



# HEATING SYSTEM

**Extend Your Limits  
& Stay Dry  
& Keep Warm**

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**Would you like to dive longer, deeper and in a more comfortable manner? Please see our innovative heating products. They will let you spend more time under water and facilitate the penetration of wrecks and caves by providing the feeling of warmth and increasing comfort and safety.**

**Choose comfort and feel the difference while diving in our heating system!**



# THE INFLUENCE OF COLD WATER ON A DIVER'S BODY

**Thermal protection is an important factor during diving. Its failure can cause thermoregulatory disorders.**

Without extra protection, most divers consider the temperature of 27°C as comfortable when under water. But what if you dive in colder waters? Or longer and deeper?

**Learn about the factors that affect your thermal balance and safety during the dive:**

## ■ 1. Body cooling

Under water both diver's body and mind must be efficient at all times. A diver whose temperature has fallen down begins to think and act unreasonably and thoughtlessly. Proper temperature of hands is an extremely important issue. When in emergency, capable hands can save your life. Sometimes you only have few seconds to solve the problem, like unfastening a snap hook. It takes much longer when your hands are cold.

## ■ 2. Constricted blood vessels

Blood vessels constrict in low temperature. Constricted blood vessels may cause decompression to be dangerous. Decompression limits are calculated for an average diver whose body functions properly and is not cooled down. However, the constricted blood vessels cause the blood to circulate more slowly. Gas bubbles may cause embolism. Slower circulation results in a slower desaturation. And that poses a serious threat to safety and health.

### ■ 3. Body cooling reduces the blood supply

When the body cools down, there are changes in circulation, too. The blood vessels constrict causing a reduced blood supply to the extremities. Fingers go numb followed by the whole hands and feet. Body cooling usually gets more serious at the end of the dive. Blood flow in the extremities decreases dramatically. The palms, which were well supplied with blood at the beginning of the dive, become numb and stiff.

### ■ 4. The elimination of fluids

The human body constantly heats up the fluids to ensure the proper functioning of all organs. In the case of body cooling, the body gets rid of them partially so that the fluid volume that needs to be heated up is reduced. This triggers a sudden urge to urinate. Secondly, the body becomes dehydrated eliminating the fluids. And this can affect decompression safety.

### ■ 5. Body cooling weakens the muscles

Body cooling causes weakening of the muscles, too. In water of a temperature of 10°C muscle strength is reduced by as much as 25%. A diver starts to shiver, which is a natural response of the human body to cold. These in turn cause him to lose motor coordination, which further hinders the diving.

## ■ 6. Body cooling increases the frequency of breathing

In cold water breathing rate increases. When a diver's body starts to cool down, his breath become sudden, rapid and uncontrolled. The body undergoes a so called hyperventilation, which cause breathing to become even more rapid. And this increases the air consumption.

## ■ 7. Hypothermia

Symptoms of body cooling can lead to hypothermia, which is a condition when the body can no longer maintain its natural temperature. Its effects for the body are very serious.

The sensation of cold is influenced by other factors, too, such as low blood pressure, vitamin deficiency, anemia, stress, fatigue, ageing body, hypothyroidism, low body fat or alcohol consumption. Hence the appropriate thermal balance is so important for both diver's comfort and safety.

# TAKE CARE OF YOUR COMFORT UNDERWATER

**Heating system prevents a diver from getting cold. It stabilises the body temperature – it does not overheat it but it provides thermal comfort under water. Many divers have already found out how comfortable it is to dive in heated products. Now it's time for you to learn about their advantages.**



**Improve your dive comfort.**



**Extend your dive time.**



**Start diving in extremely cold waters without concerns.**



**Limit the risk of undesirable and dangerous situations.**



**Take care of your health right now and in the future.**

**Heating system is an investment in your own comfort and health – in a higher diving quality, extended underwater time, and a good condition.**



**Pick your  
own set  
yourself!**



# Pick your own set yourself! It includes:

- Extreme BZ 400 Heated Undersuit
- Heated Vest
- Heated Gloves
- Connector or Thermo valve
- Suitable battery

Heated products are dedicated to all divers regardless of their experience or training. Diving in the heating system does not require the completion of any course, and its use is simple.

