REGULATORS

MR32 ABYSS

⚠ 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 MARES 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)	Cold Water (Temp. < 10°C)	Marking	Position
MR32 Abyss	approved	approved	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):

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.

⚠ 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 Units (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. 1a.
- Pressure max 300 bar (DIN 477/50 screw) Fig. 1b.
- 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

Diving in cold water (below 10 °C) without special training and equipment may cause serious injury or death. Before diving in cold water, obtain special training from a certified diving instructor. Since it is not possible to prevent a regulator from freezing under any and all conditions, MARES regulators too, though equipped with a CWD Kit, might undergo "freeze-up" phenomena. Should this happen, regulators may not function properly and could cause serious injury or death. Therefore, to minimize risks, appropriate training is required to prevent or cope with any problems caused by a regulator affected by "freeze- up" phenomena.
The following precautions must be taken when diving in cold water:
1) Do not breath from or exhale through the regulator when out of the water.
2) Press the purge button only when underwater, and then very gently and for very 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.

⚠ 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 1st 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 2nd stage shown in Fig. 4 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.

MR32 First Stage (Fig. 2)

The MR32 diaphragm first stage features the DFC system and a replaceable HP seat connector.
The high pressure poppet was designed for a "2 year or 200 dives" service interval; double the high pressure seat life standard!
Compact body, in a modern and smart style, it is made of hot-forged nickel-plated and chromed brass.
It is fitted with a preferential intermediate pressure port for connection to the primary second stage, plus 3 other LP ports and 2 HP ports with 7/16" UNF thread.
The latter are inclined at a 45° angle to allow a more rational layout of hoses.

DFC System

The exclusive MARES DFC system featured on the MR32 first stage minimizes the intermediate pressure drop which occurs in all regulators during the inhalation phase (Fig. 3). This phenomenon is all the 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. The MR32 first stage incorporates the DFC system on the preferential LP port for the primary second stage, whereas the operation of the other low pressure ports (for octopus, inflator, etc.) is standard.

CWD Kit

For particularly demanding conditions, such as professional use in cold or contaminated water, the MR32 first stage can be retrofitted with the CWD kit which completely seals off all first stage internal components from contact with the water. The CWD kit should only be installed by an authorized MARES service centre.

Abyss second stage

Abyss second stage, with its V.A.D. system, is made of nickel and chrome-plated brass. This material offers a number of benefits: absolute ruggedness and thinner walls, hence compact dimensions obtained without using smaller-diameter diaphragms; this results in reduced water drag.
Anti-freeze function, which is enhanced by the "radiator action" of the metal.
The second stage coverplate features the new "mesh-grid" system for water inflow and outflow, which provides a further performance improvement.
Furthermore, the compact and ergonomic exhaust tee ensures superior hydrodynamic performance and reduced exhalation resistance.
The mouthpiece is made of soft hypoallergenic silicone: limiting jaw fatigue and offering a secure fit even after very long dives.

V.A.D. System (patented)

The Abyss second stages features the exclusive V.A.D. (Vortex Assisted Design) system, patented by MARES. This system, which ensures low inhalation effort at all depths, uses a by-pass tube to route the air coming in from the hose through the second stage valve directly into the mouthpiece (Fig. 4). Inside the mouthpiece, the air takes on a "vortex" flow pattern, a the centre of which a low pressure zone is formed. This low pressure contributes to keeping the second stage diaphragm flexed during the inhalation phase, thereby increasing the sensitivity of the regulator.

Abyss Technical specifications	**first stage**	**second stage**
Operation	bilanciamento a membrana DFC system	VAD system
Materials: metal parts	high-resistance moulded brass - stainless steel	
Non-metal parts seals and diaphragms	high-resistance technopolymers nitryl rubber - silicone rubber	
Flow rate (air supply 180 bar)	4800 l/min	2400 l/min
Intermediate pressure: air supply 300 bar air supply 232 bar air supply 30 bar	from 9.8 to 10.2 bar from 9.8 to 10.2 bar from 9.8 to 10.2 bar	
First stage ports: intermediate pressure high pressure	n°2 7/16" UNF n°1 1/2" UNF DFC (principal) n°3 3/8" UNF	
Hose type: standard length	super flow 1/2" 85 cm	
Weight	1135 g INT / 947 gr DIN	257 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 the hoses 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 OPERATING INSTRUCTIONS

- Ensure that all the hoses have been correctly assembled onto the first 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 pressurised.
- 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 (Fig. 5).
- 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 submersible pressure gauge, making sure that it indicates the expected tank pressure and that this pressure is sufficient for the planned dive.
- Check for any leaks in the connection between the tank and regulator. If a leak is found, it may be due to incorrect assembly of the regulator on the tank valve, or to a damaged O-ring inside the tank valve.
- To ensure that the air delivery of the regulator is correct, first exhale through the mouthpiece to expel any impurities from the second stage, then inhale. Repeating these actions a few times will allow you to quickly identify any major problems.

