

SUB GEAR

Regulators
Atemregler
Détendeurs
Erogatori
Reguladores
Ademautomat
Reguladores
Регуляторы
Reduktorok
Automaty oddechowe
Regulátory
Regulatori
Regulators
Detentorare

EN 250: 2000 SUBGEAR CERTIFIED COMBINATIONS

EN 250: 2000 SUBGEAR ZERTIFIZIERTE KOMBINATIONEN

COMBINAISONS CERTIFIÉES SUBGEAR NORME EN 250: 2000

COMBINAZIONI CERTIFICATE SUBGEAR EN 250: 2000

EN 250: 2000 COMBINACIONES CERTIFICADAS 2000 DE SUBGEAR

SUBGEAR COMBINATIES GECERTIFICEERD CONFORM EN 250: 2000

EN 250: 2000 COMBINAÇÕES CERTIFICADAS DA SUBGEAR

СТАНДАРТ EN 250: 2000 СЕРТИФИЦИРОВАННЫЕ КОМБИНАЦИИ SUBGEAR

EN 250: 2000 SUBGEAR ÁLTAL HITELESÍTETT KOMBINÁCIÓK

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EN 250: 2000 CERTIFIKOVANÉ KOMBINACE SUBGEAR

EN 250: SUBGEAR KOMBINACIJE CERTIFICIRANE PREMA STANDARDU 2000

EN 250: 2000 SUBGEAR CERTIFIERADE KOMBINATIONER

SUBGEAR - COMBINATII CERTIFICATE EN250: 2000

		FIRST STAGE	
		CAYMAN (INT & DIN)	ARUBA (INT & DIN)
SECOND STAGE	CAYMAN	•	
	BONAIRE	•	
	ARUBA		•
	ARUBA OCTOPUS	•	•

SUBGEAR REGULATORS Manual

Congratulations on purchasing a SUBGEAR regulator. We are confident that you will enjoy extraordinary performance from our regulator, designed and manufactured using the most advanced technology.

We thank you for choosing SUBGEAR and wish you a future of safe dives and underwater enjoyment!

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1. Important warnings

WARNING

This manual must be read and understood entirely before using the product. It is advised that you keep this manual in your possession during the entire life of your regulator.

WARNING

When diving you must follow the rules and apply the skills taught by a recognized scuba diving certification agency. Before taking part in any diving activity, it is mandatory to have successfully completed a scuba diving course covering both theoretical and technical aspects of diving.

WARNING

This instruction manual does not replace a diving instruction course!

2. CE certification

All SUBGEAR regulators described in this manual have obtained the CE certification issued by RINA according to European directive 89/686/EEC. Certification tests have been conducted according to the specifications set by the said directive, regulating the conditions for the release on the market and the fundamental safety requirement for third category Personal Protective Equipment (PPE). The CE mark denotes compliance with the fundamental requirements for health and safety. The 0098 number next to the CE marking is the identification code for Germanischer Lloyd, the notified body controlling production compliance with regulations, as per Art. 11 A ED 89/686/EEC.

2.1 EN 250: 2000 norm regulations and what they mean

The requirements and tests defined by the EN 250: 2000 standard aim to ensure a minimum safety level for the operation of underwater breathing equipment. In Europe, the EN 250: 2000 norm defines the minimum technical standards of acceptance for recreational diving regulators. All SUBGEAR regulators have successfully passed the certification test required by this regulation.

2.2 Definition of 'SCUBA' according to EN 250: 2000

This regulation defines a SCUBA unit as a self-contained open-circuit underwater breathing apparatus. A SCUBA unit can be composed of component groups. During use, the minimum required component groups are elements a) to e) of the following list:

- a. cylinder(s) with valve(s);
- b. demand regulator(s);
- c. safety device(s);
- d. face mask: complete mouthpiece or half-mask for diving or complete mask;
- e. carrying system.