## All heated products:

- retain their insulating properties, even when the heating is disabled, through the use of Thinsulate™ on the outside and soft fleece inside.
- are equipped with the new generation heating wire covered with ultra-soft, silicone insulation resistant to breaking. An innovative, synthetic power cable coating is resistant to high temperatures and cuts.
- can be washed.
- have evenly distributed heating wiring that allows for freedom of movements.
- require a thermo valve or a connector, and an external battery for their operation.
- are the only on the market to provide “breathability” by eliminating sweating.





**“When filming in Newfoundland and the Canadian Arctic, the beauty of the environment stretches dives into very long durations. We’re diving on icebergs, filming WWII shipwrecks, exploring deep iron mines and swimming with whales. I use the full heated undergarment with gloves to offer me good dexterity and comfort for operating camera controls. Without it, I simply could not get the job done. Santi has provided me with critical tools for expedition level diving in the coldest water.”**

***Jill Heinerth***

**A pioneering underwater explorer and filmmaker  
Founder of [www.WeAreWaterProject.com](http://www.WeAreWaterProject.com)**

# Heated Gloves



Hands are the first to get cold. When chilled and numb they cause discomfort. But they are also incapable of proper handling of inflator or valves, taking pictures or filmmaking. Capable hands are also helpful if you want to quickly escape troubles underwater.

Heated gloves are very soft, and do not hinder the movements in any way. The thin heating cables are arranged and sewn in such a way that they are practically imperceptible. Under your dry glove you don't feel the difference – Is it your normal gloves or the heated ones? But you can feel the difference in the comfort you experience.

## ■ Specification:

- maximum heating temperature 40°C,
- maximum heating power: 30 W (pair),
- run time:
  - 6 Ah battery / about 2.5 h of heating,
  - 10 Ah battery / about 4 hours of heating,
  - 20 Ah battery / about 8 hours of heating,
- easy connection to SANTI heated vest and undersuit,
- CE certified.





**“My name is Kirill Egorov, and I am GUE Technical and Cave Instructor. I am teaching and diving for fun all over the world – and quite often in cold waters like Baltic Sea, Ordinskaya Cave in Urals, or caves and wrecks in Croatia.**

**For many years a factor significantly affecting my comfort during longer cave or wreck dives was cold - with my hands suffering the most.**

**Quite recently I have started using SANTI heated gloves - and this was a huge positive dramatic change. This summer I did several dives on Mars wreck in Sweden (with water temperatures as low as 4 degrees), Orda (with water temperature around 5 degrees) and caves in Cetina region in Croatia (water temperature around 8 degrees). It was great to find, that I can be totally comfortable during 1,5 – 2,5 hours dives, keeping all the dexterity in my hands - which allowed me to work with my camera and truly enjoy my dives.**

**I also should mention, that I also use the heated vest and love it – warm, comfortable and reliable piece of equipment, that allows me to do the dives I like and keeping me warm.”**

***Kirill Egorov***

**GUE Assistant Training Director  
GUE Tech 2 and Cave 2 Instructor**

# Heated Vest



The trunk is one of the most important part of diver's body. The lungs and the heart sit in it. When we feel cold, the heart works faster and the lungs constrict, which significantly affects the quality and safety of diving.

The vest is designed to be worn between a thin base layer and undersuit. This configuration allows most of the generated heat to be passed directly to the diver's body and not to the thick undersuit.

## ■ Specification:

- safety switch preventing from overheating,
- maximum heating temperature 45°C,
- maximum heating power: 55 W,
- run time:
  - SANTI 6 Ah battery / 1.2-1.5 hours of heating,
  - 10 Ah battery / 2-2.5 hours of heating,
  - 20 Ah battery / 4-5 hours of heating,
- made of BZ200 (210g/m<sup>2</sup>) Thinsulate™,
- new generation of heating wire covered with ultra-soft, silicone insulation resistant to breaking,
- innovative power cable braided sleeve resistant to high temperatures and cuts,
- new, more ergonomic nesting and wire layout inside,
- special vest bag included,
- CE certified.





