

# *Drysuit Valves*

*User Manual*

Photo: Jonas Dahm / Deep Sea Productions



[www.sitech.se](http://www.sitech.se)

**SI TECH** <sup>®</sup>  
INNOVATIVE SAFETY SOLUTIONS – MADE IN SWEDEN

## 1. *Optimal Buoyancy Control*

Before early 70's, drysuits was mainly used in commercial and military diving activities. To avoid discomfort created by squeeze at greater depth, overpressure valves were installed in the ankles, wrists and neck in order to remove excessive air inflated through the face mask.

The inflation of gas also increased the undergarments insulation ability. This type of drysuit was named constant volume drysuit. The wetsuit was a great improvement and started to be popular in the early 50's and drysuits in general became out aged.

**Stig Insulán** made his military service as a mine clearance diver. Stig was early involved in wetsuit and general diving gear manufacturing, which he started in 1962. With his dedication to diving and interest in design he tested the ideas during commercial diving operations. During long dives under ice in cold water Stig required something better.

Stig's invention of the variable volume drysuit valve, opened up for a new era of underwater comfort. From extensive diving experience and expertise in regards to diving physiology a number of criterias was set up:

1. It must act as an automatic overpressure valve, also at maximum setting.
2. It must have feature for manual dumping of insulation gas with occupied hands.
3. It must have a sensitive regulation of internal suit pressure.
4. It must at a given setting maintain internal gas for buoyancy control.
5. It must maintain insulation and flotation gas for prolonged surface time.
6. It must be placed on a location allowing easy gas dumping without inadvertently deflation. E.G Rising hands for alert call.
7. It must have adequate flow rate to enable easy ascent speed control.
8. It must be removable for checking and service.
9. It must be attached in a Valve Port, preventing leakage if material is compressed.  
 Also to avoid rip out if tangled.

**The result of Stig's and SI TECH's efforts is known worldwide and has evolved modern drysuit diving to what it is today!**

### **Basic diving physiology helps you to understand buoyancy control!**

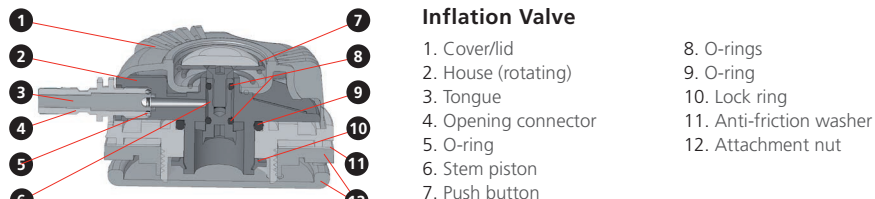
To easier determine your buoyancy, reduce number of gas filled compartments. The gas in the suit is the main compartment for a good insulation. By utilizing the valve in an optimal way you also control your buoyancy with the amount of gas in the suit. In a stressed situation it can be difficult to determine which compartment to manouver if the BCD\* is simultaneously used. Also consider buoyancy change in a thick neoprene drysuit. Gas volume changes in regards to depth. The weight of gas in your cylinder changes during the dive and must be considered when determining your weighting for a optimal buoyancy control at the end of dive. A weight loss of roughly 3 kg (6 lbs) has to be considered from start to end of dive.

*\*BCD = Buoyancy Control Device*

**SI TECH Valves** are designed to make your dives pleasant and easy avoiding dangerous pressure gradients between the suits inner and outer pressure with a maximum resistance of 25 mbar. The focus of the valves is the pressure precision that make the SI TECH valve superior. This also assures to prevent leakage of insulating gas when set to maximum pressure for extended surface buoyancy and warmth. The location of the Exhaust Valve at the upper arm ensure an easy access of internal gas venting when controlling ascent speed and fine adjustment of buoyancy during the dive. At minimum setting 2 mbar the suit can be evacuated to a minimum of free gas (not gas inherent in the underwear).