2.3 Limitations provided by EN 250: 2000

The SCUBA unit can be comprised of separate components such as: cylinder(s), regulator(s), pressure gauge. The SUBGEAR regulators described in this manual can be used with SCUBA components units certified according to directive 89/686/EEC and EN 250: 2000 norm. The air contained in the cylinder must comply with the requirements for breathable air defined by EN 12021 norm. The maximum operating depth is 50 meters (164 ft.) however divers must conform to the limits set by local regulations in force at the diving location.

**WARNING**

A SCUBA unit complying with the requirements of the EN 250 norm is not designed to supply more than one diver at a time.

If the SCUBA unit is used simultaneously by more than one diver, breathing and cold water performance may no longer satisfy the requirements set forth by EN 250 norm.

3. Important warning reminders

For your protection while using SUBGEAR life support equipment, we call your attention to the following:

1. Use the equipment according to the instructions contained in this manual and only after having completely read and understood all instructions and warnings.
2. Use of the equipment is limited to the uses described in this manual or for applications approved in writing by SUBGEAR.
3. Cylinders must only be filled with atmospheric compressed air, according to the EN 12021 norm. Should moisture be present in the cylinder, beside causing corrosion of the cylinder, it may cause freezing and subsequent malfunction of the regulator during dives carried out in low temperature conditions (lower than 10°C (50°F)). Cylinders must be transported according to local rules provided for the transport of dangerous goods. Cylinder use is subjected to the laws regulating the use of gases and compressed air.
4. Equipment must be serviced by qualified personnel at the prescribed intervals. Repairs and maintenance must be carried out by an Authorized SUBGEAR Dealer service facility and with the exclusive use of original spare parts.
5. Should the equipment be serviced or repaired without complying with procedures approved by SUBGEAR or by untrained personnel or not certified by SUBGEAR, or should it be used in ways and for purposes other than specifically designated, liability for the correct and safe function of the equipment transfers to the owner/user.
6. If the equipment will be used in cold water (temperature lower than 10°C (50°F)) it will be necessary to use a regulator suited for such temperatures.

**WARNING**

Diving in cold water requires special equipment and techniques. Before diving in cold water we strongly recommend you obtain adequate training from a recognized training agency.

7. The content of this manual is based upon the latest information available at the time of going to print. SUBGEAR reserves the right to make changes at any time.

SUBGEAR refuses all responsibility for damages caused by non-compliance with the instructions contained in this manual. These instructions do not extend the warranty or the responsibilities stated by SUBGEAR terms of sales and delivery.

4. Regulator system

A regulator system is required to reduce the pressure of the compressed air contained in the cylinder to an ambient pressure in order to supply breathable air when needed. It is also possible to connect pressure gauges (analog or digital), IP inflators to supply buoyancy compensators, dry suits and other devices to this system. The regulator system is composed of a pressure reduction device and one or more breathing devices. In this manual, the pressure-reducing device and the breathing device will be indicated, respectively, by the terms "first stage" and "second stage."

4.1 First stage

A pressure-reducing mechanism that reduces the pressure of the compressed air contained in the cylinder to an intermediate relative pressure of about 9.5 bars (138 psi). A SUBGEAR first stage uses a standard piston or balanced diaphragm mechanism.

4.2 Second stage

This unit is supplied, with the intermediate pressure coming out of the first stage through the low pressure hose. It reduces pressure further to balance air with the ambient pressure. The second stage may be balanced or unbalanced and equipped with a venturi effect control and/or with an inhalation resistance control.

An example of a complete regulator and with either a DIN or INT connection first stage, depending on the tank valve:



Img. 1

- 1 First stage with threaded DIN connection
- 2 Second stage
- 3 INT/DIN inlet protective cap
- 4 DIN retaining wheel
- 5 High pressure port
- 6 Purge button
- 7 Exhaust deflector
- 8 Venturi control
- 9 Low pressure hose
- 10 Dry balance chamber



Img. 2

- 1 First stage with yoke connection (INT)
- 2 Retaining yoke and screw
- 3 Protective cap
- 4 INT/DIN inlet protective cap

All SUBGEAR regulators can be identified via a serial number. The number is printed on the housing of the second stage and on the metal body of the first stage.

