INTERSPIRO

Keeps You Breathing

ENGLISH

Divator MKIII

User manual

99885G01

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1 APPROVALS

The Interspiro Divator MKIII apparatus has been tested in accordance with EN 250 for types of use specified by DEKRA EXAM GmbH, Dinnendahlstr. 9; 44809 Bochum, Germany. EC Type-examination (Directive 89/686/EEC) by SGS Yarsley ICS Ltd (Notified Body No 0120).

Divator MKIII has been approved for a range of 0–50 meters (0-164 feet) depth and for cold water temperatures down to 4±2°C (39.2 ± 3.6°F) in accordance with EN 250.

Divator MKIII is approved as Personal Protective Equipment (PPE) in accordance with the German VFDB 0810:2015-09, Annex 03, “Open Circuit Self Contained Compressed Air Diving Apparatus”.

2 SAFETY NOTE

WARNING!

BEFORE THE DIVATOR MKIII SYSTEM IS USED FOR THE FIRST TIME, THE USER MUST HAVE BEEN TRAINED IN ITS OPERATION, READ THIS USER MANUAL AND TAKEN A PROFICIENCY TEST IN THE PRESENCE OF A RESPONSIBLE TRAINER OR DIVING SUPERVISOR. IF THIS DOES NOT TAKE PLACE, THE USER MAY BE AFFLICTED WITH PERSONAL INJURY OR DEATH, WHICH CAN HAVE SERIOUS CONSEQUENCES FOR PEOPLE OR PROPERTY THAT ARE TO BE RESCUED.

2.1 RISK INDICATORS

This user manual contains warning information specified as DANGER! WARNING! and CAUTION! to indicate risks and dangers that are associated with the use of the Divator system. The degree of danger that can arise is indicated with these warning symbols:

DANGER!

Indicates an imminent risk situation, which, if not avoided, will result in death or a serious personal injury.

WARNING!

Indicates a potential risk situation, which, if not avoided, can result in death or a serious personal injury.

CAUTION!

Indicates a potential risk situation, which, if not avoided, can result in a minor or moderately severe personal injury. It is also used as a warning for hazardous procedures.

Not adhering to the instructions associated with these warning symbols can result in the equipment not working as intended, a major personal injury or death.

2.2 RESPONSIBILITY OF THE OWNER AND USER

DANGER! All users of the Divator system must be certified by a nationally or internationally recognized diver training organization. The users must also be adequately trained in use of the Divator system by a certified diving instructor with exhaustive knowledge and practical experience of the Divator system.

WARNING! High-pressure systems for gas should be handled carefully. Damage to pressurized components can result in personal injury or death. Interspiro disclaims all responsibility for injuries that occur as result of the instructions in this user manual not being adhered to.

WARNING! Before the Divator system is used, the user must make sure that the system has been correctly inspected and maintained. (see Chapter 11 “Maintenance and testing schedule” and Chapter 12 “Maintenance”).

WARNING! All users of the Divator system must be regularly trained in shallow water on emergency procedures so that their readiness capacity is maintained in the event of a real emergency situation.

WARNING! SCUBA complying with EN 250 are not intended for more than one user to breathe from at the same time.

WARNING! 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.

Comment: Divator MKIII has been tested with two simultaneous divers and passed the cold water performance requirements according to EN 250:2000.

WARNING! If SCUBA are configured and used by two divers the maximum depth must not exceed 30 meters (98 feet) and the water temperature must not be less than 4 °C (39.2°F). [EN 250:2014]

WARNING! Only approved components and modules may be replaced. [EN 250:2014]

3 TECHNICAL DESCRIPTION

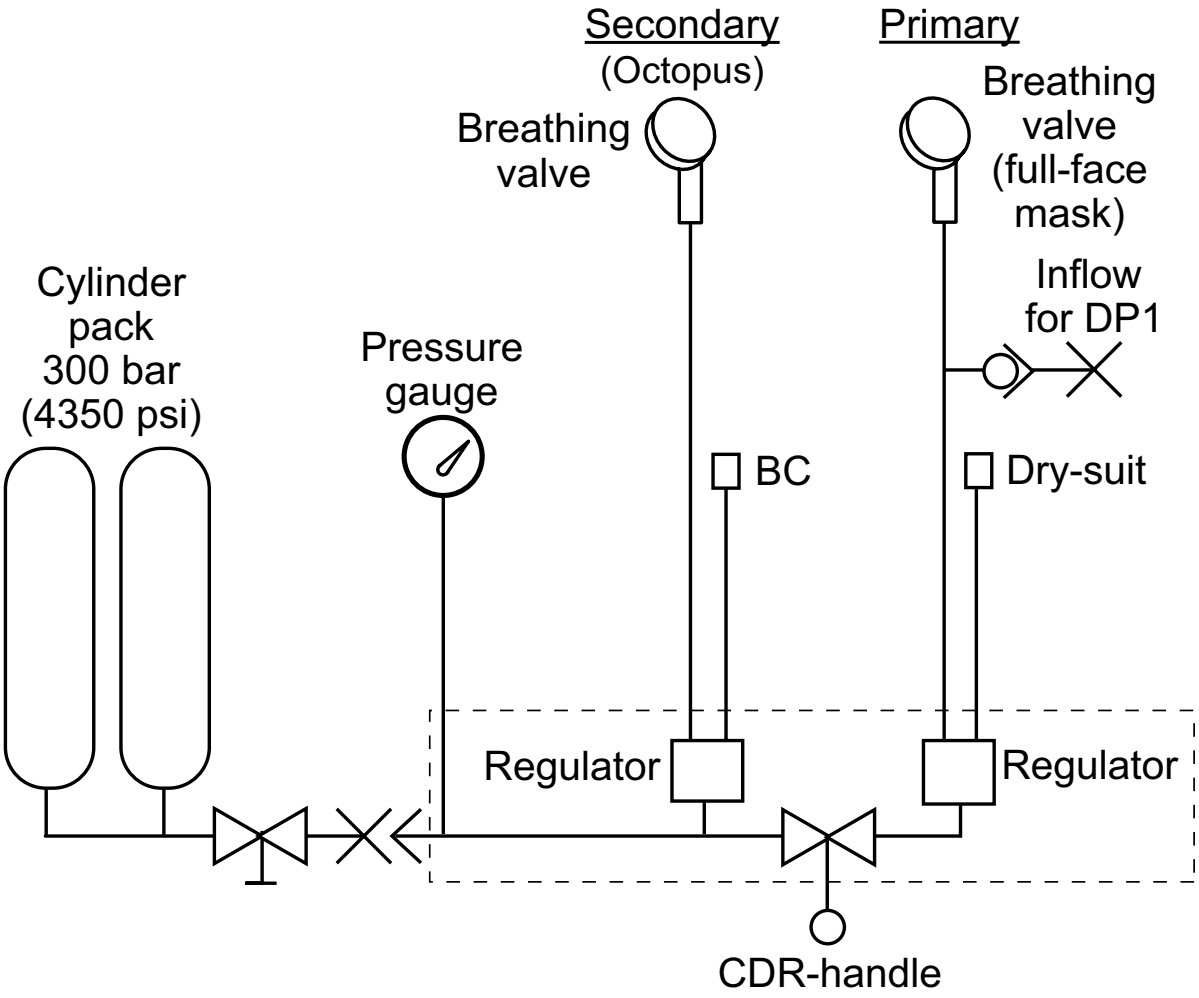
3.1 SCOPE

• The Interspiro Divator system encompasses the Divator MKIII SCUBA (Self Contained Underwater Breathing Apparatus) diving apparatus and the Divator DP1 Supply Hose System.

This user manual applies to the following components of the Divator MKIII diving apparatus:

- Divator Full-Face Mask.
- Divator MKIII Regulator.
- PED and DOT approved Divator cylinders.
- Divator BCW Vest (see Divator BCW User Manual).
- Divator Rescue BC Vest (see Divator Rescue BC User Manual).
- Divator Harness.
- Divator Breathing Valve with safety pressure.
- Divator Breathing Valve without safety pressure.
- Divator Octopus breathing valve.
- Divator Hatch (see Divator Hatch User Manual).
- Divator HUD, Heads Up Display (see Divator HUD User Manual).
- Divator Spectacles.
- Divator Mask Weights.
- Divator DP1 Supply Hose System for one or two divers (see Divator DP1 Supply Hose System User Manual).

3.2 DIVATOR MKIII SYSTEM DIAGRAM

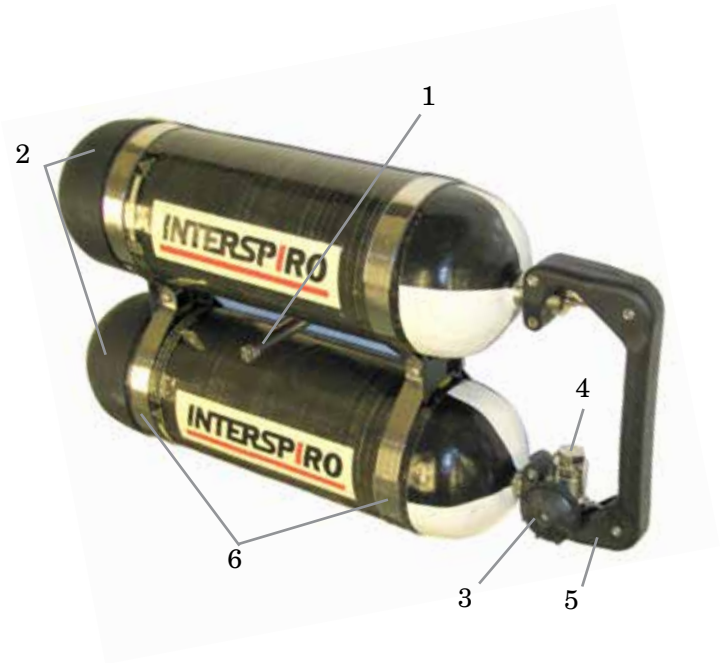


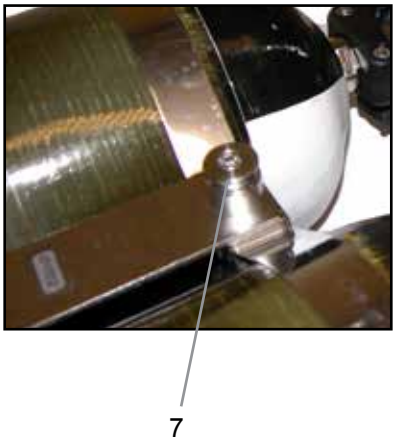
CDR = Closed-Diving-Reserve

3.3 DIVATOR MKIII SYSTEM

- The components in Divator MKIII

3.4 CYLINDER PACK





1 Weight bracket

2 Cylinder cover

3 Cylinder valve

4 Safety plug (23 mm open-ended wrench)

5 Carry handle with connecting pipe

6 Cylinder ring

7 Quick coupling for BC/harness

- The PED and DOT approved Divator Lite cylinder packs are available in two configurations. Divator Lite 323.4 is a two-cylinder pack with two times 3.4 liters and 300 bar (75 cubic feet, 4350 psi) and Divator Lite 326.7 is a two-cylinder pack with two times 6.7 liters and 300 bar (140 cubic feet, 4350 psi).

