Physical Exam

An individual AFO, KAFO or KO is exclusively produced for its user. Body measurements and muscle strength are examples for patient related data determined during the physical exam. Number and accuracy of the gathered data have a great effect on the orthosis.

In the Physical Exam online tutorial, we show all relevant steps. Please use the Orthotic Treatment Sheet to write down any patient data. It serves as a basis for the Orthosis Configurator and the communication with our Clinical Support.

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Body Weight and Height

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Body Weight

Determine the body weight. Foreseeable changes, like a weight gain due to growth, should be taken into consideration.

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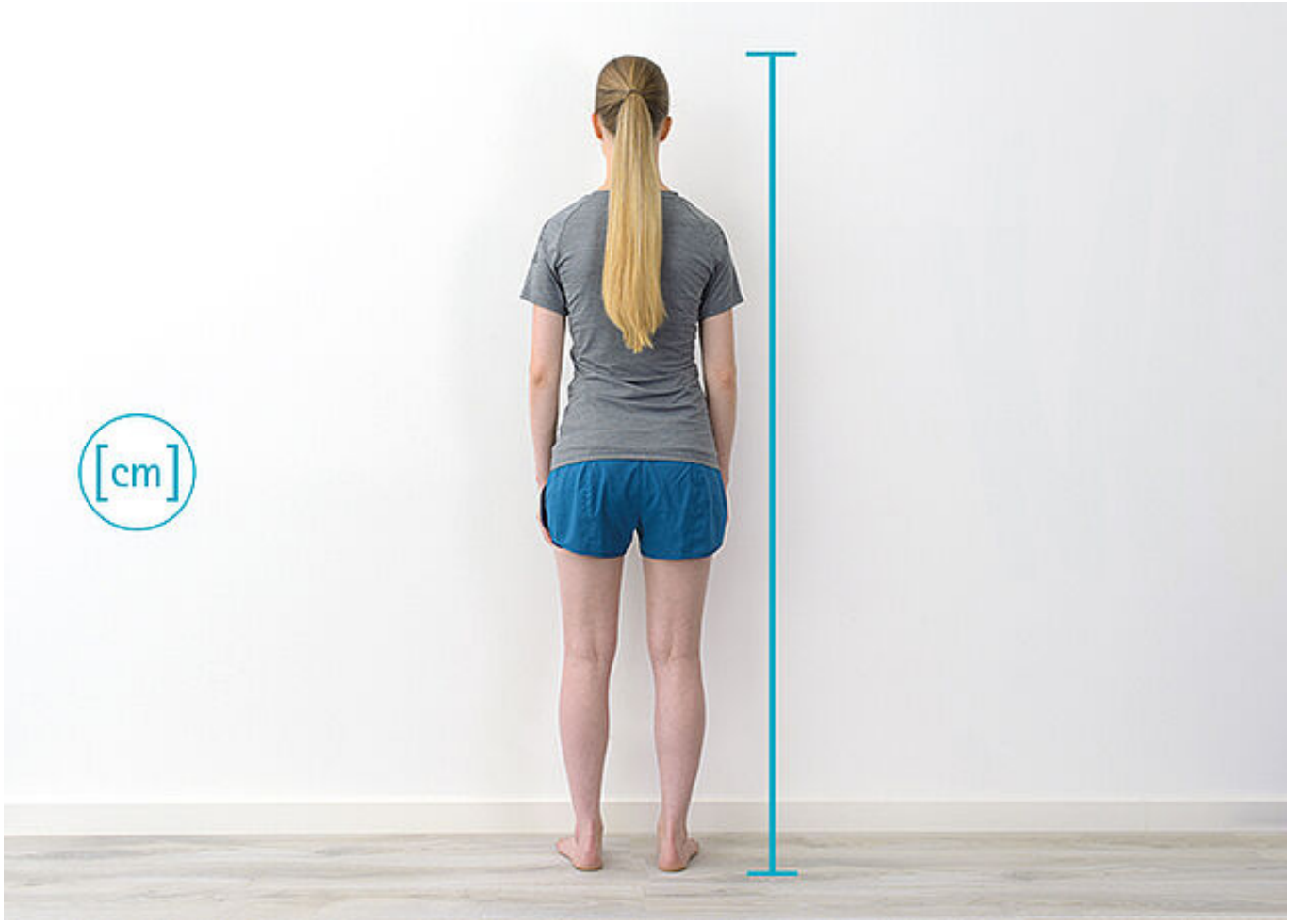

Body Height

Determine the body height. Foreseeable changes, like a change in height due to growth, should be taken into consideration.

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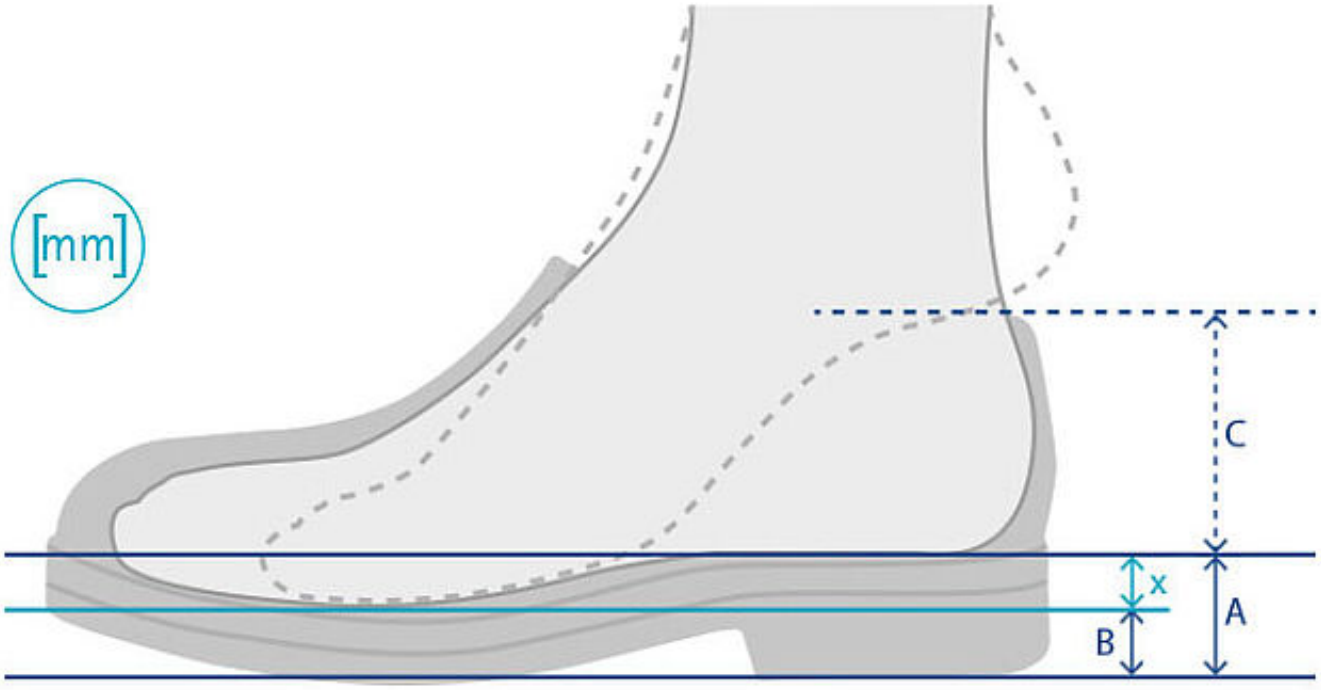

Pitch and Height Compensation

Determine the pitch x of the shoe (difference between heel height A and sole thickness B in ball area). Measure A and B and apply the formula x = A - B. Then, transfer the determined pitch to the h-Cast.