SUBGEAR offers a 30 year warranty to the original owner of all SUBGEAR regulators. This warranty covers material and manufacturing defects (with the exception of o-rings, seats, filter, mouthpiece and low pressure hose).

In order to maintain this warranty, it is mandatory to perform service on the regulator by a Authorized SUBGEAR Dealer service facility every two years or 100 dives, whichever comes first, and maintain proof of service records. For details on the warranty please consult a SUBGEAR Authorized Dealer.

5. Technical features

Our expertise in engineering and high quality components used in the manufacturing of SUBGEAR regulators ensures the maximum reliability and safety when you dive with a SUBGEAR regulator. The main technical features of SUBGEAR regulators are detailed below. To verify which of these features apply to any specific first and second stage combination, refer to the tables at the end of this chapter.

5.1 First Stages

Standard Piston

Standard piston first stages are the simplest mechanism with minimum moving parts to control the pressure drop from a tank to feed the second stage. This translates to high reliability and durability, combined with minimal maintenance requirements.

Balanced diaphragm

The inner mechanism in a diaphragm first stage is isolated from the surrounding water. This feature makes it especially suitable for diving in cold water conditions or murky water. In this system the air flows through a seat & pin assembly, controlled by a loaded diaphragm. The seat receives equal interstage pressure from both sides, making it react independently of tank pressure. Balanced diaphragm systems deliver a slightly lower flow than piston regulators, due to the smaller diameter air passageways. However, these differences in performance are only detectable at great depth.

Dry balance chamber

The dry chamber ensures the best performance in especially cold waters by preventing the entry of water inside the water balancing chamber. In extremely cold water conditions the formation of ice crystals around the main spring is thus eliminated.

High pressure ports

All first stages are equipped with at least one high pressure port. More sophisticated first stages are equipped with two high pressure ports, allowing a submersible pressure gauge, computer hose or transmitter to be positioned on the right or left side of the diver according to preference and/or correct orientation.

Intermediate pressure ports

The availability of 4 intermediate pressure ports enables the connection of equipment such as an octopus second stage, buoyancy compensator, dry suit hose or other accessories.

HF Ports

High Flow ports have a 15% higher flow compared to the standard ports, and thus are especially suited to connect the second stages. The Cayman and Bonaire systems have two HF ports each.

DIN or INT connection

SUBGEAR first stages are available with different tank valve connections:



Img. 3

DIN : uses a threaded connection complying with ISO 12209-2 norm (300 bars).



Img. 4

YOKE (INT): this international connection is composed of a yoke and screw and can be used up to 230 bars, according to the ISO norm.

5.2 Second Stages**Balanced system**

Balancing the pressure forces acting within the demand valve allows the use of a much lighter spring load decreasing the inhalation resistance and providing a smoother breathing second stage.

Adjustable Venturi Effect

High speed air flow passing over the vane creates a low pressure area inside the second stage housing. This depression pulls the diaphragm inside the housing, maintaining pressure on the valve lever and keeping the valve open without requiring an additional effort on the part of the diver. On the Cayman and Bonaire second stages the Venturi effect can be adjusted during the dive by changing the position of the flow vane via the knob positioned on the outside of the second stage. The Aruba second stage is not equipped with an external knob, the venturi effect vane position is preset to ensure maximum performance and prevent free-flow, but it can be adjusted at any time by a SUBGEAR Authorized service technician.

5.3 First and second stage features

The following tables summarize the specific features of SUBGEAR first and second stages.

First stage	ARUBA	CAYMAN
Technology		
Piston Classic downstream	•	
Balanced diaphragm		•
Materials		
Chrome plated brass body	•	•
Cold water		
Dry chamber		•
Ports		
Intermediate pressure Ports (IP)	4	4
High Flow Ports (HFP)	-	2
High Pressure (HP) Ports	1	2
Configuration		
INT 230 bar (3336 psi)	•	•
DIN 300 bar (4351 psi)	•	•
Weight DIN 300 (g/oz)		
	485 / 17.1	625 / 22
Weight INT (g/oz)		
	706 / 24.9	850 / 30
Intermediate pressure (bar/psi)		
	8.5-9.8 / 123-142	9-9.8 / 130-142

*The Bonaire system includes a Cayman first stage and a Bonaire second stage.

