



Compact DIN First Stage Owner's Manual



*HL405 - For Argon
[Drysuit Inflation]*



HL406 - For Breathing Gas

Highland is a brand of XS Scuba, Inc. located in Santa Ana, CA.

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Introduction

Thank you for purchasing a Highland Compact DIN First Stage. Whether you are using this for a redundant air supply or to inflate argon into your drysuit, you can rest assured knowing that your compact first stage is reliable and will get the job done.

Your Compact DIN First Stage is the result of quality engineering, material selection and precise assembly methods. Each Highland Compact DIN First Stage is 100% tested prior to final packaging so you know it works right the first time you use it.

With proper care and maintenance, your Compact DIN First Stage will continue to deliver its factory-new performance for many years to come.

XS Scuba, owner of the Highland brand, hopes that you have many exciting underwater adventures ahead of you. We are excited to be a part of those adventures.

Warnings, Cautions and Notes

It is important to pay special attention to the information provided in warnings, cautions and notes, which are accompanied by the following symbols:



A **WARNING** indicates any situation that, if not avoided, could result in serious injury or death.



A **CAUTION** indicates any situation or technique that could cause damage to the product, and could subsequently result in injury to the user.



A **NOTE** is used to emphasize important points, tips, and reminders.

General Precautions and Warnings

⚠ WARNING: Before using this regulator, you must have successfully received training and certification in the technique of SCUBA diving from a recognized training agency (or any Military or government operated diving school). Use of SCUBA equipment by uncertified or untrained persons is dangerous and can result in serious injury or death.

⚠ WARNING: Keep your regulator in good working condition by having it serviced annually at an authorized XS Scuba Dealer. Service, disassembly or adjustment must not be attempted by persons who

are not properly trained to work on this regulator

⚠ WARNING: Due to the compact size of this first stage, it does not have the same flow characteristics as a full-size scuba regulator. While effective at providing back-up gas or deco gas to a diver, it is not intended to take the place of your primary regulator.

⚠ WARNING: Do not use this regulator deeper than 165 fsw (50 m).

General Precautions and Warnings

⚠ WARNING: The HL405 Black Argon Model is designed for argon gas for drysuit inflation. Since this model operates at a lower intermediate pressure, it was not designed for breathing.

⚠ WARNING: This regulator is designed for use in water that is 50°F / 10°C and above. Use of this regulator in water temperatures below 50°F / 10°C could result in the regulator freezing and not performing as designed.

⚠ WARNING: DO NOT leave the cylinder standing unsecured with the regulator attached to the valve. Should the cylinder get

knocked over, permanent damage may occur to the regulator and the cylinder valve.

⚠ WARNING: DO NOT use the regulator first stage as a carry handle when lifting or transporting the cylinder as this can damage the regulator and / or the cylinder valve.

⚠ WARNING: Always pressurize the regulator gradually by opening the cylinder valve SLOWLY.

⚠ WARNING: This regulator is not configured for commercial use with surface supplied air.

Enriched Air Nitrox Use

⚠ WARNING: This section contains important information regarding the use of this regulator with enriched air nitrox. Do not use this regulator with enriched air nitrox if you do not fully understand this section. To do otherwise puts you at risk of serious injury or death.

⚠ WARNING: Obtain an enriched air nitrox diving certification. In order to fully understand the risks involved with diving elevated percentages of oxygen (above 21%), you must obtain a certification in enriched air nitrox from a recognized training agency.

Your XS Scuba regulator has been prepared for use with enriched air nitrox (EAN) where the oxygen percentage does not exceed 40% (EAN40). This is because your regulator was built to a high standard of cleanliness using EAN compatible parts and lubricant.

If it is your intention to use your new XS Scuba regulator with EAN up to 40%O₂, it is critical that you maintain the internal cleanliness of your regulator (see section on Care and Maintenance).

If it is your intention to use your regulator interchangeably with breathing air, the breathing air should be “oxygen-compatible” or “hyper-filtered” whereas the condensed hydrocarbons in the

air do not exceed 0.1mg/m³. Your local XS Scuba Dealer can help you determine whether the breathing air they provide meets this criterion.

Standard compressed breathing air, often referred to as “Grade E” does not necessarily meet this criterion. Grade E breathing air may contain certain levels of hydrocarbons, including traces of compressor oils, that while not considered harmful to breathe, can pose a risk in the presence of elevated oxygen content.

Passing hydrocarbons through a valve and regulator creates a cumulative effect where the hydrocarbons build up over time along the internal passageways

of the equipment. When these hydrocarbons come in contact with high pressure oxygen enriched air, they can pose a very real hazard that can lead to combustion.

Therefore, if a regulator has been used with Grade E breathing air, it should receive overhaul service, including hydrocarbon cleaning, prior to being put back into nitrox service.