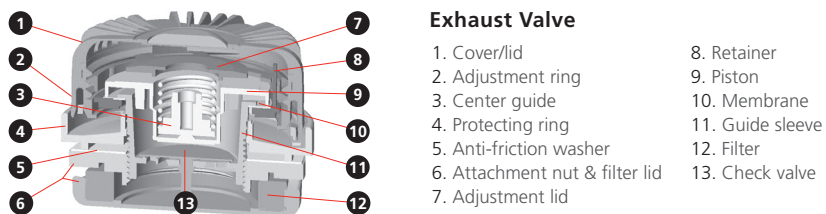
For secure attachment the valve is preferably attached with SI TECH Valve Ports. This allows you to make service an easy task.

## 2. Basic construction



### Inflation Valve

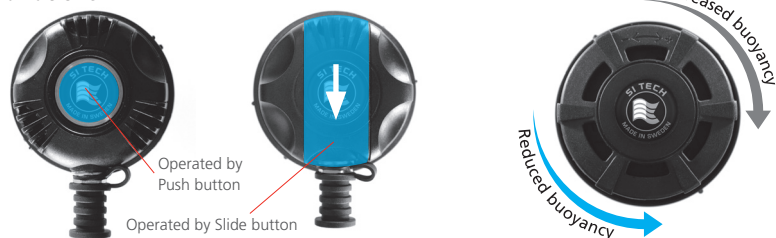
- |                      |                          |
|----------------------|--------------------------|
| 1. Cover/lid         | 8. O-rings               |
| 2. House (rotating)  | 9. O-ring                |
| 3. Tongue            | 10. Lock ring            |
| 4. Opening connector | 11. Anti-friction washer |
| 5. O-ring            | 12. Attachment nut       |
| 6. Stem piston       |                          |
| 7. Push button       |                          |



### Exhaust Valve

- |                                |                  |
|--------------------------------|------------------|
| 1. Cover/lid                   | 8. Retainer      |
| 2. Adjustment ring             | 9. Piston        |
| 3. Center guide                | 10. Membrane     |
| 4. Protecting ring             | 11. Guide sleeve |
| 5. Anti-friction washer        | 12. Filter       |
| 6. Attachment nut & filter lid | 13. Check valve  |
| 7. Adjustment lid              |                  |

### Variations



SI TECH Inflation Valves include valves operated by push or slide button. The capacity and function of the valves are the same.

SI TECH Exhaust Valves are designed to be set for automatic buoyancy control. A ratchet function provides the opportunity to fine tune the release of gas!

### Connectors and Hoses



SI TECH Inflation Valves can be delivered with either Cejn or Int'l connector (Slide Inflation Valve is only available with Int'l). There are also the opportunity of choosing between a "Quick-On" hose connector or a basic version operated manually. The "Quick-On" locks when pushed on to the male connector of the valve. Hoses and connectors shall be inspected annually.

## 3. Mounting

These instructions cover drysuits equipped with SI TECH Valve Ports, ensuring a safe and tight fitting according to standard requirement.

- Prior to detachment from the suit and prior to re-attachment into the suit Valve Port, make sure that the Exhaust Valve cover is adjusted clockwise to full stop (+).



**Do not hold the cover on the Exhaust Valve when mounting or detaching!**

**Over tightening may destroy the valve! Please use the attachment tools.**

**NEVER** use the cover/lid to tighten the valve. Do not mix the Exhaust and Inflation attachment nuts when re-fitting the valves. Note that the Exhaust Valve attachment nut has a filter! If the valve is impossible to detach, although using the appropriate tools correctly, contact your dealer.

**Hold the protection ring in a firm grip!**

**...turn the attachment nut on the inside...**

**...Anti-friction washer shall always be used...**

- Hold the protection ring in a firm grip, turn the attachment nut on the inside of the drysuit by hand until you feel its firmly tightened. The Anti-friction washer should always be used, positioned between the suit and the nut. • Use the attachment tools when applying torque. Be sure that the valve is settled correctly into the guide ridge of the Valve Port.

### Usage of attachment tools!



**DO NOT OVER TIGHTEN THE VALVE!**

This might cause damage to the drysuit and/or the valve. If you have any doubts, please contact a qualified technician.

Incorrect

Correct



## 4. Operating SI TECH Valves

SI TECH Exhaust Valves are very sensitive to small variations in the difference between internal and external pressure. The Exhaust Valve is adjustable between 10-200 mm column of water (1/2 to 8 inches) to provide buoyancy variation with the inherent gas volume.