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Leg Length/Height Compensation

The patient stands on the h-Cast. Check if the patient stands vertically, for example using a plumb laser. The plumb bob should fall from the 7th cervical vertebra (C7) through the cleft between the buttocks and the middle of the supportive area of both feet. If this is not the case, the patient needs a height compensation (for example due to a unilateral contracture). Determine the height compensation (see C at Step 1) and transfer it to the h-Cast. Check the result.

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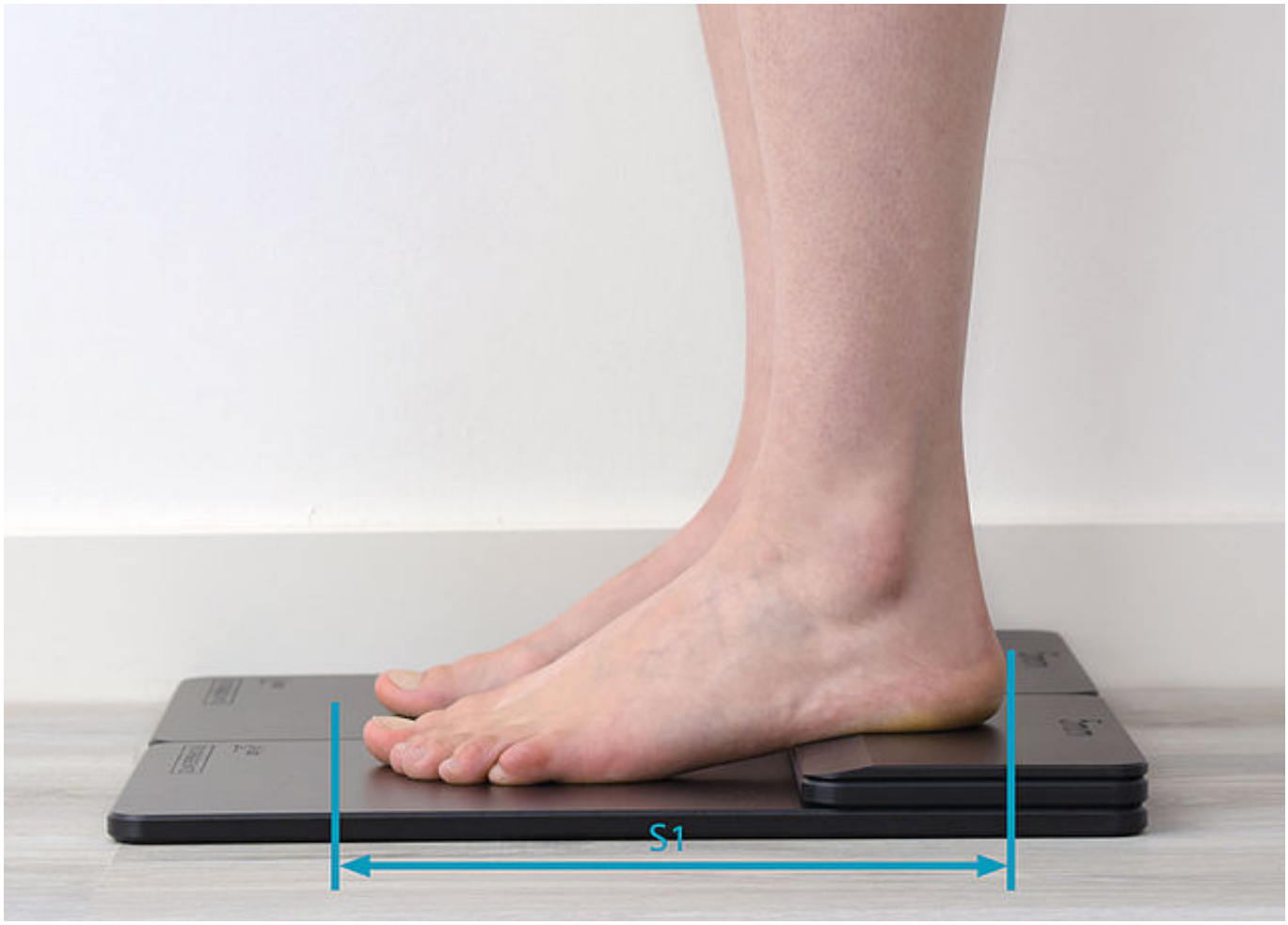

Shoe Size

Determine the shoe size (S1). If the feet should differ in length, write down the larger shoe size.

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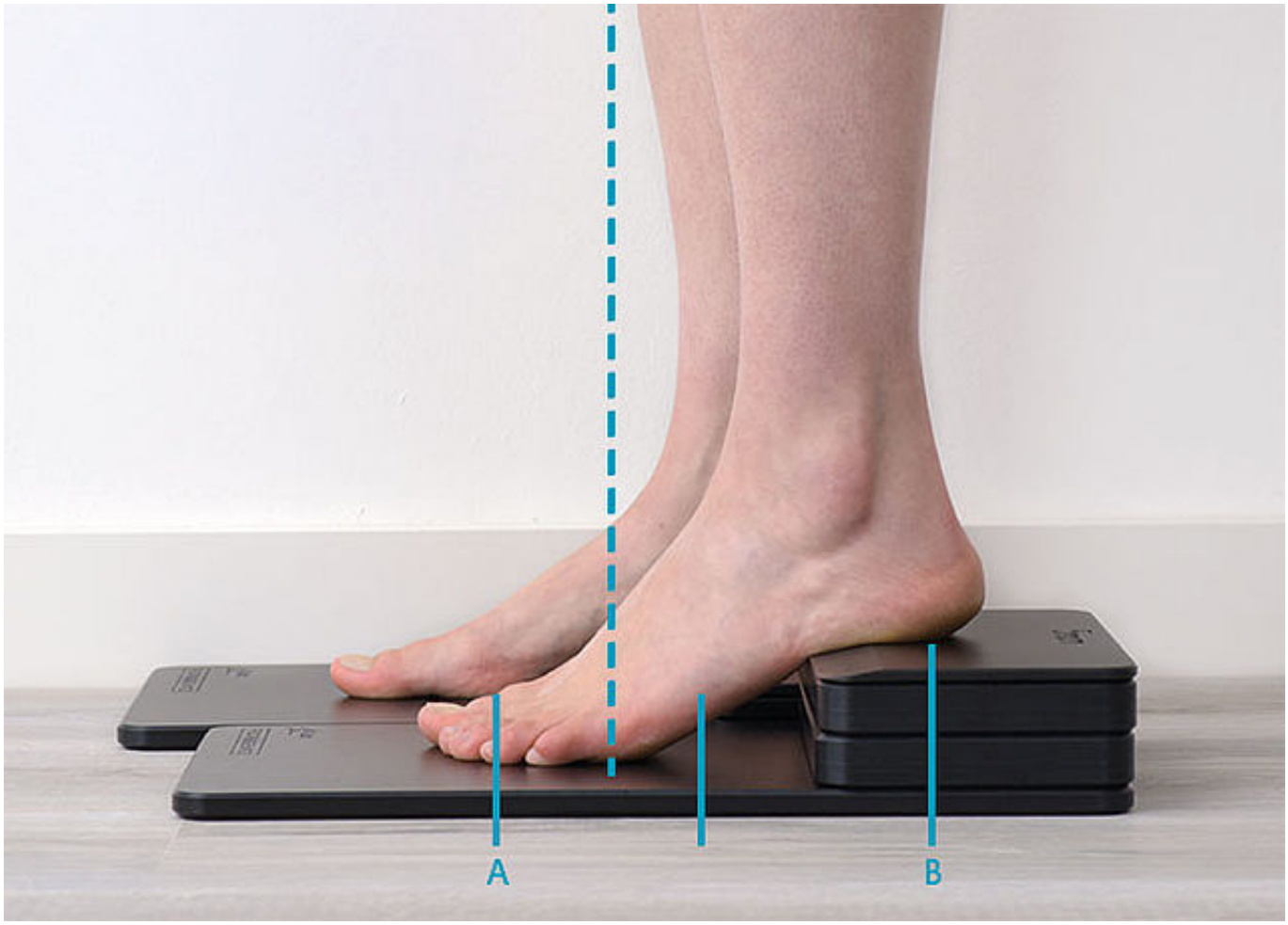

