



# ***HÖVDING 1.0*** *YOUR INVISIBLE BICYCLE HELMET*

*PLEASE READ THIS FOLDER CARE-  
FULLY BEFORE USING YOUR HÖVDING  
FOR THE FIRST TIME. IT CONTAINS  
INFORMATION ABOUT WEARING  
AND MAINTAINING THE PRODUCT  
CORRECTLY.*





## WHAT IS HÖVDING?

Hövding is a bicycle helmet unlike any other currently on the market. It's ergonomic, it's practical, it complies with all the safety requirements, and it's also subtle and blends in with what else you are wearing.

Hövding is a collar that you wear around your neck while cycling. The collar contains a folded up airbag that you'll only see if you happen to have an accident. The airbag is shaped like a hood, surrounding and protecting the cyclist's head. The trigger mechanism is controlled

by sensors which pick up the abnormal movements of a cyclist in an accident.

The actual collar is the visible part of the invention. It's covered by a removable shell that you can change to match your outfit, and we'll be launching new designs all the time. Hövding is a practical accessory that's easy to carry around, it's got a great-looking yet subtle design, and it will save your life.

# HÖVDING

## - ONCE UPON A TIME...

In 2005 we started working together on a joint master's thesis in industrial design after four and a half years studying at LTH, the Faculty of Engineering at Lund University in Sweden. The law that had just been introduced in Sweden making bicycle helmets compulsory for children up to the age of 15 had triggered a heated debate on whether it should be extended to include adult cyclists too. To people like us, who wouldn't be seen dead in a polystyrene helmet, the thought that we might be forced to wear one by law was cause for concern. Producing a bicycle helmet that people would be happy to put on looked like a much better way to go than legislation forcing people to wear one or else. We realised that our industrial design master's thesis was the perfect place to find out whether the traditional bicycle helmet could be improved on.

We started out with a survey, asking people on the streets why so few people wear bicycle helmets. They came up with plenty of reasons: "They're a pain to carry about, they all look hideous, they ruin your hair, nobody else wears them, you can't get your hat on underneath." Some good arguments, it's true, others more like excuses. It was clear that bicycle helmets are a hot topic that everyone has an opinion on and strong feelings about. Cycling is something we do every day and there's a sense of freedom that goes with it. Although people are well aware of the risks on the roads, the vast majority are choosing to cycle without a helmet. When it comes down to it, people do really want to protect their heads in road accidents, but there are limits. It isn't the cyclists who need to change, it's the product.

When we asked people what they'd ideally like the bicycle helmet of tomorrow to look like, we got responses like these:

*"Like a cool hat with a built-in helmet."*

*"Something small that you can fold up and put in your pocket."*

*"Something that lets you change what it looks like, like you can with mobile phone skins or wigs."*

*"Invisible."*

The instant we heard the word "invisible", we realised that was what the world was waiting for. An invisible bicycle helmet. That wouldn't ruin your hair.

Since that day we've learned that nothing is impossible. We've learned that people who call themselves "realists" are actually scaredy-cats who just aren't brave enough to think big enough. Hövding is the Swedish for "Chieftain" and our Hövding is a leader and a role model, with its sights set on changing the world. We want to encourage others to follow in our footsteps and dare to demand something better, to stand out from the crowd, and believe in themselves and their own capabilities. We may be a small company but we think big and we aim high. Delusions of grandeur are exactly what it takes!