⚠ WARNING

Do not use any type of adapter to attempt to connect the low pressure hose to the high pressure port, as this may lead to serious injury. The low pressure components are not constructed to withstand pressures higher than 285 psi.

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.

AFTER-DIVE OPERATIONS - MAINTENANCE

Your regulator should ideally be rinsed with fresh water when it is still pressurized. This allows the second stage to be thoroughly washed without introducing any impurities into its important sealing components. Rinse the first stage, and also run water into the second stage mouthpiece and out through the exhaust ports. If the regulator is not pressurized, do not press the purge valve during washing. Pressing the purge valve would allow impurities to enter the valve seat, which might give rise to leaks. To prevent contamination of the filter and first stage, do not allow water to enter the air inlet of the first stage. Place the dust cap on the first stage filter and secure it with the yoke nut (Fig. 8). Allow the regulator to dry completely before putting it away. If the regulator is stored for prolonged periods in environments that are greasy, dusty or exposed to direct sunlight, some of its components might be damaged. Lubricants are not necessary, and in fact should not be used in routine maintenance operations.

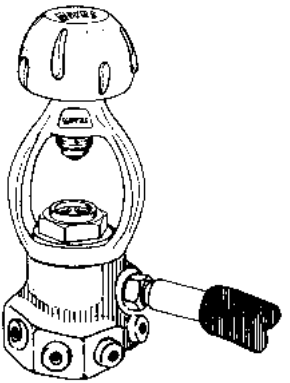
⚠ WARNING

The correct operation of your regulator also depends on proper maintenance. It is therefore advisable to have your regulator serviced at least once a year by an authorized MARES service center. In particular, it is recommended to replace the first stage valve after 2 years of use or 200 hours of diving. Failure to observe this precaution may result in serious injury or death.

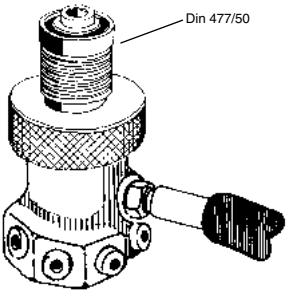
WARRANTY CARD

On purchasing a MARES regulator you will receive a permanent "Original Owner Identification Card" made of durable plastic. This card is embossed with the model and serial number of your regulator. Write your name and sign in the spaces provided. Keep this card, which may be used at any Authorized MARES Service Centre world-wide for servicing the regulator.

Yoke CGA 850



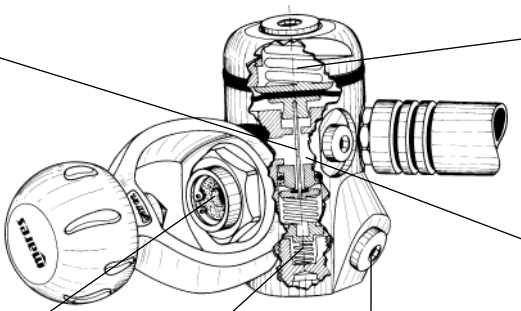
1a



1b

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

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



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

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

Uscita LP 7/16" UNF
7/16" UNF LP port
7/16" UNF Mitteldruck-(LP) Anschluss
Salida LP 7/16" UNF
Saída LP 7/16" UNF
7/16" UNF lagedrukpoort
7/16" UNF LP-port
Έξοδος LP 7/16" UNF
Matalapaine-ulosotto 7/16"
UNF-kierteellä
Port UNF LP 7/16"
7/16" UNF LP csatlakozó

Sede valvola alta pressione
HP seat connector
Hochdruck-(HP)ventilsitz
Siège haute pression
Asiento de la válvula de alta presión
Assento válvula alta pressão
Hogedrukklepzitting
HP-säteskoppling
Σύνδεσμος βάσης HP
Korkeapaineistukan vastakappale
Złącze gniazda HP
Nagynyomású csatlakozóaljzat