Length Differenc

Place the standing patient on two h-Casts. Ensure the correct position of the plumb bob. It should fall posteriorly from cervical vertebrae C7 through the intergluteal cleft to the middle floor space of both feet and on the sagittal plane from the ear through the greater trochanter to the front half between the functional rolling off line A and the heel lever B.

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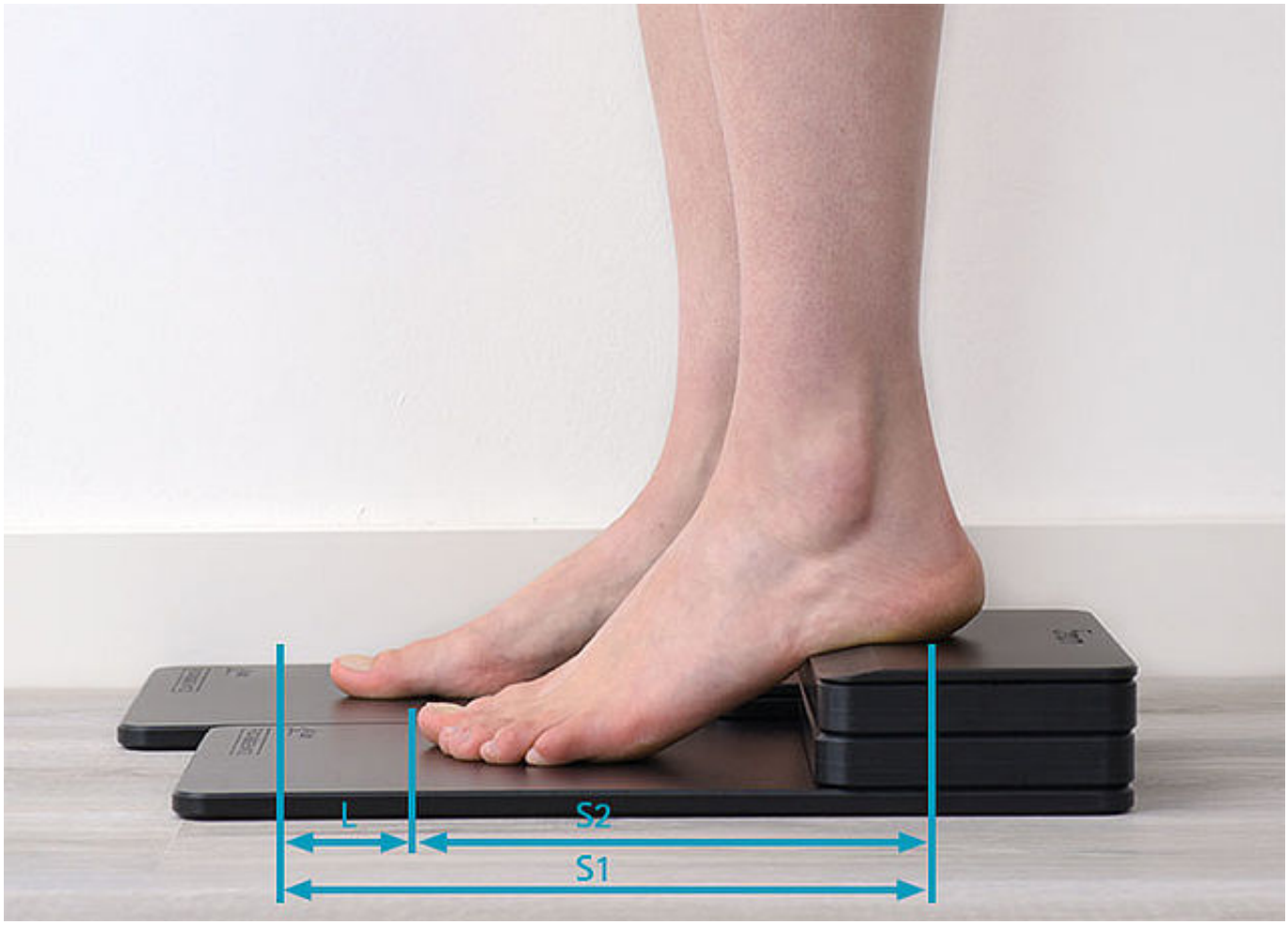

Length Difference

Determine the length difference L. To do so, measure S1 and S2 and apply the formula L = S1 - S2. Write down the length difference L in order to be able to compensate the difference during following steps.

Important: For the step length to be symmetric, the leverage ratio should be the same on both sides. Therefore, the rolling off line's position and the heel lever must be adjusted if there is a functional shortening (e.g. due to a height compensation).

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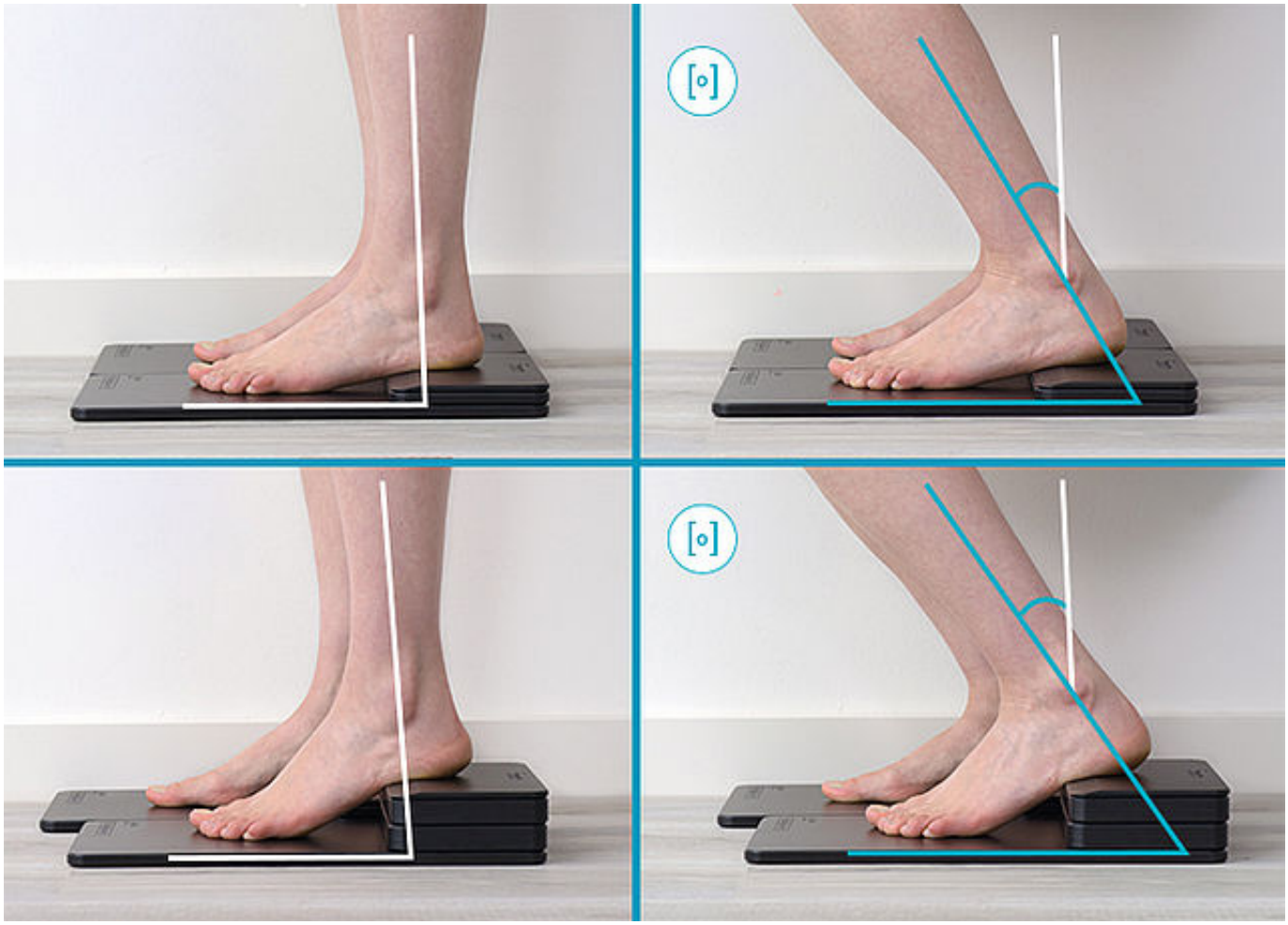

