

ottobock.

Step into your future

The new C-Brace[®]

Quality for life

David wears the new C-Brace®

The day starts early; it's raining and time is short. With a lecture beginning at 8 o'clock, David has a quick cup of coffee standing up. He heads down the stairs; it's pouring outside, but fortunately David has his umbrella. He only just catches the bus and gets on, takes a seat and catches his breath. This might sound like an everyday occurrence for many – but not for David.

Now a 24-year-old student, he had a serious motorcycle accident in 2016. Whether it was caused by a moment of inattentiveness, poor visibility or someone else's mistake doesn't really matter in the end. The fact is that David's left leg is now completely paralysed from the hip down due to a spinal cord injury. "An injury like that would probably have put me in a wheelchair in the past, or my everyday life and independence would have been quite limited at a minimum," David says.

But not today: David is now studying renewable energy and energy efficiency in Regensburg, Germany, and works in the development department at a start-up. This is his everyday life. When he is with his family in Traunstein, he spends a lot of time with his brother. They like being out in nature together; David goes climbing, cycling and spends his evenings with friends. But many things have changed again for David since he started wearing the C-Brace®.

He was previously fitted with a stance phase controlled system. When he was at home, he got about without walking aids but used a completely locked joint. When he was outside, however, David had to depend on walking aids. "My muscles were always completely exhausted at the end of the day. I had to support myself with my arms to a large extent, and my hands were never free. I only used my right leg on stairs and hopped up and down them. When I came to an incline, I had to figure out how to get down.

Negotiating the cobblestones in Regensburg's old town was really challenging, and walking in the woods on uneven trails here in Traunstein would have been impossible for me." Which takes us back to where we started: getting down the stairs from his flat on the first floor, having a hand free for his umbrella, getting on the bus – all this gives David a whole new attitude towards life with the C-Brace®. "Every step used to mean a certain impact on my hip. With the C-Brace®, everything is much more comfortable, gentler, smoother." David is naturally fascinated by the technology of the C-Brace® as well. "I love technology, so I asked about this highly complex sensor system right away," David says. "It's really impressive and is a win for me in every way. I like that I can rely on this technology."





“Walking with the C-Brace® is a giant leap ahead for me. I can stand, bend over forwards and backwards. It basically catches me, and I have the chance to react.”



Living life to the fullest again

Even when things got tough, my family, my friends and my girlfriend really helped me get back on my feet and encouraged me to actively take part in life. The accident made me appreciate the small things in life much more again.

Without the technology that's available today, I wouldn't be able to take a single step without walking aids. In other words, I couldn't take care of myself or participate in sports – and that would really restrict my quality of life.





Melvin is fascinated by technology

He works in the mathematics and IT department at TU Darmstadt, a technical university. Grasping complex correlations, developing creative solutions to tricky problems, the fields of digitalisation and new media: these are the things he understands; this is his world. So you might wonder why he was a bit skeptical about the C-Brace® and its intelligent computer technology at first. "I was fitted with a system that controlled the stance phase. This meant there was no resistance when I swung the leg through, and the orthosis was locked when I was standing in order to support me. I was really quite satisfied with that." But he adds that he was only satisfied until he tried the C-Brace® for the first time.



"The problem with my old orthosis was that I couldn't walk backwards. Now I'm excited to find out all the other things I can do in everyday life with the C-Brace®."



Melvin – you have to give new technology a chance.

But let's start at the beginning: Melvin has polio; there's no way of knowing when and how he became infected anymore. "I was born in Mumbai in India, and my parents in Germany adopted me when I was three. My mother was a pediatrician, so she naturally did everything to make sure I got the best care from the outset." Melvin became an athletic child who loved to be active despite his disability. He started swimming at the age of ten and attended Paralympic youth camps, first as a participant and later as a coach. "It's incredibly important not to put excessive strain on the body when you have polio, however, as this causes the muscles to deteriorate, and they cannot be built up again after that." And this is where the C-Brace® comes into play again. "When I first saw the C-Brace®, I thought it was too big and heavy – besides which, I was already satisfied. But the first time I walked with the C-Brace® was incredible. It truly was another quantum leap. I would never have expected that," Melvin says.