The Divator Lite cylinders are fully composite cylinders with plastic inserts that are wound with carbon fiber and fiber glass.

Divator MKIII can also be equipped with 4 or 6 liter steel cylinder packs

The cylinder pack consists of two cylinders assembled with two stainless steel tension ties. The cylinders have a common valve mounted on one of the cylinders; the cylinders are then coupled via the connection pipe that is protected by the carrying handle.

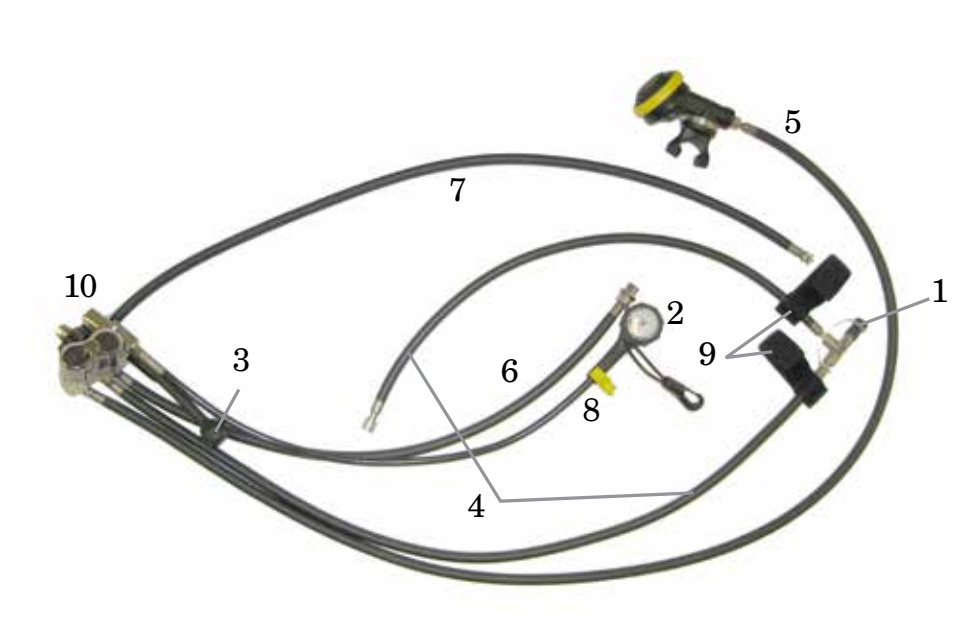
To close the cylinder valve, the knob on the cylinder must be pressed in and subsequently turned. This prevents unintentional closing of the valve.

The cylinder pack's safety disc is designed to break at a pressure of 450 ±50 bar (6525±725 psi).

Impacts against the cylinder pack can cause skewing and/or damage that weakens the unit. Skewing and damage must be checked and rectified. Negligence when handling the cylinder with its weight fitted may result in deformation of the retaining pin or weight bracket.

Information about filling the cylinders can be found in Chapter 8 “Filling”.

3.5 MKIII REGULATOR UNIT



1 External coupling for supply hose diving with DP1.
2 Pressure gauge
3 Reserve valve handle (CDR)
4 Primary breathing hose (two parts)
5 Secondary breathing hose (octopus), with octopus breathing valve
6 Dry-suit hose (optional)
7 BC hose (optional)
8 Clamp for secondary breathing valve
9 Holder (one or two depending on model)
10 Regulator block with anti-freezing caps

• The air from the cylinder pack is fed to the pressure regulators that reduce the high pressure to an intermediate pressure. The air is then led through the intermediate pressure hoses to the breathing valves.

The regulator unit comprises two pressure regulators in a connecting pipe with a reserve valve. The primary pressure regulator has two hoses connected. One of them feeds the primary breathing hose with its primary breathing valve regardless of whether it is connected to a full-face mask or a mouthpiece. There is a quick coupling on the hose that interacts with the external surface air supply. The other hose is intended for inflating dry-suits (Optional).

The secondary pressure regulator has two hoses connected. One of them feeds the secondary breathing hose (the octopus hose) with its octopus breathing valve. The other hose is intended for Divator BCW or Divator Rescue BC, buoyancy compensating vest (Optional).

The regulator unit is connected to the cylinder valve with a coupling that is tightened by hand. The regulator unit cannot be loosened without the air first being ventilated from the system. The pressure regulator is a piston-type with extremely high air flow capacity. To make the regulator small and light, the piston has been balanced, which also guarantees stable and even intermediate pressure. The pressure in the air cylinders can be controlled on the pressure gauge, which is connected to the regulator with a high-pressure hose.

3.5.1 WORKING PRINCIPLE

• The pressure regulator is a pressure-balanced, piston-equipped counter-flow regulator. The result of balancing is firmly reduced pressure (intermediate pressure) that is not affected by pressure fluctuations in the air supply (high-pressure).

The regulator opens at corresponding gas pressure. The principle is called downstream regulation. Thanks to this, the regulator can regulate pressure from the maximum flow rate to a minimum supply pressure of approximately 15 bar (218 psi).

The regulator reduces the highest pressure to 8.5 bar (123 psi) dynamic pressure. The constant pressure regulation results in a sharp temperature drop. If the air is humid, ice crystals can form thereby risking blockage to the air supply. This is called “internal freezing” and can cause total air stoppage. For this reason, dry and clean air must always be used. Information about quality requirements for the air can be found in chapter 8 "Filling".

3.5.2 HIGH-PRESSURE HOSE

• The high-pressure hose consists of a plastic inner hose (sealing layer) clad in metal and aramid (pressure load absorption) with an outer black plastic jacket of polyurethane (wear protection). Airflow to the high-pressure hose is limited by an orifice. This minimizes a rapid pressure drop in the event of a hose rupture, and protects the pressure gauge from pressure impacts.

3.5.3 RESERVE VALVE HANDLE (CDR)

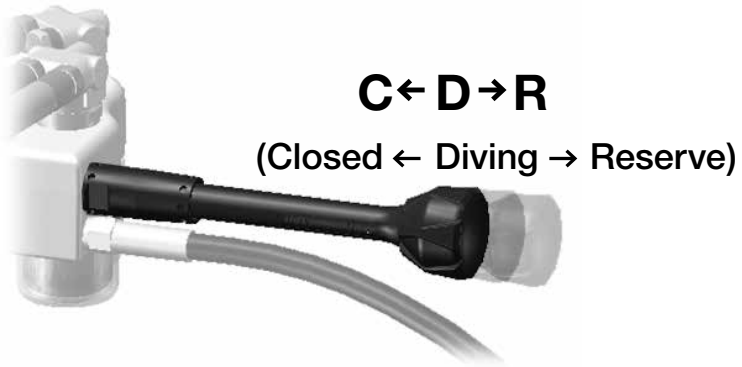
• The reserve valve handle is used to switch between different air supply units. Air is added either from the DP1 Supply Hose System, from the diver's cylinder pack or from the cylinder pack's backup volume. The reserve valve handle is sometimes called the “CDR handle”, whereby CDR represents the handle's 3 positions: Closed - Diving - Reserve.

When diving with surface air, e.g. DP1, the reserve valve handle should be in closed (C) position in order to ensure that only air from the surface is used. If for some reason the surface air supply is interrupted, the diver will receive a warning since air is not being supplied from the cylinder pack. If the surface air supply is interrupted, the diver can simply pull the reserve valve handle to activate the air supply from the cylinder pack.

For independent diving when only air supply from the cylinder pack is used, the reserve pressure handle must be opened by pulling it out to diving position (D) so that the air supply from the cylinder pack is activated.

When the cylinder pressure falls to about 65 bar (943 psi), the air supply warning is activated (which is indicated by increased breathing resistance). In this case, the diver should pull out the reserve valve handle to the reserve position (R) in order to subsequently utilize the cylinder pack's reserve air volume.

Pull for air in all diving positions!



3.5.4 REDUNDANT BREATHING SYSTEM

- The regulator unit comprises two pressure regulators. The primary regulator provides the primary breathing valve or the full-face mask valve with intermediate pressure air, and the secondary regulator provides the octopus breathing valve with intermediate pressure air.

The primary regulator receives air via the reserve valve handle, while the secondary regulator is always directly supplied with air from the air cylinders. Thus the system has a backup system. The diver can always obtain respiratory air in three different ways:

- If the surface air supply from the DP1 Supply Hose System is interrupted - Pull out the reserve valve handle to switch to air supply from the cylinder pack.
- If only a limited cylinder capacity (volume) remains - Pull out the reserve valve handle to switch to the reserve air volume.
- If the primary breathing valve or the full-mask valve does not work – Press in the reserve valve handle to the closed position and use the octopus breathing valve. Alternatively, if possible, pull the CDR handle, take a breath and close the CDR handle. Repeat this while ascending to the surface. If this does not work, go over to the octopus breathing valve permanently!

Surface air supply does not work

If the air supply from the DP1 Supply Hose System is interrupted, the diver will receive an insufficient amount of air or no air at all. In emergency situations, the diver should simply pull the reserve valve handle to activate the air supply from the cylinder pack.

