit any pressure loss during regulator operation and ensure an adequate airflow under every condition of use.
The intermediate pressure adjustment system (a unique feature of all Cressi-Sub regulators) has also been upgraded.

⚠ ***WARNING:*** *The intermediate pressure adjustments should only be made by certified technicians or by Cressi-sub authorized centers. Changing pre-set values can affect the proper function of the regulator.*

Fig. 3

Another very important feature of this regulator concerns *maintenance*, which is particularly easy and quick to perform due to its advanced design.

Two high-pressure (HP) 7/16" ports are located on the main regulator body with 0.2 mm controlled air vent. In the event of accidental damage to the high-pressure hose, the flow of air from the tanks is controlled against rapid air depletion.

⚠ ***WARNING:*** *It is necessary to connect either a pressure gauge or a pressure-measuring computer to the 1st Stage HP port. Since cylinders do not feature a reserve device, an underwater pressure gauge must to be connected to the regulator 1st Stage in order to monitor air consumption. Without a pressure gauge you cannot monitor air consumption, and should you suddenly run out of air while diving, you can put your life at risk.*

The main regulator body features a number of technical innovations of this balanced piston 1st stage: an *extrusion-proof* retainer (17K) for the O-Ring inside the regulator case has been added. This new feature has been designed to further improve the regulator performance.
Special care was given to materials used and to the design of each component, aimed at preventing oxidation. For example, a *spring protection capsule* (no. 12) has been added to avoid any spring-poppet contact. A new screw, locking the revolving turret (no. 9) has been designed with a larger airflow cross-section, and a lower head profile to minimize *galvanic* oxidation.

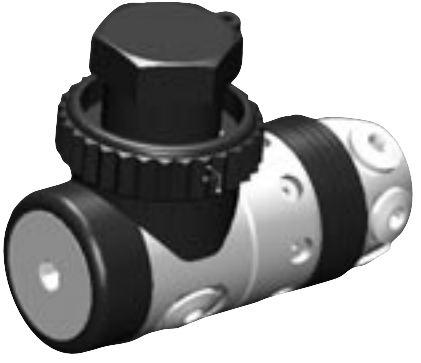


fig. 4

Air supply into the first stage is protected by a *cone-shaped sintered filter* (30K) which retains all impurities from the cylinder and the valves.
The first stage is connected to the cylinder valves by means of an international YOKE CGA 850 connection using *a newly designed advanced engineering concept* bracket (31), or by means of a DIN UNI EN 12209-1-2-3 (21K o 22K) *threaded* connection in compliance with UNI EN 250:2000 standards. DIN connections are recommended when cylinders with more than 200 bar (2900 psi) working pressure are used.

In addition to these advancements, the balanced piston 1st stage has been aesthetically improved with finishing details and a high-tech design. Its outstanding technically advanced construction and simple mechanics insure superior performance and ease of service for years.

1.4 - AC2 In-Line Piston 1st stage

Small, lightweight, simple, durable construction and easy maintenance; these are the features of this In-Line Piston 1st stage that offers remarkably high performance compared to a balanced piston model.
Its compact and attractive design features 4 low-pressure 3/8" ports, arranged in pairs, with preset angles to allow for easy connection with accessory equipment. Intermediate pressure setting is easily performed by externally adjusting a unique revolving nut.
Inside, a cone shaped high capacity filter provides a filtering capacity 200% higher than a standard flat filter.
Airflow capacity reaches up to 2,100 liter/minute due to new larger air ports, offering unequalled performance in this category of regulators.

International (200÷300 bar) (2900÷4350 psi) DIN connections are interchangeable and easily replaced in a few minutes.
Satin finish offers maximum surface protection, while contributing to the outstanding strength and reliability. The first stage is manufactured with the finest materials and quality Cressi-sub workmanship.

fig. 5

1.5 - Performance

1.5 - Performance

Balanced diaphragm 1st stage MC7 regulator	
Working pressure (INT connection)	0÷232 bar (0÷3365 psi)
Working pressure (DIN connection)	0÷300 bar (0÷4350 psi)
Calibration pressure	9.2÷9.6 bar (134÷140 psi)
Air supply	3000 l/min (*)
High pressure seats (HP)	2
Low pressure seats (LP)	4

(*) values measured at LP seat outlet with second stage connected and 200➡150 bar (2900➡2175 psi) pressure in the cylinders.

Balanced piston 1st stage AC10	
Working pressure (INT connection)	0÷232 bar (0÷3365 psi)
Working pressure (DIN connection)	0÷300 bar (0÷4350 psi)
Calibration pressure	9.5÷10 bar (138 ÷ 146 psi)
Air supply	2800 l/min (*)
High pressure seats (HP)	2
Low pressure seats (LP)	5

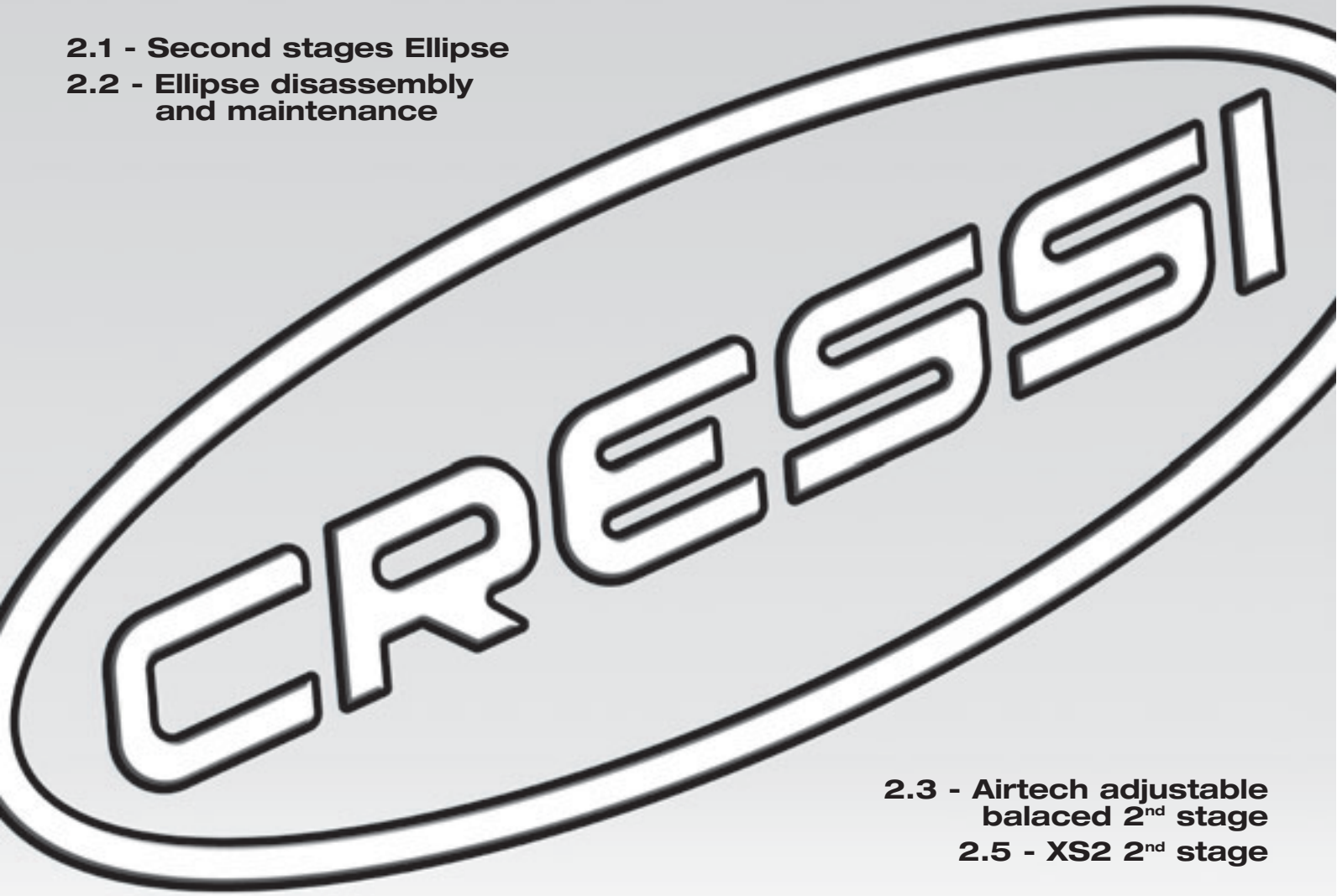
(*) values measured at LP seat outlet with second stage connected and 200➡150 bar (2900➡2175 psi) pressure in the cylinders.

Unbalanced piston 1st stage AC2	
Working pressure (INT connection)	0÷232 bar (0÷3365 psi)
Working pressure (DIN connection)	0÷300 bar (0÷4350 psi)
Calibration pressure	9.0÷10 bar (128÷146 psi)
Air supply	2100 l/min (*)
High pressure seats (HP)	1
Low pressure seats (LP)	4

(*) values measured at LP seat outlet with second stage connected and 200➡150 bar (2900➡2175 psi) pressure in the cylinders.

2.1 - Second stages Ellipse

2.2 - Ellipse disassembly and maintenance



2.3 - Airtech adjustable balaced 2nd stage

2.5 - XS2 2nd stage

2.1 - Second stages Ellipse

fig. 6

The Ellipse second stage (in its various models) is a revolutionary elliptical shaped lightweight (only 158 gr - the lightest of its class!) "downstream" regulator featuring a futuristic design.
The regulator has a number of innovative features covered by different patents.
It is manufactured in several versions, which are different not only because of their first stages but also because the "Ellipse Titanium" version has several components and inserts made of titanium, a material which shows advanced mechanical characteristics, and is incomparably light and resistant to corrosion.
All regulators have the same mechanical components and functional characteristics as well as the same cage made of a new elastic techno-polymer with excellent mechanical properties: therefore, from now on, the regulator will be described simply by calling it "Ellipse".

Ellipse was designed to supply air "on demand" i.e. only when the diver inhales into the mouthpiece, creating a small vacuum inside the regulator. This vacuum, acts on the ellipitical shaped, variable-section diaphragm designed to have an increase in its operating surface, and to keep the breathing effort as low as possible. This ensures performance which is similar to that of more expensive regulators.