Range of Motion of the Upper Ankle Joint in Dorsiflexion

The range of motion of the upper ankle joint is measured based on the individual normal posture. Place the patient on the h-Cast considering the leg length/height compensation and the shoe's pitch. Measure the range of motion of the upper ankle joint in dorsiflexion based on the individual normal posture.

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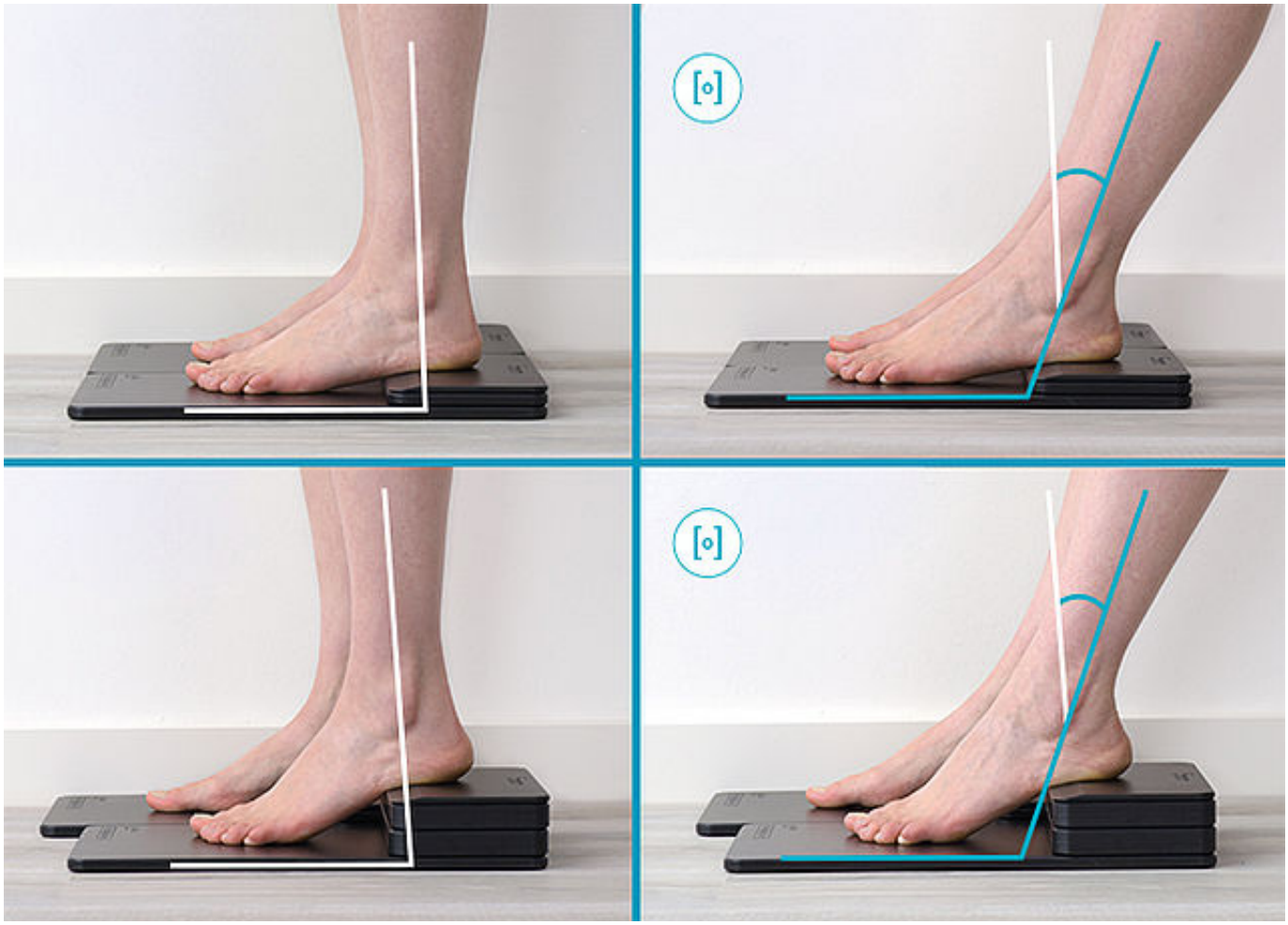

Range of Motion of the Upper Ankle Joint in Plantar Flexion

The range of motion of the upper ankle joint is measured based on the individual normal posture. Place the patient on the h-Cast considering the leg length/height compensation and the shoe's pitch. Measure the range of motion of the upper ankle joint in plantar flexion based on the individual normal posture.

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Deformities

The patient stands on the h-Cast. Determine into which direction the leg axis deviates from the neutral position, if any.