The C-Brace® provides him with considerable relief while walking. Not only is Melvin able to walk for much longer distances, he also puts less strain on his body and muscles. Melvin: "The C-Brace® also supports me when I'm walking and moving about – not just when I'm standing, as my previous fitting did. And it does all this whether I'm at home or on one of my many outings." Ordinary, everyday movements are suddenly possible again. "But you don't

learn how to fly right away of course, even with the C-Brace®. You do have to practise and see how the system reacts. But it's definitely worth it." Being able to walk backwards again with the C-Brace® is a special experience for Melvin. "To sum it up, my biggest step forward was taking a step back." Today Melvin wouldn't want to be without the C-Brace® and its technology; he is certain of that. "To put it in technical terms, I previously had an analogue system, and now I'm using a digital system that can be controlled with a modern app. It's completely convinced me." Sometimes you simply have to give new technology a chance.

Hannah – the C-Brace[®] gave me back my freedom.

The mother of two suffered injuries to her spinal cord nerves after an operation, and one of her legs was completely paralyzed as a result. “The time immediately after the operation was really the most difficult period of my life. I was in a wheelchair and the doctors predicted things would stay that way. My husband is a police officer and isn’t home much, I was pregnant with our second child, and my future life and daily routine felt like an insurmountable obstacle,” Hannah says openly. The young woman simply didn’t know what to do. She lives in the countryside, so any trip is a long one. “My neighbors helped me and gave me a ride so I could go grocery shopping once a month,” she reports.

“But that’s the thing – you’re dependent on others and have to wait until they are ready to drive into town. And of course every movement, every step is difficult.” Hannah was using locked orthoses at this time, which were an improvement over the wheelchair, but she still couldn’t be independent in her everyday life. For Hannah, getting the C-Brace[®] means more than just walking uphill, downhill, on uneven ground, and even feeling safer in stumbling situations. The C-Brace[®] means getting back to her normal everyday life. “The C-Brace[®] gave me back my freedom and daily routine. I can take care of my children and myself on my own again, and I’m very grateful for that. We shouldn’t just be thankful for having enough to eat in our everyday lives, but

also for being able to pick things up off the floor. That’s something we shouldn’t take for granted,” says Hannah. Today, she once again has goals she wants to achieve. “When I couldn’t move, I gained weight. I now walk two miles a day and work out. I can drive a car and be independent. And, the most important thing of all, I can carry my children again.” With the help of the C-Brace[®], Hannah regained confidence in herself and in life.



“We shouldn’t just be thankful for the big things in our everyday lives – being able to pick things up off the floor, for example, is a big deal as well.”



Hannah

Raising two young children requires a lot of energy and can become extra challenging when relying on others to accomplish routine tasks, like grocery shopping. Hannah’s story exemplifies how regaining independence, restoring confidence, and progressing through the day with the freedom of movement can change the trajectory of her life, and that of her entire family.

Wolfgang – I know I’m on my way.

Wolfgang contracted polio at the age of eight, and his right leg was paralysed as a result. “For a long time I simply ignored my illness; I refused to deal with it and just pretended it wasn’t happening.” He only faced his illness later on, and this certainly helped him find his way as well. “I was very athletic before my illness, but was then confined to a wheelchair at times, and had to walk with an old-fashioned splint apparatus as a child. But since I couldn’t walk very well, I took up swimming.” He also later discovered his passion for horses and riding due to the fact that he couldn’t walk very well.

The effects of post-polio syndrome emerged when he was 40, making many everyday things even more challenging for Wolfgang. “Before that, there were times when I could walk and also ride without using walking aids, but after that I couldn’t anymore,” he reports. From then on, many years of his life were dominated by the fear of falling and injuring himself – several severe leg fractures and numerous hospital stays attest to this. “When I was fitted with the first generation of the C-Brace®, I felt safe again for the first time in a long time,” Wolfgang says. “It’s probably difficult to imagine how valuable that is.” Being able to walk smoothly and stepping down gently on an unlocked leg are key. But the most important thing is being supported even when there are tripping hazards, as he knows the orthosis will “catch” him in a manner of speaking. The new

C-Brace® Wolfgang wears now is an important step along his way. “The basic functions are the same. I can walk down stairs and ramps as well,” he says. “But what’s really special is that the new C-Brace® reacts even faster and is more intuitive. It responds even when I shift my weight slightly, and I really feel that my orthosis knows what I’m doing and how I’ll move ahead of time.”