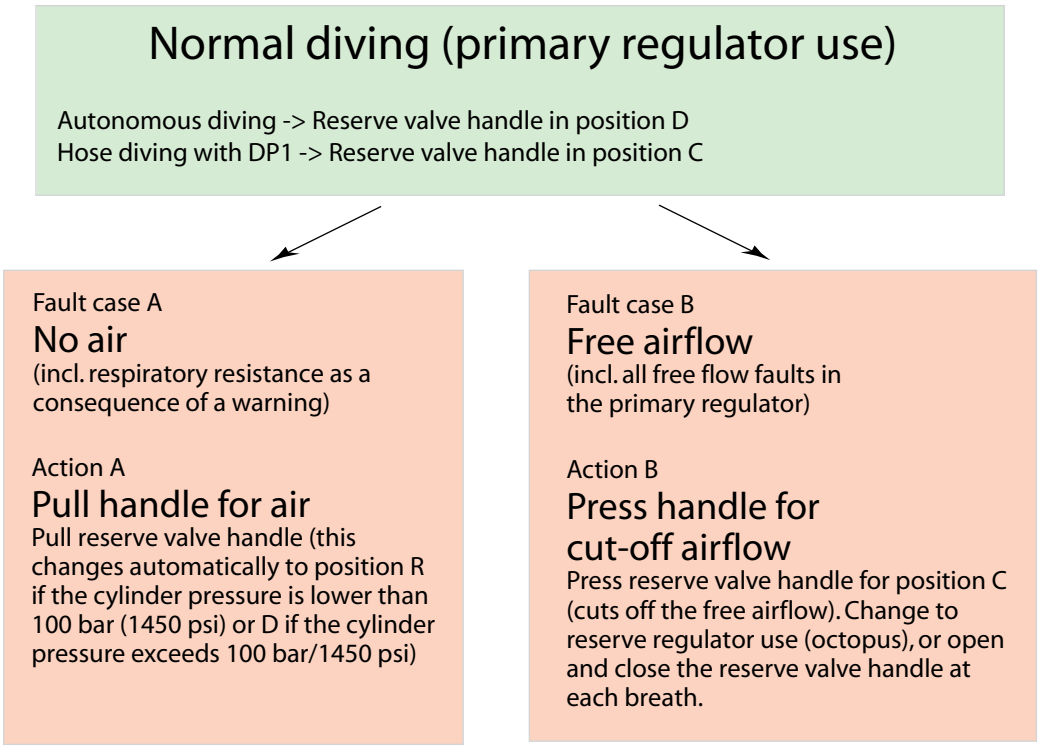
Air supply warning

If cylinder pressure drops to approximately 65 bar (943 psi), the air supply warning will be activated. This will result in a reduction in air flow from the primary breathing valve or full-face mask valve, which the diver will perceive as a respiratory resistance.

In this case, the diver must pull out the reserve valve handle to the reserve position (R) in order to utilize the remaining reserve air volume of the cylinder pack.

Malfunction in primary breathing valves

If the primary breathing valve does not work (e.g. as a result of freezing) resulting in insufficient air or no air, the diver should depress the reserve air handle (to close the air-flow) and change to the octopus breathing valve. Always check the pressure on the pressure gauge after changing the air supply. Start your ascent to the surface.



3.5.5 PRESSURE GAUGE

• Pressure in the cylinder pack can be read from the pressure gauge. The pressure gauge is connected to the regulator's connecting pipe via a high-pressure hose. The air pressure affects a Bourdon tube (a pipe-shaped spring) in the pressure gauge, which in turn affects the indicator. The safety valve (behind the rubber covering) on the rear of the pressure gauge opens if the pressure in the pressure gauge casing rises too much. The rubber covering protects the pressure gauge from impact damage and dirt.

3.6 BREATHING VALVE

• The Divator breathing valve is available in three designs:

(1) Primary with safety pressure

(2) Primary without safety pressure

(3) Secondary (octopus) with locking handle and without safety pressure

The primary breathing valves are available in black or gray. The octopus breathing valve in only available in black with a yellow protective ring.

The primary breathing valves are mounted in the face mask using a bayonet coupling. All breathing valves are demand valves that supply the diver with air only during inhalation.

The Divator breathing valve is balanced and maintains an extremely low respiratory resistance at all diving depths, even if secondary pressure varies.

The breathing valve is also designed to function as a safety valve for the first-stage regulator. If secondary pressure from the first-stage regulator increases to approximately 14 bar (203 psi), the overpressure valve on the breathing valve opens. This prevents overpressure in the secondary system components.

As an additional safety feature, there is a check valve in the inhalation channel to prevent water from penetrating the valve mechanism where it can freeze and cause the valve to stick in open position.

3.6.1 PRIMARY BREATHING VALVE COMPONENTS (SAFETY PRESSURE)

1 Connection nipple	6 Locking ring
2 Check valve, inhalation channel	7 Protective ring
3 Bayonet coupling	8 Vent button
4 Diaphragm housing	9 Knob for safety pressure (only versions with safety pressure)
5 O-ring (not used with mouthpieces)	10 Locknut

• Interspiro recommends the use of a Divator breathing valve with safety pressure when diving in contaminated water.

A Divator breathing valve is designed to maintain a safety pressure of an approximately 35 mm (1.5 inch) water column in a full-face mask in atmospheric air. The safety pressure is activated automatically when the diver takes his or her first breath in the mask. The safety pressure reduces the risk of water leaking in (or contaminated air leaking in at the surface), which is very important when diving in contaminated water. Safety pressure in the mask is maintained regardless of the diver's air consumption.

If water enters the mask, it can simply be drained by pressing the vent button on the breathing valve. When the mask is removed, the safety pressure knob on the breathing valve must be pressed in (closed) against the valve housing.

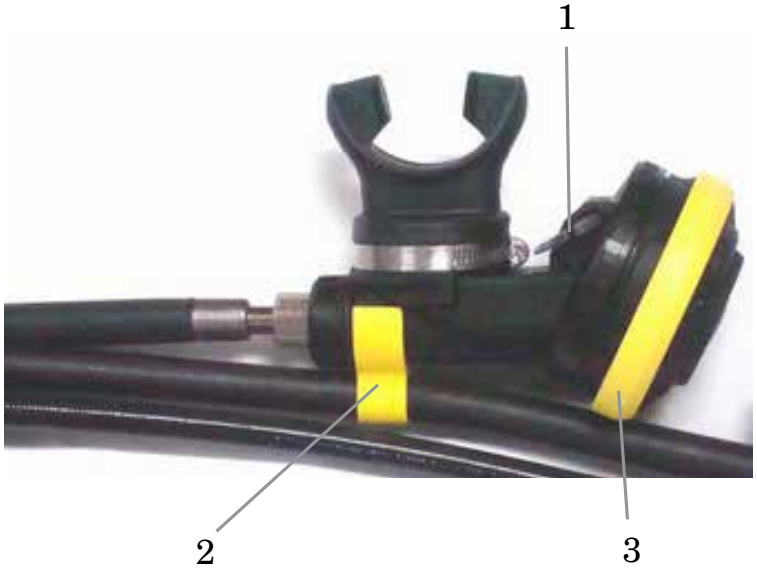
DANGER! The Divator breathing valve with safety pressure must not be combined with a Divator mouthpiece due to the risk for uncontrolled airflow if the valve is dropped.

3.6.2 PRIMARY BREATHING VALVE WITHOUT SAFETY PRESSURE.

• The Divator breathing valve without safety pressure has no extra safety pressure in the full-face mask at atmospheric pressure, but is ideal with regard to diving conditions as it still provides a weak overpressure. Otherwise, its functionality is identical to the Divator breathing valve with safety pressure.

A rubber sealing plug replaces the safety pressure knob, and there are also a number of different inner components.

3.6.3 SECONDARY OCTOPUS BREATHING VALVE



1 Locking handle

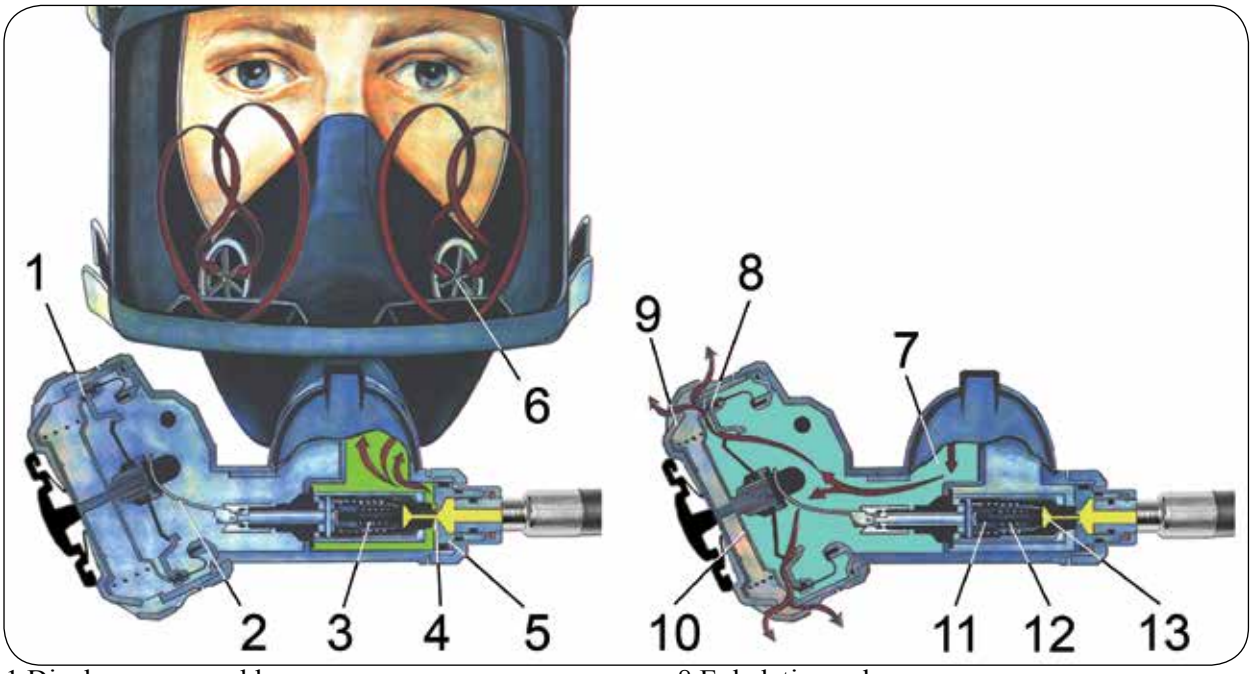
2 Clamp

3 Protective ring

• A Divator Octopus breathing valve is recognizable by its yellow protective ring and clamp. The octopus breathing valve is the type that does not have any safety pressure but is equipped with a locking lever. The locking lever locks the valve against unintentional free airflow.