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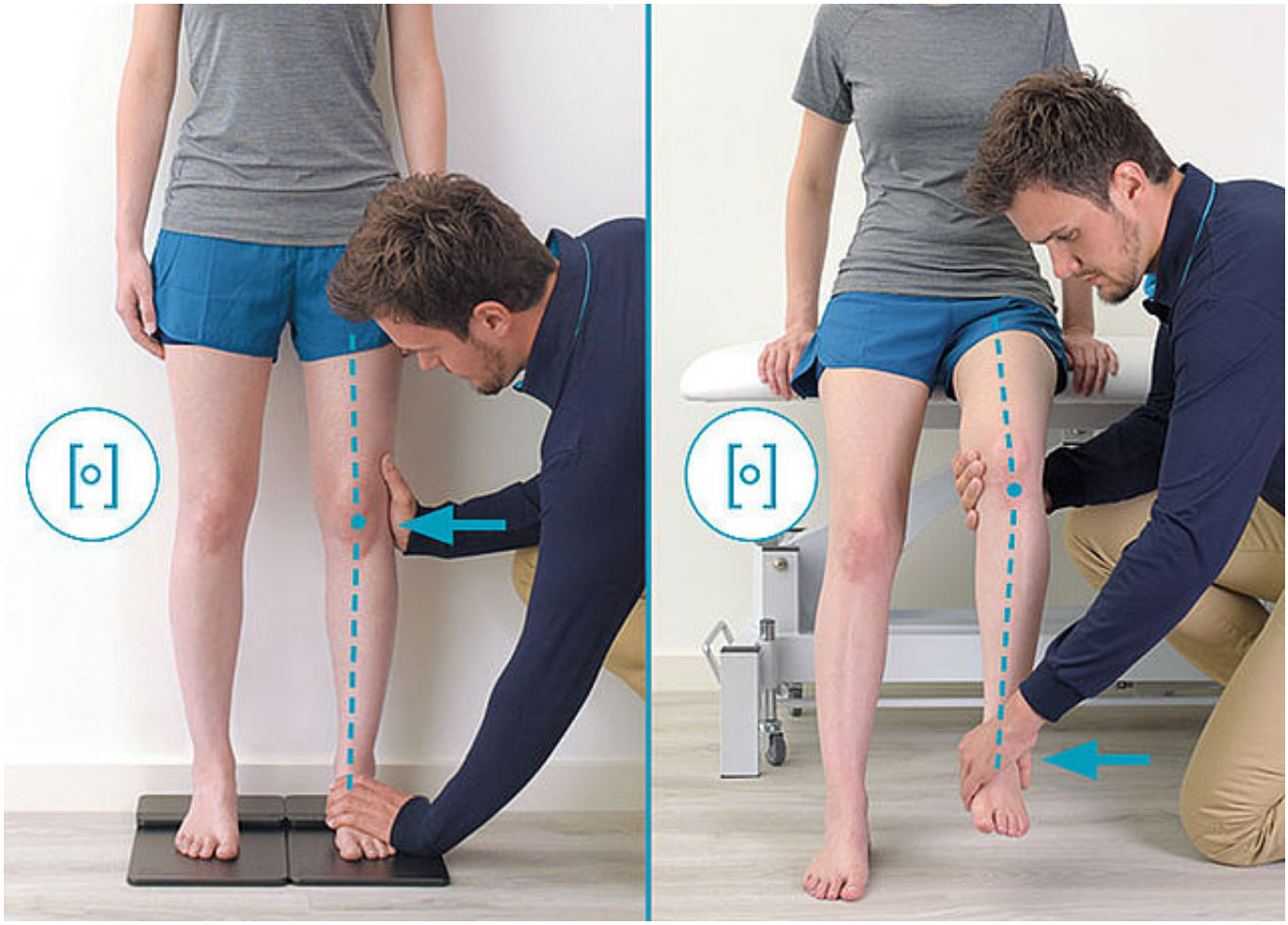

Varus Deformity - Maximum and Corrected

If there is a deviation in varus, correct it as far as possible and determine the value of the corrected varus deformity. Is the deformity not correctable, we still recommend to use the box on the orthotic treatment sheet to document the assessed data. Then, determine the maximum of the varus deformity without load on the leg. If the values coincide, there is a deformity, but no instability.

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Valgus Deformity - Maximum and Corrected

If there is a deviation in valgus, correct it as far as possible and determine the value of the corrected valgus deformity. Is the deformity not correctable, we still recommend to use the box on the orthotic treatment sheet to document the assessed data. Then, determine the maximum of the valgus deformity without load on the leg. If the values coincide, there is a deformity, but no instability.

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Hyperextension - Maximum and Corrected

Measure the maximum knee hyperextension. Correct the position, if possible, in order to achieve a physiological knee angle. Due to patient-specific characteristics, this cannot be achieved in some cases. Determine the corrected hyperextension (e.g. 4°) in any case. All values, which exceed 0° flexion (e.g. 4° flexion), undo any hyperextension and are marked as 0°.

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Extension Limitation of the Hip

Apply the Thomas test to assess the extension limitation of the hip. The patient lies on the back. Place one hand under the lumbar vertebrae to check the delordosing of the lumbar spine. Bring the leg not to be tested into hip flexion with the knee bent. Measure the hip flexion angle on the side to be tested. Please note that the assessed extension limitation of the hip can affect the individual normal posture in the sagittal plane.

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Extension Limitation of the Knee

The patient stands on the h-Cast. Adjust it accordingly to take all influencing factors, like the extension limitation of the hip, into consideration. Measure the knee angle. It deviates from the physiological angle if there is an extension limitation in the knee and/or hip. Pain can also be a factor causing deviations.

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Dorsalextension

Dorsiflexion
Extension dorsale
Estensione dorsale
Dorsaalextensie

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Dorsiflexion - Muscle Strength 5 and 4

The patient lies on the stomach, the foot of the leg to be tested hangs over the edge of the bed. Fix with one hand the lower leg without restricting the muscle function. Push against the dorsum of the foot with the other hand. Have the patient bring the foot in dorsiflexion. At complete range of motion against gravity with full resistance, the muscle strength is 5. At complete range of motion against gravity with some resistance, the muscle strength is 4.

Dorsiflexion - Muscle Strength 3

The patient sits, the lower legs hang over the edge of the bed. Fix with one hand the lower leg without restricting the muscle function. Have the patient bring the foot in dorsiflexion. At complete range of motion against gravity, the muscle strength is 3.

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Dorsiflexion - Muscle Strength 2

The patient lies on the side of the leg to be tested. Place one hand under the foot so that it does not rest on the bed anymore. Have the patient bring the foot in dorsiflexion. At complete range of motion with gravity eliminated, the muscle strength is 2.

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Dorsiflexion - Muscle Strength 1 and 0

The patient lies on the side of the leg to be tested. Place one hand under the foot so that it does not rest on the bed anymore. Have the patient bring the foot in dorsiflexion. Palpate if there is any muscle activity. At slight contraction with no joint motion, the muscle strength is 1. At no evidence of contraction, there is a total paralysis and the muscle strength is 0.

Plantarflexion

Plantar flexion
Flexion plantaire
Flessione plantare
Plantairflexie

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Plantar Flexion - Muscle Strength 5 and 4

The patient lies on the stomach, the foot of the leg to be tested hangs over the edge of the bed. Fix with one hand the lower leg without restricting the muscle function. Push against the forefoot from below with the other hand. Have the patient bring the foot in plantar flexion. At complete range of motion against gravity with full resistance, the muscle strength is 5. At complete range of motion against gravity with some resistance, the muscle strength is 4.

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Plantar Flexion - Muscle Strength 3

The patient lies on the stomach, the leg to be tested is flexed. Have the patient bring the foot in plantar flexion. At complete range of motion against gravity, the muscle strength is 3.