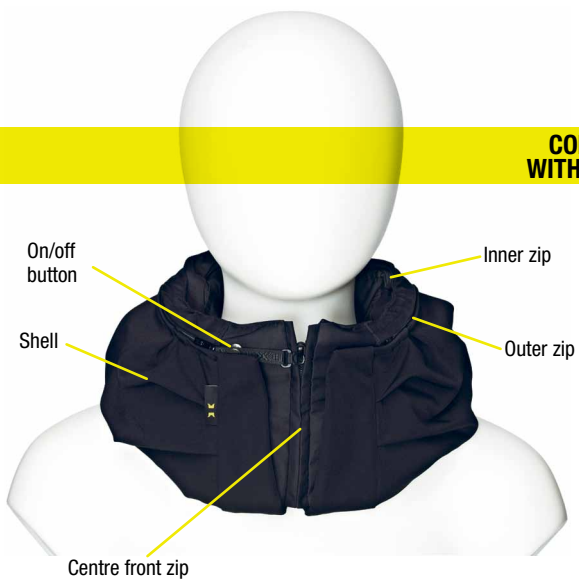
/Anna Haupt och Terese Alstin

# HÖVDING OVERVIEW

## COLLAR WITHOUT SHELL



## COLLAR WITH SHELL



**ACCESSORIES** The following accessories come with Hövding 1.0: • Micro USB cable (for charging from a computer) • 4 extra rivets





## USAGE

HÖVDING IS DESIGNED TO PROTECT YOUR HEAD IN CYCLING ACCIDENTS BY DETECTING ABNORMAL BODY MOVEMENTS. FALSE ACTIVATION OF THE AIRBAG MAY BE TRIGGERED BY EXTREME MOVEMENTS WHEN HÖVDING IS WORN AND IS SWITCHED ON, E.G. JUMPS FROM HEIGHTS. THEREFORE HÖVDING SHOULD NOT BE WORN AT DISCO OR WHEN STAGE DIVING.

**WHEN?** Hövding is intended for riding a bicycle – only. Hövding is not designed for other activities such as motorcycling, skiing, horse-back riding, skateboarding etc.

Hövding is intended for regular cycling, i.e. in urban environments and on main roads. Hövding is not designed for extreme cycling such as BMX, off-road cycling, mountain biking, trick cycling or similar.

**WHO?** Hövding will fit head sizes 52 – 59 cm (20,5 – 23,2") in circumference.

Hövding will fit neck sizes up to max 42 cm in circumference. This is an absolute maximum measure. If your neck size is bigger than that, you are going to have to wait for our size Large Hövding.

Hövding is recommended for cyclists from age 15 and up.

Hövding cannot be used for small children because their movements are different from those of adults in normal cycling and in accidents.

This means that if worn by a child, Hövding cannot distinguish between an accident and normal cycling sufficiently safely. We can't set a precise age limit for Hövding's function as the transition to an "adult" movement pattern is gradual and is individual for each child. We would, however, judge that by the age of 15 all children will have gained an adult movement pattern.

**HOW?** Hövding is designed for bicycles of a standard design and should not be used when riding special cycles such as tandems, unicycles, BMX bikes, recumbents, foldable cycles etc.

The distance between the ground and the top of the saddle should be between 80 cm and 120 cm (31,5 - 47,2"). This is the case for most bicycles.

The bicycle wheel should be of standard sizes 26" or 28".

THE SPECIFICATIONS OF USE ABOVE APPLY FOR THE FUNCTION STATED.