**“I do use my hands a lot while sidemount diving. They are subject to hard work and strain when I don and doff my stage cylinders, run a wheel or practice gas switches. It is nice to exercise these skills in warm waters but my homeland offers only cold and dark quarries and the Baltic sea is nowhere near the Red sea temperature-wise. Add to this running a course where the students perform the set skills and all you do is neutrally buoyant motionless supervision. At first I was a bit worried about all the cables and bulkiness of the heating vest and gloves....but ever since my first cold water dive having them on I have not even considered coming back to my old habit of rubbing my hands against each other to stay warmer. A great product every serious cold water diver should at least try out.”**

***Tomasz Michura***

**MSDT PADI Instructor**

**TEC ITDA Instructor**

# Heated Undersuit



The heated undersuit is designed to protect the whole body of a diver from the cold in a comprehensive manner. The undersuit heats evenly the trunk, thighs and arms.

The undersuit is designed to be worn on a thin base layer.

This configuration allows most of the generated heat to be passed directly to the diver's body.

## ■ Specification:

- safety switch preventing from overheating,
- maximum heating temperature: 45°C,
- maximum heating power: 110 W,
- run time:
  - 10 Ah battery / 1.2-1.5 hours of heating,
  - 20 Ah battery / 2-2.5 hours of heating,
- made of BZ400 (420g/m<sup>2</sup>) Thinsulate™,
- new generation of heating wire covered with ultra-soft, silicone insulation resistant to breaking,
- innovative power cable braided sleeve resistant to high temperatures and cuts,
- new, more ergonomic nesting and wire layout inside,
- integrated heated gloves connection cable,
- works only with new SANTI thermo valve and connector,
- special undersuit bag included,
- CE certified.





**„As for me, SANTI products are perfect everywhere and in all conditions. I dive in many places, although recently mainly in the Baltic Sea, at the depth of 20 - 70 meters, with bottom time up to one hour. Thus, SANTI heating products are my ‘fairy tale’. I feel as if they were invented just for me.**

**Frequently, under my E.lite drysuit I am wearing the heated BZ400 undersuit. For shorter and shallower dives I only take thinner undersuit and heating gloves.**

**I like the fact that this is a Polish company that manufactures diving products at the highest level. According to me, they are the best on the market. SANTI has decent service facilities, experienced and friendly people work there.**

**I honestly recommend heating products for all, especially for those who dive in cold waters, during periods when deco phase is 4 degrees”**

***Adam Chróścicki***  
KDP CMAS M2 Instructor

# Battery 6Ah

It is designed for the SANTI heating system. Based on the modern lithium-ion batteries, so you can connect elements with a total power up to 100 W.

6 Ah battery is small, ergonomic and extremely light at the same time, weighing just 0.68 kg. It works even at a depth of 100 meters. The battery can also be used for dive lights.

It is the most innovative battery designed for heating on the market, with its illuminated connector which makes you always know whether it is enabled or not. Divers highly appreciate this functionality.



## ■ Specification:

- capacity: 6 Ah,
- operating voltage: 12 V,
- height: 115 mm
- diameter: 74 mm,
- E/O cord length: 60 cm,
- material: polyacetal / POM / Delrin,
- charging time: 4-5 hours,
- operation depth: 100 m,
- weight: 0.68 kg.





