

REGULATOR V42 PROTON METAL

WARNING

CAREFULLY READ THIS INSTRUCTION MANUAL BEFORE USE, AND KEEP IT FOR FUTURE REFERENCE.

INTRODUCTION

Congratulations. You have purchased one of the finest, most dependable regulators available on the market today. Your Mares regulator has been constructed using manufacturing processes and materials which are the result of fifteen years of continuing research and evolution. This sophisticated technology is backed by the guarantee that every component of your regulator has been tested at our modern facility in Rapallo, Italy. All this is synonymous with reliability, a fundamental requirement for any piece of diving equipment, which you will find in EVERY Mares product.

This manual is intended as a guide for experienced technicians, and not as a comprehensive instruction book on all aspects of diving equipment for inexperienced repair personnel.

MARES periodically offers technical training courses at its factory. Technicians are strongly advised to obtain specific practical training in the servicing of MARES diving equipment before attempting any repairs.

Carefully read all parts of this manual before undertaking any repairs.

Important:

Any critical information or warnings that might affect the performance or result in the injury or death of the technician, regulator owner, or other persons is highlighted with the following symbols:

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

MARES reserves the right to modify any products, processes and manufacturing techniques at any time. It is the technicians' responsibility to acquire the latest information and parts from Mares for service and repairs to be performed.

IMPORTANT:

If the instructions provided in the manual are unclear or difficult to understand, please contact Mares before using the regulator or attempting any repairs.

WARNING

Carefully follow these and all the other instructions concerning your Mares regulator and all other SCUBA equipment. Failure to do so could lead to serious injury or death.

WARNING

As with all SCUBA equipment, Mares regulators are designed to be used by trained, certified divers only. Failure to fully understand the risks of using such equipment may result in serious injury or death. DO NOT use this regulator or any SCUBA equipment unless you are a trained, certified SCUBA diver.

EC CERTIFICATION

The Mares regulators described in this manual have been tested and certified by Registered Test Centre No. 0426 - Italcert - Viale Sarca 336, Milano - I, in compliance with EC directive 89/686/EEC of 21 December 1989. The test procedures were conducted according to the EN 250: 2000 standard, in conformance with the aforesaid directive which sets out the conditions for marketing and essential safety requirements for Category III Personal Protective Equipment (PPE).

The certification testing results are the following:

Model	Warm water (Temp. = > 10 C (50 F) Approved	Cold Water (Temp. < 10 C (50 F) Approved	Marking	Position
V42 Poton Metal			CE 0426	On the first stage

The CE mark certifies compliance with the essential health and safety requirements (DE 89/686/EEC Annex II). The suffix 0426 after the letters "CE" indicates the Italcert Registered Test Center in charge of monitoring the production under Art. 11B DE 89/686/EEC.

REFERENCES TO EN 250: 2000 - OBJECT - DEFINITIONS - LIMITS

Object: The requirements and tests provided for in EN 250: 2000 are aimed at providing a minimum safety level for the operation of diving breathing apparatuses at a maximum depth of 50 m / 162 feet.

Scuba - Definition: Self-contained, open-circuit compressed air underwater breathing apparatus is an apparatus which has a portable supply of compressed air carried by the diver, allowing him to breathe underwater.

Scuba - Minimum equipment (EN 250: 2000):

- Air tank(s).
- Regulator.
- Safety device, e.g. pressure gauge/computer, reserve mechanism or alarm.
- Transport and retaining system, e.g. backpack and/or straps.
- Facepiece (mouthpiece assembly or full-face mask or diving helmet).
- User instructions.

WARNING

SCUBA equipment complying with EN 250 is not intended for breathing by more than one user at the same time.

WARNING

If SCUBA equipment is configured and used by more than one diver at the same time, the cold water and breathing performance may not fulfill the requirements of EN 250.

Limits (EN 250: 2000)

- SCUBA - Component Groups (EN 250: 2000):** The SCUBA unit can be made up of separate pieces of equipment such as a tank, regulator and submersible pressure gauge. The Mares regulators described in this manual can be used with other SCUBA unit components certified according to directive EEC/89/686 and EN 250: 2000. The air contained in the tanks must conform to the requirements for breathable air set out in EN 12021.