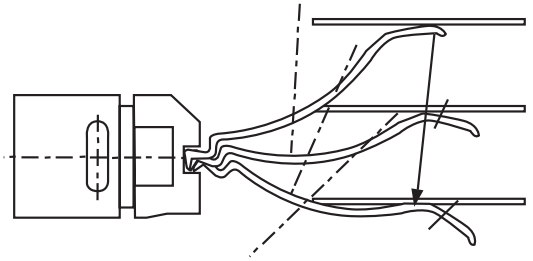


fig. 7

The diaphragm, which has been depressed inside the second stage, causes the center plate to contact a variable-profile lever designed to optimize and dramatically reduce the friction resulting from the contact between lever and diaphragm, concentrating it into a single point of the plate. This minimizes friction between the demand lever and the diaphragm plate. To carry out this task, the special (patented) lever profile is assisted by a swinging motion of the piston.
When activated, the lever opens the regulation valve. Air comes out of the (adjustable) valve nozzle when the mechanism opens flows into the injector which carries it directly into the mouthpiece. The air is accelerated due to the Venturi effect which causes a depression inside the second stage body. To avoid free flow the injector portion directs a small opposite counterflow of air toward the diaphragm.
A "valve-guiding" bushing made of a thermoplastic rubber, placed inside the valve, performs the following two functions: guides the spindle motion, reducing friction between the mechanical elements each time the valve opens as well as to protect the regulator in case the valve starts freezing at its most crucial point. In this way, all the air required by the diver is only fed inside the injector, thus avoiding any air loss in the spindle/valve-housing coupling.

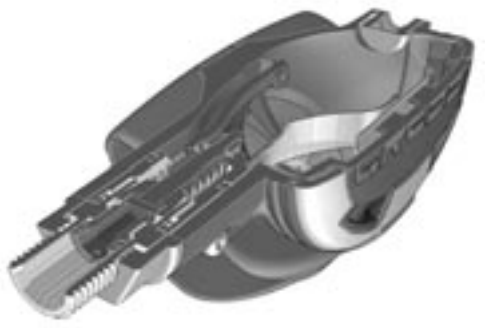


fig. 8

When the air flow supplied into the injector and directed to the mouthpiece becomes dense, it undergoes, as we mentioned above, an acceleration known as Venturi effect. The consequent vacuum which is created inside the second stage, keeps the diaphragm depressed, thus virtually reducing the breathing effort to zero.
The Venturi effect immediately stops as soon as the diver stops breathing. The diaphragm returns to its normal position, the lever comes up again pushed by its spring, and the nozzle is closed by the piston.
In order to optimize the Venturi effect, Ellipse is provided with a new and ergonomic flow deflector which has two operating positions, *clearly shown by the symbols on the regulator housing*: "-" ("pre-dive" position) and "+"("dive" position). At the first position, a flow limiting device placed in the mouthpiece inlet starts operating and inhibits the Venturi effect, preventing a constant flow. At the "+" position, the Venturi effect works at its best, increasing the air flow supplied to the regulator to the maximum level.

⚠ ***WARNING:*** *Remember to always set the lever of the flow limiting device to the pre-dive (-) position when the regulator is not used, otherwise one of the following situations may cause an even strong constant flow producing high air consumption: an accidental impact, the regulator falling into water, pressing the manual regulation purge button when the regulator is not inside the mouth or suddenly taking the regulator out of the mouth.*
The dive (+) position must only be used while diving and only when the regulator is inside the mouth.

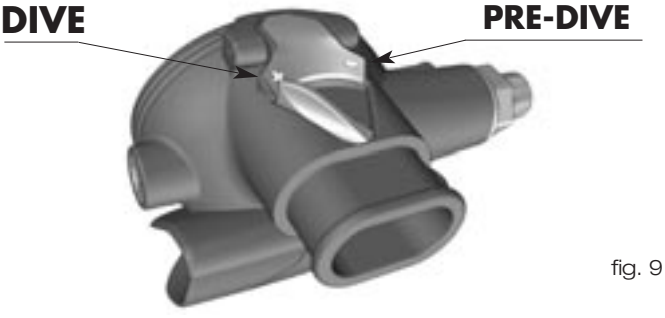


fig. 9

When the diver exhales, he/she causes the pressure to increase inside the regulator second stage, which opens the exhaust valve. The exhaust valve, has a large cone shape. The newly designed exhaust tee is formed directly from the second stage, thus creating an extremely compact assembly with an extraordinary design. Air fed to the sides of the exhaust valve seat, in the regulator second stage, protects the valve against water turbulence which might lift it when the second stage inside is depressurized, causing flooding. Moreover, a special bulkhead on the second stage exhaust tee center line suitably pushes the exhaust valve on its middle section, ensuring a balanced opening.

fig. 10

The 2nd stage is connected to one of the 3/8" LP outlets of the 1st stage through an intermediate pressure, high flow capacity hose.

Cressi-sub Ellipse is a downstream regulator design.
This means that in the event of over-pressurization of the 1st stage, excess air will be safely released through the 2nd stage.

Cressi-sub Ellipse complies with 89/686/CEE Directive of 21/12/1989, having been tested and certified by Genova-based Test Board No. 0474 RINA, through tests complying with UNI EN 250:2000 standard which sets forth the requirements concerning 3rd-class Individual Safety Devices (DPI), and consequently bears the EC marking followed by the Certification Board identification (0474) in compliance with Art. 11B DE 89/686/CEE.

2.2 - Ellipse disassembly and maintenance

The Ellipse regulator has been designed to ensure easy and quick servicing by authorized repair technicians.

⚠ ***WARNING:*** *The 2nd stage must ONLY be opened, disassembled and calibrated at Cressi-sub authorized centres and the calibration values can NOT be and must NOT be changed in order not to jeopardize the correct operation of the regulator. Cressi-sub assumes no responsibility for any operation carried out by personnel not authorized by Cressi-sub.*

Using the same socket wrench supplied with the regulator to disassemble the first stage HP and LP little plugs, you can open and disassemble the 2nd stage, reaching directly its internal mechanical components. This extraordinary characteristic, which is unique in this field and patented, allows to open the tank in a very easy and quick way in order to clean it, and to check for the perfect operation of the various components.

In the different steps shown on the previous figures, the cap and the middle compartment of the exhaust conveyor appear as mechanically constrained to each other. The unusual (patented) "cam-lock" locking system, allows to open and close the tank very quickly, locking both the cap and the diaphragm with high efficiency and accuracy.
Opening and closing a regulator has never been so easy, and so safe, too!!!
In order to make test, overhaul and setup easier, all the mechanical components of the second stage can be fully removed from the tank in a few seconds, without changing its calibration. In this way, during the periodic maintenance works, any worn part can be disassembled and replaced after all the mechanical components of the regulator have been removed, thus allowing extraordinary easy operations.
To remove the mechanical components from the tank, as shown on the following figure, just loose the lateral lock nut and remove the two cone-shaped locking pins. The mechanical components can then be removed as a whole, i.e. without having to remove any single component, and especially without changing the regulator calibration: a unique characteristic in this field which provides numerous advantages.

fig. 11

fig. 12

fig. 13

fig. 14

To assemble the regulator, follow the disassembly steps in the opposite order, just paying special attention when closing the regulator. As you can see from the following pictures, once the mechanical components have been fitted into the regulator, first place the regulation diaphragm into its housing, then fit the cap, made out of a special semirigid thermal rubber belonging to the last generation of technical polymers, and finally close the regulator making sure that the tooth in the cap bottom correctly slides into the appropriate tank seat, as shown on figure B.

figure A

figure B

figure C

figure D

2.3 - Airtech Adjustable Balanced 2nd Stage

fig. 15

The balanced second stage supplies air to the diver on demand.

As the diver inhales, a slight vacuum is generated in the second stage causing the diaphragm (no.20) to come in contact with a low friction demand lever disk, located on a demand lever (no. 16K). As the vacuum is increased, air flows from the air supply orifice. Airtech CE 2nd Stage features a unique, pneumatically balanced poppet (11K) with a small hole across its longitudinal axis (fig. 16). The air coming from the 1st stage flows across this small hole and reaches a small balancing chamber located at the end of the poppet (11K). The air inside this chamber exerts pressure (which varies with depth) on the poppet. The poppet is pushed toward the orifice, closing it (4K) toward the air inlet from the 1st stage. Since the forces acting on the orifices opening and closing are balanced, a light rated spring (12) is used, which allows for a smoother opening of the orifice. This results in an almost effortless inhalation effort.

The air flowing through the orifice opens the seat, which is located at the end of the poppet.(11K). This force is counteracted by the sum of the spring and the air force. The air has now entered

the balancing chamber. Airtech Balanced Adjustable 2nd Stage also allows you to adjust the breathing effort. By turning the outside knob along the direction of the arrows, you can adjust the level of resistance to inhalation by changing the poppet spring load. By screwing the knob in (clockwise), the resistance to inhalation is increased; by unscrewing it (counterclockwise), the resistance to inhalation is lowered. Two O-rings are utilized in the adjustment system for protection of the adjustment mechanism against water leaks. These properly lubricated O-rings protect the mechanism thread against oxidation, which could harden and restrict the adjustment knob rotation. With proper regular maintenance, the adjusting knob will always rotates smoothly, allowing for accurate and smooth adjustment of the inhalation effort.

fig. 16

The adjustable orifice is located inside the housing. When the mechanism is open, air enters the injector (19) and flows into the mouthpiece. Air flows across the diaphragm-balancing hole, which is aligned with the diaphragm. As a result of this design, the second stage vacuum is controlled, not allowing the diaphragm to be forced on the demand lever, resulting in a free flow.
When a significant amount of air flows through the injector into the mouthpiece, a vacuum is formed inside the regulator case due to increased air speed. This high flow of air is called a Venturi effect. Venturi effect keeps the diaphragm drawn down and significantly reduces the inhalation effort.
When breathing stops, the Venturi effect is immediately disconnected; the diaphragm resumes its original position, the lever, pushed by its spring force is raised, and the orifice is closed by the poppet.
In order to maximize this Venturi effect, Airtech CE is fitted with a flow control vane (7K) with two operating positions, clearly indicated in the graduated scale on the regulator case as
Pre-dive "-" and Dive "+". When the vane is set to the pre-dive position, a flow limiter inside the mouthpiece is actuated, which limits the Venturi effect and prevents free-flowing. When in "+" position, the Venturi effect is maximized, and the airflow to the regulator is increased to the highest level.