Second stage

	CAYMAN	BONAIRE	ARUBA
Technology			
Air-balanced	•		
Classic downstream valve		•	•
Materials			
Precision molded carbon fiber & technopolymer housing	•		
Full metal valve housing		•	•
Breathing comfort			
Diver's adjustable venturi effect	•	•	
Venturi effect preset			•
Sturdy super-flow hose with kevlar lining for extra durability and flawless air delivery			
	•	•	•
High comfort orthodontic mouth piece			
	•	•	•
Left and right attachment for extra convenience			
		•	•
Weight (g/oz)			
	158 / 5.6	174 / 6.1	167 / 5.9
Air Flow at 200 bar (l/min / SCFM)			
	1850 / 66	1400 / 50	1400 / 50
Maximum low pressure (bar/psi)			
	14 / 203	14 / 203	14 / 203

6. Preparing for use

Before assembling the SCUBA unit verify that all components comply with local or European standards.

- Before connecting the first stage to the cylinder verify that the connection is free from dirt (sand, debris) and that the O-ring is undamaged.
- INT connection: place the first stage connector on the cylinder valve after checking that it is also free from dirt or debris. Check that the contact surfaces are in the correct position and then tighten the yoke screw. In order to obtain the maximum comfort, the low pressure hose connecting the first stage to the second stage should be horizontal and directed toward the diver's right shoulder
- DIN connection: screw the first stage connector on the cylinder valve after checking that this is also free from dirt or debris. Before tightening the hand-wheel and while screwing it in, confirm that the threads on the DIN connection and on the valve correspond correctly and are not crossed. In order to obtain the maximum comfort, the low pressure hose connecting the first stage to the second stage should be horizontal and directed toward the diver's right shoulder.
- Fit the carrying system/jacket (refer to the appropriate user instruction guide). After fitting the carrying system, the cylinder should sit securely. Check to be sure that the cylinder cannot come loose on its own accord.
- Conduct a vacuum leak test. With the cylinder valve closed slowly inhale from the second stage. It should be possible to achieve and maintain a minimal negative pressure without air entering the system. This test must be repeated for all regulator second stages connected to the SCUBA unit in use.
- Now conduct a high-pressure leak test. Slowly open the cylinder valve, check for any leaks and read the pressure registered on the pressure gauge.

6.1 Set-up/in-use warning

WARNING

While opening the cylinder valve, the pressure gauge face must not be directed towards the user or others, in the event and risk of a pressure gauge malfunction.

WARNING

When opening the cylinder valve the second stage purge button should be slightly depressed, so that the second stage valve is open.

WARNING

Do not push down on the purge button in low temperatures, as this may cause a second stage freeze-up.

- Close the cylinder valve and check the pressure gauge once again. During the first minute the displayed pressure should not decrease. Then open the valve again.
- If the cylinder valve is equipped with a reserve rod, verify that it is free to move downwards for its entire length. If you plan on using the reserve, ensure that the mechanical reserve valve is in the correct position (Up).
- Check that the entire SCUBA unit is functioning correctly by performing several complete breathing cycles (deep inhalation / exhalation) with the cylinder valve open and the second stage mouthpiece in the mouth.
- Check that all devices connected to the SCUBA unit are operating correctly. For example, check that the buoyancy compensator inflator (or the dry suit inlet valve) is functioning etc.

WARNING

Never connect a low pressure hose to a high pressure port. These connection threads are different sizes and are not compatible. Do not use adapters of any kind to connect low-pressure devices to high-pressure ports. Doing so could cause serious damage to both the user and equipment.