3.7 FULL-FACE MASK AND BREATHING VALVE

The mask has an inner mask with separate inhalation and exhalation channels that match corresponding channels in the breathing valve. This ensures that inhalation and exhalation air is never mixed. During inhalation, air flows from the breathing valve up through the mist protection openings, over the inside of the visor and continues through the check valves in the inner mask. During exhalation, the exhaled air exits into the surrounding water via the exhalation valve.



1 Diaphragm assembly
2 Lever arm
3 Sealing spring
4 Sealing cone
5 Connection nipple
6 Check valve (two)
7 Exhalation channel
8 Exhalation valve
9 Cover
10 Sealing disc
11 Overpressure valve piston
12 Overpressure valve spring
13 Balance diaphragm

The following text describes usage of the breathing valve. See figure above.

When the diver inhales, the diaphragm unit (1) is drawn inwards and presses against the lever arm (2). The lever arm lifts the sealing cone (4) from the valve seat on the connection nipple (5). Then air flows through the inhalation channel into the inner mask through the check valves (6). When the diver stops inhaling, the diaphragm unit (1), the lever arm (2) and the sealing cone (4) return to their starting positions and the inflow is closed by the sealing spring (3). When the diver exhales, exhalation air flows from the inner mask through the exhalation channel (7) and the exhalation valve (8), and lifts the sealing disc (10). Then the exhalation air flows out into the surrounding water through the gaps in the cover (9). The overpressure valve mechanism functions as a safety valve for the first-stage regulator by automatically opening the sealing cone if the secondary pressure increases to between 14 and 20 bar (203-290 psi). For example, this can happen when the regulator is leaking. When this happens, the overpressure valve spring (12) can no longer withstand the pressure against the central section of the balance diaphragm (13). The back-pressure piston is then pressed inwards so that the valve mechanism is lifted and pulls the sealing cone off the valve seating. Air then flows out until the pressure drops to approximately 10 bar (145 psi). The breathing valve has a check valve in the inhalation channel (not shown in the figure) that prevents water penetration, thereby minimizing the risk of freezing.

Regulations specify that breathing valves and face masks must regularly be cleaned and disinfected. In addition, breathing valves and face masks used by several persons must be cleaned and disinfected after each use. Interspiro recommends personal breathing valves and face masks as the most hygienic solution.

3.8 DIVATOR BCW VEST (BUOYANCY COMPENSATING WING)

Interspiro Divator BCW is a buoyancy compensator that combines high quality, durable design, weight integration and buoyancy. It is placed on the back of the diver.

Divator BCW's modular design enables switching between dry-suit and wet-suit diving. It is made of heavily reinforced 1050 denier ballistic nylon. Divator BCW has been adapted for a number of different options and accessories such as separate emergency filling cylinder, breathing bags, pockets and adapted equipment attachments.

Divator BCW is available in four sizes: Small, Medium, Large and Extra Large.

Additional information is available in the Divator BCW User Manual.

3.9 DIVATOR RESCUE BC

The Divator Rescue BC blader is inflated and drained of air during diving using the power inflator. The bladder has three dump valves. One on the lower right back side (or left), and one on each shoulder.

A rescue air inflation cylinder is attached to the back (left or right) of the bladder, which is used to quickly inflate the bladder for emergency ascent (buoyancy)..

The Divator Rescue BC has four buoyancy pockets, two on the back side of the vest and two on the front.

Additional information is available in the Divator Rescue BC User Manual.

3.10 DIVATOR HARNESS

The Divator harness is used instead of the Divator BCW or the Divator Rescue BC when diving with the front-mounted buoyancy vest or with a dry-suit and there is no need for extra buoyancy, e.g. when underwater work is being carried out in an upright body position with connection to surface air. There are several different versions of the Divator harness.

3.11 DIVATOR DP1 SUPPLY HOSE SYSTEM

• Additional information about the Divator DP1 Supply Hose System is available in the Divator DP1 Supply Hose System User Manual.

4 PREPARATIONS BEFORE USE

CAUTION! It is of great importance that the measures stipulated in Section “12.3 Control and inspection” have been carried out before the equipment is prepared for use.

4.1 ANTI-FREEZING CAPS

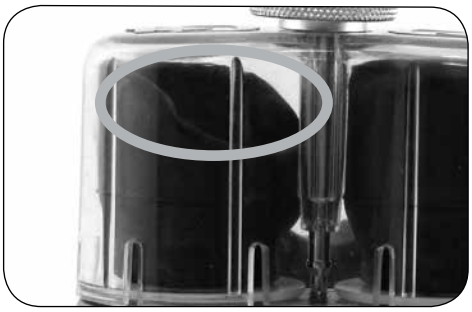
The diver must carry out a visual inspection of the anti-freezing unit before beginning a dive.

The inspection should ensure that anti-freezing cover is mounted in the correct position, that screws are tightened and that the anti-freezing caps are correctly mounted and not kinked.

Examples of incorrectly mounted anti-freezing units and a correctly mounted one are shown below.

Kinked anti-freezing cap

- Not acceptable for diving!

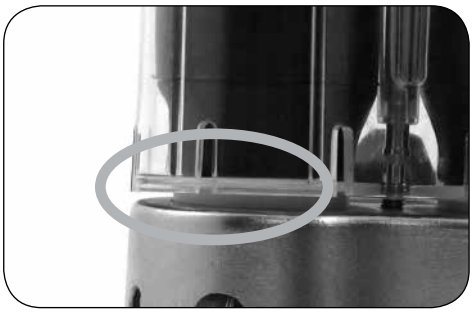


Incorrectly mounted anti-freezing cap.
The white base is visible.

- Not acceptable for diving!

Incorrectly mounted anti-freezing cover.
There is a gap between the regulator block and the cover.

- Not acceptable for diving!



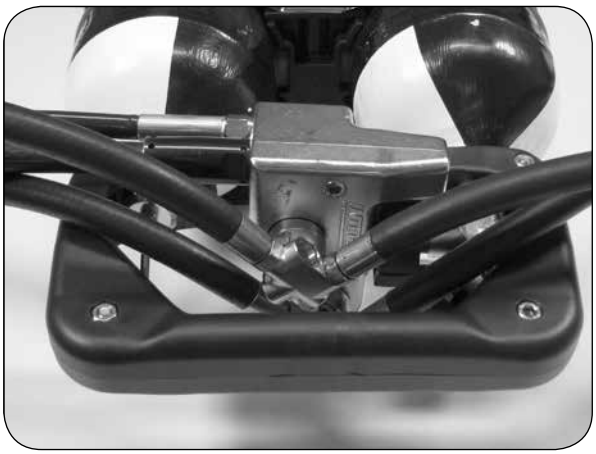
CORRECTLY mounted anti-freezing unit
with unkinked anti-freezing caps.

WARNING! The anti-freezing cap should only be disassembled if there is reason to suspect that the functionality or mounting of the anti-freezing unit is incorrect. If this is the case, see Section 12.3.5.
It is also very important to make sure that the anti-freezing unit is not exposed to water or dirt during disassembly and assembly. Always repeat the visual inspection described in Section 4.1 before diving.

4.2 MOUNTING AN MKIII REGULATOR UNIT AND CYLINDER PACK

- Mount the components in the following manner:

1. Place the cylinder pack on a flat surface with the cylinder valve facing you. Unscrew the safety plug from the threaded inflow. Make sure that the O-ring is not still in the opening.
2. Unscrew the yellow protective sleeve from the regulator unit's high pressure coupling. Check the O-ring. Connect the regulator unit between the cylinders and the carrying handle so that the anti-freezing cover is facing the cylinders.
3. Screw the knob coupling carefully into the cylinder valve and only tighten by hand. Arrange the hoses as illustrated in the figure below.



4.3 SECURING THE BC OR HARNESS

1. Align the quick coupling's rail with holes on the BC or harness with the quick coupling pins on the cylinder pack.

2. Attach the BC or harness in the cylinder pack by moving the rail with holes into place against the quick coupling's pins until it locks. Check that the quick coupling has locked by pulling on the BC or harness.

4.4 SECURING THE BC HOSE

1. Place the BC inflator hose between the rear of the BC unit and the cylinder pack. Allow the BC inflator hose to pass through on the inside of the BC's inflator connection.

2. Thread the BCW inflator hose through the eye of the Velcro strip. (If the BC is fitted with reflectors the hose must be placed under the reflector.)

3. Connect the BC inflator hose to the BC connection.

4.5 SECURING THE BREATHING HOSE IN THE BC

1. Place the breathing hose between the rear of the BC unit and the cylinder pack.

2. Move the hose up over the right shoulder strap on the BC and attach the Velcro strip over the breathing hose. (If the BC is fitted with reflectors the hose must be placed under the reflector.)

3. Attach the Velcro holders on the breathing hose around the right shoulder strap as illustrated in the figure. If necessary, adjust the length of the breathing hose to a suitable position.

4.6 SECURING THE OCTOPUS BREATHING VALVE IN THE HOSE

1. Carry out a visual inspection of the octopus to ensure it is not damaged.
   Tighten the locking nut and locking ring on the octopus breathing valve as described in Section 4.7 “Connecting the full-face mask”.
2. Connect the octopus breathing valve to the breathing hose if this has not already been done.
   Properly hand tighten the octopus breathing hose nut as described in Section 4.7 “Connecting the full-face mask”.

3. Fold and attach the octopus hose in the bungee cord/bungee cords. Place the hose between the BC breathing bag and the right side of the BC harness.

   Adjust the length of the octopus hose so that it runs parallel to itself and along the pressure gauge hose up to the pressure gauge, and ensure that it can be easily detached if necessary.

4. Connect the octopus breathing valve to the yellow clamp. Check that the octopus valve's locking lever is in locked (closed) position against the valve housing.
   The octopus breathing valve should now be easy to pull out for use as an emergency air unit.
5. Attach the pressure gauge on the vest using the included rubber line with hook so that the pressure gauge and octopus valve are kept upright.

4.7 CONNECTING THE FULL-FACE MASK

1. Carry out a visual inspection of all plastic, rubber and metal parts and ensure that there is no damage. Make sure that the rubber components do not exhibit signs of wear or cracking.

2. Ensure that the check valves in the inner mask are even and secured.

3. Make sure that the pressure equalization cushion is correctly placed and adjusted.

4. Check that the connection on the breathing valve is free from dirt and that the O-ring is in place in the breathing valve.

5. Connect the breathing valve to the mask by pressing it into the coupling device and turn counterclockwise so that it fastens in the bayonet joint.