Wolfgang no longer thinks about his orthosis at all; it’s just there. “I like putting it on in the morning and taking it off again at night. I ride again occasionally, I go biking and do Nordic walking and yoga. When I think about it, I don’t really feel that I have a disability anymore.”



“I’m in charge of my own fate and am responsible for making the best of it.”



Wolfgang

One thing Wolfgang says stands out: "I know I'm on my way." His journey was and is not always easy; the path isn't always straight, and there are certainly challenges. But the fact that he can say this after many years of illness should encourage others.





“The C-Brace® gave me back my freedom.”

Benefits of the C-Brace®

- Natural movement patterns
- Controlled walking, including on uneven ground
- Easier walking on inclines
- Walking down stairs step-over-step
- Sitting down in a controlled, flowing movement
- Walking requires less physical exertion
- The need for compensating movements is reduced, improving body posture and reducing subsequent damage
- The moveable ankle joint enables a more natural footfall and rollover
- The user can look ahead
- Inconspicuous to wear, also under clothing
- High-performance battery lasts all day when fully charged
- Notification sound indicates that battery is too low – automatic safety mode is activated
- User-defined mode can be selected, e.g. for cycling
- Smartphone app for adjusting modes

Thigh shell
Custom fabricated

C-Brace® joint unit
With integrated Li-Ion
battery and microprocessor

Microprocessor
Controls walking
in real time

Display
Display of system
information

Lower leg shell
Individually fabricated

Unilateral ankle joint
Range of movement can be adjusted
continuously and individually

Foot component
Custom fabricated

**The
Cockpit app**

**Information system
and mode setting**
available via smartphone



What's inside

How does the C-Brace® work?
How can people with symptoms
ranging from paralysis in their
legs up to incomplete paraplegia
walk with smooth, flowing move-
ments again?

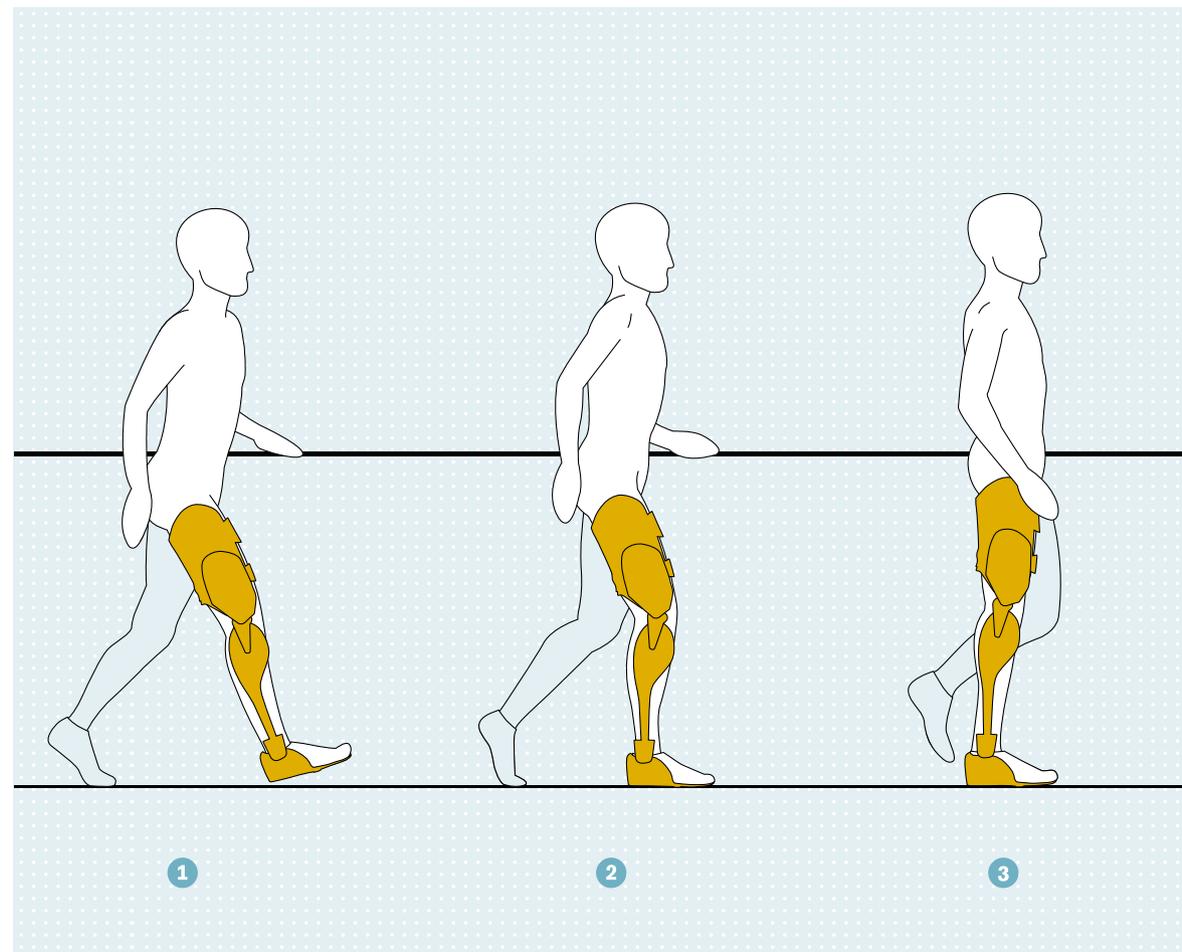
SSCO® is the answer. This abbreviation stands for stance and swing phase control orthosis and means that the orthosis controls both the swing and the stance phase during the gait cycle. For the first time anywhere in the world.