7. Equipment use

Check that the SCUBA unit is complete in all respects and complies with all requirements. Refer to the IMPORTANT WARNING REMINDERS and PREPARING FOR USE sections. Open the cylinder valve, don the equipment and put the second stage in your mouth, breathe deeply a few times to ensure that the system is operating correctly. When the mouthpiece is out of the mouth, simply pressing the purge button may trigger the Venturi effect and cause a regulator free-flow. The free-flow can be stopped by covering the mouthpiece opening with a finger.

7.1 Second stages with Venturi effect adjustment

If the second stage is equipped with a Venturi effect adjustment system, this device must be turned to the minimum (marked "MIN") or the "PRE-DIVE" setting while at the surface (Img. 5). At the beginning of the dive the adjustment knob must be turned to the "MAX" or "DIVE" position.

An accidental free-flow can be stopped by covering the mouthpiece opening with a finger or by submerging the second stage regulator with the mouthpiece turned down, or by placing the mouthpiece in the mouth.

**WARNING**

Breathing must be continuous, without holding one's breath.

If the second stage is used as an alternate air source (octopus) the Venturi effect knob should be set to the "MIN" or the "PREDIVE" position for the entire duration of the dive. Should the use of this second stage be needed, the adjustment knob must be turned to "MAX" or "DIVE".



Img. 5

**WARNING**

All dives must be planned and carried out so that at the end of the dive the diver will still have a reasonable reserve of air for emergency use. The suggested amount is usually 50 bars (725 psi).

7.2 Cold water use

EN 250: 2000 norm defines "cold waters" as those having a temperature lower than 10°C (50 °F) and requires that regulators certified for use in such conditions must be tested and approved to work properly in temperatures of 4°C (39 °F). If the SCUBA equipment is used in water with a temperature lower than 10 °C (50 °F) it is important to keep in mind the following:

1. Use only regulators certified for use in these conditions. **All SUBGEAR regulators are certified for use in cold water in accordance with norm EN 250: 2000.**
2. Prior to the dive keep the regulator in a warm environment before fitting your regulator on the tank.
3. If the regulator is exposed to colder conditions, much lower than 0°C (32°F), set the Venturi effect knob on "MIN" or "PREDIVE" (Img. 5) to avoid the risk of spontaneous and uncontrolled free-flow.
4. With high air flows the regulator first stage cools rapidly, therefore avoid high consumption rates during cold water dives. For example, avoid simultaneously using the buoyancy compensator and dry suit inflator and the alternate air source. Its also advised to avoid checking the second stage function via the purge button, unless absolutely necessary. Ensure that the cylinder is filled only with air compliant with norm EN 12021.
5. In extremely cold water diving, SUBGEAR recommends the use of a cylinder equipped with two separate valves, connected to two complete regulators.

**WARNING**

Diving in cold waters requires special equipment and techniques. Before attempting a cold water dive, obtain adequate training from a recognized certification agency.

7.3 Post dive

Close the cylinder valve and drain the system by pushing on the purge button of each second stage. Once the system has been depressurized disconnect the first stage regulator from the valve. All inlets must be closed with the provided protective caps to avoid the entry of debris, dirt or moisture (Img. 1 and Img. 2). If the cylinder valve is equipped with a reserve system the rod should be put in the “open” position (fully lowered) to indicate that the cylinder needs to be filled.

8. Equipment care and maintenance

8.1 Care

SUBGEAR regulators are precision devices that are essential to the diver’s safety. For this reason SUBGEAR uses only materials that have been selected, after thorough testing, as the best for efficiency and durability.

To ensure that your SUBGEAR regulator is always in perfect condition, a minimum of care and maintenance is required.

After every dive and especially if in chlorinated water (pools), rinse the regulator with fresh water, preventing water from entering the system by following these steps:

1. Ensure that the high pressure inlet of the first stage regulator is closed with the special protective cap.
2. Should water accidentally enter the low pressure hose, connect the regulator to the cylinder, open the valve and press the second stage purge button down until all water has been expelled.
3. Dry your regulator completely in a dry ventilated place, away from heat and direct sunlight.