⚠ ***WARNING:*** *The small flow control lever vane must always be kept in the pre-dive (-) position when the regulator is not in use. In case of an accidental impact when the regulator is being submerged, or in the event of the purge button being depressed with the regulator out of the divers mouth, the regulator may start an excessive flow (free flow), depleting a significant amount of air from the cylinders. The dive (+) position must exclusively be used for diving at depth and only when the mouthpiece is in the mouth.*

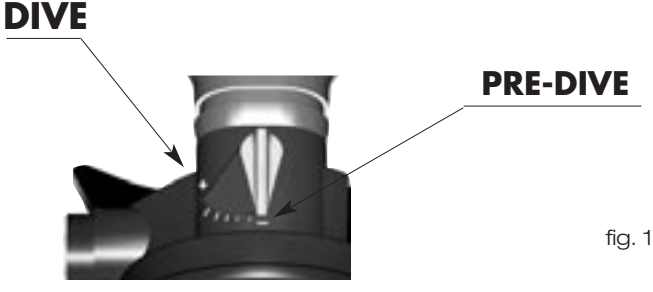


fig. 17

fig. 18

When the diver exhales, the pressure inside the regulator case increases and the exhaust valve opens (17). The AirTech exhaust tee has been improved over previous exhaust tees to improve its exhalation effort. The exhaust tee (9K) directs exhausted air to the side of the divers head, protecting the valve against water turbulence, which could open it while the valve body is not under pressure.
The 2nd stage is connected to one of the 3/8" ports of the 1st stage through a flexible intermediate pressure hose.
All Cressi-sub second-stage regulators feature a safety, downstream valve so that in case of sudden increase of intermediate pressure, the second stage will automatically open, relieving excessive over pressure. In the unlikely event of a first stage malfunction, resulting in an over pressure situation, the second stage will relieve excess pressure, allowing for the continued use of the second stage.

Airtech CE case is manufactured with new, techno-polymer materials featuring outstanding mechanical properties and an attractive look. Additionally, the cover features a special lightweight corrosion resistant *titanium* insert supported by locking rings. CAD design and in-depth studies of water flow across the regulator case have led to further optimization and enhancement of the performance level of CRESSI-SUB regulators.

fig. 19

2.5 - XS2 2nd stage

The second stage supplies air on demand, namely only when the diver inhales through the mouthpiece, thus generating a slight air vacuum inside the regulator. This vacuum is minimum for effortless breathing, but enough to operate the diaphragm (19) which is sucked inward, thus moving the center disk (coated with a special antifriction material) into contact with the small lever (9). At this point the lever is brought down and opens the air supply valve.

fig. 20

The XS2 orifice consists of *a new modular* plastic and chrome-plated brass *poppet* (22K). *It is perfectly interchangeable with all the previous models of the* XS range (5). On one side, the poppet is connected to the small lever, while on the other side it houses, in a special housing, a *newly designed and thicker* rubber seat. This seat closes the *new adjustable orifice*, *through which air flows at a* pressure by 9.0÷10 (128÷146 psi) bar higher than ambient pressure.
The air flowing through the orifice (21K) pushes the seat which is counteracted by the poppet spring (7).
Therefore the new poppet sort of "floats" under the push of the incoming air and the spring. However, since the spring force is greater, the orifice will be kept tightly closed.
The *adjustable* orifice is housed inside the housing. When the mechanism is open, the air is pushed through the injector (10) and directly sent into the mouthpiece. When a significant amount of air is flowing through the injector into the mouthpiece, a vacuum is formed inside the regulator case due to increased air speed. This is called Venturi effect, which keeps the diaphragm down and significantly reduces the inhalation effort. When breathing stops, the Venturi effect is immediately discontinued; the diaphragm resumes its original position, the lever, pushed by its spring, is raised and the orifice is closed by the poppet.

In order to maximize this Venturi effect, XS2 CE is fitted with a flow control vane (12K) with two operating positions, *as clearly indicated in the graduated scale on the regulator case* :
pre-dive "-" and dive "+". When the device is set on the first position, a flow limiter inside the mouthpiece hose is actuated which limits the Venturi effect, and prevents free-flowing. When in "+" position, the Venturi effect is maximized, and the air flow to the regulator is increased to the highest level.

⚠ ***Warning:*** *the small lever of the flow control vane must always be kept in pre-dive (-) position when you are not using the regulator. Otherwise in case of accidental impact, when the regulator is placed in water, when pressure is exerted on the manual air supply button and the regulator is not in the mouth, or even when suddenly taking the regulator out of your mouth, the regulator may even violently start to free flow with significant air consumption.*
The dive (+) position must exclusively be used for diving at depth and only when the mouthpiece is in the mouth.

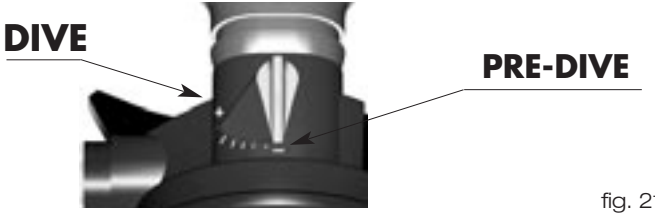


fig. 21

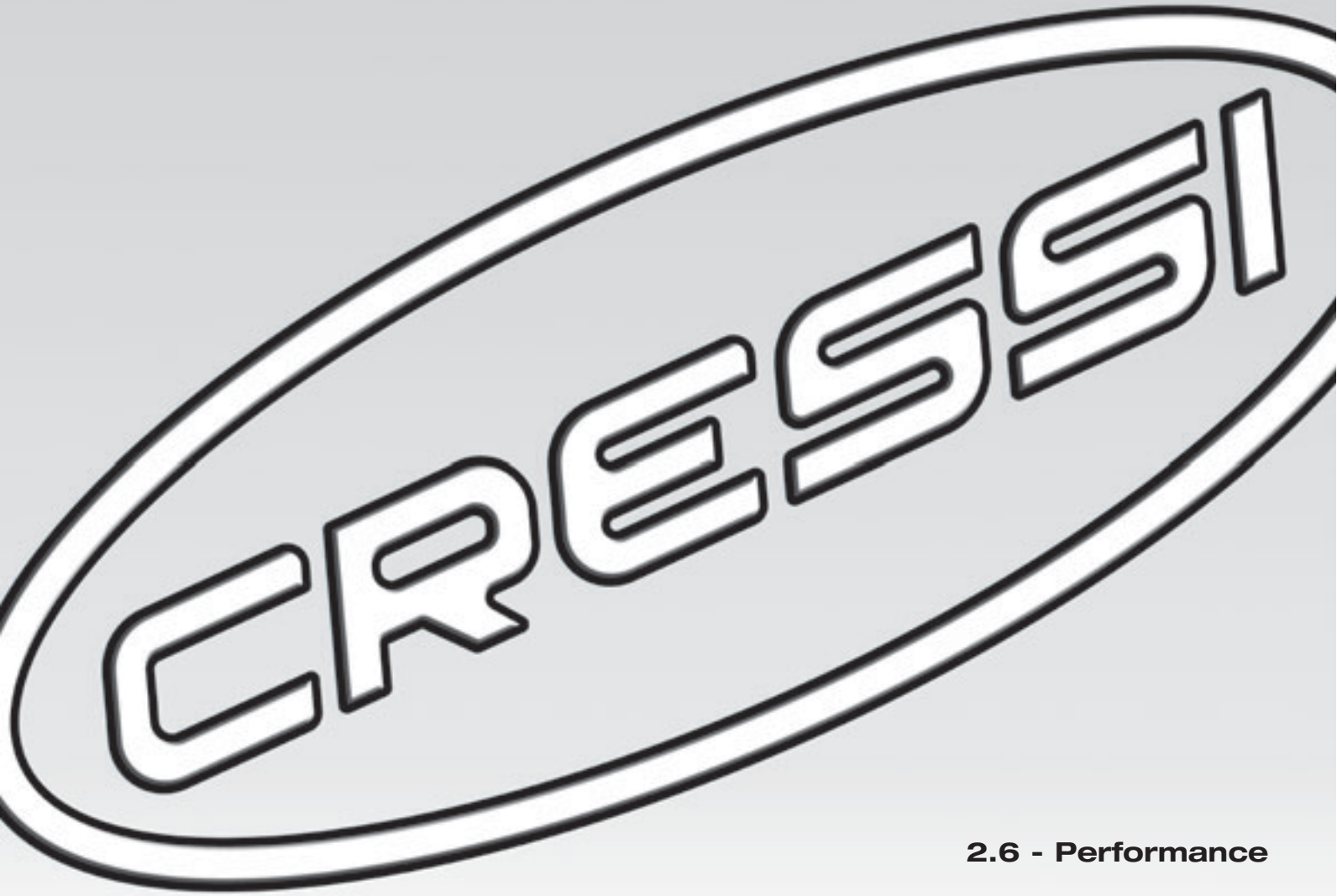
When the diver exhales, the pressure inside the regulator case is raised and the exhaust valve opened (18). This is a new tapered angled design valve with a greater diameter to let the air out. The exhaust tie (14K) conveys the air at the side of the head protecting the valve against water turbulence which could open it when the valve body is not under pressure, flooding it.

The 2nd stage is connected to one of the 3/8" seats of the 1st stage through a flexible medium pressure and high capacity hose.
All Cressi-sub second -stage regulators feature a down-stream type valve so that in case the 1st stage calibration is lost or there is a sudden intermediate pressure peak, the valve will open automatically.
This means that any excessive pressure flowing to the 2nd stage may cause the regulator to free flow but never to get stuck.
XS2 CE case is manufactured with new technopolymer materi-

als offering outstanding mechanical properties and an extremely attractive and aggressive look.
CAD design and in-depth studies of water flows inside the front of the regulator case have led to a further optimization and enhancement of the already very high performance level of CRESSI-SUB regulators, together with their user-friendly and easy maintenance features.
Servicing in particular, has been made easier with the introduction of a side plug (20K) and related OR.

⚠ ***Warning:*** *Servicing must be carried out by Cressi-sub authorized centers only. Changing pre-set values can affect the proper function of the regulator.*

All internal components are in chrome-plated brass, *stainless steel, and acetal resin construction*. Springs are manufactured in harmonic stainless steel, diaphragms in silicon, O-rings and the mouthpiece in allergy-free and *comfortable* silicon.



2.6 - Performance

2.5 - Performance

2nd stage Ellipse titanium	
Working pressure	INT: 0÷232 bar (0÷3365 psi); DIN: 0÷300 bar (0÷4350 psi)
Calibration pressure	MC7: 9.2÷9.6 bar (134÷140 psi);
Average inhale effort (*)	4 mbar
Average exhale effort (*)	11 mbar
Average breathing work (*)	0,9 J/l
Average air supply	1600 l/min
Weight (without hose)	158 gr

(*) Values measured in compliance with UNI EN 250:2000 standards.