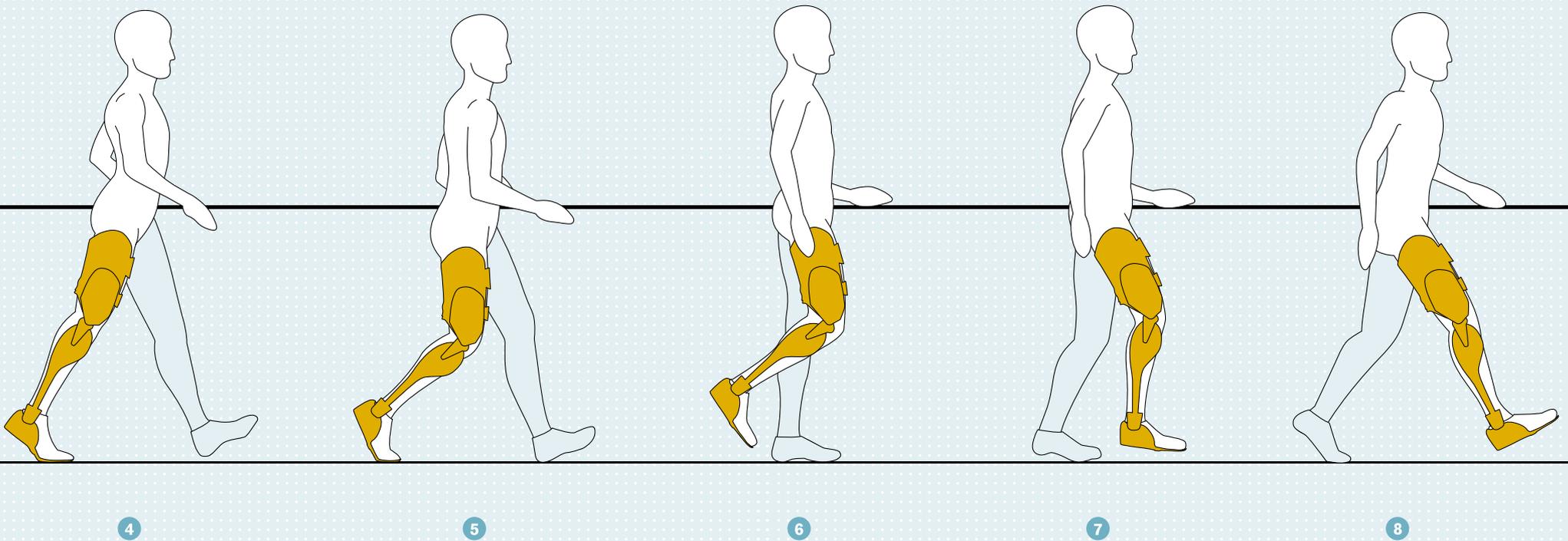
The sensors in the orthosis knee joint register which movement you are currently performing and how quickly – 100 times per second. This information is passed on to the microprocessor in the C-Brace®, which regulates the required support.