DANGER

Mares regulators and octopus are designed and intended for use only with clean, compressed atmospheric air. Do not use this equipment with any other gas or enriched air. Failure to adhere to this warning may result in serious injury or death due to fire and explosion or the serious deterioration or failure of the equipment.

WARNING

FOR NORTH AMERICA ONLY

Mares regulators, alternative second stages, and gas delivery components are designed for and compatible with open circuit SCUBA using compressed air or enriched air (Nitrox) mixtures not exceeding 40% Oxygen ONLY. These limits conform to the DAN Nitrox Industry Workshop Proceedings of November, 2000. Failure to follow this warning may result in SERIOUS INJURY or DEATH to the user due to fire, explosion, or the deterioration or failure of the equipment.

- Maximum depth: 50 m / 162 feet.
- Pressure max 232 bar (international YOKE CGA 850 adapter) (Fig. 1).
- Pressure max 300 bar (DIN 477/50 screw) (Fig. 2).
- Warm water regulators - water temperature over or equal to +10°C (50°F).
- Cold water regulators - water temperature below +10°C (50°F).

Under the EN 250: 2000 standard, water is considered to be cold at a temperature below 10°C. To use MARES regulators in cold water conditions, always install the CWD (Cold Water Diving) kit. THE CWD KIT SHOULD ONLY BE INSTALLED BY AN AUTHORIZED MARES SERVICE CENTER.

WARNING

Attempting to dive in cold water conditions (10°C or less) without adequate training may result in serious injury. Before diving in cold water, it is advisable to take a special training course under the supervision of a certified diving instructor. Because no regulator can be completely guaranteed against freezing of the second stage under all conditions, even Mares regulators fitted with the CWD kit may be subject to "icing" phenomena which can interfere with their correct operation. This may result in serious injury. Therefore, to minimize the potential hazards, it is essential to be adequately trained in the prevention and handling of the problems which may arise from a regulator subject to "icing" phenomena. Particularly in these situations, the following precautions should be observed:

- 1) Avoid breathing through the regulator when out of the water.
- 2) Only press the purge valve underwater, and even then very gently and for brief periods.

WARNING

For safety reasons, it is not advisable to use an Octopus second stage that is not a certified Mares Octopus. The manufacturer declines responsibility for damages to persons or property resulting from the use of different Octopus second stages. The MARES Octopus second stages have been designed and tested for use on first stage low pressure ports OTHER than the preferential port used for the primary second stage. An Octopus second stage MAY NOT be substituted for a primary second stage, and must in no circumstances be connected to the preferential low pressure port intended for the primary second stage.

WARNING

For safety reasons, the submersible pressure gauge / high pressure safety device that is assembled on the regulator must comply with the EN 250: 2000 standard. According to this regulation, with an upstream pressure of 100 bar the maximum permitted airflow through the connector toward the first stage must not exceed 100 liters/min. If you have a submersible pressure gauge / high pressure safety device that complies with the EN 250: 1993 standard or a different specification, check whether the instruction manual indicates the value of the maximum airflow.

The use of submersible pressure gauges / safety devices that do not comply with the EN 250: 2000 standard, or which do not have an indication of the maximum permitted airflow through the first stage connector may result in serious accidents.

GENERAL WORKING PRINCIPLE

Regulators reduce cylinder pressure, referred to as inlet pressure, to a pressure suitable for breathing. Modern regulators do this in two stages connected by a hose. The first stage provides pressure to the second stage; this reduced pressure remains constant despite the sizeable changes undergone by the cylinder inlet pressure during the dive (dropping from 3000/4350 to few hundred psi). The second stage brings pressure down to ambient pressure and delivers air only when the diver inhales. Each stage of the regulator contains an internal valve. When the diver inhales, the pressure inside the case is lowered and a pressure differential (imbalance) is created across the diaphragm (beginning of inhalation). The response of the diaphragm is to bend inward, contact the lever and open the second stage valve. Air continues to flow into the case until the pressure balance is regained (end of inhalation).