2nd stage Ellipse piston	
Working pressure	INT: 0÷232 bar (0÷3365 psi); DIN 0÷300 bar (0÷4350 psi)
Calibration pressure	AC10: 9.5÷10 bar (138÷146 psi)
Average inhale effort (*)	5 mbar
Average exhale effort (*)	11 mbar
Average breathing work (*)	1 J/l
Average air supply	1500 l/min
Weight (without hose)	160 gr

(*) Values measured in compliance with UNI EN 250:2000 standards.

2nd stage Ellipse	
Working pressure	INT: 0÷232 bar (0÷3365 psi); DIN 0÷300 bar (0÷4350 psi)
Calibration pressure	AC2: 9.0÷10 bar (128÷146 psi)
Average inhale effort (*)	5,5 mbar
Average exhale effort (*)	11 mbar
Average breathing work (*)	1,1 J/l
Average air supply	1450 l/min
Weight (without hose)	166 gr

(*) Values measured in compliance with UNI EN 250:2000 standards.

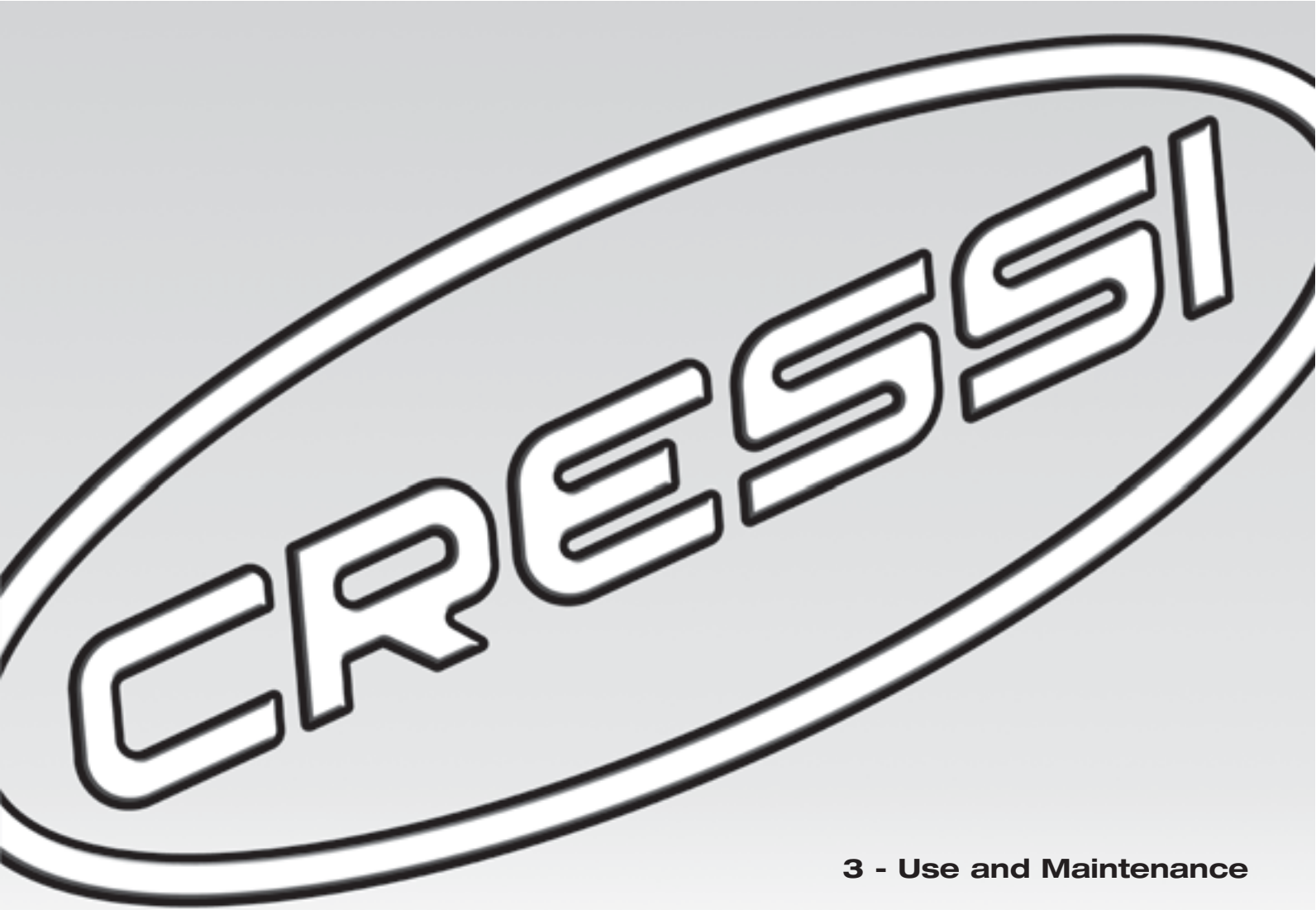
Performance

Adjustable balanced 2nd stage Airtech	
Working pressure	INT: 0÷232 bar (0÷3365 psi); DIN 0÷300 bar (0÷4350 psi)
Calibration pressure	MC7: 9.2÷9.6 bar (134÷140 psi); AC10: 9.5÷10 bar (138÷146 psi)
Average inhale effort (*)	3 mbar
Average exhale effort (*)	13 mbar
Average breathing work (*)	0,9 J/l
Average air supply	1700 l/min
Weight (without hose)	260 gr

(*) Values measured in compliance with UNI EN 250:2000 standards.

2nd stage XS2	
Working pressure	INT: 0÷232 bar (0÷3365 psi); DIN: 0÷300 bar (0÷4350 psi)
Calibration pressure	AC2: 9.0÷10 bar (128÷146 psi)
Average inhale effort (*)	10 mbar
Average exhale effort (*)	13 mbar
Average breathing work (*)	1,4 J/l
Average air supply	1050 l/min
Weight (without hose)	200 gr

(*) Values measured in compliance with UNI EN 250:2000 standards.



3 - Use and Maintenance

3.1 - Use of the SCUBA and Risk Assessment

Before using any Scuba diving equipment, you should complete a proper diving course.
Do not attempt to dive if weather is bad or your physical condition is inadequate.
Always watch out for underwater currents, rough sea, extremely cold water and low visibility.
If you are suffering from emotional and physical stress, bad digestion, or if you lack training, diving can become dangerous.
The safety risk of diving is greater if you have not gone diving for a long period of time, as your skill level has diminished.
All Cressi-sub regulators are manufactured with first quality anti-corrosion materials for use in total safety.

All open circuit air regulators are designed for use down to 50 m (150ft) depth, in compliance with UNI EN 250:2000. We recommend not exceeding 40 m (120ft) of depth for recreational diving.

3.2 - Checks Before Use

Always check your cylinder pressure before entering the water.
Test the regulator by pressing the purge button repeatedly to make sure that air is flowing properly. Holding the mouthpiece between your teeth, inhale and exhale deeply to check if the regulator and the exhaust valves are working well. Additionally, check your octopus in the same manor.
Check for air leaks at connections, hoses or leaking from the regulator.

⚠ **Warning:** *First check your regulator out of the water, by depressing the manual outlet button repeatedly, in order to check the regular air outlet; then, wear your mouthpiece and make some deep inspirations and expirations, in order to check its perfect working (not for use in cold water < 10°C/< 50°F).*
The same must be done on the surface of the water, before plunging, wearing your mouthpiece and deeply inspiring and expiring, in order to check its perfect working.

⚠ **Warning:** *When the regulator has been assembled on the cylinder, the equipment has to be laid horizontally to prevent accidental falls from causing damage to components or injury to people.*

3.3 - Assembly of the Regulator on the Cylinder

Before assembling the regulator, make sure that the cylinder has been filled with compressed air at a proper working pressure. Use a suitable compressor able to supply breathable air in compliance with UNI EN 12021.

⚠ ***Warning:*** *Always remember to check the cylinder valve O-ring. If it shows cuts, scratches or abrasions, replace it. Even if it is intact, it has to be replaced every 3 months because it is constantly exposed to the cylinder high pressure and to weathering. It is advisable to only use Cressi-sub original spare parts.*

The instructions indicated below must be followed for 1st Stage with yoke connections:
Unscrew the yoke screw, remove the dust cap and place it against the valve outlet, after making sure that the 2nd Stage is on the suitable side.
Tighten the yoke screw to connect the 1st Stage. Do not over-tighten.
Open the cylinder valve counterclockwise and keep the 2nd Stage purge button pressed until the air starts flowing. Release the button and open the cylinder valve completely.
In order not to damage the thread, it is advisable to turn the valve 1/4 of a turn clockwise.

The assembly of the 1st Stage with DIN connection is not very different from the procedure described above. In this case, the connection must be screwed directly on the valve outlet without over-tightening.

When using a second independent regulator, connect it to the additional valve outlet following the above instructions.