When you swing the leg forward, for example, damping decreases. And when you stand, it increases so that you can assume a natural, slightly flexed position with your leg. The C-Brace® responds to any situation instantly in real time. Even cycling can be possible again. You'll always remember your first step with the C-Brace®!

Walking with the C-Brace®

No matter whether you're walking quickly or slowly, or what position your leg is in at the time: the C-Brace® adapts to changing situations. Always at just the right moment.





1–4 Stepping down and rolling over

As with a natural gait, the knee is not fully extended when stepping down with the heel. The orthosis damping results in a smooth roll-over movement. Finally, the orthosis switches shortly before the toes leave the ground.

5–8 Swinging forward and stepping down

The orthosis resistance in the knee joint is now minimal. This allows the leg to swing forward with the help of a slight movement from the hip. In the final phase of a step, the C-Brace® gently dampens the movement, even at changing walking speeds.

Quality and service

Ottobock regularly performs a mandatory service inspection. Your orthotist checks the fit and settings at the same time.



Examination and fitting recommendation

Before deciding whether the C-Brace® is suitable for you, the orthotist performs some tests with you. With the help of the diagnostic trial orthosis (DTO), you work together to find out if you can use the C-Brace®.



User

Training and rehabilitation

You gradually learn how to use the orthotronic mobility system by working with trained physiotherapists.



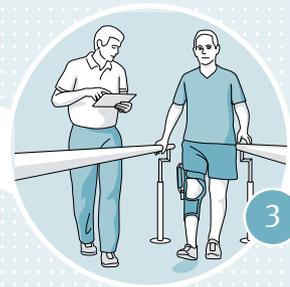
Trial and fabrication

Now your individual trial orthosis is fabricated to determine a precise fit. The technician takes plaster casts of your leg for this purpose and fabricates a trial orthosis to check the fit. The final C-Brace® orthotronic mobility system is then fabricated.



Fitting and adjustment

The technician adapts the C-Brace® to your requirements with the help of a setup app. If desired, the technician configures a second mode which allows activities such as cycling.



The fitting

Your certified orthotist is your primary point of contact. He or she will work with you to determine whether you can wear the C-Brace®.

For example, it is essential that you can stand freely. You should also be able to swing your leg forward from the hip.

The initial tests will be conducted while you are wearing the diagnostic trial orthosis (DTO). It's not as comfortable as the final orthosis, which you will wear after the successful examination and custom fabrication. But it allows you to experience how the C-Brace® works for the first time and gives you a feel for the movements. This is important so that you can be confident in choosing the C-Brace®.

Once you have decided on the C-Brace®, an orthosis is fabricated especially for your body size and according to your requirements. You then learn how to use the C-Brace®.

You should plan several weeks for the entire process. This creates a foundation that allows you to achieve the full range of functionality.



Indication

In principle, the C-Brace® can be considered for all neurological indications of the lower limbs. The leading indications are incomplete paraplegia (lesion between L1 and L5) with very minor or no spasticity as well as post-polio syndrome, the condition following poliomyelitis.



One team: working together with your orthotist is key. He or she fits the orthosis.



The diagnostic trial orthosis: this lets you get an initial feel for the new movements.



The therapy

Monique Bongers has accompanied many patients on their journey with the C-Brace®. As a physiotherapist, she is already involved in the decision as to whether the C-Brace® is the best fitting for the patient.

“Therapy begins with a consultation. I want to know more about the patient’s history, their social and work environment, and what the patient wants to accomplish with the C-Brace®.

I also examine their physical condition, including muscle functions, balance and mobility. After the orthotist has fabricated the orthosis in cooperation with Ottobock, I spend even more time with the patient.

This is when intensive training begins. I help the patient become familiar with the functions of the C-Brace® and use it to the best possible advantage. The orthosis system often activates disused muscles. When this happens, the

patient frequently notices muscle activity that they didn’t feel before.