FIRST STAGE

For the second stage to work properly, the first stage must deliver air at a correct and - most importantly - constant intermediate pressure. This characteristic, provided by all Mares first stages, is essential for obtaining optimal adjustment of the second stage and ensuring top performance for the entire duration of the dive, regardless of tank pressure.

All Mares first stages are available with the following types of tank valve fittings: DIN 477/50 screw (max pressure 300 bar), international YOKE CGA 850 adapter (max pressure 232 bar), in accordance with the EN 250: 2000 standard.

SECOND STAGE

The purpose of the second stage is to deliver air at ambient pressure, only during the inhalation phase. The diagram of a second stage shown in Fig. 5 illustrates its operation. When the diver inhales, the pressure inside the second stage decreases, creating a pressure difference (imbalance) between the two sides of the diaphragm. This pulls the flexible diaphragm inward, pressing the demand lever and unseating the second stage valve. This opening allows air to flow in through the second stage and to the diver, until the diver stops inhaling. At this point the internal 2nd stage pressure increases, pushing the diaphragm back in the opposite direction, causing the valve to return to its seat and shutting off the airflow.

V42 Proton Metal First stage (Fig. 3)

The V42 Proton Metal is equipped with the brand new V42 first stage, with a forged brass, nickel- and chrome-plated body, which stands out immediately thanks to its highly reduced size and weight. This was made possible by simple but innovative technical solutions, which is why today the V42 can be called the smallest and best-performing diaphragm first stage on the market. The general technical characteristics are those of the best Mares first stages with diaphragm operation and the DFC system.

The high-pressure valve features the SCS spherical core seal system, for superior durability. The low and high-pressure ports are positioned to offer the most sensible arrangement of the hoses, ensuring maximum comfort for the user.

The DFC system

The exclusive Mares DFC system on the V42 Proton Metal first stage makes it possible to minimize the pressure drop that occurs in all regulator first stages during breathing (Fig. 4). This phenomenon is even more marked when higher airflow is demanded of the regulator. The DFC system substantially reduces breathing effort and inhalation resistance, especially during deep dives and under demanding conditions.

Cold Water Diving Kit

For especially serious conditions entailing professional use in cold water, the V42 first stage may be supplemented by the CWD kit, which completely isolates all the internal parts of the first stage from contact with the water. The CWD kit should only be installed by an authorized MARES service center.

Proton Metal second stage

Thanks to the integrated VAD system, this second stage offers top-level performance that vastly exceeds not only the requirements for CE certification, but the stringent U.S. Navy specifications as well. The world's most compact metal nickel- and chrome-plated second stage.

Thanks to its "all metal" technology, it is also ideal for diving in very cold water. Indeed, a unique and revolutionary design. The oversized purge button is extremely easy to use, even while wearing thick neoprene gloves. The "mesh grid" system minimizes the likelihood of free-flow in strong currents. The new design exhaust tee, with its streamlined shape, affords superior performance while directing air bubbles further away from the face.

VAD Integrated System (patented)

The Proton Metal second stage uses the exclusive patented Mares V.A.D. (Vortex Assisted Design) system. This system guarantees a low breathing effort at any depth, so that as the air from the hose passes through the second stage valve, it is routed directly to the

mouthpiece via the by-pass tube (Fig. 5). This innovative technical development ensures great ease of breathing in an exceptionally compact and lightweight second stage.

Technical specifications	V42 first stage
Operation	DFC diaphragm balancing system, SCS
Materials: Metal parts	High-resistance molded brass, nickel- and chrome-plated - stainless steel
Non-metal parts Seals and diaphragms	High-resistance technopolymers Nitril rubber - silicone rubber
Flow rate (air supply 180 bar)	4800 l/min
Intermediate pressure: Air supply 200 bar Air supply 30 bar	from 9.8 to 10.2 bar (142-148 psi) from 9.8 to 10.2 bar (142-148 psi)
First stage ports: High pressure Intermediate pressure	n°2 7/16" UNF n°1 3/8" UNF DFC (principal) n°3 3/8 UNF
Hose type: Standard length	super soft 3/8" 80 cm
Weight	INT 646 g - DIN 452 g