6. If communication equipment is used, it should be connected at this point.

7. Mount the fixing cover to secure the position of the breathing valve and tighten the screws by hand. Do not overly tighten the screws as this may pull out the thread insert thereby damaging the mask.

   Make sure that the O-ring is in place and undamaged.

8. Check that the locknut on the breathing valve is properly tightened.

9. Check that the locking ring on the breathing valve is properly tightened.

10. Connect the full-face mask with the mounted breathing valve to the breathing hose. Securely hand-tighten the breathing hose nut. Close the safety pressure knob if that type of full-face mask is used.

4.8 CYLINDER WEIGHT

1. Check that the weight screws are tightened.
2. If the underlying weights are exchanged for another weight combination, an 8 mm Allen key should be used.

CAUTION! If any of the underlying brass weights are removed in order to reduce the total weight, each of these must be switched out with plastic replacement weights in order to retain weight strength and performance.

5 PREPARATIONS BEFORE DIVING

5.1 LEAKAGE AND FUNCTION TEST

5.1.1 LEAKAGE AND FUNCTION TEST FOR MKIII REGULATOR

Quick check of reserve valve

1. Close the reserve valve handle (position C) by pressing it in as far as possible.
2. Open the cylinder valve.

   Check that the pressure is > 270 bar (3916 psi).
3. Close the cylinder valve.

   Wait one minute.

   Pressure drop < 10 bar/minute (145 psi/min) = OK
4. Open the cylinder valve.
5. Vent the octopus breathing valve by pressing the air discharge button.

   Airflow? Yes = OK
6. Vent the primary breathing valve by pressing the air discharge button.

   Airflow? No = OK
7. Reset the lever on the primary breathing valve if an overpressure version is being used.
8. Pull out the reserve valve handle as far as possible.

   Is the reserve valve handle in middle position (D)? Yes = OK
9. Close the cylinder valve.
10. Release the pressure from the primary breathing valve by breathing slowly until the reserve position is triggered (the respiratory resistance increases until the air supply stops completely). Check that the air supply stops at an acceptable level above zero bar (or psi). (That is, the pressure gauge's red area.) Yes = OK
11. Pull out the reserve valve handle.

    Does the needle of the pressure gauge drop to approximately 0 bar (0 psi)? Yes = OK
12. Reset the lever on the primary breathing valve if an overpressure version is being used.
13. Open the cylinder valve before diving.

5.1.2 LEAKAGE AND FUNCTION TEST FOR BC

1. Inspect the BC vest so that it does not show any signs of material deterioration or wear.
2. If the primary breathing valve with safety pressure is used, it is important to ensure that the breathing valve knob is in the closed position. If the primary breathing valve without safety pressure is used, this step can be skipped.
2. Carefully open the cylinder valve completely if this has not yet been done. Close the valve a quarter of a turn!
3. Fill the vest's breathing bag with air until the overpressure valve opens.
4. Wait one minute and check that the breathing bag remains inflated and that no leaks can be observed.

CAUTION! If leakage is heard or observed, the BC must be taken out of operation and repaired by an Interspiro-certified service technician.

5. Close the cylinder valve if the Divator diving apparatus is not to be used right away.

Additional information is available in the Divator BCW User Manual, or Divator Rescue BC User Manual.

5.2 PUTTING ON THE APPARATUS

5.2.1 BC

1. Pull out the shoulder straps and waist buckles and don the apparatus with the cylinder valve facing downwards.
2. Adjust the shoulder straps by grasping the free ends and pulling them until the apparatus fits well and comfortably.
3. Tighten the belly-band and fasten it. Secure the waist buckle and pull the loose ends to tighten and secure.
4. Check that the reserve valve handle is accessible and not blocked by other equipment.
5. If a dry-suit is being used, the suit hose should be connected to the dry-suit's inflow valve.

5.2.2 HARNESS

1. Pull out each waist buckle to the end of each waist strap. Open both side buckles and pull out the shoulder straps. Don the apparatus with the breathing valve facing downwards.
2. Adjust the shoulder straps by pulling the waist straps until the apparatus fits well and comfortably. Close the harness's side buckles.
3. Secure the waist buckle and pull the loose ends to tighten and secure.
4. Check that the reserve valve handle is accessible to both hands and not blocked by other equipment.
5. If a dry-suit is being used, the suit hose should be connected to the dry-suit's inflow valve.

5.3 PUTTING ON THE FULL-FACE MASK

1. Pressurize the Divator diving apparatus according to the description in Section 5.1 “Leakage and function test”. If the Divator fresh air hatch is used, it should be opened.
2. Pull out the rubber straps on the rubber-band device as far as possible by grasping the metal buckles and pulling them out.

3. Adjust the pressure equalization cushion (there are several positions) so that it is easy to reduce the pressure in your ears and breathe through your nose unimpeded. Check that the pressure equalization cushion is correctly secured.

4. Don the Divator full-face mask by grasping the two lower rubber straps of the head harness and pulling it over your head.
5. Properly press your chin down into the mask's chin support. Press the mask tightly against your face to form a seal.

WARNING! Make sure that the inner mask is correctly positioned. If this is not done correctly, high levels of CO_2 may build up, which will increase breathing frequency, give rise to panic and may even result in a fatal accident.

Pull down the rear part of the strap device as far as possible and check that no rubber straps have become twisted.

6. Adequately tighten the rubber straps by pulling them straight back, not outwards. Begin with the two lower straps, then the two upper side straps and finally the top strap at the forehead. Make adjustments where necessary.

WARNING!Some neoprene hoods become compressed as the diving depth increases. When these hoods are used, you must continue to adjust the rubber straps during the dive. The neoprene hood should also have a smooth edge to provide an adequate seal against the full-face mask. If this is not done correctly, high levels of CO_2may build up, which will increase breathing frequency, give rise to panic and may even result in a fatal accident.

Comment: Only tighten the top strap at the forehead to prevent if from being loose. If the top strap and the upper rubber straps are excessively tightened, the mask will press tightly against the diver's chin resulting in chin fatigue with accompanying headache and/or jaw pain.

7. Read the pressure gauge. Breathe in deeply to automatically activate the safety pressure (if this is used), or alternatively press lightly on the vent button. Stop breathing and listen for signs of leakage.

Comment: If there is leakage when a dry-suit is used, you must check that the dry-suit's face seal has an appropriately smooth surface design to fit against and provide a good seal with a full-face mask.

8. Check the overpressure function (if this is used) by holding your breath and placing two fingers between the edge of the seal and your face; you should hear a strong airflow sound.

9. Check that you can equalize pressure (ease the pressure in your ears) by pressing the breathing valve upwards so that the pressure equalization cushion reaches your nose.

10. Check the pressure gauge to ensure that the pressure is sufficient for diving.

5.4 CHECKING RESERVE VALVE HANDLE POSITION

5.4.1 DIVING WITH DIVATOR DIVING APPARATUS.

Check that the reserve valve handle is in the diving position (D), or move the handle to the D position when the Divator diving apparatus is pressurized.

5.4.2 DIVING WITH A SUPPLY HOSE SYSTEM

Check that the reserve valve handle is in the closed position (C), or move the handle to the S position when the Divator diving apparatus is pressurized.

Additional information is available in the Divator DP1 Supply Hose System User Manual.

5.5 ATTACHING WEIGHTS

When the Divator diving apparatus is ready for use, the diver's assistant mounts the weight on the weight bracket for the Divator Lite cylinder pack, and secures it with the spring pin with the open end facing downwards.

Comment: When the spring pin has been inserted to secure the weight, it must be turned a quarter turn around its own axis in order for it to lock. The twisted thread on the securing spring pin should point upwards to facilitate easy access for the assistant after diving.

The Divator diving apparatus is now ready for use.

6 DIVING

6.1 CHECKS DURING AN ONGOING DIVE

- Read the pressure gauge regularly.
- Make sure that other equipment does not block usage or access to necessary controls and components.
- Check for leaks.

Important: The dive must be terminated when the diver activates the reserve valve. The dive should be planned with the aim of not using reserve air.

6.2 DIVING IN COLD WATER

Diving in cold water is full of risk and requires special planning and special preparations.

Below is information about the effects cold water can have on the components in the Divator system.

6.2.1 THE REGULATOR UNIT

Internal freezing

First-stage regulators reduce cylinder pressure to approximately 8 bar (116 psi). The air expands with an accompanying pressure drop and a significant drop in temperature. If the air is humid, ice crystals can form thereby risking blockage to the air supply. “Internal freezing” of this kind can also cause a total stoppage of air. Therefore, always use dry and clean air. Information about quality requirements for the air can be found in Chapter 8 “Filling”.

Internal freeing can result if the water and/or temperature is low and the regulator's anti-freezing unit is damaged, when this occurs in combination with the cooling brought about by the pressure drop in the regulator. If this happens, water will force its way into the regulator and solid ice will form in the spring housing, resulting in the regulator's mechanism getting stuck in open position. Secondary pressure will rise to above normal level and open the breathing valve's safety valve. The excess air will then flow through the face mask (the mouthpiece) and out into the surrounding water. To prevent this, the anti-freezing unit should be checked before diving.

External freezing

Under extreme conditions, i.e. diving in ice-cold water, it can be difficult, or in the worst case impossible to operate the reserve valve handle due to ice formation on the outside of the reserve valve handle. If this occurs, the octopus breathing valve can be used as an emergency air system.

External freezing as described above is very unusual and only occurs in very cold water.

6.2.2 BREATHING VALVE

All breathing valves from Interspiro provide air during inhalation. When the diver inhales, air flows from the breathing hose through the breathing valve into the diver's lungs. Expansion of the supplied air causes the air at the valve inflow to be cooled to approximately -10°C (14°F) at a water temperature of 0°C (32°F). Any moisture in the inflow section of the breathing valve can then be transformed to ice and thereby increase friction between the valve mechanism's moving parts to such a degree that the return spring does not close the valve when inhalation is concluded. If this happens, the breathing valve will flow freely. To minimize the risk of this occurring, the breathing valve is equipped with a check valve in the inflow section of the breathing valve. Moisture can force its way into the breathing valve's inflow section for the following reasons:

a) The breathing valve is cleaned in water and not allowed to dry properly.

b) The breathing valve's check valve is leaking. Information about the leakage test can be found in Chapter 12 “Maintenance”.

c) The breathing valve is initially submerged in water and then exposed to air with a temperature under zero degrees prior to diving. To prevent this, the breathing valve should not be submerged in water before use. If the breathing valve has already been submerged in water, it should be adequately vented.