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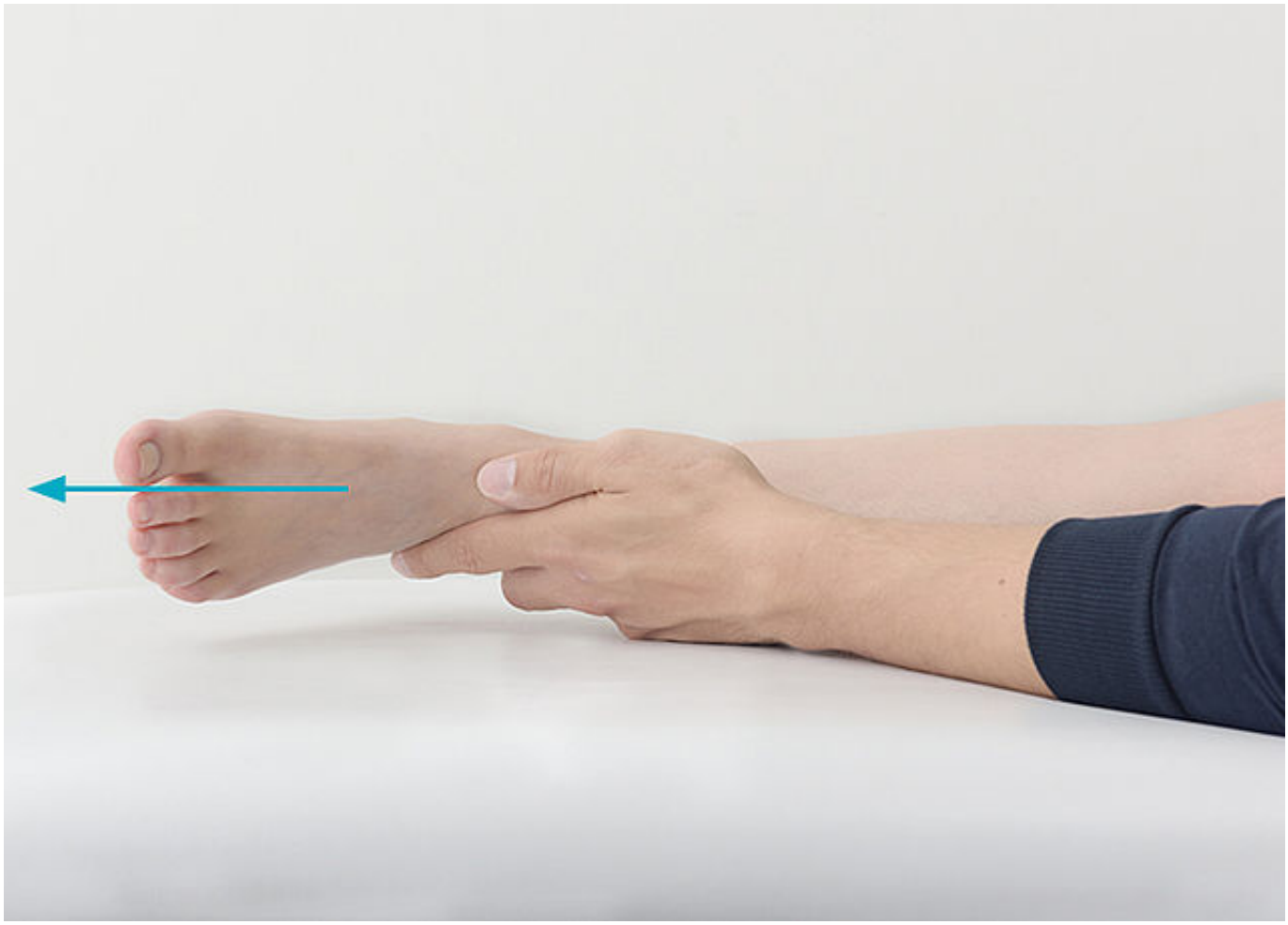

Plantar Flexion - Muscle Strength 2

The patient lies on the side of the leg to be tested. Place one hand under the foot so that it does not rest on the bed anymore. Have the patient bring the foot in plantar flexion. At complete range of motion with gravity eliminated, the muscle strength is 2.

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Plantar Flexion - Muscle Strength 1 and 0

The patient lies on the side of the leg to be tested. Place one hand under the foot so that it does not rest on the bed anymore. Have the patient bring the foot in plantar flexion. Palpate if there is any muscle activity. At slight contraction with no joint motion, the muscle strength is 1. At no evidence of contraction, there is a total paralysis and the muscle strength is 0.

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Knieextension

Knee extension
Extension du genou
Estensione del ginocchio
Knie-extensie

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Knee Extension - Muscle Strength 5 and 4

The patient sits, the lower legs hang over the edge of the bed. Fix with one hand the lower leg without restricting the muscle function. Push against the lower leg above the foot with the other hand. Have the patient bring the knee in extension. At complete range of motion against gravity with full resistance, the muscle strength is 5. At complete range of motion against gravity with some resistance, the muscle strength is 4.

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Knee Extension - Muscle Strength 3

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Knee Extension - Muscle Strength 2

The patient lies on the side of the leg not to be tested. Support and lift the upper leg. Fix with the other hand the pelvis without restricting the muscle function. The leg to be tested is slightly flexed. Have the patient bring the knee in extension. At complete range of motion with gravity eliminated, the muscle strength is 2.

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Knee Extension - Muscle Strength 1 and 0

The patient lies on the back, the leg to be tested is slightly flexed in hip and knee. The other leg remains extended. Have the patient bring the knee in extension. Palpate if there is any muscle activity. At slight contraction with no joint motion, the muscle strength is 1. At no evidence of contraction, there is a total paralysis and the muscle strength is 0.

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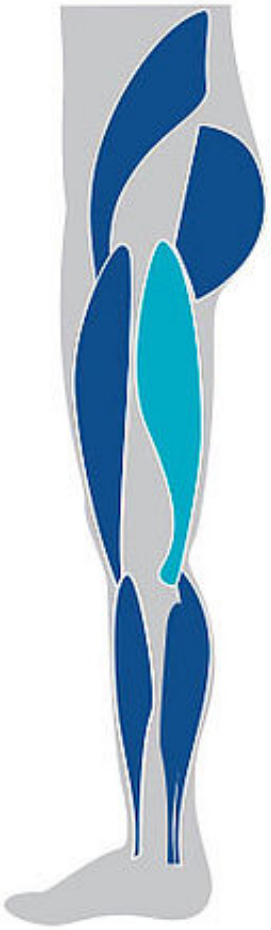
Knieflexion

Knee flexion
Flexion du genou
Flessione del ginocchio
Knieflexie



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Knee Flexion - Muscle Strength 5 and 4

The patient lies on the stomach, one foot hangs over the edge of the bed and the leg to be tested is flexed. Fix with one hand the lower leg without restricting the muscle function. Push against the lower leg close to the foot with the other hand. Have the patient bring the knee in flexion. At complete range of motion against gravity with full resistance, the muscle strength is 5. At complete range of motion against gravity with some resistance, the muscle strength is 4.

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Knee Flexion - Muscle Strength 3

The patient lies on the stomach, one foot hangs over the edge of the bed and the leg to be tested is flexed. Fix with one hand the lower leg without restricting the muscle function. Have the patient bring the knee in flexion. At complete range of motion against gravity, the muscle strength is 3.

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Knee Flexion - Muscle Strength 2

The patient lies on the side of the leg not to be tested and the upper leg is slightly flexed. Support and lift the upper leg. Fix with the other hand the pelvis without restricting the muscle function. Have the patient bring the knee in flexion. At complete range of motion with gravity eliminated, the muscle strength is 2.

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Knee Flexion - Muscle Strength 1 and 0

The patient lies on the stomach, one foot hangs over the edge of the bed and the leg to be tested is slightly flexed. Support the flexed leg with one hand. Have the patient bring the knee in flexion. With the other hand, palpate if there is any muscle activity. At slight contraction with no joint motion, the muscle strength is 1. At no evidence of contraction, there is a total paralysis and the muscle strength is 0.

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Hüftflexion

Hip flexion
Flexion de la hanche
Flessione dell'anca
Heupflexie

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Hip Flexion - Muscle Strength 5 and 4

The patient lies on the back, the lower legs hang over the edge of the bed. Fix with one hand the pelvis without restricting the muscle function. Push against the thigh close to the knee with the other hand. Have the patient bring the hip in flexion. At complete range of motion against gravity with full resistance, the muscle strength is 5. At complete range of motion against gravity with some resistance, the muscle strength is 4.