Technical specifications	Proton Metal second stage
Operation	VAD system, mesh-grid cover, all metal case
Materials: Metal parts	Nickel- and chrome-plated brass, stainless steel
Non-metal parts Seals and diaphragms	High-resistance technopolymers Nitril rubber - silicone rubber
Flow rate (air supply 180 bar)	2400 l/min
Intermediate pressure: Air supply 200 bar Air supply 30 bar	from 9.8 to 10.2 bar (142-148 psi) from 9.8 to 10.2 bar (142-148 psi)
Weight	243 g

OPERATION AND MAINTENANCE

WARNING

DO NOT attempt to use your regulator unless you have performed all of these pre-dive operating procedures. Failure to do so may lead to serious injury or death if the regulator malfunctions.

Connecting accessories to the first stage

The hoses and accessories should be connected in such a way as to avoid damaging the O-ring. Use a suitable wrench to remove the plug from the first stage port, and screw the terminal fitting of the hose firmly but gently into the first stage port.

WARNING

The regulator in and of itself is not a complete SCUBA unit, but only one of its components. Under the EN 250: 2000 standard, a complete SCUBA unit must include at least the following minimum equipment:

- a) Air tank(s).
- b) Regulator.
- c) Safety device, e.g. pressure gauge/computer, reserve mechanism or alarm.
- d) Transport and retaining system, e.g. backpack and/or straps.
- e) Facepiece (mouthpiece assembly or full-face mask or diving helmet).
- f) User instructions.

Your Mares regulator has been designed for use in conjunction with other SCUBA unit components conforming to the EEC/89/686 directive and certified with the EC mark. The air inside the tanks must conform to the requirements for breathable air set out in EN12021.

BEFORE ASSEMBLING THE COMPONENTS OF YOUR SCUBA UNIT, CAREFULLY READ ALL THE USER INSTRUCTIONS AND ANY WARNINGS WHICH THEY CONTAIN.

PRE-DIVE CHECKLIST

- Ensure that all the hoses have been correctly assembled onto the 1st stage, and check them for cuts, signs of wear or other damage. If the hoses are loose enough to be unscrewed manually, they must be tightened with a wrench before being pressurized.
- Make sure that the first and second stages do not show signs of damage.
- Position the tank control valve so that the valve opening is directed towards the diver.
- Remove the dust cap from the regulator yoke and position the A-clamp or DIN fitting so that it is centered on the tank valve opening.
- The first stage should be oriented in such a way that the hose leading to the second stage is routed over the diver's right shoulder.
- Tighten the yoke nut finger tight only, being careful not to damage the O-Ring on the tank valve.
- Check the submersible pressure gauge, making sure that the pressure reading is zero.
- Very slowly open the tank valve, allowing air to enter the regulator gradually.
- Do not turn the first stage connected to the tank when the system is pressurized!

WARNING

When opening the air valve, press the purge valve of the second stage. This helps to reduce the impact on the valve (Fig. 6). DO NOT PERFORM THIS OPERATION AT AMBIENT TEMPERATURES BELOW 10°C (50°F). COLDER TEMPERATURES MAY RESULT IN ICING OR FREE-FLOW.

- Check the pressure gauge to ensure that it indicates the proper cylinder pressure for your planned dive.
- Check the cylinder and regulator connection for leakage. If leakage exists, it may be caused by incorrectly mounting the regulator on the valve or by a damaged cylinder valve O-ring.
- To confirm that the regulator delivers air properly, first exhale through the mouthpiece to blow any foreign matter from the second stage, then inhale. A few breathing cycles should indicate if there are any obvious problems that cannot be discovered by actually breathing from the regulator while underwater.

DURING THE DIVE

- If you are using a second stage as an Octopus regulator, the dust cap should be used to prevent foreign matter from entering the second stage through the mouthpiece.
- When the regulator is out of the diver's mouth, free flowing of air may occur. This inconvenience may be easily eliminated by turning the regulator downward and lightly shaking it to fill it with water (Fig. 7). Should free flow continue, abort the dive immediately.