Easy adjustment of the gas volume in the drysuit is hereby simplified and the drysuit may be used as the only method of buoyancy control during normal diving conditions (BCD emptied of gas during the dive). This will also support a controlled ascent, approx. 10-18 meters/minute (35-60 feet/minute), provided the diver's buoyancy is correctly compensated and the valve is set properly.

### Set the Exhaust Valve for automatic buoyancy control

You can remain neutrally buoyant without manual deflation; when the Exhaust Valve is correctly located (on the highest point of the drysuit, most commonly on the left upper arm) and properly set, and when you are correctly compensated with weights. When you adjust the setting by turning the valve cover, a clicking sound will help you determine the fine tuning. When the valve is properly set you will be able to fine tune the gas volume in the drysuit further by rolling the body or by raising or lowering the elbow.

The valve may need further fine tuning during the dive depending on gas consumption during dive and the suit material. There should be no gas in your BCD during the dive. The BCD is used only as a back-up. Adjust the valve slightly by turning the valve cover. The clicking sound that can be heard when you turn the valve cover makes it easy for you to fine tune the valve while diving. The symbols + and – above the logo label on the lid indicates the effect.

**For reduced buoyancy (red):**  
adjust counter clockwise (towards-)  
= lower pressure = less gas  
retained in the suit.

**For increased buoyancy (blue):**  
adjust clockwise (towards+)  
= higher pressure in the suit  
compared to ambient water  
pressure = more gas retained in the suit.



### Manual deflation

If the pressure setting of the valve is high (clockwise, to +), press anywhere on the valve lid to override this setting and to deflate gas. However, the valve is normally operated by minor pressure changes.



**Factors that need to be considered if the deflation capacity of the Exhaust Valve seems inadequate are:** the valve location on the suit, the suit fit (too much volume above the shoulders could lead to a pocket of gas being trapped above the valve), the permeability of the underwear and insufficient weight compensation.

**For further information, please contact your local SI TECH dealer!**

## 5. Maintenance

Both valves should be checked/serviced annually by a SI TECH approved service center.

### Inflation Valve

- Avoid exposing the quick connector socket on both valve and hose to water and sand. Use the protective cap when the hose is not attached.
- Rinse the drysuit and Inflator Valve with fresh water after every dive. After rinsing, attach the hose and purge air through the valve until clean and dry. If the action of the inflate button becomes stiff, spray a suitable silicone based spray into the quick connect socket and work the push/slide button.

### Exhaust Valve

- After each dive, especially if water contains debris and sand, flush the Exhaust Valve thoroughly with fresh water while turning the cover/lid back and forth. Make sure the valve is empty from water when diving in cold conditions.
- The Exhaust Valves is equipped with a filter, that prevents lint from your undergarments getting stuck in the check valve which could cause the valve to leak. Flush the filter through the attachment nut.



Before each dive, check that the ratchet action of the lid feels distinct. Old models of SI TECH valves might be without ratchet action.

## 6. Warnings & Recommendations

- Before donning your drysuit – check that the valves are properly fitted.
- SI TECH AB recommends you to limit drysuit compartments that can trap and contain gases which could cause buoyancy control problems. This means that the BCD should normally not be used for buoyancy control during the dive.
- A tightly fitting suit, belt or other equipment may restrict the flow of gas within the suit causing reduced deflation capacity of the Exhaust Valve. A non-restrictive-fit is desirable, but the suit must not be too large, especially not over the shoulder area .
- Be sure that the neck seal is properly trimmed and folded for comfortable fit. A neck seal that is too tight can restrict the flow of blood to and from the brain. A neck seal that is too loose will allow gas to leak out and cause a reduction of pressure within the suit that will have a negative effect on the Exhaust Valve's capacity to provide automatic buoyancy control. Remember to squeeze the drysuit before entering the water feet first. If not, you may risk the neck seal turning inside out.
- Differing compositions and physical properties of various drysuit undergarments affect the flow of gas through to the exhaust valve.
- While diving, avoid inflating when your feet are above your head.
- Using yourself and your drysuit as a lift bag will put your life in danger. For the same reason, never attach a lift bag to your Drysuit or BCD Hose.
- If you are unfamiliar to diving with a drysuit tell your dive buddy and/or your dive master. Allow yourself time to get familiar with the characteristics of your drysuit.
- Diving can be a potentially dangerous activity. Stressed divers can make decisions that may prove fatal. Dive within your physical, mental and experience limitations. Get to know your equipment and practice in a comfortable environment. Your personal fitness, experience, knowledge and judgment are factors that will be crucial for your ability to handle a crisis situation. Give up diving for the day if you are not feeling well or if you do not feel comfortable with the dive situation, your own ability or equipment. Always perform a pre-dive check on all your diving equipment and correct any malfunctions before diving.  
**All diving is done at your own risk.**