6.2.3 FULL-FACE MASK

The Divator Full-Face Mask protects the diver's face from being exposed to ice-cold water. The Divator Full-Face Mask separates inhalation air from exhalation air. This means that moisture in the diver's exhalation air cannot reach the inhalation valve's inflow section through the mask's air channels or through the valve mechanism. This significantly reduces the risk of freezing.

6.2.4 OCTOPUS

Octopus has separate channels for inhalation and exhalation. The breathing valve's inhalation opening is protected against water by a check valve that minimizes the risk of the valve freezing.

6.2.5 ROUTINES DURING REPEATED DIVES IN ICE-COLD WATER AND/OR AT LOW AIR TEMPERATURE

1. Prepare the next diving occasion by shaking out the water from the full-face mask and the breathing valves. Disassemble the equipment's components as quickly as possible to prevent them from freezing solid to each other.
2. Press the full-face mask against your face at the same time as you depress the breathing valve's vent button for a few seconds. This removes any water that has fastened in the mask's air channels and in the breathing valve.
3. Press the octopus breathing valve's vent button. This will remove any trapped water from the breathing valve.
4. Shake the lower section of the cylinder with its branch pipe and regulators in order to remove any trapped water. This will counteract the risk of freezing.
5. Place the full-face mask on a dry surface with the visor turned upwards to prevent water and snow from finding its way into the mask.
6. If possible, the Divator diving apparatus should be stored in a warm and dry area between diving occasions.
7. If ice has formed on the equipment or if its components have frozen to each other, e.g. if the Divator cylinder weights cannot be detached from the cylinder pack, the regulator unit cannot be detached from the cylinder valve or the reserve valve handle has frozen solid - then the ice can be thawed and removed with hot water.
8. In the event of repeated dives, we recommend that a used breathing valve be replaced with a dry one.

7 AFTER DIVING

7.1 Removing Divator

1. The assistant should loosen the spring pin and remove the weight, preferably while the diver is still in the water.
2. Loosen the full-face mask's rubber-band device. If the primary breathing valve with safety pressure is used, the safety pressure is closed by pressing the breathing valve knob in towards the valve housing. Remove the full-face mask.
3. Release the dry-suit's quick coupling.
4. Open the waist buckle and belly-belt if a BC is used.
5. Loosen the left shoulder buckle or loosen the shoulder strap. If a harness is used, loosen the left side buckle and shoulder strap.
6. Remove the diving apparatus and swing it to the right.

7.2 Disassembly

The diving apparatus should be cleaned in accordance with the description in Section 12.1 “Cleaning”, before the following steps are carried out:

1. Close the cylinder valve by pressing in and turning the cylinder valve knob clockwise until it reaches its stop position.
2. Vent the system by pressing in the breathing valve's vent button at the same time as the reserve valve handle is moved to the R position (Reserve).

Comment: Venting can take up to 30 seconds. The first-stage regulator's O-ring can be damaged if it is removed when the system is still pressurized.

3. If the Divator diving apparatus is used with the Divator DP1 Supply Hose System, there is information about loosening and venting the system in the User Manual for Divator DP1 Supply Hose System.
4. Disconnect the breathing hose from the right shoulder strap on the BC. Disconnect the pressure gauge.
5 Detach the octopus breathing valve from the yellow clamp and pull the octopus hose from the spring line.
6. Detach the BC hose and remove the BC or harness from the cylinder pack by pressing in the locking mechanism on the upper part of the BC or harness.
   Maintain pressure and pull the carrying handle to loosen the quick coupling.

7. Remove the regulator from the cylinder pack.
8. When the regulator unit is not connected, the cylinder valve must be provided with a safety plug that is tightened by hand. The regulator connection nipple must be protected with the yellow protective cap.
9. If the equipment is defective or damaged, it must be repaired or returned to a maintenance shop approved by Interspiro. Parts that the user can repair personally are described in the repairs section in this user manual.
10. Moist equipment should be properly dried if it is meant to be stored in a bag or sack for a period longer than a few days.
11. Fill the air cylinders in accordance with the description in Chapter 8 “Filling”.

8 FILLING

8.1 FILLING INTERSPIRO FULLY COMPOSITE CYLINDERS

The following measures must be performed when filling Divator Lite cylinders with an initial pressure less than 30 bar (435 psi).

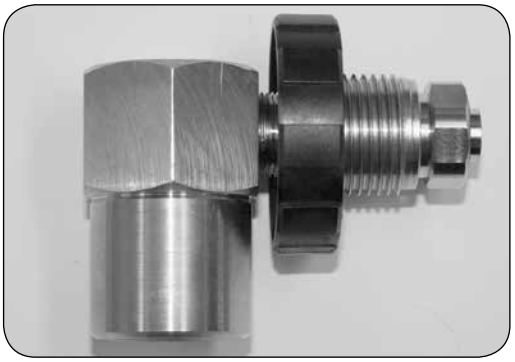
- The filling rate must be limited to no more than 30 bar (435 psi) a minute. Using an Interspiro Filling Adapter is recommended.
- The cylinder pack must always be filled in an upright position with the valves pointing upwards.
- When filling cylinders or cylinder packs having an initial pressure exceeding 30 bar (435 psi), a normal filling rate can be used.
- As a minimum, the air with which the cylinders are filled should comply with the requirements in European standard EN 12021 or the purity Standard for US FED SPEC BB-A-1034 Grade A.

8.2 FILLING ADAPTER

The filling adapter (item no. 99369-01) connects the cylinder valve to the filling hose.

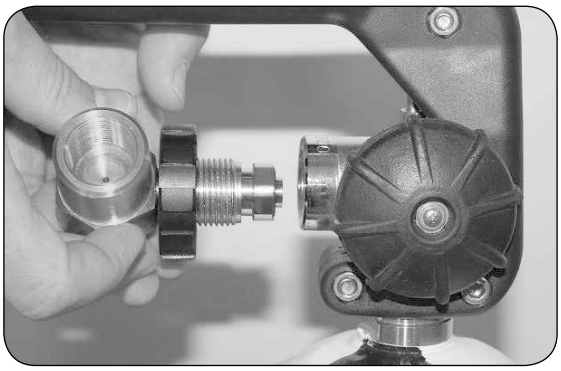
The adapter is designed for filling Divator Lite cylinder packs 323.4 and 326.7.

The adapter has a built-in nozzle that limits the filling rate to approximately 30 bar (435 psi) a minute.



USING THE FILLING ADAPTER

1. Detach the pressure regulator or the plug from the cylinder valve and connect the filling adapter to the cylinder valve. Tighten the knob on the adapter by hand to prevent leakage.



2. Connect the filling hose to the filling adapter and tighten the coupling by hand to prevent leakage.

3. Open the cylinder valve and fill the cylinder pack.

9 CHECK LIST

9.1 BEFORE DIVING

• Clean the cylinder valve.	See 4.1
• Check the anti-freezing unit.	See 4.1
• Install the regulator.	See 4.2
• Mount the BC or harness.	See 4.3 - 4.5
• Mount full-face mask and octopus.	See 4.6 - 4.7
• Check the full-face mask, check valves and pressure equalizer.	See 4.7
• Check cylinder pressure.	See 5.1
• Perform a leakage test, including BC.	See 5.1

9.2 DURING DIVING

- Check the pressure gauge regularly.

9.3 AFTER DIVING

- Rinse and clean the equipment.
- Close the cylinder valve.
- Disassemble, dry and store the equipment.

10 MEASURES IN THE EVENT OF AN EMERGENCY

The following measures constitute examples of how the equipment can be handled in the event of an emergency situation. Organizations that carry out diving training with Interspiro equipment are responsible for developing adequate routines and measures for emergency situation training with Interspiro equipment.

10.1 DRAINING WATER FROM FULL-FACE MASK DURING AN ONGOING DIVE

If water finds its way into the full-face mask during diving and fills it completely or partially, it is most conveniently drained by pressing the vent button on the breathing valve.

If the mask falls off during the dive, the first step is to find it again. If the breathing valve with safety pressure is used, the safety pressure knob should be pressed in to its closed position to prevent free airflow and loss of respiratory air from the cylinders. Pull out the rubber straps on the strap device and don the mask.

Hold the mask against your face with your left hand. With your face in an upright (vertical) position, press the vent button until the mask is sufficiently drained of water so that you can breathe again.

After a few breaths, repeat the draining procedure if necessary. There will always be some water left in the mask after this procedure.

Alternatively, if you have just taken a deep breath, you can hold the mask against your face and then breathe out to drain the mask of water.

When you have made sure that the mask is drained of water, tighten the strap device using the lower positioned straps first. Consider terminating the dive.

10.2 OCTOPUS MEASURES

Divator Octopus is designed for use in emergency and rescue situations in order to provide divers who have lost air supply with respiratory air.

Divator Octopus is released by pulling it out of the clamp.

The hose to Divator Octopus can be detached and pulled out to a length of 1.7 meters (5.6 feet). This allows the afflicted person to swim freely behind or at the side of the diver.

In any event, the dive must be cancelled.

10.3 FREE FLOW IN THE FULL-FACE MASK'S BREATHING VALVE

In the event of free airflow in the full-face mask, the following measures are recommended:

1. Continue breathing.
2. Terminate the dive and start your ascent to the surface.
3. If there is a pressure drop, see Section 10.5 “Pressure drop”.

In any event, the dive must be cancelled.

10.4 FREE FLOW IN OCTOPUS BREATHING VALVE

In the event of free airflow in the octopus breathing valve, the following measures are recommended:

1. Continue breathing. If the octopus valve is not used, close the safety pressure knob; if this does not help, try limiting the outflow of air by closing the mouthpiece hole with your thumb.
2. Terminate the dive and start your ascent to the surface.
3. If there is a pressure drop, see Section 10.5 “Pressure drop”.

In any event, the dive must be cancelled.

10.5 PRESSURE DROP

In the event of a pressure drop, the following measures are recommended:

1. Check the pressure gauge.
2. Activate the handle of the reserve valve or the bailout valve.
3. Check that the cylinder valve is fully open.
4. Terminate the dive and start your ascent to the surface.
5. If the pressure drop persists, use your diving buddy's octopus, if available.
6. If the diving buddy does not have an octopus, use your own octopus instead.

In any event, the dive must be cancelled.

10.6 DRAINING OF BREATHING VALVE WITH MOUTHPIECE

1. Grasp the breathing valve and put it in your mouth.

2a. Drain the breathing valve by exhaling and turning your head at the same time so that the exhalation segment of the breathing valve is at the lowest position.