WARNING

DO NOT attempt connect LP hoses into HP with the use of adaptors. This can result in serious personal injury. LP components are not intended to withstand pressures greater than 285 psi.

POST-DIVE CARE AND PERIODIC MAINTENANCE

Ideally, your regulator should be rinsed with fresh water while pressurized. This allows the second stage to be rinsed internally without introducing contaminants into critical sealing areas. Rinse the first stage and also run water into the mouthpiece of the second stage and out of the exhaust tees to remove foreign matter.

If the regulator is not pressurized, do not depress the purge button while rinsing. Actuation of the purge function may allow particles to contaminate the valve seat and cause leakage.

In order to avoid filter and first stage contamination, prevent water from entering the first stage air inlet. Cover the first stage filter with the special dust cup (Fig. 8). Allow the regulator to dry completely before storage.

Prolonged storage in direct sunlight or in oily or dusty areas can be damaging to some of the regulator components.

Do not use lubricants. Lubricants should never be used in routine care and maintenance.

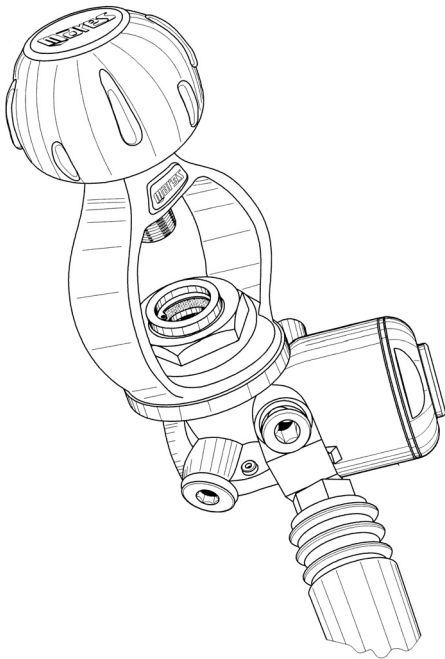
WARNING

Proper operation of your regulator also depends on appropriate maintenance. Therefore, your regulator should be submitted to a Mares authorized service center for inspection at least once a year. It is also recommended that the first stage valve, or the valve seat (for SCS systems) be replaced every two years or every 200 diving hours. Failure to do so could lead to serious injury or death.

WARRANTY

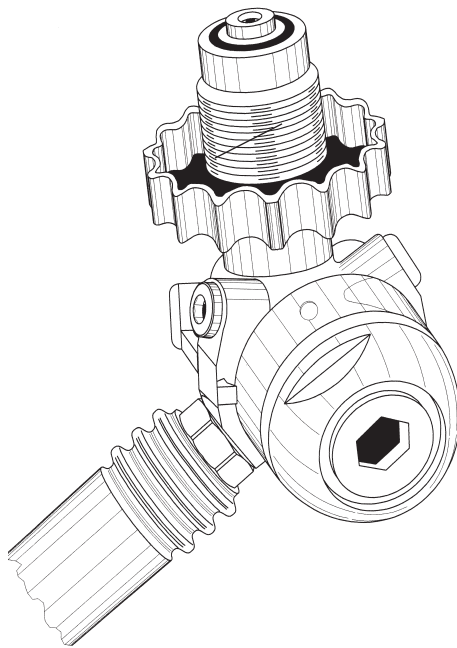
With the purchase of a Mares regulator, you receive a Permanent "Original Owner Identification Card" made of durable plastic. Your card will have the model and serial number embossed on it. Please print your name and sign in the appropriate space provided.

You are to retain the card and present it whenever periodic maintenance of the regulator is performed by any Mares Authorized Service Center worldwide.