3.4 - Disassembly of the Regulator Maintenance and Storage

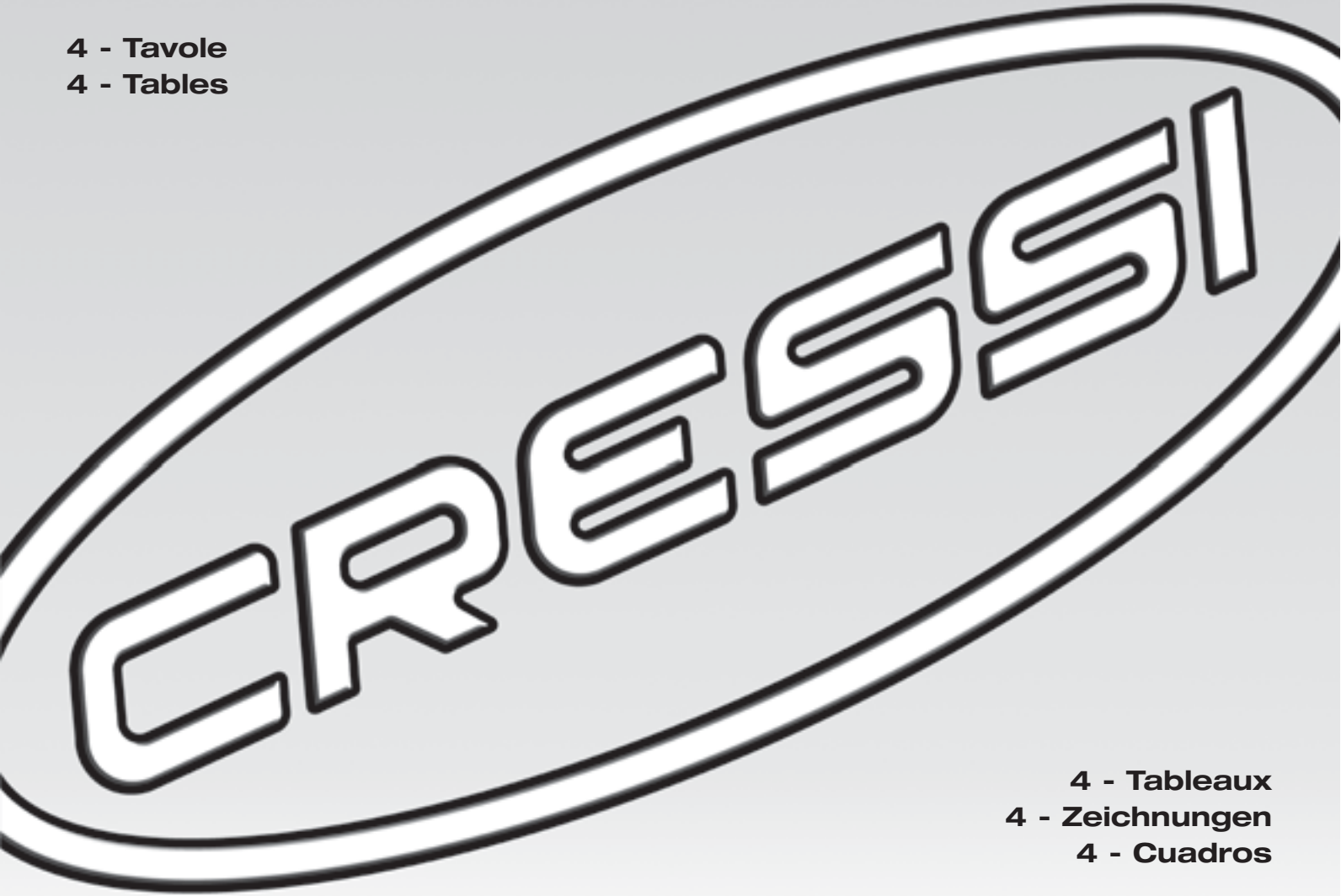
After diving, turn the cylinder valve clockwise until it is shut off. Press the manual purge button and let out the air from the hoses and connections. Disassemble the 1st Stage by unscrewing the yoke counterclockwise. Cover the sintered filter with your finger and blow off all water from inside the dust cap. Place the dust cap on the 1st Stage air outlet and hold it there by tightening the yoke screw. Make sure that the dust cap O-ring is in place.
Always rinse your Cressi-sub regulator with fresh water after each dive. Let water flow into 1st and 2nd Stage orifices, but do not press the manual purge button to keep water from flowing into the hoses and, therefore, into the 1st Stage.
Allow the regulator to dry prior to storage. Make sure the hoses are stored in a proper way to avoid acute folds.
Cressi-sub regulators have to be serviced on a yearly basis or more often according to use.

⚠ **Warning:** *Regulators should be serviced by Cressi-sub certified repair technicians or at a Cressi-sub authorized repair centers using only original spare parts. Non-certified technicians can jeopardize the diver's life. Cressi-sub shall not be held liable for maintenance or adjustments made by not duly authorized or trained staff.*

If the regulator is used by more than one person, it is advisable to disinfect it for 2 to 3 minutes in a 2% Stereamine G water solution or other similar pharmacy products.

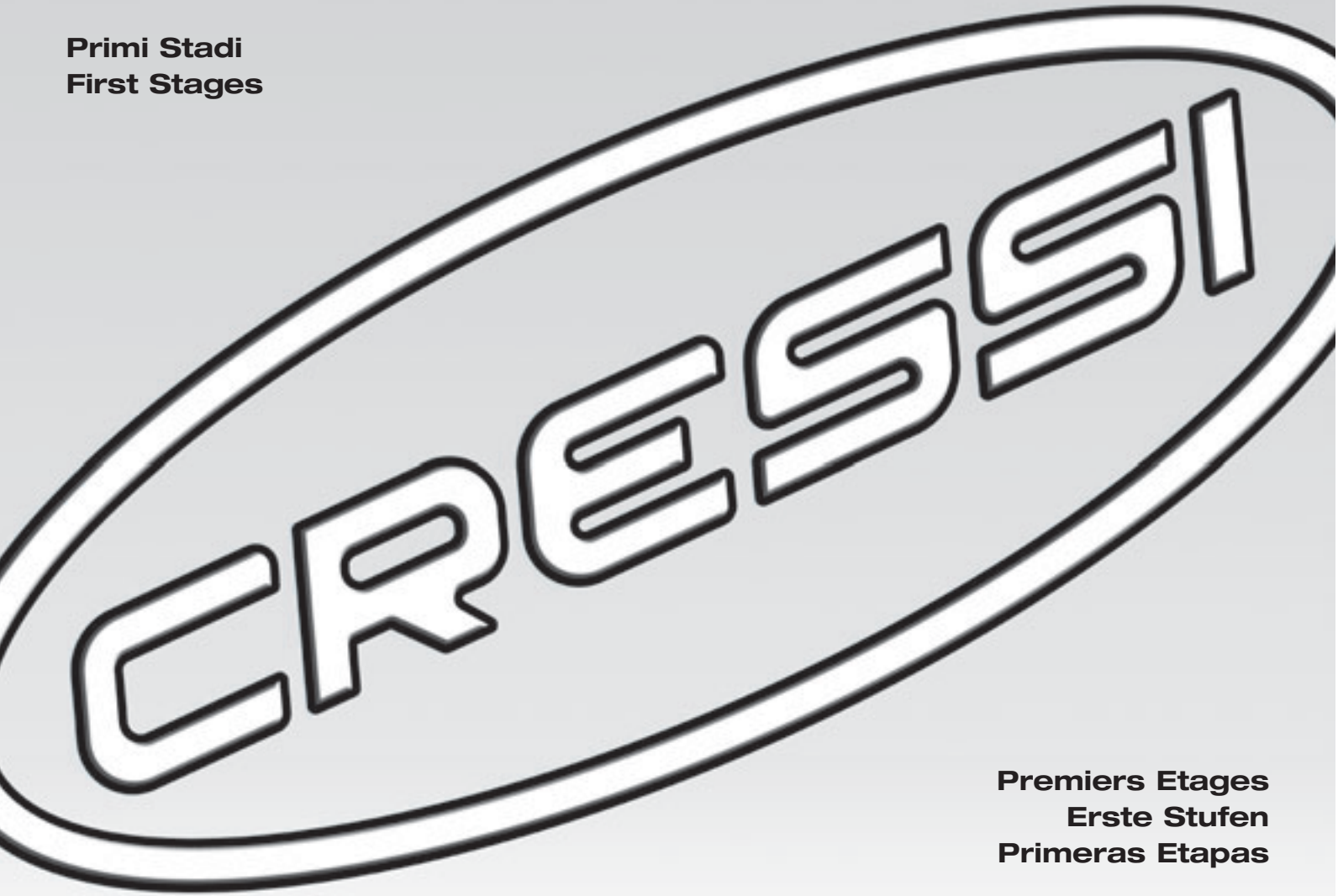
All regulators are in compliance with UNI EN 250:2000 and therefore, they bear the CE mark followed by the year of manufacturing and the certifying body identification number (0474).

4 - Tavole
4 - Tables



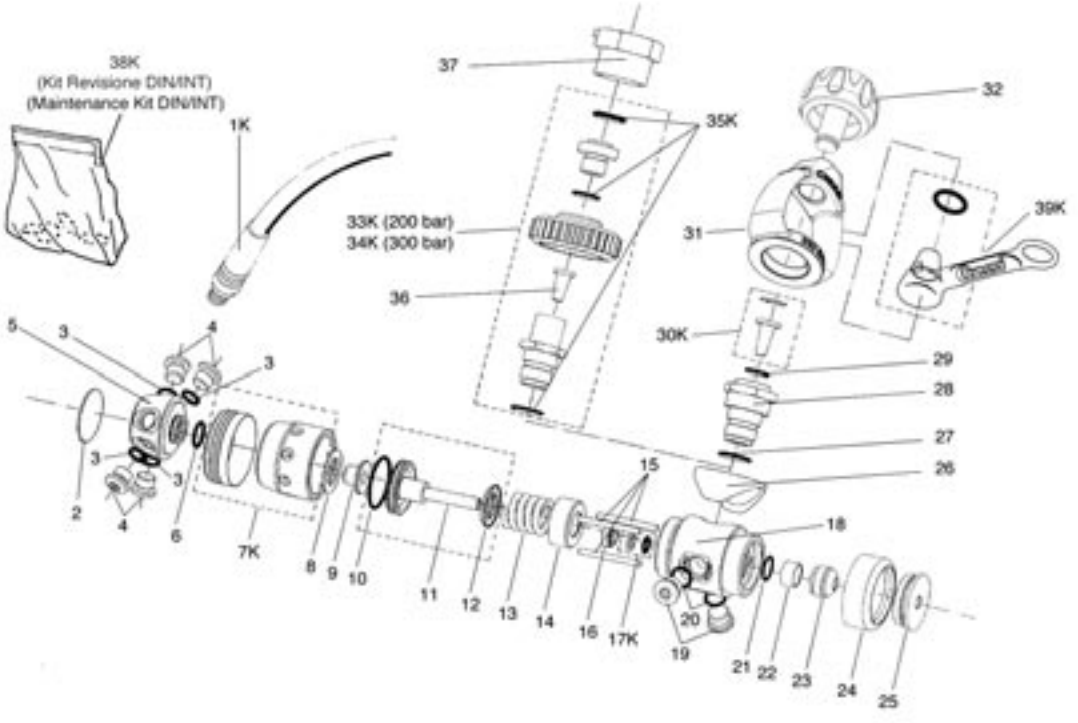
4 - Tableaux
4 - Zeichnungen
4 - Cuadros