## *IMPORTANT INFORMATION*

- Do not repair, stitch up, disassemble or modify Hövding. Only authorized personnel should service Hövding. Hövding contains parts which may become dangerous if removed and improperly handled.
- Hövding is rainproof. However, Hövding must not be immersed in water or otherwise suffer water damage. Do not attempt to dry your Hövding using an external heat source such as a hair dryer or a microwave oven.
- Do not use Hövding if it has a hole in it, been damaged by water or if a seam has split.
- Only turn your Hövding on once you are wearing it, immediately before going out on your bike (see also "Cycling with Hövding").
- Keep the area above the upper tear seam of the collar free. Don't cover it with a tight scarf or similar on top.
- Extreme hairstyles or headgear that are excessively bulky, stiff or heavy may prevent or make it more difficult for the airbag to inflate. Most hairstyles and headgear do not prevent the airbag inflating. For information on hairstyles and headgear that are not recommended if you are wearing Hövding, see [www.hovding.com/hairstyles\\_and\\_headgear](http://www.hovding.com/hairstyles_and_headgear) or contact our customer services.
- Do not store Hövding in a hot environment, such as a car on a sunny day. Hövding should not be used in temperatures below  $-20^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$ ) or above  $+50^{\circ}\text{C}$  ( $+122^{\circ}\text{F}$ ).
- Do not expose Hövding to open fire. Hövding contains a gas inflator which may break if exposed to temperatures above  $+130^{\circ}\text{C}$  ( $+266^{\circ}\text{F}$ ), and a lithium-polymer battery (cell phone battery) which may explode if exposed to temperatures above  $+60^{\circ}\text{C}$  ( $+140^{\circ}\text{F}$ ).
- Hövding contains sensitive parts and should be handled carefully. Keep out of reach of children.
- Make sure that Hövding is turned off when travelling with other means of transportation such as car, train, bus, aircraft etc.
- Permission to bring Hövding onboard an aircraft may be restricted. Check the regulations with your airline company.
- Hövding cannot guarantee complete protection against all sharp objects.
- The risk of the airbag inflating causing temporary hearing impairment is almost non-existent. Hövding uses what is known as a cold gas generator, which, unlike most airbag systems in cars, uses compressed gas (helium) to inflate the airbag instead of gunpowder. This means Hövding inflates more slowly, more gently and more silently than the airbags in cars. (Faster and more explosive airbag systems are required in the car industry due to higher speeds.)
- No safety products can guarantee 100% protection in every situation imaginable. Depending on the type of collision, even accidents that occur at very low speeds can cause severe head injuries and even be fatal. Always cycle carefully and follow the rules of the road.

# GETTING STARTED



JUST LIKE A PAIR OF NEW SHOES, HÖVDING IS STIFF TO BEGIN WITH AND NEEDS TO BE CYCLED IN TO MAKE IT SOFT, FLEXIBLE AND ADAPTED TO YOU. THIS USUALLY TAKES ABOUT 2-3 WEEKS OF USE.

**CHOOSE YOUR SIZE** Hövding is currently available in two sizes; Small (S) and Medium (M). As far as performance/safety goes, it doesn't matter whether your Hövding is a tight or a loose fit around your neck. The collar sizes currently available (S, M) are both designed for the same range of head sizes: 52 - 59 cm (20 1/2 - 23 inches) in circumference. Choose the size that feels best for you.

We'd recommend getting a Small if your neck circumference is up to 36 cm.

We'd recommend a Medium if your neck circumference is between 34-42 cm.

If your neck circumference is between 34-36 cm:

Choose Small if your neck is on the long side and/or you prefer a tight fit.

Choose Medium if your neck is on the short side and/or you prefer a loose fit.

Hövding 1.0 is adapted and tested for neck sizes up to max 42 cm in circumference. This is an absolute maximum measure. If your neck size is bigger than that, you are going to have to wait for our size Large Hövding.

**CHARGE THE BATTERY** Hövding has an internal rechargeable battery. The battery is delivered partly charged. Fully charge the battery before initial use. It takes around 6 hours to fully charge the battery.

Hövding is recharged from a computer using the USB cable included. Plug the cable into the USB port in the bottom edge of the plastic section. Your computer must be turned on and not in sleep or standby mode. The LEDs will flash during charging and when Hövding is fully charged, they will all remain lit without flashing.

Hövding's battery will last around 18 hours of usage. Hövding only uses battery power when it's switched on.

You can also recharge your Hövding from a wall socket using an ordinary mobile phone charger with a micro USB connector.

The six LEDs on the battery life indicator show battery charging status. When Hövding is fully charged, all the LEDs in the battery life indicator are lit.

If the battery is completely flat, it may take a while before the diodes light up after plugging your Hövding into the computer or wall socket.

Battery life when on: about 18 hours. Battery life when off: about 850 hours = 36 days.