Over time, the therapist and patient form a special relationship based on trust. This is important so we can practise movement patterns that the patient might lack confidence for at first, or that they could only perform with strenuous compensating movements in the past. When the patient is suddenly able to walk down stairs normally again, or across uneven terrain, there is a real sense of achievement – and some very emotional moments. The patient’s self-confidence and motivation become even stronger.”



Monique Bongers, physiotherapist at Ottobock

Questions and answers about the C-Brace®

1. What does the C-Brace® offer compared to other KAFOs?

The range of motion is expanded. You can walk down stairs with natural movement patterns, walk down a ramp and sit down without dropping into the seat. Because the orthotronic mobility system controls the entire gait cycle dynamically, safety is also improved, which means you are less likely to stumble. Physical strain is reduced, especially when one side of the body is not affected and was used for compensating movements. This can reduce damage caused by excessive, one-sided strain.

2. Do the size and weight of the orthosis have a detrimental impact on the gait pattern?

No, there are no noticeable limitations. It's true that the orthosis is heavier than other KAFOs. But this is less noticeable since walking is more dynamic.

3. How did the C-Brace® make walking different?

Safety while walking is improved because the C-Brace® controls walking in real time and responds quickly. Your movements become smoother and more natural.

4. Can I wear the orthosis over trousers?

Generally, yes. However, the trousers should fit closely to avoid wrinkles, which can lead to pressure sores. We recommend wearing the C-Brace® directly on your skin.

5. Can I operate a vehicle with the C-Brace®?

Yes, you can. Driving a vehicle while wearing an orthosis is subject to the regulations of your respective country. Always check these regulations in advance. The leg with the orthosis may not be used to control the vehicle (e.g. operate the accelerator and brake pedals). Specialised garages can retrofit the vehicle if required and adapt it to your needs (e.g. manual controls for the brake and accelerator).

6. Do I have to wear special footwear or always use the same shoes?

You can wear any type of shoe in principle. However, the orthotist adjusts the C-Brace® for one heel height, and you should then maintain that. You may have to wear shoes that are a size larger in order to leave sufficient room for the foot component. A comfortable, wide loafer with laces or hook-and-loop closures makes it easier to use the C-Brace®.

7. Can I use the orthosis without shoes?

No, because the risk of slipping with the foot component would be too great. This would also change the heel height.

8. Is the C-Brace® waterproof?

The C-Brace® cannot be used in wet areas, such as the shower or bath. It must not be exposed to salt water, either.

9. Can I be outside in the rain?

The C-Brace® is protected against splashed water, so being out in the rain is generally not a problem.

10. How often do I have to charge the C-Brace®?

We recommend daily charging. It is best to always keep the C-Brace® upright for charging and storage.

11. What happens when the battery is drained completely? Can I continue walking?

A notification sound warns you promptly when the battery is low. The C-Brace® then enters a safety mode (empty battery mode). It maintains a certain level of damping, which you and the technician establish in advance. You can therefore continue using the C-Brace®, but not with the usual dynamics and technology.

12. Does the C-Brace® offer me any other potential applications?

Your orthotist can configure a user-defined mode for you. It allows activities such as cycling. Your movements are not dampened in this case. The C-Brace® also recognises when you sit down and reduces the damping so you can sit comfortably.

13. How can I switch to the user-defined mode?

This is done using the smartphone app.

14. What do I do if there is a defect?

The system automatically switches to safety mode (see question 11). Please contact the orthotist who provided the fitting.

15. How does the C-Brace® indicate possible errors?

Malfunctions are indicated by an acoustic and visual signal. Please contact your orthotist in this case.

16. What happens during service appointments?

You will visit your orthotist regularly for a service appointment. Your orthotist sends the joint and charging cable of the C-Brace® orthotronic mobility system to Ottobock for inspection.

17. Is there anything I should keep in mind when storing the orthosis?

The orthosis should be stored upright to prevent air from accumulating in the hydraulics.

18. Does the C-Brace® technology work under various climatic conditions as well?

Generally, yes. However, the relative humidity must not exceed 93%, and the temperature has to be between -10 and +40 °C.

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