2b. Drain the breathing valve by pressing the vent button and turning your head at the same time so that the exhalation segment of the breathing valve is at the lowest position.

11 SERVICE AND TESTING SCHEDULE

Service and testing shall be performed according to Service and testing schedule 30500.
Visit www.interspiro.com for latest revision.

12 MAINTENANCE

12.1 CLEANING

12.1.1 AFTER EACH DIVE

1. If the equipment is very dirty or in need of disinfection, see Section 12.2 “Monthly cleaning”.
2. Pressurize the Divator diving apparatus by opening the cylinder valve.
4. Rinse the face mask and the breathing valve carefully in clean water. Remove water and dirt by pressing the vent button and blowing air through the valve. Repeat the measure a couple of times until the valve is completely clean.
5. Rinse all other parts of the Divator diving apparatus including the BC or harness with clean water. Allow the BC to be partly inflated when it dries.
6. Close the cylinder valve. Vent the regulator by pressing in the breathing valve's vent button at the same time as the reserve valve handle is moved to the R position.Remove the regulator from the cylinder pack. Allow all regulator components to dry.
7. Blow out moisture from the cylinder valve by opening it and letting air flow out for 1 to 2 seconds.

WARNING! The sound from blow cleaning and pressure impacts can cause hearing impairment. Always use ear protectors when filling or emptying cylinder packs.

8. Close the cylinder valve and screw in the sealing plug by hand.
9. Remove the cylinder cover and allow the cylinder pack to dry.
10. Fill the cylinder pack. Inform the air filling site if the cylinder pack has been subjected to exceptional stress or if the pressure in the cylinder falls below 30 bar (435 psi).

Comment: The cylinder pack should not be completely emptied. There must always be a residual pressure of at least 10 bar (145 psi) in the air cylinder to prevent moisture from finding its way through the valve.

12.2 MONTHLY CLEANING

1. Assemble the air cylinder pack, regulator and full-face mask/breathing valve.
2. Open the cylinder pack and check the pressure on the pressure gauge before cleaning begins. To prevent water from entering the regulator and to detect leakage, there should always be pressure in the cylinder pack. Replace the cylinder pack if the pressure gauge indicates less than 270 bar (3915 psi).
3. If the full-face mask is used, the fixing lock should be removed by loosening the screws. Hold the lower part of the full-face mask (where the valve is located) with the visor facing upwards. Turn the breathing valve clockwise to loosen the breathing valve bayonet coupling.
4. Fill a container with clean water (preferably lukewarm and no hotter than 40°C (100°F)). Use a liquid, colorless, non-perfumed soap solution.
5. Wash the face mask and the breathing valve carefully; use a brush if necessary. Remove water and dirt by pressing the vent button and blowing air through the valve. Repeat until the valve is clean and dry.
6. Remove the cylinder cover and place the cylinder pack and regulator in the cleaning container. Clean these parts; use a brush where necessary. Remember that the system must still be pressurized. If there are leaks, it should be possible to localize these by observing air bubbles. Outflowing air will also prevent water from entering.

Comment: Air bubbles can also come from cavities in the equipment. In order to determine whether or not a leak is involved, the apparatus should be held underwater at different angles. Try to drain all air pockets by hand.

7. Remove all parts from the container. Clean the BC and harness in the container. Use a brush where necessary.
8. Fill the container with new clean water and rinse the soapy solution off all parts. Begin with the full-face mask/breathing valve, continue with the cylinder pack/regulator and finally the BC or harness.

WARNING! If water accidentally enters and is subsequently not removed from the inhalation side while cleaning the full-face mask and breathing valve, there is a risk of the valve freezing, which may result in a continuous airflow (valve with free airflow). There is a risk of freezing because expanding air can reduce the temperature to below 0°C (32°F) on the valve's inhalation side when the equipment is used at low temperatures.

9. Vent the system by pressing in the breathing valve's vent button at the same time that the reserve valve handle is pulled out to the R position.

Comment: Venting can take up to 30 seconds. The first-stage regulator's O-ring can be damaged if it is removed when the system is still pressurized.

10. Blow out moisture from the cylinder valve by opening it and letting air flow out for 1 to 2 seconds.

Comment: The sound from blow cleaning and pressure impacts can cause hearing impairment. Always use ear protectors when filling or emptying cylinder packs.

11. Close the cylinder and screw in the sealing plug by hand. The sealing plug should only be tightened by hand on a cylinder pack that is to be filled.
12. Allow the cylinder packs to dry.
13. Shake off the water from the other parts and allow them to air dry. Dry thoroughly.
14. Fit the breathing valve into the full-face mask. Turn the breathing valve counterclockwise to attach the breathing valve bayonet coupling. Attach the fixing cover.
15. Remove the cylinder pack for filling. Inform the air filling site if the cylinder pack has been subjected to exceptional stress or if the pressure in the cylinder falls below 30 bar (435 psi). On a filled cylinder pack, the sealing plug should be tightened with an open-ended wrench (23 mm).

Comment: The cylinder pack should not be completely emptied. There must always be a residual pressure of at least 10 bar (145 psi) in the air cylinder to prevent moisture from finding its way through the valve.

Check the check valve's tightness.

The tightness of the check valve must be checked during the monthly cleaning routine.

1. Connect the breathing valve to the intermediate pressure hose on the regulator.
2. Remove the breathing valve from the full-face mask, alternatively, remove the mouthpiece from the octopus breathing valve (see “Replace mouthpiece” in Section 12.4.4 “Breathing valve”).
3. Open the cylinder valve.
4. Fill the space at the check valve disc with water.
5. Ensure that water is not leaking into the breathing valve. The water level over the check valve must not decrease. If there is a leak, the check valve must be cleaned or replaced.
6. Blow the valve dry using the vent button. Check that the check valve disc is even after dry-blowing.
7. Close the cylinder valve and insert the breathing valve in the full-face mask or replace the mouthpiece.

Disinfecting the full-face mask/breathing valve

The full-face mask/breathing valve must be disinfected during the monthly cleaning procedure or when the need arises.

Interspiro recommends that full-face masks and breathing valves used by several persons be cleaned and disinfected after each use.

Disassembly

1. Clean the full-face mask/breathing valve according to the instructions for monthly cleaning.

2. Remove the breathing valve if the full-face mask is used. If a mouthpiece is used, remove the mouthpiece section.

3. Remove the exhalation unit from the breathing valve. Hold the exhalation unit and the valve housing and loosen the locking ring.

4. When the exhalation unit has been removed, press the threads to remove the diaphragm unit from the exhalation unit. Place your hand over the diaphragm unit to prevent it from getting lost.

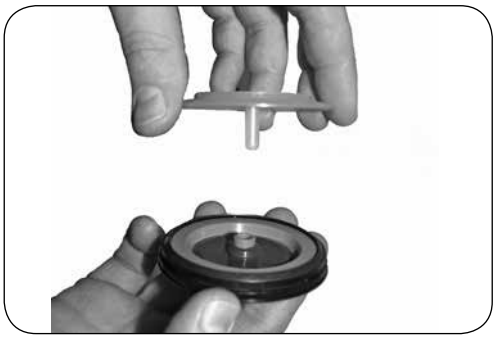
5. Clean the spring, cover, diaphragm unit and mouthpiece in water. Carefully pull the diaphragm unit so that the diaphragm is stretched and the dirt on the surface can be removed. Make sure that the diaphragm unit and the loose parts are not damaged.

6. There is a white plastic sealing disc on the diaphragm unit. The sealing disc must be removed and cleaned. Clean the inner parts of the diaphragm unit. Clean the inside of the diaphragm unit's black sealing flange that is in contact with the sealing disc. Make sure that the diaphragm does not have any holes or damage from wear. If the diaphragm needs to be replaced, this must be done by a certified service technician.

7. After washing and rinsing, the parts are disinfected by submerging them in a solution consisting of 0.1 % chlorhexidine and the rest water for one hour.
8. Clean the parts carefully in clean water and allow them to air dry.

Assembly

1. Replace the sealing disc in the diaphragm unit and then place the sealing disc with spring in the cover and press the diaphragm unit together. Check that the spring fits into the recess for the sealing disc.



2. Set the inhalation unit in the breathing valve and screw the valve housing together with the locking ring.

Comment: Only the locking ring should be turned. Otherwise there is a risk that the O-ring will be moved causing a leak.

3. If the full-face mask is used, check that the O-ring in the bayonet coupling is not damaged and that it is placed in the O-ring groove. Information about replacing the O-ring can be found under “Replacing an O-ring (only full-face mask) in Section 12.4.4 ”Breathing valve”.

4. If a full-face mask is used, connect the breathing valve in the bayonet coupling by turning the breathing valve counterclockwise. Mount the fixing cover on the full-face mask and tighten the two screws.

If the mouthpiece is used, make sure that there is **no** O-ring in the O-ring groove; mount the mouthpiece in the breathing valve and check that the rubber flange on the inside of the mouthpiece runs in the O-ring groove. Fix the mouthpiece with the hose clamp.

12.3 PERIODIC CHECKING AND INSPECTION

The checks described in this section must be regularly carried out between dives (after one diving occasion and before the next one).

12.3.1 CHECK THE RESERVE VALVE HANDLE

1. Install the Divator diving apparatus in accordance with the mounting instructions.
   Pressurize the unit.
2. Check the following:
   – The handle functions unimpaired and remains in position (C, D or R).
   (The air pressure must be reduced to check position R.)
   – There are no deposits in or around the reserve air handle.
   – No parts show signs of wear or damage.
3. Perform a function test; see Section 5.1 “Leakage and function test”.

If the equipment is defective or damaged, it must be repaired by an Interspiro-approved service technician.

12.3.2 CHECK THE MOVEMENT OF THE PRESSURE GAUGE INDICATOR.

The first-stage regulator has a throttle opening in the high-pressure connection that limits airflow to the pressure gauge hose and the pressure gauge. This limitation protects the user and equipment if the high-pressure hose or pressure gauge malfunctions.

1. Install the diving apparatus in accordance with the mounting instructions.
2. Open the cylinder valve and study the pressure gauge result at the same time. Check that the movements of the indicator are even and normal. If the indicator moves unevenly or not at all, the pressure gauge is defective.
3. Close the cylinder valve, press the vent button on the breathing valve to vent the Divator diving apparatus and move the reserve valve handle to position R.

If the equipment is defective or damaged, it must be repaired by an Interspiro-approved service technician.