**“As an Explorer, Scientific Diving Safety Officer, and Technical Diving Instructor Trainer, I dive in many environments around the world. Safety is the number one priority, and this requires exceptional quality and performance from my equipment. SANTI have supported my projects for many years with their outstanding dry suits, and over recent years that support has extended to improving safety and comfort during extreme cold-water projects with the advent of suit heating systems.**

**Many variations of suit heating systems have been tried over the years, several from manufacturers providing equipment for non-diving users such as motorcyclists, but none were custom designed and manufactured for the needs of divers.**

**The heating of a diver requires care to prevent decompression complications. Heat must be applied gently to the right areas and used as a prevention to heat loss rather than a means to re-warm.**

**I have used the SANTI system in water temperatures down to 0.5°C and run times of over 5 hours in cave, mine, and open ocean environments, and utilised the heated vest, full heated suit and the heated glove system via the ‘Thermo-Valve’, and found it an excellent if not essential piece of equipment for projects in such extreme environments.**

**The quality of materials, construction, and operation are exceptional, as I have become used to with all SANTI products.**

**SANTI conducted a lot of research and trials, including thermal camera imaging, to determine the optimum output necessary to maintain core body temperature whilst not overheating the diver.**

**For divers venturing into cold-water environments for extended run times I would not fail to endorse and recommend the heating system range SANTI offer.”**

***Phil Short***

**Explorer, Scientific Diving Safety Officer, Technical  
Diving Instructor Trainer**

# Thermovalve

The thermovalve connects the external battery and the components of the heating system placed under the drysuit. It replaces the standard inflation valve. Unlike connector, it offers two functions in one device: drysuit inflation valve with an integrated connector.

It has a rotating head and is available with “APEKS” or “SI-TECH” screw size.



# Drysuit Connector

It's a connector integrating connection to the inflation valve and battery. E/O cord connector passes through a standard suit inflation valve and provides power connection from the external battery to a heated product under the drysuit.



# Double Drysuit Connector

The device is equipped with two power cables that allow you to use a greater number of heated products and their independent connection. Using it you can make two independent heating systems, eg. when you dive in very cold waters, one can be connected to the undersuit and the other to the vest.



# Y connector

“Y” connector is essential when you want to create your custom heating system.

It is ideal for one battery owners. The connector allows for power split from one source to two separate devices.

It consists of three waterproof two pole connectors in a single device. The “Y” connector can be used for all type of underwater electrical devices, like heating or lightning systems. The “Y” connector is compatible with all types of E/O cord endings.



## ■ Specification:

- max current: 15 A,
- poles: 3 x 2,
- depth rating: 200 m.

**All the components of the heating system are made at SANTI headquarters. They are subject to constant quality control. It guarantees high quality which ensures safety under water.**

## **You can adjust the heating system to meet your individual needs:**

1. If it's your hands that are the first to get cold – start with SANTI heated gloves.
2. If you expect more from your dive – consider using a gloves and vest set.
3. If you dive for a long time and in cold waters – heated undersuit is the perfect solution.
4. If you have only one battery – get yourself a “Y” connector.
5. If you are an extreme diver, you can build two independent heating systems using two batteries, one powering the undersuit, and the other powering the vest.

Our heated products heat up quickly. We recommend switching the system on already at the beginning of the dive.