1

Yoke CGA 850



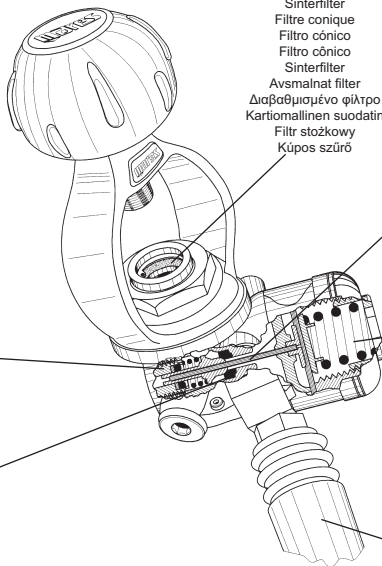
2

Din 477/50

PRIMO STADIO V42
V42 FIRST STAGE
ERSTE STUFE V42
PREMIER ÉTAGE V42
PRIMEIRA ETAPA V42
PRIMEIRO ESTÁGIO V42
EERSTE TRAP V42
V42 FÖRSTATEG
ΠΡΩΤΟ ΣΤΑΔΙΟ V42
V42 PAINEENAENNIN
PIERWSZY STOPIEŃ V42
V42 ELSŐ LÉPCSŐ

Camera bilanciamento
 Balancing chamber
 Hochdruckkammer
 Chambre de compensation
 Cámara de compensación
 Câmara de balanceamento
 Hogedrukkamer
 Balanskammare
 Θάλαμος εξισορρόπησης
 Tasapainotuskammio
 Komora równoważąca
 Kiegyenlítőkamra

Sede valvola alta pressione
 HP seat connector
 Hochdruck-(HP)ventilsitz
 Siège haute pression
 Asiento de la válvula de alta presión
 Assento válvula alta pressão
 Hogedrukkelepzítig
 HP-sáteskoppling
 Σύνδεσμος βόθης HP
 Korkeapaineistukan vastakappale
 Złącze gniazda HP
 Nagynyomású csatlakozójlat



Filtro conico
 Tapered filter
 Sinterfilter
 Filtre conique
 Filtro cónico
 Filtro cónico
 Sinterfilter
 Avsmalnät filter
 Διαβαθμισμένο φίλτρο
 Kartiomallinen suodatin
 Filtr stożkowy
 Kúpos szűrő

Spillo di spinta
 Thrust pin
 Ventilstift
 Pointeau
 Disco de empuje
 Pino de empuxo
 Spindel
 Tryckstift
 Ωστικός πείρος
 Venttiilin neula
 Trzpień zaworu
 Nyomó csapaszeg

Molla principale
 Main spring
 Hauptfeder
 Ressort de membrane
 Muelle principal
 Mola principal
 Veer
 Huvudfjäder
 Κύριο ελατήριο
 Pääjousi
 Główna sprężyna
 Fő rugó

Uscita LP 3/8" UNF
 3/8" UNF LP port
 3/8" UNF Mitteldruck-(LP)anschluss
 Sortie LP 3/8" UNF
 Saída LP 3/8" UNF
 Saída LP 3/8" UNF
 3/8" UNF lagedrukpoort
 3/8" UNF LP- port
 3/8" UNF έξοδος LP
 Matalapaine-ulosotto 3/8" UNF-kierteellä
 Port UNF LP 3/8"
 3/8" UNF LP csatlakozó

3

Differenza della caduta della pressione intermedia in fase inspiratoria
 Difference in intermediate pressure drop during inhalation
 Unterschiede im Mitteldruckabfall während der Einatemphase
 Comparaison de la chute de la moyenne pression à l'inspiration
 Diferencia del descenso de la presión intermedia durante la fase de inspiración
 Diferença de queda da pressão intermediária em fase de inspiração

Verskil in terugval middendruk tijdens inademing
 Skillnad i mellantryck under inandning
 Διαφορά στην πτώση της ενδιάμεσης πίεσης κατά την εισπνοή
 Ero välipaineen laskussa sisäänhengityksen aikana
 Różnica w spadku średniego ciśnienia podczas wdechu
 A középnyomás-esés különbsége belélegés közben



Primo stadio tradizionale
 Traditional first stage
 Herkömmliche erste Stufe
 Premier étage classique
 Primera etapa tradicional
 Primeiro estágio tradicional
 Traditionele eerste trap
 Traditionell förststeg
 Κλασικό πρώτο στάδιο
 Perinteinen paineenalennin
 Tradycyjny pierwszy stopień
 Hagymányos első lépcső