WARNING

Open the cylinder valve only with a regulator connected to the cylinder or slowly turning the cylinder valve knob as to control the air flow.

Care of regulators when not in use:

- a. Make sure that the high pressure inlet protective cap is in the correct position.
- b. Keep the regulator in a dry place, away from heat and direct sunlight. The mouthpiece should be periodically immersed in a disinfecting solution and rinsed with fresh water to completely remove the disinfectant. Do not use disinfectant substances that could damage the mouthpiece.

8.2 Maintenance



WARNING

Do not use silicone grease on silicone components, as this may cause some parts to deform. In addition, do not use silicone grease on components in the high pressure area of the first stage as this would compromise the compatibility with Nitrox mixes.

Maintenance procedures should not be carried out by the user but only conducted by a SUBGEAR Authorized service technician. A SUBGEAR authorized technician must verify the correct operation of the regulator and if necessary repair it, after 100 dives and not later than every 2 years, by authorized experts. The inspections are necessary to preserve warranty claims also. Please refer to the Johnson Outdoors warranty conditions.

Every 2 years or in case of damage, the diaphragm and exhaust valve of 2nd stage should be replaced by an authorized expert.”

Servicing is available through SUBGEAR Authorized dealers identified by the SELECTED DEALER SUBGEAR sign or by visiting www.subgear.com

9. Nitrox



WARNING

To prevent severe and potentially lethal injuries DO NOT dive using Nitrox (oxygen enriched air) mixes unless you have first obtained adequate training and certification in their use by a recognized certification agency.



WARNING

Maximum operating depth (MOD) and exposure times to Nitrox (oxygen enriched air) mixes are dependent upon the oxygen concentration of the mix in use.

The term Nitrox (oxygen enriched air) defines breathable mixes composed of oxygen and nitrogen and containing oxygen in a percentage higher than 21% (atmospheric air). The higher oxygen concentration limits the use of these mixes with standard scuba equipment and requires the use of materials and procedures that differ from those required by the use of atmospheric air.

USE OF NITROX MIXES OUTSIDE OF THE EUROPEAN UNION

Standard production SUBGEAR regulators distributed to countries outside of the European Community use normal INT or DIN connections and are manufactured with materials, assembly procedures and lubricants that ensure compatibility with gas mixes containing oxygen up to 40%.

In these countries, users are required to follow the same safety procedures that apply to dedicated nitrox regulators and to comply with the regulations set by each country concerning the use on Nitrox mixes for diving.



WARNING

If SUB GEAR regulators have been used with standard compressed air it will be necessary to perform a new maintenance and cleaning procedure specifically designed for the use of nitrox mixes and carried out by a SUB GEAR authorized technician, before using them again with Nitrox.

10. Troubleshooting

MALFUNCTION	PROBABLE CAUSE	SOLUTION
After opening the cylinder valve the pressure gauge shows zero.	<ol style="list-style-type: none"> 1. Empty cylinder. 2. Malfunctioning pressure gauge. 3. Malfunctioning cylinder valve. 	<p>Fill the cylinder.</p> <p>Have the pressure gauge replaced by a SUBGEAR authorized technician.</p> <p>Have the cylinder valve checked by a SUBGEAR authorized technician.</p>
HP or IP leak.	Damaged O-rings.	Have the O-rings replaced by a SUBGEAR authorized technician. Avoid over-tightening the connections.
Valve leak.	Defective valve or stem.	Have the valve checked by a SUBGEAR authorized technician.
No air supply.	Malfunctioning regulator (first or second stage).	Have the regulator checked by a SUBGEAR authorized technician.
The regulator free flows.	Venturi effect has been triggered.	Cover the mouthpiece with a finger or direct the mouthpiece opening down or submerge it.
If the free flows continues.	Malfunctioning regulator.	Do not begin the dive (or end it) and have the regulator checked by a SUBGEAR authorized technician.
Water leak inside the regulator second stage.	Dirt or malfunctioning exhaust valve or damage to mouthpiece or diaphragm.	Have the regulator checked by a SUBGEAR authorized technician.

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