## SI TECH Drysuit Valves

### Inflation Valves

#### Skeleton



- High or low push button
- Rotating 360° degrees
- Anti-friction washer
- Nipple cover
- Available with Int1 or Cejn coupling

### Exhaust Valves

#### Thetis



- Ratchet action
- Adequate flow performance
- Easy manoeuvring
- Safety Valve

#### Shell



- High or low push button
- Rotating 360° degrees
- Anti-friction washer
- Nipple cover
- Available with Int1 or Cejn coupling

#### Argo



- Ratchet action
- Adequate flow performance
- Easy manoeuvring
- Safety Valve
- Great when using heavy duty gloves

#### Slide



- Slide activated sideways
- Rotating 360° degrees
- Anti-friction washer
- Nipple cover
- Available with Int1 coupling

#### Gaude



- Ratchet action
- Adequate flow performance
- Easy manoeuvring
- Safety Valve
- Great when using heavy duty gloves

### Dump Valves

Our complete range of valves does also include Dump Valves for a variety of needs. These can be found at: [www.sitech.com](http://www.sitech.com)

This manual cover standard valves and hoses. Custom made valves and hoses may differ in use and procedures. SI TECH reserves the right to incorporate modifications in products without any notice. SI TECH reserves the right for misprints. Images and illustrations are protected according to copyright regulations.

#### Warranty:

SI TECH warrants to the original purchaser, their valves and hoses to be free of defects in material or workmanship for a period of thirty six (36) months from the date of purchase, to a maximum of sixty (60) months from the date of manufacture. Comments or questions about this warranty should be directed to [info@sitech.se](mailto:info@sitech.se). Please include information about the batch code, brand and model of drysuit, serial numbers and proof of purchase. SI TECH AB will provide further information about where to send the product.

#### Limitations in warranty:

This warranty will be considered null and void when damages are caused by misuse or abuse such as, but not limited to, impact damage, unauthorized repair or modification, chemical or gas exposure, temperatures in excess of 175 degrees F (\*80 degrees C). Products with altered or removed identification numbers are not covered. This warranty does not cover parts normally found in SI TECH service kits, such as O-rings, gaskets, seats, etc.

## Manufactured in Sweden Quality Approved Worldwide

SI TECH is a Swedish company focusing on development, manufacturing and marketing of innovative safety solutions for protective suits such as; drysuits, rescue suits and similar protective garments. SI TECH is rooted in the diving industry and this is still the company's core market. The company was founded in 1971 by innovative diving pioneer Stig Insulán.

#### Core products:

Modular Quick Change Solutions, Drysuit Valves, Seals, Dry Glove Systems, Gas Supply Systems.

#### Market Segmentation

Marine | Military | Rescue

#### Development & Production

We take pride in the statement "Made in Sweden"! At SI TECH we are running both development and production in-house at our facilities in Brastad. Inhouse competencies include: CAD construction, Injection Molding, CNC Machining, EMD Machining, Assembly, Sales and Marketing, Logistics and Administration. Our team of engineers, sales and marketing personell have a close co-operation with the end-users of our products. Our location close to the ocean provides us with fantastic opportunities of testing our products in situations from normal to extremes.

#### Sales & Marketing

Company sales and marketing is operated from company headquarters in Brastad, Sweden. On the international arena SI TECH is guiding a network of distributors operating on a worldwide basis.

Thank you for choosing a drysuit equipped with valves from SI TECH, the No. 1 choice of discerning divers! SI TECH valves are designed to meet the highest standards of comfort and safety!

I strive to keep it that way and wish you many pleasant dives.

Jonas Axelsson, President of SI TECH AB