Heat will degrade the battery's performance. Do not store Hövding in a hot environment, such as a car on a sunny day.

Charge the battery in temperatures between +5°C (+41°F) and +40°C (+104°F).

Never force a connector into the USB port. If you can't push the connector in without violence, you have probably got it the wrong way round. It is bevelled on two corners and therefore only fits in one way up. Try turning it 180 degrees.

## PUT THE SHELL ON TO THE COLLAR

Putting on the shell: Place the shell around the collar. Close the two zips on front and back of the collar's upper part.

Removing the shell: To remove the shell, open the two zips on the front and back of the collar's upper part.

**PUT ON YOUR HÖVDING** To put on your Hövding, place it around your neck and pull the zip at the front up under your chin – all the way up. Hövding's on/off button is on the zip tag. Pull up the zip and close the on/off snap fastener button on the right-hand side of the collar to turn Hövding on. You'll hear a sound and LEDs light up to tell you that Hövding is switched on.



Do not put on Hövding in any other way than described above.



Do not turn Hövding on by closing the on/off button without closing the front zip – all the way up.



Hövding may not be used along with other head and/or neck protection device or helmets.



Make sure that the upper tear seam of the collar is not covered by any piece of clothing.

**CYCLING WITH HÖVDING** Make sure that Hövding is switched on by listening for the on sound alert when you have closed the on/off snap fastener button or by checking that the LEDs are lit before you start cycling.

Only switch your Hövding on once you are wearing it, immediately before going out on your bike. It's a good thing to make turning on your Hövding just before you get on your bike part of your routine. Otherwise there is a risk that you will forget that you are wearing Hövding – switched on – and accidentally trigger your Hövding, causing it to inflate. This can happen if you are not on your bike and jump down from a height or similar.

A low battery sound will alert you well before the battery needs to be recharged.

If you are cycling in a noisy environment it might be a good idea to check the battery level indicator occasionally.

After your bicycle ride you can take your Hövding off. Open the on/off button and the centre front zip under your chin. The off sound will play.

**AFTER CYCLING** After your bicycle ride when you have taken off Hövding, you can fold it and stow it away in your bag.



As the on/off button contains a magnet to activate Hövding, do not allow it to come close to other magnets (magnetic locks, speakers etc).

#### CLEANING YOUR HÖVDING



**Collar:** The collar is not washable as it contains sensitive components. Any marks on the collar can be rubbed off carefully with a damp cloth. The collar is protected from wear, sweat and dirt by the surrounding fabric shell.

**Shell:** See the washing instructions for each shell.



**MAINTENANCE** Check your Hövding regularly for any visual damage. If your Hövding has visual damage, you should not use it until you have contacted our customer services for further information.

**RECYCLING** For information about recycling, visit [www.hovding.com/recycling](http://www.hovding.com/recycling).

**VID FEL** If your Hövding doesn't work properly, please contact our customer services: [www.hovding.com](http://www.hovding.com) or +46 (0) 40-23 68 68

**INDIVIDUAL MARKING** Each Hövding has an individual label for traceability. A label with the product barcode and serial number can be found behind the woven information label on the inside of the neck. The 12-digit serial number indicates the product generation, year of production, date of production and a running number (see picture). State this serial number when reporting a fault.



A = Product generation YY = Year of production  
DDD = Date of production LLLLLL = Running number



# HOW HÖVDING WORKS



**AIRBAG** The airbag inflates and surrounds the head in case of an accident. The illustration shows the airbag's coverage area around the head and neck. The airbag consists of an inner and an outer hood, attached together by straps. It's made in an ultra-strong nylon fabric that won't rip when scraped against asphalt. The way the hood is designed and folded into the collar ensures that it will inflate quickly and safely. It takes about 0.1 seconds to inflate and the airbag will be fully inflated before head impact. Hövding protects nearly all of the head while leaving the field of vision open.