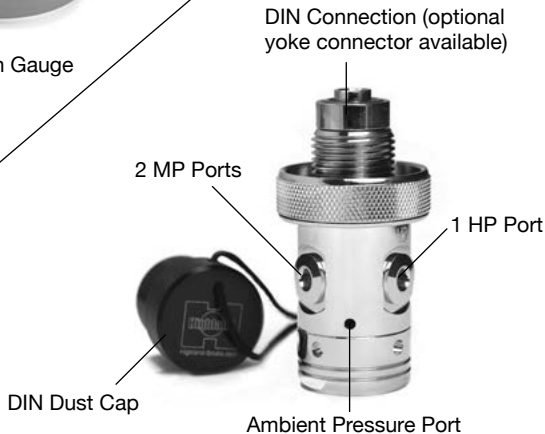
Although second stage components are not subjected to high pressure EAN, XS Scuba recommends that the same guidelines apply.

Your Regulator at a Glance

Complete Argon Regulator



Compact DIN First Stage



Scope of Use

The Highland Compact DIN First Stage is offered in two versions. The bright chrome version, p/n HL406, is designed for breathing gas. The black chrome version, p/n HL405, is designed for use with argon gas for the purpose of inflating drysuits. This black version (only), also includes a Mini Pressure Gauge, Over-Pressure Relief Valve and inflation hose.

HL406 Compact DIN First Stage

The HL406 Compact DIN First Stage is an in-line piston model that is unconventionally small. While it is robust and reliable, it does not provide the extreme

flow rate that a full-size first stage would produce. As such, it is best suited for back up use with an octopus regulator, decompression hang bottles or short duration shallow water use. Do not use this first stage beyond 165 fsw (50 m). The maximum supply pressure for this regulator is 3000 psi (206 bar).

HL405 Complete Argon Regulator

The HL405 Complete Argon Regulator is recognized by its black chrome plating. It produces a lower intermediate pressure than its HL406 counterpart. Due to this lower intermediate pressure, it has not been designed for breathing. Rather, it is designed for dry suit inflation with argon. Never attempt

to breathe argon gas as it will not support life. The maximum supply pressure for this regulator is 3000 psi (206 bar).

⚠ WARNING: Never attempt to breath Argon gas as it will not sustain life.

Convert to a Yoke Connector

If you prefer to convert your Compact DIN Regulator to a Compact Yoke Regulator, use the optional Spin-On Yoke accessory, P/N AC370.

Preparation and Set Up

Your regulator has 1 high pressure

port and 2 medium pressure ports to attach your various accessories. The high-pressure port is where you would attach your submersible pressure gauge (SPG), console, transmitter or air-integrated computer. Medium pressure ports are for your second stage(s), or a drysuit inflator hose.

⚠ CAUTION: XS Scuba recommends that you have your XS Scuba Dealer install your accessory items to prevent over-torquing the hose fittings and to optimize placement of accessory hoses.


Preparing to Dive

Remove the dust cap from the DIN connector.

Vent a small amount of air from the cylinder valve to blow out any dust, debris or moisture.

Inspect the condition of the DIN connector o-ring. Confirm that it is clean and free from any nicks or imperfections.

Thread the DIN connector into the cylinder's DIN valve until the o-ring on the connector bottoms out on the back of the DIN valve's receptacle. Turn the DIN handwheel until snug.

 **CAUTION:** Over-tightening the regulator on the valve can cause damage and make it difficult to remove the regulator after the dive. It is the DIN o-ring


that forms the seal, not excessive tightening of the DIN handwheel.

Make sure that your pressure gauge or computer faces away from you.

Pressurize the regulator by SLOWLY opening the cylinder valve. Continue to open the valve all the way and then back a half turn.

Listen for leaks near both stages of the regulator, any accessories and along the length of the hoses. If there is air leaking between the regulator and the cylinder valve, follow the procedures for removing the regulator from the valve. Replace the DIN o-ring and reseat the regulator. If leakage persists, return the regulator with


cylinder to your local XS Scuba Dealer for inspection and repair.

 **WARNING:** Do not dive if your regulator or its accessories are leaking.


Depress the purge button briefly to ensure sufficient air flow and to blow out any dust or debris.

For the HL406 model, place the regulator second stage in your mouth. Inhale and exhale slowly and deeply. The regulator should breathe easily without noticeable resistance.

Post Dive Procedure

 **NOTE:** If freshwater is readily available, rinse your regulator

thoroughly prior to depressurizing it. This will prevent water from entering the first stage.

 **NOTE:** When you remove the first stage from the cylinder, exercise caution not to let any water enter the first stage through the inlet fitting, where the filter is located.

Shut off the cylinder gas supply by turning the cylinder valve handwheel until snug.

Depress the second stage purge button (HL406) or the drysuit inflation button (HL405) to drain the remaining gas from the regulator and hoses. Keep the button pressed in until no more gas can be heard exiting the regulator.