## **Make your own heating system**

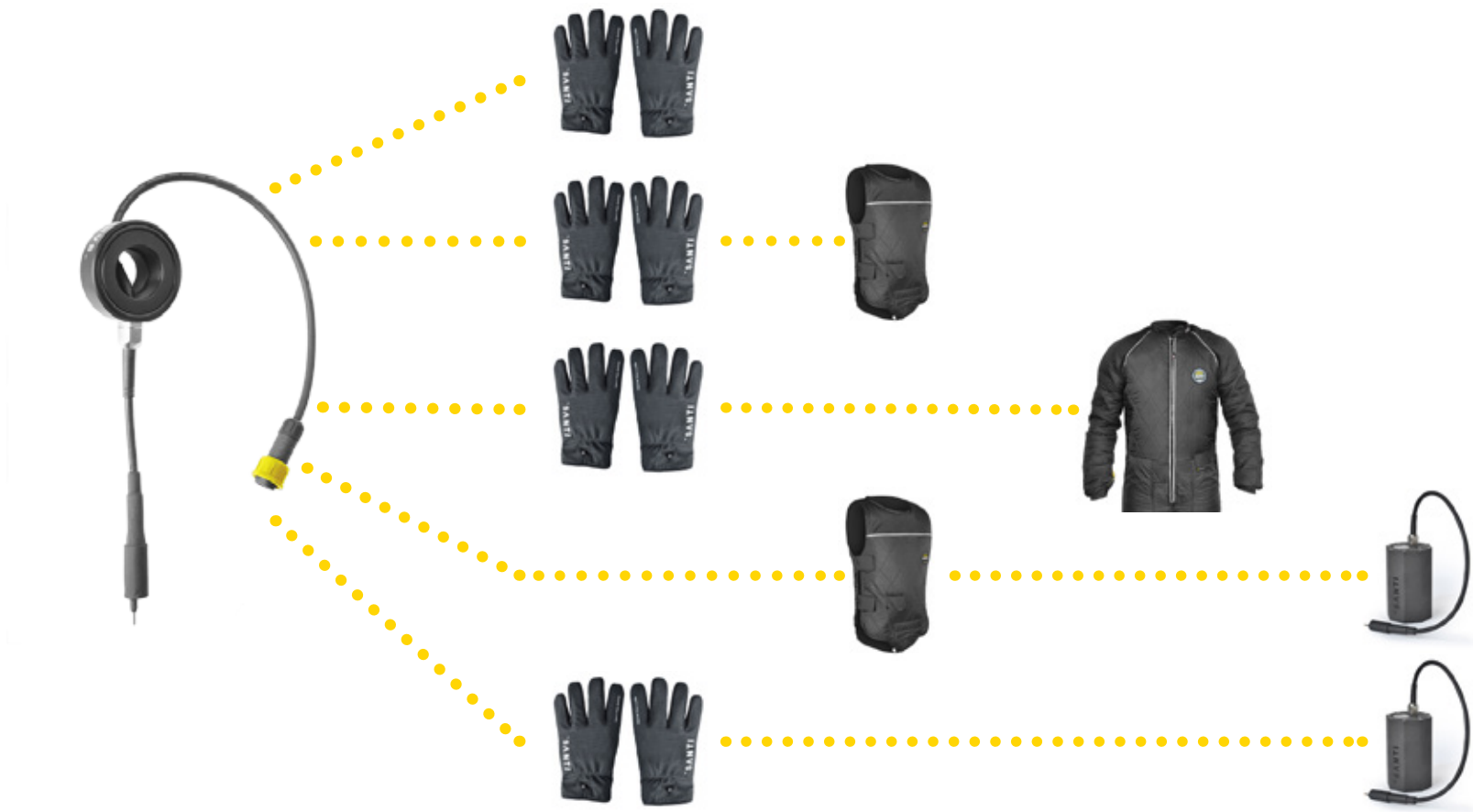
You don't have to buy the whole set at a time. The hands cool down the fastest, so most divers buy heated gloves as their first heated product. When you power your heated gloves with a 6 Ah battery, you can enjoy underwater comfort for 2.5 hours. Only after the first dive you will see that you can't do without them.