Primi Stadi
First Stages



Premiers Etages
Erste Stufen
Primeras Etapas

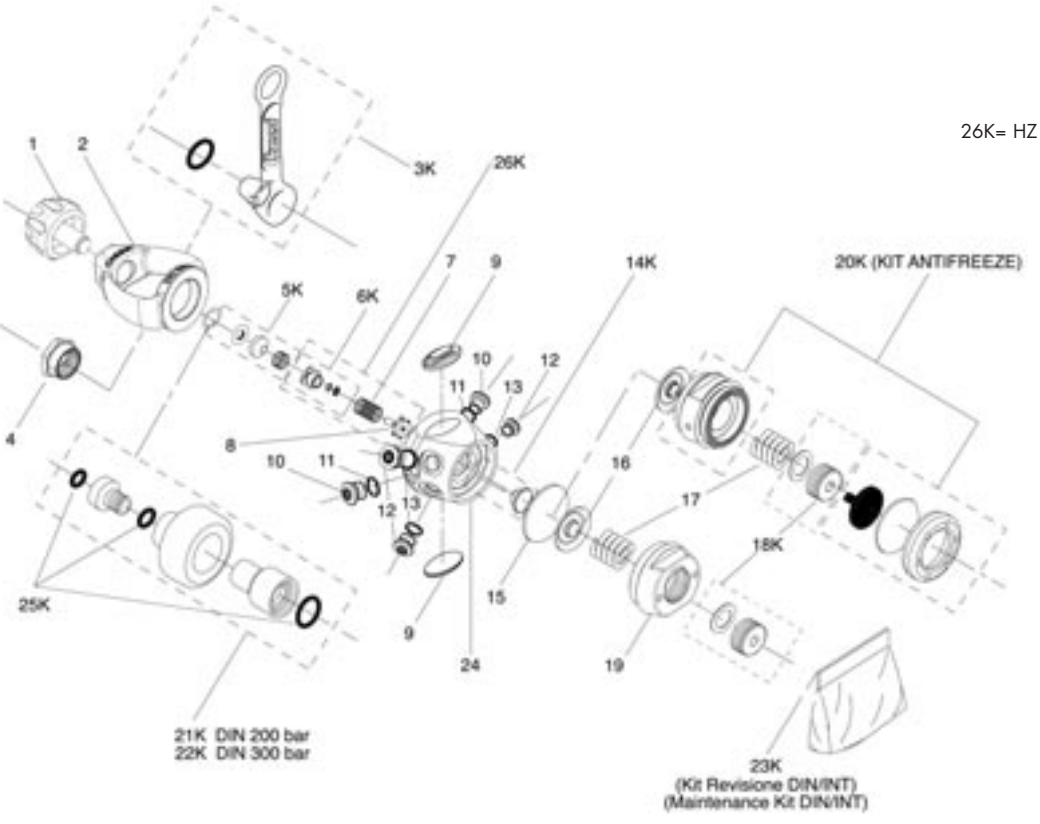
Cressi-sub



POS.	CODICE / CODE
1K	HZ 730022 Nero
1K	HZ 730225 Giallo
2	HZ 770090
3	HZ 730108
4	HZ 730106
5	HZ 770091
6	HZ 700095
7K	HZ 770089
8	HZ 770087
9	HZ 770088
10	HZ 735108
11	HZ 735136
12	HZ 735135
13	HZ 700097
14	HZ 735132
15	HZ 735131
16	HZ 770086
17K	HZ 770085
18	HZ 770084
19	HZ 730127
20	HZ 730132
21	HZ 735128
22	HZ 735138
23	HZ 735129
24	HZ 770082
25	HZ 770081
26	HZ 735127
27	HZ 735126
28	HZ 700088
29	HZ 730114
30K	HZ 730188
31	HZ 770080
32	HZ 730027
33K	HZ 735162 (DIN 200 bar)
34K	HZ 735163 (DIN 300 bar)
35K	HZ 735197 (SET OR DIN 200-300 bar)
36	HZ 735154
37	HZ 735170
38K	HZ 735050 INT (kit Revisione/Maintenance Kit)
38K	HZ 735051 DIN 200 bar (kit Revisione/Maintenance Kit)
38K	HZ 735052 DIN 300 bar (kit Revisione/Maintenance Kit)
39K	HZ 800090

1° Stadio a Pistone Bilanciato AC10 CE / Balanced Piston 1st Stage AC10 CE	Ed./Issue	AC10/2
	A/07	N° Tav./Rev.

Cressi-sub



POS.	CODICE / CODE
1	HZ 730027
2	HZ 770080
3K	HZ 800090
4	HZ 800089
5K	HZ 800088
26K= HZ 800069 { 6K	HZ 800087
26K= HZ 800069 { 7	HZ 800086
26K= HZ 800069 { 8	HZ 800085
9	HZ 800084
10	HZ 730127
11	HZ 730132
12	HZ 730106
13	HZ 730108
14K	HZ 800083
15	HZ 800082
16	HZ 800081
17	HZ 800080
18K	HZ 800079
19	HZ 800078
20K	HZ 800050 kit Antifreeze
21K	HZ 800076 kit DIN 200 bar
22K	HZ 800075 kit DIN 300 bar
23K	HZ 800074 INT (kit Revisione/Maintenance Kit)
23K	HZ 800071 DIN 200 bar (kit Revisione/Maintenance Kit)
23K	HZ 800070 DIN 300 bar (kit Revisione/Maintenance Kit)
24	HZ 800073
25K	HZ 800072 (kit OR DIN 200-300 bar)

1° Stadio a Membrana Bilanciata MC7 CE / Balanced Diaphragm 1st Stage MC7 CE	Ed./Issue	MC7/3
	A/07	N° Tav./Rev.

INTERCAMBIABILITÀ VALVOLE HP MC7 - MC7 HP VALVES INTER-CHANGEABILITY

⚠ **ATTENZIONE** la valvola A, presente sui modelli MC7 prodotti fino al 2003 (aventi finitura del corpo SATINATA come fig. 1) è ***fuori produzione***! Pertanto, durante la manutenzione ordinaria di questo modello, occorre sostituire ***tutti*** i componenti della valvola A con ***tutti*** quelli che compongono la valvola B di attuale produzione (cod. 26K=HZ 800069). I modelli MC7 dotati di valvola B si riconoscono per la finitura del corpo LUCIDA (come fig.2).

⚠ **WARNING** The A valve on MC 7 models (produced until 2003 – showing satin finished body, as in image 1) is ***off production***! By ordinary maintenance of this model, you have therefore to replace ***every*** component of the A valve with ***all those*** composing the B valve being produced at present (code 26K=HZ 800069). MC7 models equipped with the B valve have got polished body (as in image 2).

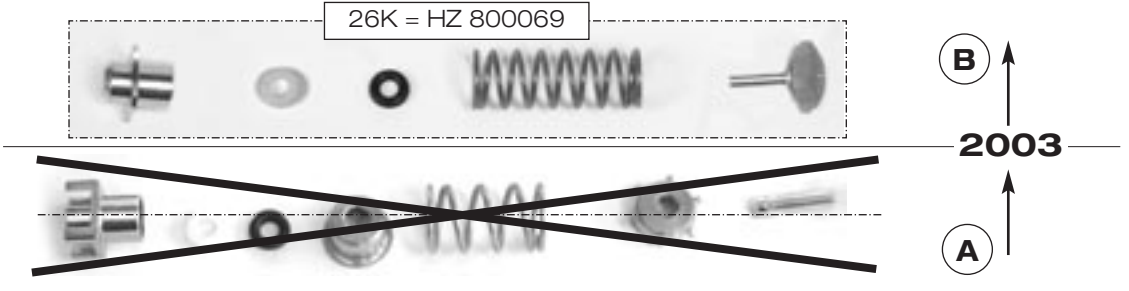
fig. 1

fig. 2

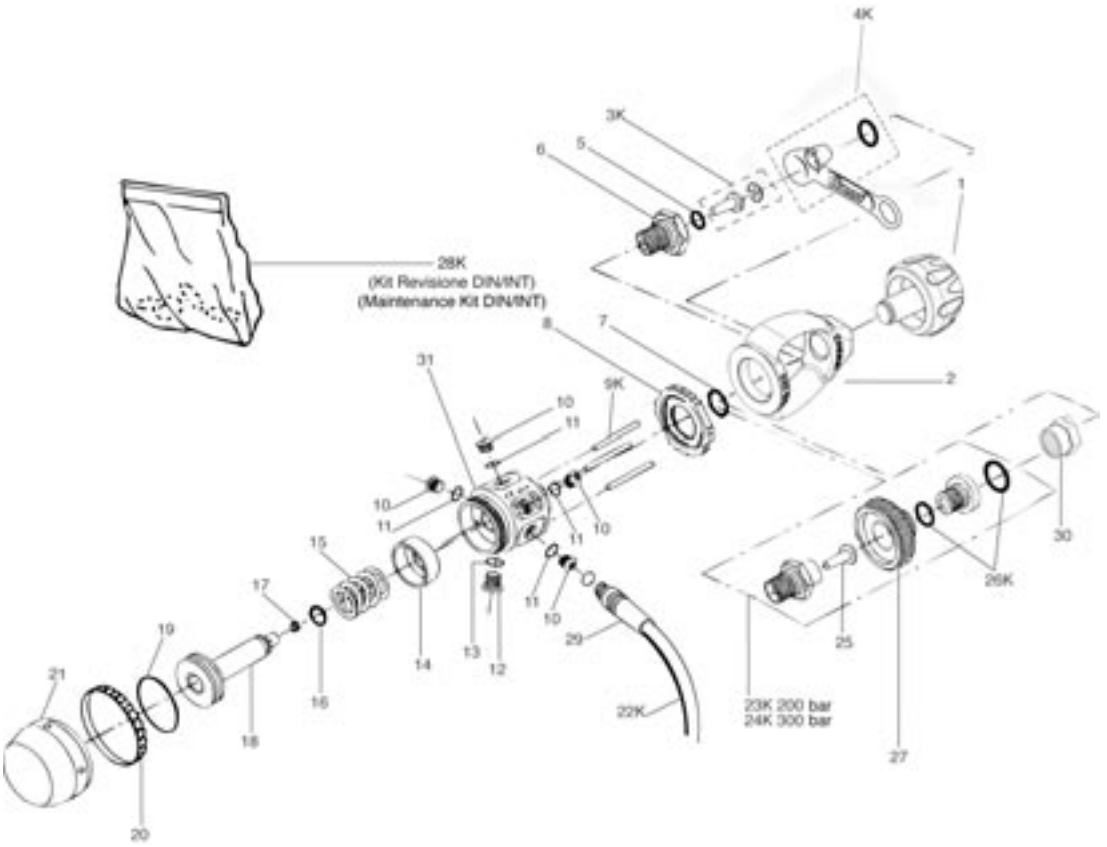
⚠ **ATTENTION** la soupape A, présente sur les modèles MC7 réalisés jusqu'en 2003, (avec finition du corps SATINÉE, comme dans fig. 1) est ***hors production***! Par conséquent, pendant l'entretien ordinaire de ce modèle, il faut remplacer ***tous*** les composants de la soupape A par ***tous*** ceux qui constituent la soupape B actuellement en production (code 26K=HZ 800069). On peut aisément reconnaître les modèles MC7 équipés de soupape B, grâce à la finition du corps BRILLANTE (comme dans fig.2).