Turn the DIN handwheel counterclockwise to loosen the regulator in the cylinder valve. While removing the regulator, keep the first stage inverted with the DIN connector facing down. This will prevent water drops from going in the inlet area where the filter is located.



Dry the dust cap with a towel. Thread the dust cap on to the DIN connector until snug.

Care and Maintenance

As soon as possible after the dive, it is important to soak or rinse your regulator in fresh water. Warm water (<120°F / 49°C) is best.

The best method is to soak it in a tub of water while it is still connected to the cylinder and pressurized. This keeps rinse water out of the hoses and the first stage.

If this is not possible, then you may soak it while it is depressurized as long as you follow these steps:

- Ensure that the dust cap is making a water tight seal over the regulator's DIN connector.
- DO NOT depress the purge button (HL406). This will allow water to enter the regulator and make its way down the hose to the first stage.
- Keep the second stage lower than the first stage (HL406).

If soaking is not possible, then, as a minimum, rinse with a garden hose. Do not use a high-pressure nozzle as this could compromise the 2nd stage internal parts. Be sure to rinse the inside of the second stage via the mouthpiece as well as the venturi lever. Be sure to direct freshwater into the ambient pressure ports on the first stage to flush out the main spring cavity.

After rinsing, shake any residual water out of the second stage (HL406). Hang the regulator by the first stage in a cool, dry environment, out of direct sunlight. After your regulator is completely dry, you may store it in a regulator box or bag.

⚠ CAUTION: DO NOT store your regulator in a hot environment or near an electric motor, which produces ozone. Prolonged exposure to heat, ozone, chlorine fumes or ultraviolet rays can cause premature degradation of your regulator's soft parts and hoses.

Dealer Inspection and Service

Do not assume that your regulator is in good working order because it has received little use since its last servicing. Storage can be hard on a regulator as seals and other soft parts can take a set and dry out.

You must obtain factory authorized service from an XS Scuba Dealer at least once a year. Your regulator may require more frequent service depending on the amount of use it receives and the type of environmental conditions that it is subjected to.

If the regulator is used for rental or training purposes, it will require factory prescribed service every three to six months. Chlorinated swimming pool water is an especially damaging environment for scuba equipment, due to the high levels of chlorine and pH balancing chemicals that can cause certain components to rapidly deteriorate.

⚠ WARNING: Be sure to have your regulator serviced at least once a year by an XS Scuba Dealer. Your personal safety and the mechanical integrity of your regulator may depend on it.

Warranty

XS Scuba offers a Limited Lifetime Warranty against defects in material and workmanship on their regulators.

This warranty is limited and subject to the following restrictions:

- The warranty is offered to the original owner only
- The regulator must have been purchased from an authorized XS Scuba dealer.
- This warranty does not cover normal wear. Factory prescribed service by an authorized XS Scuba Dealer is required at least once annually.
- Some parts are subject to wear under minimal or normal use. O-rings, seats, filters, diaphragms, valves, tie wraps, mouthpieces and hoses should be inspected for wear on a regular basis. Replacement of these items is usually necessitated based upon normal wear rather than defects.
- This warranty does not extend to damages caused

by improper use, improper maintenance, neglect, unauthorized repairs, modifications, accidents, fire or casualties.

- Cosmetic damage, such as scratches dents or nicks, is not covered by this warranty.
- This warranty does not extend to regulators used for rental, training, commercial or military purposes.
- This warranty is limited to repair or replacement at the discretion of XS Scuba.



NOTE: All warranty transactions must be accompanied by proof of original purchase from and authorized XS Scuba dealer. Be sure to save your sales receipt along with proof

of prior annual service.

XS SCUBA DISCLAIMS AND EXCLUDES ANY LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

Some states in the U.S, and some foreign countries do not allow exclusions or limitations of liability for incidental or consequential damages, so this may not apply to you.

Regulator Specifications

Type: In-line piston first stage

Connection: DIN

Material: Chrome over brass

Maximum Supply Pressure:
3000 psi (206 bar)

**Intermediate Pressure Output
at 3000 psi (206 bar) supply
pressure:**
HL406 135 – 145 psi (9.3 – 10 bar)
HL405 115 - 125 psi (7.9 - 8.6 bar)

**Intermediate Pressure Output
at 500 psi (206 bar) supply
pressure:**
HL406 75 – 85 psi (5.2 – 5.9 bar)
HL405 75 – 85 psi (5.2 – 5.9 bar)

**Recommended Maximum
Operating Depth:** 165 ft (50 m)

**Flow Rate at 3000 psi (206 bar)
supply pressure:**
HL406 480-500 liters per min
HL405 420-440 liters per min

IP Adjustment: Add or remove
spring shims

Service Kit: p/n RK8



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