The protective area is designed according to current accident statistics, and the protection is greatest where it is needed most. The darker the colour in the illustration, the better the protection. The airbag is weakest along its seams in the front edge and strongest at the crown and the back of the head.

Gas is optimal as protective material. The airbag provides soft and effective shock absorption and maintains constant pressure for several seconds, making it able to withstand several impacts to the head in the same accident. After that the airbag slowly starts to deflate.

**GAS INFLATOR** The gas inflator that inflates the airbag is placed in a holder in the collar on the cyclist's back. Hövding's gas inflator is a cold gas inflator that uses helium and it's one of the smallest gas inflators on the market. A similar inflator is used in a motorcycle helmet with airbag system for neck and back.

**SENSORS** The airbag is deployed by sensors – accelerometers and gyros – that pick up a cyclist's abnormal movements in the event of an accident. The sensors then send a signal to the gas inflator to inflate the airbag.

When Hövding is switched on, the sensors are constantly monitoring the wearer's movements. A cyclist's movement patterns are divided into two different categories:

**Normal movements:** All cycling in the city and on main roads, as well as all the normal movements you make before, during and after a bicycle ride such as running up and down steps, locking your bicycle, braking suddenly, giving way, pumping the tyres, etc. are defined as normal movements. Normal movements won't cause Hövding to inflate.

**Abnormal movements:** The movement patterns of a cyclist in an accident are defined as abnormal movements. In an accident, a cyclist's movements are completely different from those seen in normal cycling. That's why the airbag is only triggered by accidents\*.

To be able to distinguish between these two categories of movements, we've spent the past few years gathering data on the movement patterns of a large number of cyclists in everyday cycling situations. We've also re-enacted all known types of cycling accident and recorded the movement patterns of cyclists in these accidents. We staged fatal cycling accidents using crash test dummies, while other cycling accidents were re-enacted by stunt riders, male and female. We put all these movement patterns into our database and have developed a unique, patented, mathematical method for distinguishing between normal and abnormal movements. This method combined with the sensors is Hövding's brain.

**\*Direct hit:** Hövding will only be deployed and inflate if the cyclist makes an abnormal movement in an accident. The Hövding airbag is completely inflated in approximately a tenth of a second (0.1 seconds). Head impact occurring before Hövding has reacted and is completely inflated is referred to as a Direct hit.

Examples of Direct hits can be an icicle falling from above straight down on the cyclist's head, or if the cyclist cycles into a tree branch at head height. However, Direct hits are a very unusual category of cycling accident.

No cycle helmet can protect you from all types of cycling accident. In a collision with a motor vehicle, the speed of impact is always a factor limiting the protection a cycle helmet can offer. At higher speeds the risk of the cyclist suffering other internal injuries increases – injuries that a cycle helmet cannot protect you against.

**Accidents without head impact:** Some types of cycling accident rarely affect the head. Skids are one such category. Skidding is one of the most common cycling accidents but often the head is undamaged. For example, you might wobble but manage to regain your balance and land on your feet or your knees without your head being anywhere near hitting the ground. The experience can shake you up, but a cycle helmet wouldn't have made any difference because you didn't bump your head.

Hövding has been designed to deploy in the cycling accidents where it can do good. As a cyclist, you don't want the airbag to inflate when it isn't necessary. In these relatively mild accidents the airbag will be deployed only if the cyclist's movement patterns indicate that there is a risk of imminent head injury.

**COLLAR** The collar with its shell is the visible part of Hövding, which encases the whole airbag system. All the components are located inside the collar for optimum ergonomics and performance. The weight of the collar is evenly distributed across the shoulders and it is heavier at the back than at the front so that when cycling the weight is resting on your back.

The instant it is triggered, the pressure from the airbag splits open the upper tear seam of the collar, allowing the hood to inflate around your head. This means it's important that you keep the area above this seam free and don't cover it with a scarf or similar on top. But you can still wear a shawl or a scarf both outside and inside your Hövding.