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Hip Flexion - Muscle Strength 3

The patient lies on the back, the lower legs hang over the edge of the bed. Fix with one hand the pelvis without restricting the muscle function. Have the patient bring the hip in flexion. At complete range of motion against gravity, the muscle strength is 3.

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Hip Flexion - Muscle Strength 2

The patient lies on the side of the leg not to be tested, the leg to be tested is slightly flexed in hip and knee. Support and lift the upper leg with one hand. Fix with the other hand the pelvis without restricting the muscle function. Have the patient bring the hip in flexion. At complete range of motion with gravity eliminated, the muscle strength is 2.

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Hip Flexion - Muscle Strength 1 and 0

The patient lies on the back, hip and knee are slightly flexed. Support the flexed knee with one hand. Have the patient bring the hip in flexion. With the other hand, palpate if there is any muscle activity. At slight contraction with no joint motion, the muscle strength is 1. At no evidence of contraction, there is a total paralysis and the muscle strength is 0.

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Hüftextension

Hip extension
Extension de la hanche
Estensione dell'anca
Heupextensie

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Hip Extension - Muscle Strength 5 and 4

The patient lies on the stomach, the feet hang over the edge of the bed. Push against the thigh close to the knee with one hand. Have the patient bring the hip in extension. Make sure that the pelvis stays on the bed. At complete range of motion against gravity with full resistance, the muscle strength is 5. At complete range of motion against gravity with some resistance, the muscle strength is 4.

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Hip Extension - Muscle Strength 3

The patient lies on the stomach, the feet hang over the edge of the bed. Have the patient bring the hip in extension. Make sure that the pelvis stays on the bed. At complete range of motion against gravity, the muscle strength is 3.

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Hip Extension - Muscle Strength 2

The patient lies on the side of the leg not to be tested and the upper leg is slightly flexed. Support and lift the upper leg with one hand. Fix with the other hand the pelvis without restricting the muscle function. Have the patient bring the hip in extension. At complete range of motion with gravity eliminated, the muscle strength is 2.

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Hip Extension - Muscle Strength 1 and 0

The patient lies on the stomach. Have the patient bring the hip in extension. Palpate if there is any muscle activity. At slight contraction with no joint motion, the muscle strength is 1. At no evidence of contraction, there is a total paralysis and the muscle strength is 0.

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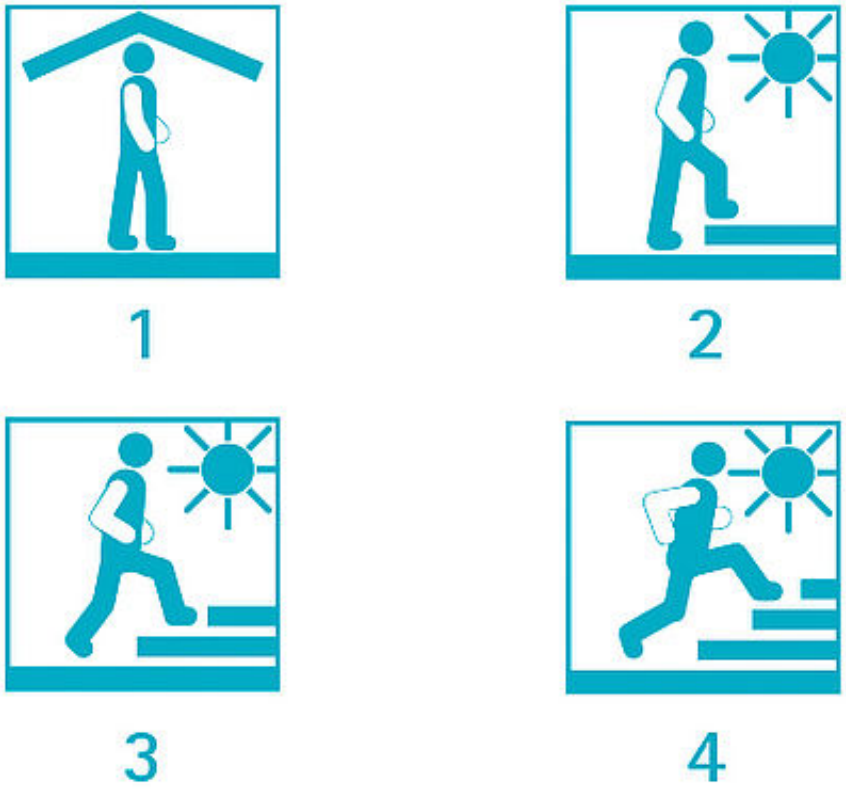
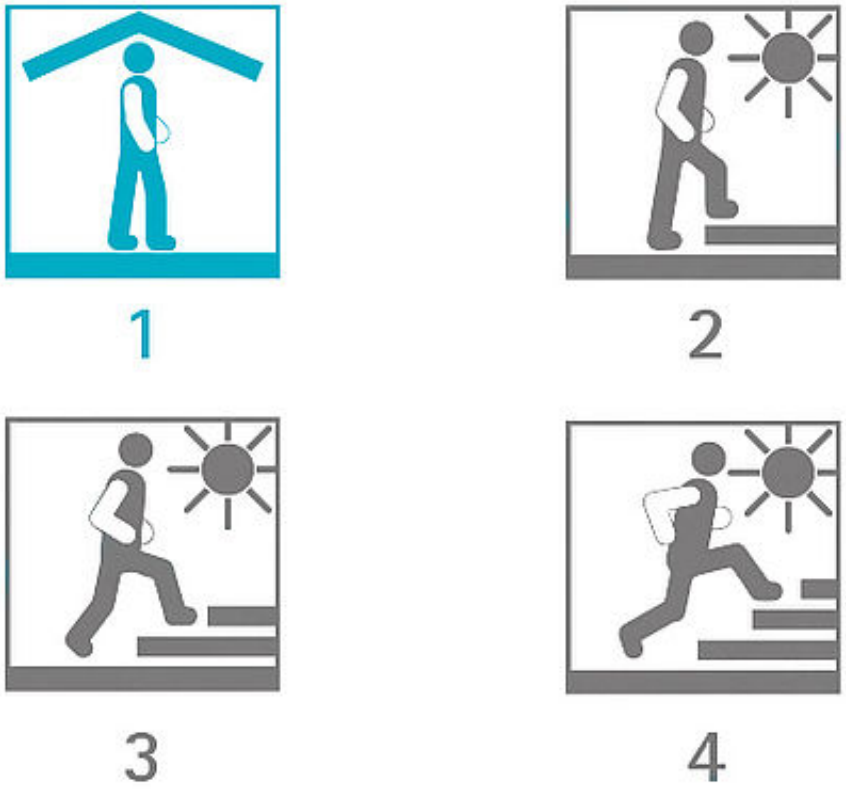


Activity Level

Evaluate the activity level together with your patient while already taking into consideration foreseeable changes:



1. Indoor Walker

The patient has the ability or the potential to make transfers and to move with an orthosis on even surfaces at low walking speed. Ambulation is possible for a very short distance and duration due to the physical condition of the patient.