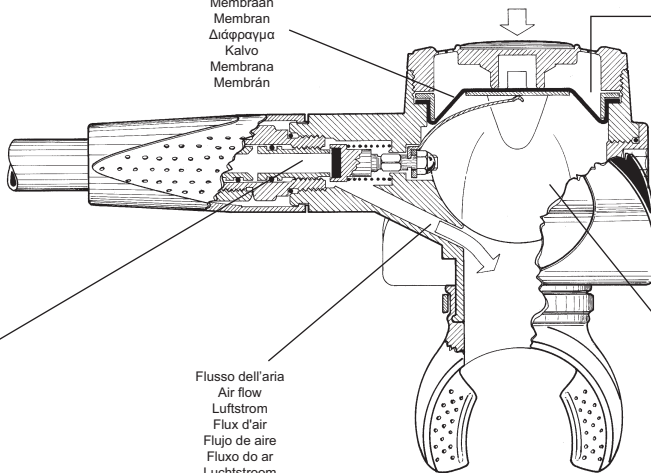
Primo stadio con D.F.C.
 D.F.C. first stage
 DFC erste Stufe
 Premier étage D.F.C.
 Primera etapa con DFC
 Primeiro estágio com D.F.C.
 Eerste trap met D.F.C.
 D.F.C. förststeg
 Πρώτο στάδιο D.F.C.
 D.F.C. -paineenalennin
 Pierwszy stopień D.F.C.
 D.F.C. (dinamikus áramlásszabályozó) első lépcső

4

SECONDO STADIO
 SECOND STAGE
 ZWEITE STUFE
 DEUXIEME ETAGE
 SEGUNDA ETAPA
 SEGUNDO ESTÁGIO
 TWEDE TRAP
 ANDRASTEG
 ΔΕΥΤΕΡΟ ΣΤΑΔΙΟ
 ANNOTIN
 DRUGI STOPIEN
 MÁSODIK LÉPCSŐ

Membrana
 Diaphragm
 Membran
 Membrane
 Membrana
 Diafragma
 Membraan
 Membran
 Διάφραγμα
 Kalvo
 Membrana
 Membrán

Pressione dell'acqua
 Water pressure
 Umgebungsdruck
 Pression de l'eau
 Presión del agua
 Pressão da água
 Waterdruk
 Vattentryck
 Πίση νερού
 Veden paine
 Ciśnienie wody
 Víznyomás