⚠ **ACHTUNG** In die vor 2003 produzierten MC7-Modelle (mit MATTER Gehäuseoberfläche, wie in Abb. 1 gezeigt) ist das Ventil A eingebaut, das inzwischen ***nicht mehr hergestellt wird*** ! Aus diesem Grund müssen bei der ordentlichen Wartung dieses Modells ***alle*** Komponenten des Ventils A ***komplett*** durch die Komponenten des aktuell verwendeten Ventils B ersetzt werden (Art. Nr. 26K=HZ 800069). Die MC7-Modelle mit eingebautem Ventil B sind an der GLATTEN Gehäuseoberfläche erkennbar (siehe Abb. 2).

⚠ **ATENCIÓN** ¡la válvula A, presente en los modelos MC7 producidos hasta 2003, y con el acabado del cuerpo SATINADO como en la fig. 1, ya ***no está en producción***! Por lo tanto, durante el mantenimiento ordinario de este modelo, hay que sustituir ***todos*** los componentes de la válvula A con ***todos*** los que componen la válvula B actualmente en producción (cód. 26K=HZ 800069). Los modelos MC7 dotados con válvula B se reconocen por el acabado del cuerpo BRILLANTE (como en la fig.2).



Cressi-sub



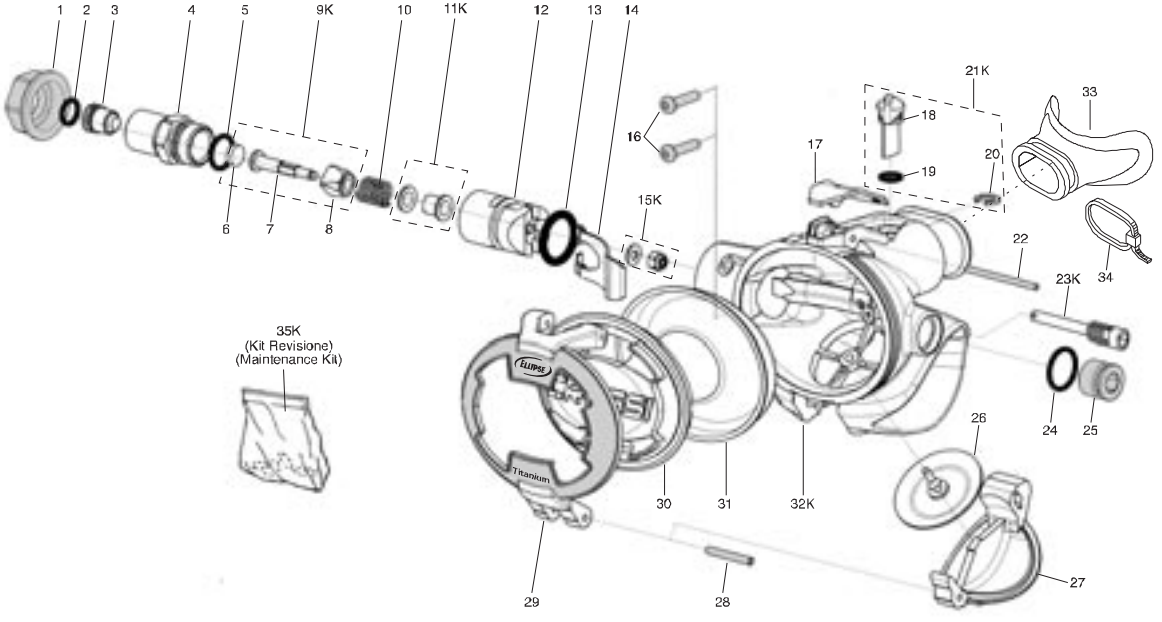
POS.	CODICE / CODE
1	HZ 730027
2	HZ 700089
3K	HZ 730188
4K	HZ 800090
5	HZ 730114
6	HZ 730151
7	HZ 735126
8	HZ 730152
9K	HZ 730153
10	HZ 730106
11	HZ 730108
12	HZ 730127
13	HZ 730132
14	HZ 730154
15	HZ 730105
16	HZ 730104
17	HZ 730155
18	HZ 730156
19	HZ 735108
20	HZ 730157
21	HZ 730158
22K	HZ 730222 Nero
22K	HZ 730225 Giallo
23K	HZ 735158 (DIN 200 bar)
24K	HZ 735157 (DIN 300 bar)
25	HZ 735154
26K	HZ 735195 200 bar
26K	HZ 735196 300 bar
27	HZ 730159
28K	HZ 730150 INT (kit Revisione/Maintenance Kit)
28K	HZ 730148 DIN 200 bar (kit Revisione/Maintenance Kit)
28K	HZ 730149 DIN 300 bar (kit Revisione/Maintenance Kit)
29	HZ 730224
30	HZ 735170 (TAPPO PROTEZIONE DIN)
31	HZ 730160

1° Stadio a Pistone non Bilanciato AC2 CE / Unbalanced Piston 1st Stage AC2 CE	Ed./Issue	AC2/2
	A/07	N° Tav./Rev.

Secondi Stadi
Second Stages

Deuxiemes Etages
Zweite Stufen
Segundas Etapas

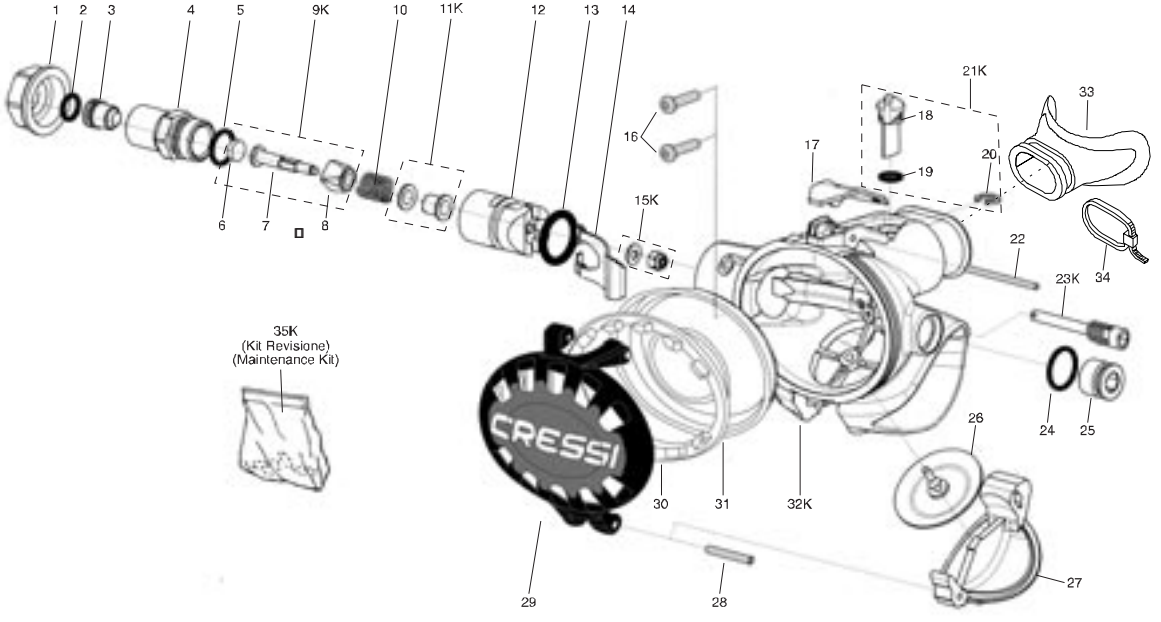
Cressi-sub



POS.	CODICE / CODE
1	HZ 810060
2	HZ 810095
3	HZ 810094
4	HZ 810093
5	HZ 810092
6	HZ 742013
7	HZ 810091
8	HZ 810090
9K	HZ 810089
10	HZ 730207
11K	HZ 810088
12	HZ 810087
13	HZ 810086
14	HZ 810085
15K	HZ 746094
16	HZ 810084
17	HZ 810083
18	HZ 810082
19	HZ 810081
20	HZ 810080
21K	HZ 810079
22	HZ 810078
23K	HZ 810077
24	HZ 810076
25	HZ 810061
26	HZ 810074
27	HZ 810073
28	HZ 810072
29	HZ 810062
30	HZ 810070
31	HZ 810069
32K	HZ 810068
33	HZ 790094
34	HZ 730202
35K	HZ 810067
	(kit Revisione/Maintenance Kit)

2° Stadio Ellipse titanium CE / 2nd Stage Ellipse titanium CE	Ed./Issue	ELLT/2
	B/04	N° Tav./Rev.

Cressi-sub

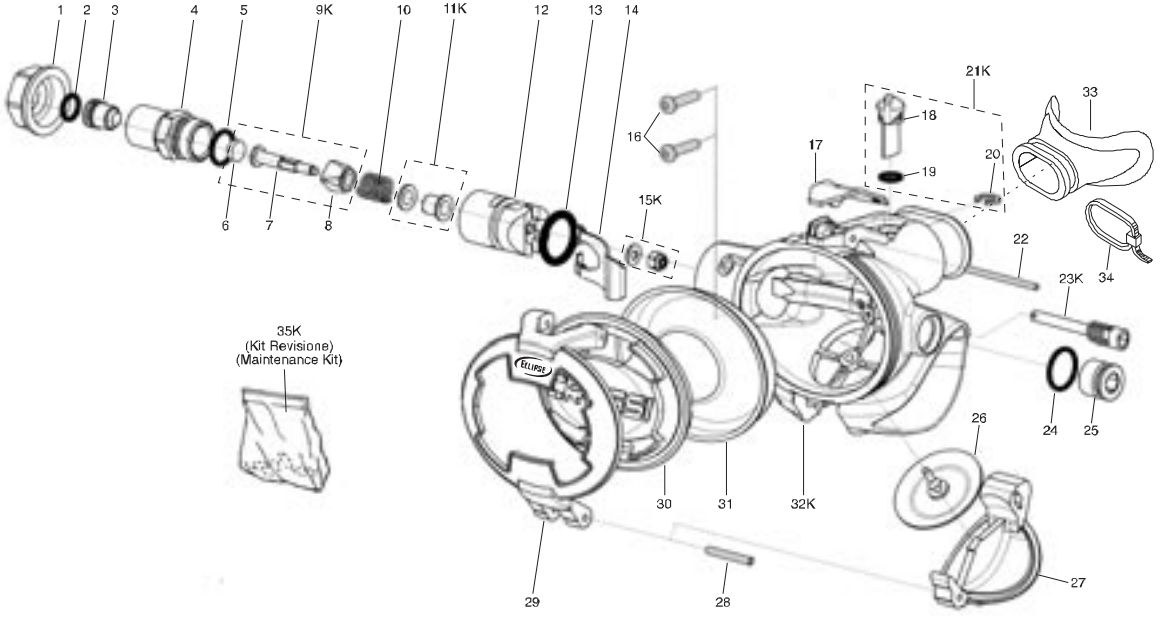


POS.	CODICE / CODE
1	HZ 810096
2	HZ 810095
3	HZ 810094
4	HZ 810093
5	HZ 810092
6	HZ 742013
7	HZ 810091
8	HZ 810090
9K	HZ 810089
10	HZ 730207
11K	HZ 810088
12	HZ 810087
13	HZ 810086
14	HZ 810085
15K	HZ 746094
16	HZ 810084
17	HZ 810083
18	HZ 810082
19	HZ 810081
20	HZ 810080
21K	HZ 810079
22	HZ 810078
23K	HZ 810077
24	HZ 810076
25	HZ 810075
26	HZ 810074
27	HZ 810073
28	HZ 810072
29	HZ 810063
30	HZ 810064
31	HZ 810069
32K	HZ 810068
33	HZ 790094
34	HZ 730202
35K	HZ 810067