12.3.3 CHECKING HOSES

Check all hoses by bending and pulling them, and by making a note of any damage, cracks, discoloring and changes in hardness.

If the equipment is defective or damaged, it must be repaired by a service technician approved by Interspiro.

WARNING! A pressure drop caused by a rupture on a dry-suit hose is just as great as any caused by a rupture in the breathing hose. For this reason, be careful when carrying out the inspection!

12.3.4 CHECKING O-RINGS

O-rings that have been exposed to sunlight, salt water, chemicals (including mild detergents) and ozone will age and subsequently become defective.

1. Check all visible O-rings.
2. Cracked and damaged O-rings must be replaced.
3. All O-rings in this user manual should be lubricated with Interspiro's special lubricant 331 900 269.

The user may only personally replace the O-rings described in Section 12.4 “Repairs” in this user manual. Other defective or damaged parts must be repaired by a service technician approved by Interspiro.

12.3.5 CHECKING THE ANTI-FREEZING CAPS

A leaking anti-freezing cap increases the risk of freezing and causes the regulator to function less effectively.

WARNING! Oxide layers and salt deposits in the regulator can stop the air supply. If the regulator has been exposed to water inside the regulator housing for a long time, the regulator piston can jam or stick. If a fault of this type is suspected, the regulator must be repaired a service technician approved by Interspiro.

It is important to make sure that the anti-freezing caps are internally free of water. If they contain water, the unit must be inspected and, if necessary, serviced by a service technician approved by Interspiro.

Regular inspection should be carried out on a dry, clean apparatus in a dry, clean and, to the extent possible, cold-resistant environment. Inspection should always be carried out before the equipment is placed in storage, but it can also be carried out during air filling, and at least once a week.

During regular inspection, the anti-freezing unit must be disassembled and the anti-freezing caps must be checked for internal occurrence of water, dirt and damage; the O-rings must also be checked for dirt and damage. Dirty parts must be cleaned and wet parts must be dried. All parts must be dry before they are assembled again.

Always rinse with fresh water. The anti-freezing unit should not be disassembled when the apparatus is used regularly and does not have time to dry.

1. Remove the anti-freezing cover. The anti-freezing caps are mounted inside.

2. Make sure that the anti-freezing caps are internally free of water.

3. If they contain water, the unit must be inspected and, if necessary, serviced by a service technician approved by Interspiro.

4. Check that the anti-freezing caps have not been damaged. If damage is detected or suspected, the anti-freezing caps must be replaced. Make sure that the anti-freezing caps are not deformed when installing them in the base.
5. Replace the anti-freezing caps in the anti-freezing cover.
6. Replace the anti-freezing cover in the regulator unit.

12.3.6 CONTROLLING THE VISOR

Inspect the visor of the full-face mask and look for cracks in the plastic. If there are cracks in the visor, it must be replaced by a service technician approved by Interspiro.

12.3.7 CHECKING RUBBER AND PLASTIC PARTS

Inspect the rubber parts of the full-face mask by stretching and bending them.

Check the connection points around the buckles and metal bands. Check all plastic parts (sealing surfaces, bayonet couplings, fixing cover and screws) If there are cracks or other damage, the part in question must be replaced.

12.3.8 CONTROLLING THE ANGLE OF THE CYLINDER VALVE

The cylinder valve must not be angled in relation to the intersection between the two halves of the handle. If the angle of the cylinder valve is incorrect, the cylinder pack must be returned to a service technician approved by Interspiro.

12.3.9 CHECKING THE CYLINDER PACK

If the cylinder pack is filled, it must be equipped with a safety plug that has been tightened with a wrench. Only a full air cylinder pack may be equipped with a wrench-tightened safety plug. Check that the cylinder pack does not have any mechanical damage or other defects. If the equipment is defective or damaged, it must be repaired by a maintenance shop approved by Interspiro.

Additional information about checking air cylinders is available in the Divator Lite User Manual.

12.3.10 CHECKING CYLINDER WEIGHT

Oxidation changes the color of the weight's surface layer. The oxide forms a hard layer that protects the underlying material. The only check that needs to be carried out on the weight is to make sure that the handles, twisted thread and spring pin are not damaged or deformed.

12.4 REPAIRS

12.4.1 GENERAL

This section describes the repairs that users may carry out personally. Repairs other than those described here must be carried out by a service technician approved by Interspiro.

12.4.2 REGULATOR

Replacing the O-ring for the high-pressure connection

This O-ring is placed in the connecting nipple on the regulator's high-pressure connection. Normally there is no need to replace or repair the O-ring between annual inspections, but it can be moved or damaged if the regulator is removed from the cylinder pack without prior venting of the Divator diving apparatus.

1. Unscrew the high-pressure connection's nipple using a 5 mm hexagon wrench. The nipple also functions as a seal and holder for the regulator filter. Thus, the nipple must always point downwards during the removal and assembly procedure. Otherwise there is a risk of dirt from the filter ending up in the regulator.
2. Unscrew the nipple a couple of turns using a 5 mm hexagon wrench to release the O-ring flange so that a new O-ring can be placed there.
3. Where necessary, remove the old O-ring and replace with a new one. Do not use any tools when removing or installing the O-ring as these can damage the sealing surfaces.
4. Screw the nipple back in place with a 5 mm hexagon wrench.

Comment: Tighten the nipple a moderate amount. However, the nipple must be tightened sufficiently as it may become too loose during use.

5. Check that the O-ring is correctly placed in the groove.

12.4.3 HARNESS

Replacing a belt buckle

There are two belt buckles - one on the left and one on the right. When a hip belt is correctly positioned, the free ends of the belt will be on the outside of the hip belt to facilitate easy tightening.

1. Make sure that the outward-bent parts of the buckles are facing away from the user (“the outside”). Pull the hip belt from the inside through the slot nearest the buckle.
2. Thread the belt through the second slot from the outside of the buckle.
3. Make sure that the belt has not become kinked.

12.4.4 BREATHING VALVE

Replacing a protective ring

1. Lift the protective ring over the flanges one at a time until the ring comes away. Lift the protective ring over a flange by pressing it together slightly and then carefully lift it over the flange.
2. Installing a new ring: The ribbed edge of the protective ring must be facing away from the diaphragm bracket. Place the protective ring over the two or three wing flanges and press the ring down over the remaining flanges.

Replace O-ring (only full-face mask)

The O-ring is located in the breathing valve's bayonet coupling.

WARNING!: This O-ring must not be installed in a breathing valve with a mouthpiece as it can subsequently cause the mouthpiece to come loose.

1. Remove the breathing valve from the full-face mask.
2. Where necessary, remove the old O-ring. Press the old O-ring out using your thumb and index finger. Do not use sharp objects as these can damage the O-ring groove.
3. Place a new O-ring in the groove.

Check that the O-ring is correctly positioned and has not become twisted.

Replacing a mouthpiece

1. Loosen the hose clamps, keeping the mouthpiece in place using a screwdriver. Loosen the hose clamp until it is released from the wide groove in the mouthpiece.
2. Install a new mouthpiece and clamp it in the breathing valve. Place the clamping screw in the area between the diaphragm bracket and the mouthpiece.
3. Tighten the clamping screw with sufficient force. Check that the hose clamp is correctly positioned by holding the valve housing and pulling the mouthpiece.
4. Connect the breathing hose to the breathing valve and tighten the connecting nipple by hand.

WARNING! The full-face mask's O-ring must **not** be used when the breathing valve is used together with a mouthpiece. Otherwise, there is a risk that the mouthpiece will come loose.

12.4.5 FULL-FACE MASK

Replacing a strap device

Begin with the strap device's upper strap. Thread the strap through the buckle from the inside of the full-face mask. The IS logo in the middle of the strap device must be visible after installation. Thread the main strap through the lower part of the buckle under the roller and then back over the roller and through the upper part of the buckle. Repeat the procedure for the other straps.

Replacing a valve disc

The valve disc is located in the inner mask.

1. Grip the valve disc with your fingers and pull it upwards. Discard the old valve disc.
2. Insert a new valve disc by first threading the hole of the valve disc over the short side of the valve seat pin. Carefully stretch the valve disc so that the hole can be threaded over the entire pin.
3. Check that the valve disc is positioned on the pin in an unimpeded manner.
4. Check that the rubber in the inner mask is not deformed and that it is tightly positioned around the valve seat.

Replacing a fixing lock

Check that the O-ring is in place (replace the O-ring if necessary) in the fixing cover and that the locks are correctly positioned around the screws.

Attach the fixing cover. The round part must be facing the visor. Tighten the two screws.

Comment: Carefully tighten the screws by hand.

Replacing a pressure equalization cushion

The pressure equalizer is held in place by a wire holder.

1. Check that the wire holder is not deformed.
2. The pressure equalizer has three grooves for connecting the wire holder. When replacing the pressure equalizer, the wire holder must be returned to the same groove. Check that the wire holder is in place in the groove so that the pressure equalizer will not come loose or move.

13 TRANSPORT AND STORAGE

13.1 STORAGE

13.1.1 AIR CYLINDERS

• Before long-term storage, the air cylinders must be filled and equipped with safety plugs. Make sure that necessary warning notifications have been posted at the door of the storage area in accordance with all current and applicable regulations.

13.1.2 HARNESS OR BC

• When being stored, the harness or BC should be cleaned and dried and subsequently stored in a dry place.

13.1.3 REGULATOR UNIT AND FULL-FACE MASK OR MOUTHPIECE WITH BREATHING VALVE

• All parts made of rubber should be stored in sealed plastic bags in a dry place where they are protected against direct sunlight and external temperatures.

During transport, the equipment must be stored so that it cannot be damaged and people cannot be injured. Cylinder packs must be transported with tightened safety plugs and, if possible, in packing boxes.

The equipment must not be stored in places where temperatures may exceed 70º C. The equipment must be completely dry before being placed in storage.

Before the cylinder packs are transported, applicable transport regulations must be complied with.

The air cylinders must be emptied for certain types of transport. Use Interspiro drainage plug 460 190 770, which provide a residual pressure of approximately 2 bar (30 psi) in the cylinder. During long-term storage, the storage area should be dark, dry and cold with minimum temperature variations. This is because the equipment is sensitive to UV radiation and ozone.

Important: When air is released from a cylinder pack, a drainage plug must be used. Uncontrolled emptying of air can give rise to moisture build-up in the cylinders.

INTERSPIRO

Keeps You Breathing

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