The collar is made of waterproof functional fabric, chosen to provide the ultimate protection for the airbag system it contains. The collar isn't washable but it is protected from wear, sweat and dirt by the surrounding fabric shell. Any marks on the collar can be rubbed off carefully with a damp cloth.

Even if it's possible to wear the collar without the shell, we recommend using the shell as well since the collar isn't washable.







**SHELL** The shell surrounds the collar. The most important function of the shell is to enable you to change the look of your Hövding – every day if you feel like it. The shell is removable and attaches to the collar with zips. It's easy to change the shell to match your outfit, to suit the season or to wash it.

The shell's appearance can be varied in a virtually endless number of designs, colours, patterns and fabrics, turning Hövding into a fashion accessory. At the moment there are two different shell designs to choose from but we will be launching new collections all the time.

Unlike the collar, the shell is washable.

**CENTRE FRONT ZIP** To put on your Hövding, place it around your neck and pull the zip at the front up under your chin. The zip needs to be completely closed for Hövding to work correctly. Hövding's on/off button is on the zip tag.

**ON/OFF BUTTON** Hövding is switched on and off using the zip at the front of the collar. There is an on/off switch on the zip tag. Pull up the zip and click the on/off button on the right-hand side of the collar to turn Hövding on. Turn it off by pressing the on/off button again.

You'll hear a sound and LEDs light up to tell you that Hövding is switched on. When you turn it off, the lights go out and you'll hear another sound to tell you that Hövding has been switched off.





### BATTERY LIFE INDICATOR AND USB PORT

At the front of the collar there is a plastic section with the following functions:

- An LED logo that lights up when Hövding is on
- Six LEDs showing the battery level
- A micro USB port for charging the battery

When Hövding is fully charged, all the LEDs will be lit. The lights will go out one by one as the battery runs down. When only the logo is lit, the battery level is very low and Hövding needs charging before the next bicycle ride.

Battery life when on: about 18 hours.

Battery life when off: about 850 hours = 36 days.

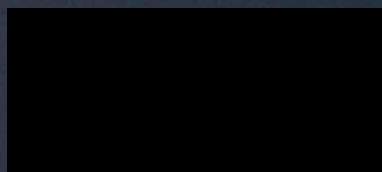
When the battery is low, Hövding will start to make a beeping noise. The beeping increases in frequency until you charge the battery or until the battery runs out and Hövding is deactivated. When Hövding beeps for the first time, you've got about an hour's cycling time left. When the battery runs out, Hövding will give an extra loud beep before it is deactivated to warn you that it is about to stop working.

Hövding is recharged from a computer using the USB cable included. Plug the cable into the USB port in the bottom edge of the plastic section. The LEDs will flash during charging and when Hövding is fully charged, they will all remain lit without flashing.

When Hövding is charged using a computer connected to the Internet, you can update the Hövding firmware from our website at the same time (if updates are available). You'll also be able to download new on and off sounds.

And of course you can also recharge your Hövding from a wall socket using an ordinary mobile phone charger with a micro USB connector. And chargers can be bought as accessories from our web shop.

**THE BLACK BOX** Inside Hövding there is a black box. The box records 10 seconds of data on the cyclist's movement patterns during (and just before) a cycling accident. This data is interesting and valuable to us in our ongoing development work. We would be grateful if you could send in your Hövding to us if you are involved in a cycling accident. We will examine the black box and recycle the product. To say thank you for your help, we'll give you a discount on a new Hövding in return.



### ALERT SOUNDS

There are alert sounds for the following functions:

- On • Off • Fail • Low battery warning • Critical battery warning



### CE DECLARATION OF CONFORMITY

Hövding confirms to the provisions of Council Directive 89/686/EEC.  
Notified body No. 0402 (SP). There is a copy of the declaration of conformity at [www.hovding.com/declaration\\_of\\_conformity/](http://www.hovding.com/declaration_of_conformity/)





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