(kit Revisione/Maintenance Kit)

2° Stadio Ellipse Piston CE / 2nd Stage Ellipse Piston CE	Ed./Issue	ELLPT/1
	A/05	N° Tav./Rev.

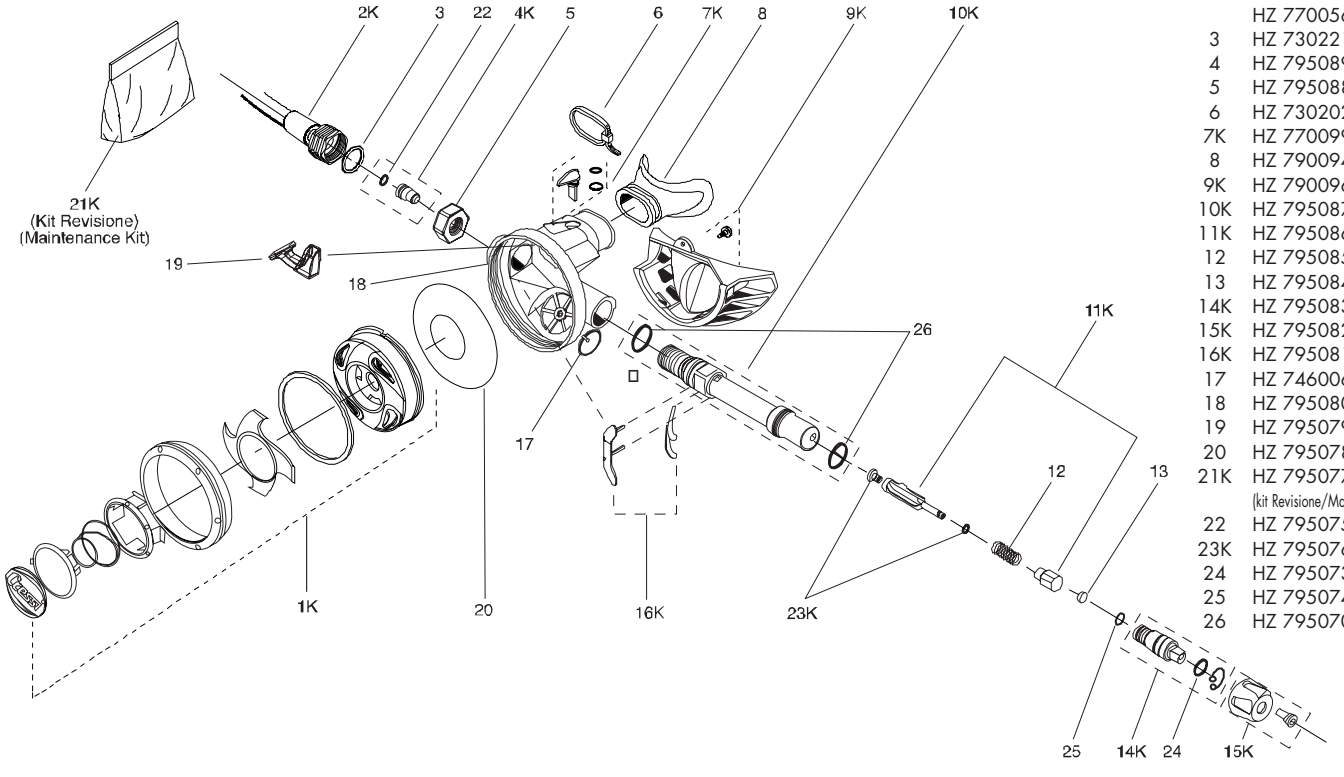
Cressi-sub



POS.	CODICE / CODE
1	HZ 810096
2	HZ 810095
3	HZ 810094
4	HZ 810093
5	HZ 810092
6	HZ 742013
7	HZ 810091
8	HZ 810090
9K	HZ 810089
10	HZ 730207
11K	HZ 810088
12	HZ 810087
13	HZ 810086
14	HZ 810085
15K	HZ 746094
16	HZ 810084
17	HZ 810083
18	HZ 810082
19	HZ 810081
20	HZ 810080
21K	HZ 810079
22	HZ 810078
23K	HZ 810077
24	HZ 810076
25	HZ 810075
26	HZ 810074
27	HZ 810073
28	HZ 810072
29	HZ 810071
30	HZ 810070
31	HZ 810069
32K	HZ 810068
33	HZ 790094
34	HZ 730202
35K	HZ 810067
	(kit Revisione/Maintenance Kit)

2° Stadio Ellipse CE / 2nd Stage Ellipse CE	Ed./Issue	ELL/2
	B/04	N° Tav./Rev.

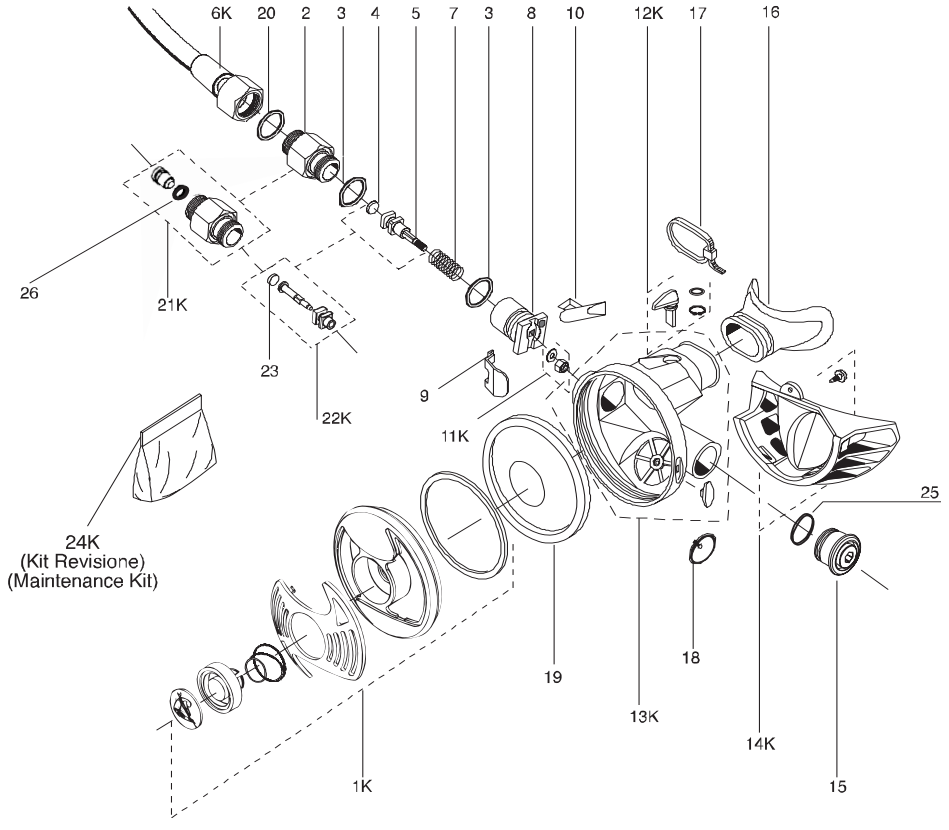
Cressi-sub



POS.	CODICE / CODE	
1K	HZ 795090	
2K	HZ 770056	Nero
	HZ 770056	Giallo
3	HZ 730221	
4	HZ 795089	
5	HZ 795088	
6	HZ 730202	
7K	HZ 770099	
8	HZ 790094	
9K	HZ 790096	
10K	HZ 795087	
11K	HZ 795086	
12	HZ 795085	
13	HZ 795084	
14K	HZ 795083	
15K	HZ 795082	
16K	HZ 795081	
17	HZ 746006	
18	HZ 795080	
19	HZ 795079	
20	HZ 795078	
21K	HZ 795077	
	(kit Revisione/Maintenance Kit)	
22	HZ 795075	
23K	HZ 795076	
24	HZ 795073	
25	HZ 795074	
26	HZ 795070	

2° Stadio Airtech Bilanciato Regolabile CE / Adjustable Balanced 2nd Stage Airtech CE	Ed./Issue	AIRT/1
	A/04	N° Tav./Rev.

Cressi-sub



POS.	CODICE / CODE
1K	HZ 780050 Nero
1K	HZ 780051 Giallo
2	HZ 742007
3	HZ 730218
4	HZ 730208
5	HZ 742008
6K	HZ 730222 Nero
6K	HZ 730225 Giallo
7	HZ 730207
8	HZ 770096
9	HZ 770095
10	HZ 770094
11K	HZ 746094
12K	HZ 770099
13K	HZ 770097
14K	HZ 790096
15	HZ 790095
16	HZ 790094
17	HZ 730202
18	HZ 746006
19	HZ 730212
20	HZ 730221
21K	HZ 742006
22K	HZ 742012
23	HZ 742013
24K	HZ 790090 (kit Revisione/Maintenance Kit)
25	HZ 790091
26	HZ 790092

2° Stadio XS2 CE / 2nd Stage XS2 CE	Ed./Issue	XS2/1
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