**Check out our heating systems designed for your comfort.**



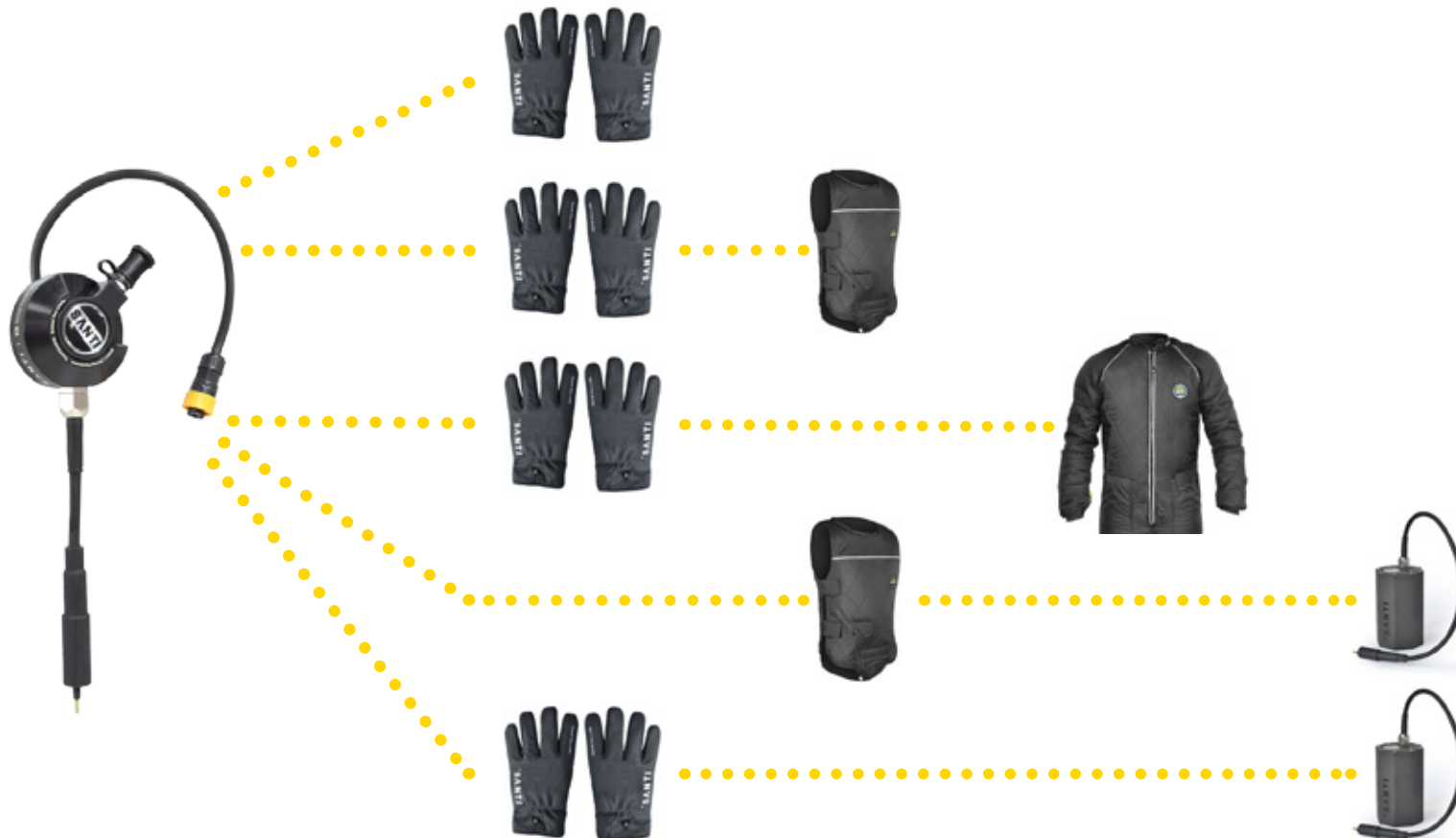
# Sets including connector

	Connector	Gloves	Vest	Undersuit	Battery 6Ah
Comfort	X	X			
Premium	X	X	X		
Max	X	X		X	
Vest Combo	X		X		X
Gloves Combo	X	X			X



# Sets including thermovalve

	Thermovalve	Gloves	Vest	Undersuit	Battery 6Ah
Comfort +	X	X			
Premium +	X	X	X		
Max +	X	X		X	
Vest Combo +	X		X		X
Gloves Combo +	X	X			X



# HEATING SYSTEM EXTENDS YOUR COMFORTABLE DIVE TIME

Our heating system will provide you with comfort for a long time spent under water. Find out how long you can dive depending on the battery you use\*.

Battery	Gloves	Vest	Undersuit
6 Ah	2,5h	1,5h	-
10 Ah	4h	2,5h	1,5h
20 Ah	8h	5h	2,5h

\*approximate times, dependent on the depth and battery status.

## TEST OUR HEATING SYSTEM

Would you like to find out how our equipment can improve your comfort during dive?

**Nothing could be simpler. Ask about the heating system and test it:**

- At our Distributors and Dealers.
- At dive fairs all over the world.
- In Demo Centers we cooperate with.
- In our SANTI Concept stores.

# TM SANTI



Description:



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