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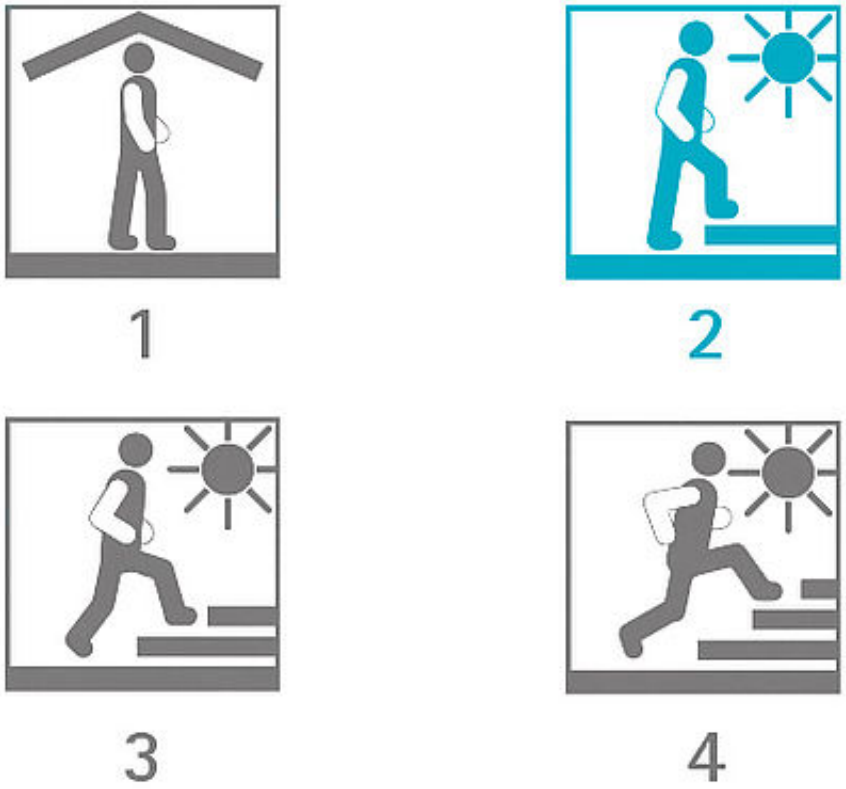

2. Restricted Outdoor Walker

The patient has the ability or the potential to move with an orthosis at low walking speed and is able to overcome small environmental obstacles such as curbs, single steps or uneven surfaces.

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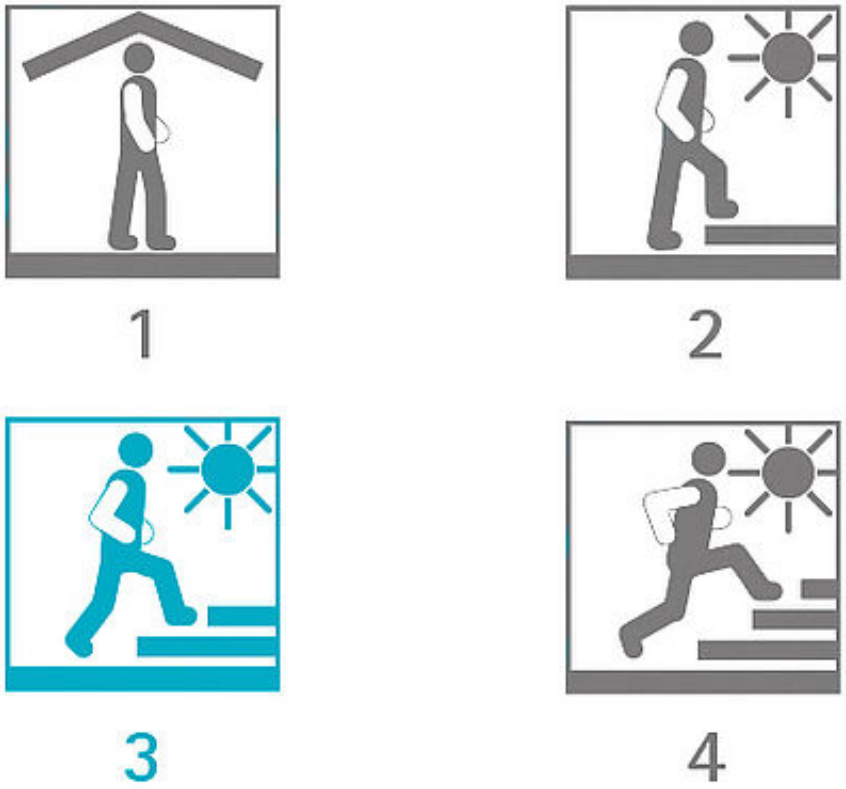

3. Unrestricted Outdoor Walker

The patient has the ability or the potential to move at medium to high and also varying speed and to overcome most environmental obstacles. Additionally, the patient can walk on open terrain and perform professional, therapeutic and other activities which do not apply an above average mechanical load on the orthosis.

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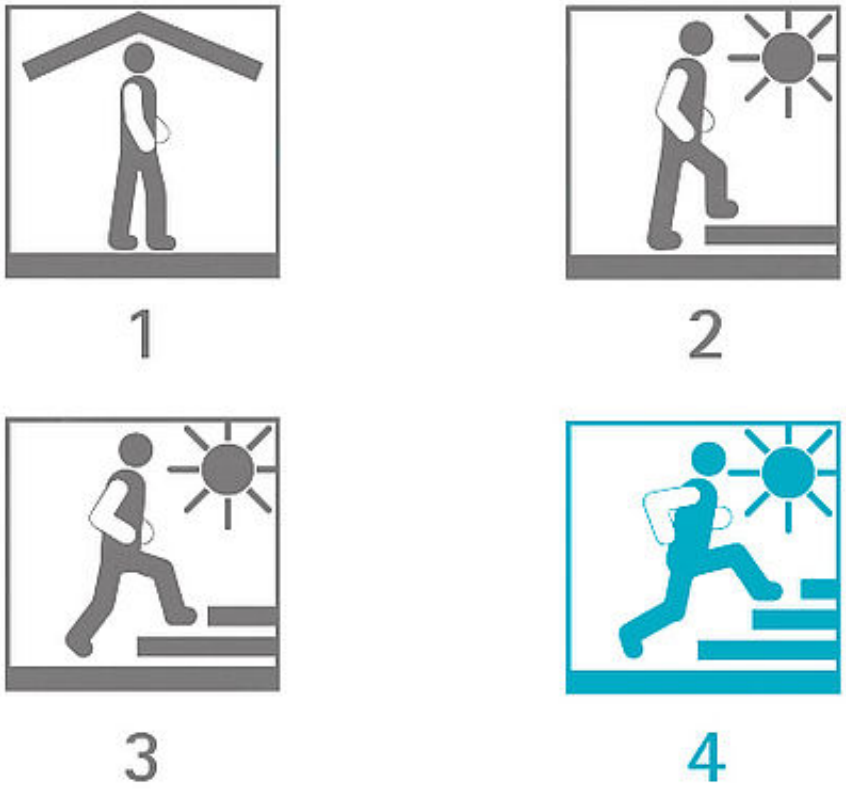

4. Unrestricted Outdoor Walker with Especially High Demands

The patient has the ability or the potential to move with an orthosis like the unrestricted outdoor walker. Additionally, the increased functional demands can generate high impact loads, tension and/or deformation on the orthosis. These patients are mainly athletes and children.

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ap Measurement at Knee Height

Determine the ap measurement by using a calliper. Measure on the slightly flexed knee when the muscles are relaxed. Measure rectangular from the knee fold to the longitudinal axis of the lower leg and parallel to the movement direction.

Note: In order to avoid measuring errors, do not use the patella as basis to determine the ap measurement as the patella's position can vary (e.g. at luxations, TEPs and patella alta).

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