PRIMO STADIO ABYSS
ABYSS FIRST STAGE
ERSTE STUFE ABYSS
PREMIER ÉTAGE ABYSS
PRIMERA ETAPA ABYSS
PRIMEIRO ESTÁGIO ABYSS

EERSTE TRAP ABYSS
ABYSS-FÖRSTASTEG
ΠΡΩΤΟ ΣΤΑΔΙΟ ABYSS
ABYSS PAINEENALENNIN
PIERWSZY STOPIEŃ ABYSS
ABYSS ELSŐ LÉPCSŐ

2

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

Verschil in terugval middendruk tijdens inademing
Skillnad i mellantryck under inandning
Διαφορά στην πτώση της ενδιάμεσης πίεσης κατά την εισπνοή
Välipaineen muutos sisäänhengityksen aikana
Różnica w spadku średniego ciśnienia podczas wdechu
A közbenső nyomásesés különbsége belégzés közben

Primo stadio tradizionale
Traditional first stage
Herkömmliche erste Stufe
Premier étage classique
Primera etapa tradicional
Primeiro estágio tradicional

Traditionele eerste trap
Traditionellt förstasteg
Κλασικό πρώτο στάδιο
Perinteinen paineenalennin
Tradycyjny pierwszy stopień
Hagyományos első lépcső

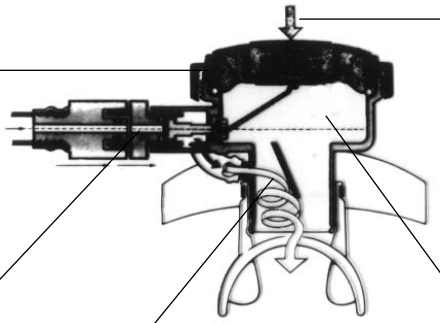
Primo stadio con D.F.C.
D.F.C. first stage
DFC erste Stufe
Premier étage D.F.C.
Primera etapa con DFC
Primeiro estágio com D.F.C

Eerste trap met D.F.C
D.F.C. förstasteg
Πρώτο στάδιο D.F.C.
D.F.C. -paineenalennin
Pierwszy stopień D.F.C.
D.F.C. (dinamikus áramlásszabályozó) első lépcső.

3

SECONDO STADIO
SECOND STAGE
ZWEITE STUFE
DEUXIEME ETAGE
SEGUNDA ETAPA
SEGUNDO ESTÁGIO

TWEEDE TRAP
ANDRASTEG
ΔΕΥΤΕΡΟ ΣΤΑΔΙΟ
ANNOSTIN
DRUGI STOPIEŃ
MÁSODIK LÉPCSŐ



Membrana
Diaphragm
Membran
Membrane
Membrana
Diafragma
Membraan
Vattentryck
Διάφραγμα
Veden paine
Membrana
Membrán

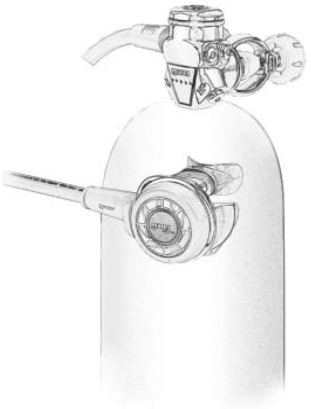
Pressione dell'acqua
Water pressure
Umgebungsdruck
Pression de l'eau
Presión del agua
Pressão da água
Waterdruk
Membran
Πίεση νερού
Kalvo
Ciśnienie wody
Víznyomás

Pressione intermedia
Intermediate pressure
Mitteldruck
Moyenne pression
Presión intermedia
Pressão intermediária
Middendruk
Luftström
Ενδιάμεση πίεση
Ilmavirta
Średnie ciśnienie
Közbenső nyomás

Flusso dell'aria
Air flow
Luftstrom
Flux d'air
Flujo de aire
Fluxo do ar
Luchtstroom
Medeltryck
Ροή αέρα
Välipaine
Przepływ powietrza
Légáramlás

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

4



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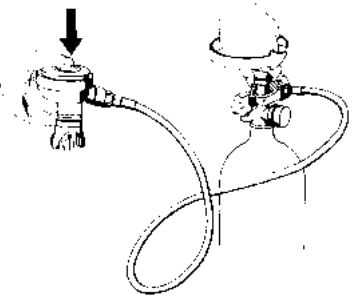

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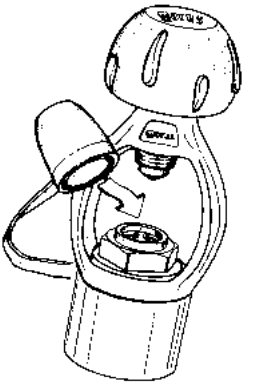

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