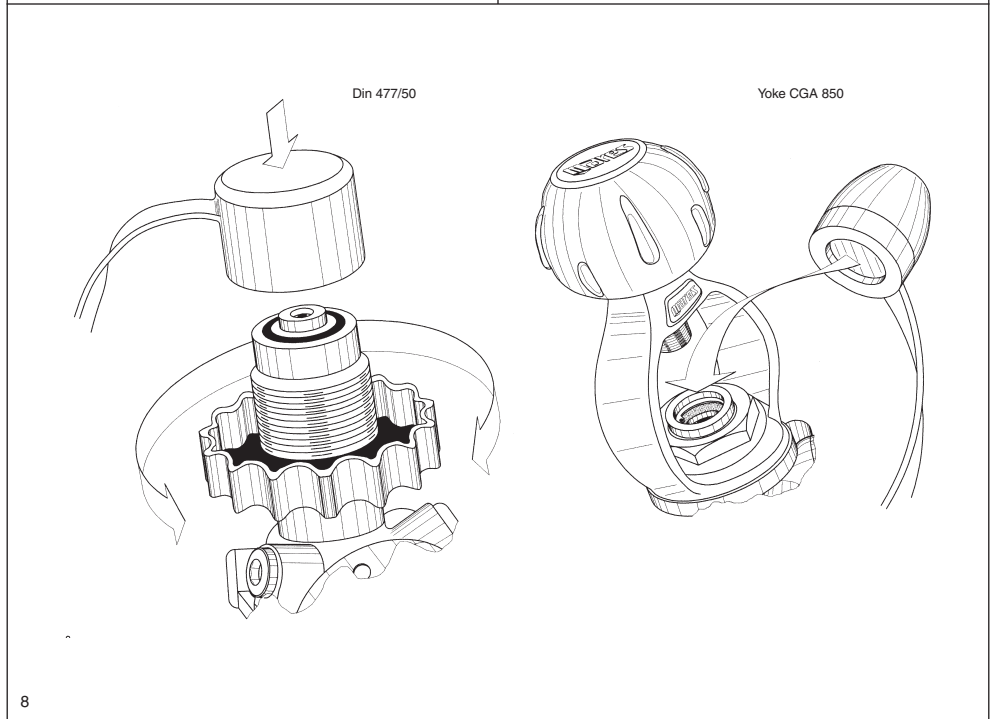
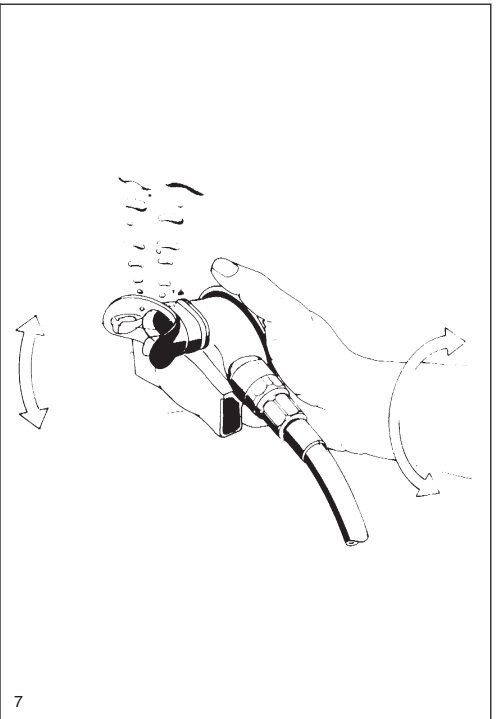
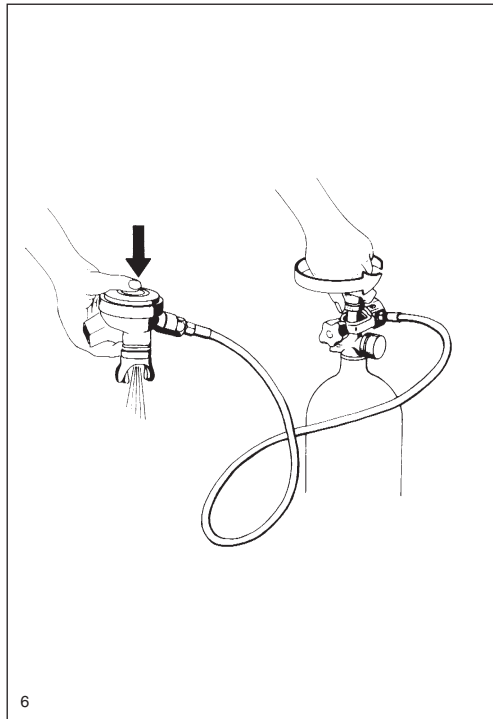


Pressione intermedia
 Intermediate pressure
 Mitteldruck
 Moyenne pression
 Presión intermedia
 Pressão intermediária
 Middendruk
 Medeltryck
 Ενδιάμεση πίση
 Välipaine
 Średnie ciśnienie
 Közbenő nyomás

Flusso dell'aria
 Air flow
 Luftstrom
 Flux d'air
 Flujo de aire
 Fluxo do ar
 Luchtstroom
 Luftström
 Ποή αέρα
 Ilmavirta
 Przepływ powietrza
 Légáramlás

Bassa pressione
 Low pressure area
 Niederdruckbereich
 Basse pression
 Baja Presión
 Baixa pressão
 Laga druk
 Lågtrycksområde
 Περιοχή χαμηλής πίεσης
 Matalapainealue
 Strefa niskiego ciśnienia
 Kisnyomású zóna

5



mares[®]

