

3R60 Family of products

Hydraulic controlled polycentric knee joint



Quality for life



3R60 Family of products

After a lower limb amputation the patients concerned have different expectations and hopes for how they want to live their future lives. There is one wish almost all of them share: Finally being able to walk safely and largely natural again.

Mobility made by Ottobock

Electronically controlled leg prosthesis systems like the C-Leg and the Genium are prime examples for your customers to learn just what modern prosthetics can do. However, the consistent further development of product functions and features is a matter of course for us when it comes to mechanical components as well.

In order to find suitable solutions, we are guided by the example of nature and transfer these insights to orthopaedic technology – made by Ottobock.

Ottobock's 3R60 knee joints stand for innovative mechanical products closely reflecting natural movement patterns serving to open up new perspectives for amputees.

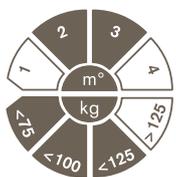
In the following pages we are pleased to present an overview of each member of this family.



3R60-Pro*

Recommendation according to the Ottobock mobility system (MOBIS) for amputees with mobility grades 2 and 3 (restricted outdoor walker – unrestricted outdoor walker).

Maximum body weight: 75 kg/165 lbs



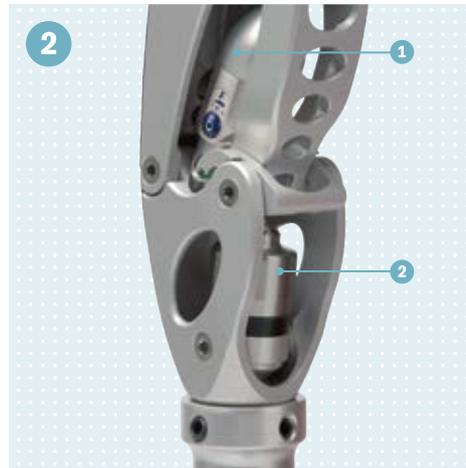
3R60* & 3R60 Vacuum

Recommendation according to the Ottobock mobility system (MOBIS) for amputees with mobility grades 2 and 3 (restricted outdoor walker - unrestricted outdoor walker).

Maximum body weight: 125 kg/275 lbs

The design of the 3R60 product family

- 1 The joints in the 3R60 product family have five axes arranged in a circular form. The anterior axis chain is designed like a conventional four-axis joint, but the posterior linkage bar is interrupted by an additional pivot point (see red marking). As a result, this sophisticated design allows for two different modes of operation: swing phase mode plus stance phase flexion mode.
- 2 Two specially configured hydraulic-spring combination units control the two modes.
- 3 With the **3R60 Pro**, the proximal pyramid adapter can be shifted in the anterior or posterior direction to correct or optimise prosthetic alignment.
- 4 Expanding the 3R60 product family by adding the **3R60 Vacuum** we are striving to retain the basic functionality and proven characteristics of the product group. The newly added joint features a vacuum pump integrated in the upper joint section. The intake valve is connected to the socket by flexible tubing. When the knee joint is flexed, the integrated pump generates negative pressure in the socket. Air and perspiration fluids are expelled through the discharge valve by means of an additional tube.



Winning combination to support the 3R60 Vacuum

In order to create the best possible fitting for your clients, we have taken to recommend prosthetic systems consisting of components known to complement and reinforce each other. The right hand image demonstrates our winning combination to go with the 3R60 Vacuum knee joint.

Featuring an integrated pump the 3R60 Vacuum uses the knee flexion movement during swing phase to create negative pressure in the socket. In order to benefit from the advantages generated by suction pressure the knee joint works best with the ProSeal sealing system consisting of the ProSeal ring (452A1) and a silicone liner, e.g. the ProSeal SIL 6Y81 (suitable for residual limbs with a minimum of 13 cm/5.12 in.) The system serves to maximise the vacuum surface allowing for an improved suspension. The non-stick surface on the liner's outside allows for easy donning and doffing while the silky textured inside of the liner facilitates adhesion and comfort.

Adding the Trias lightweight prosthetic foot to the system users with a moderate level of activity will receive optimal support in everyday life. Made of carbon fibre the foot is known for its stability and ability to support a near to natural rollover. The foot is able to adapt to different gait speeds and to uneven terrain without compromising comfort. All in all the securely controlled movement patterns allow for a confident gait.



The technology for a near to natural gait pattern

Special functionality in the stance phase

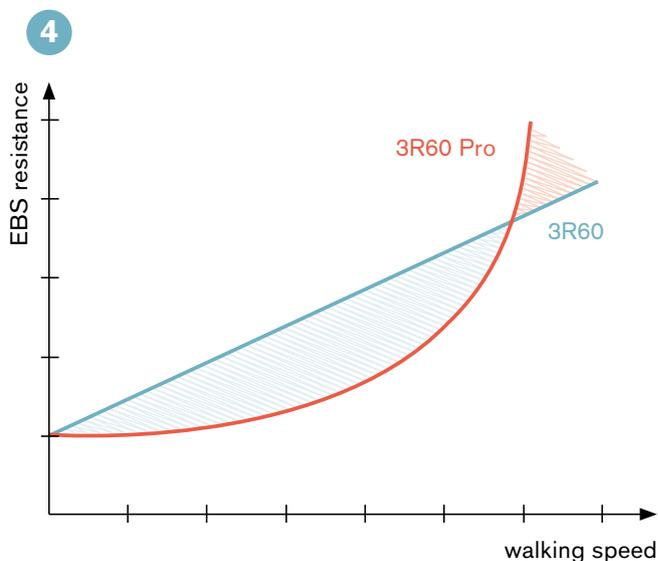
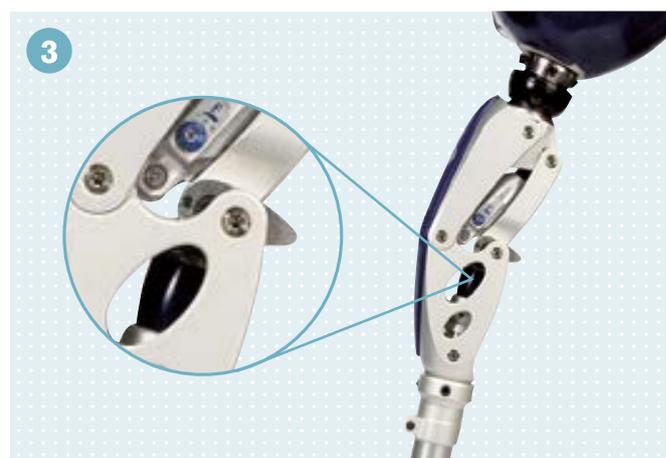
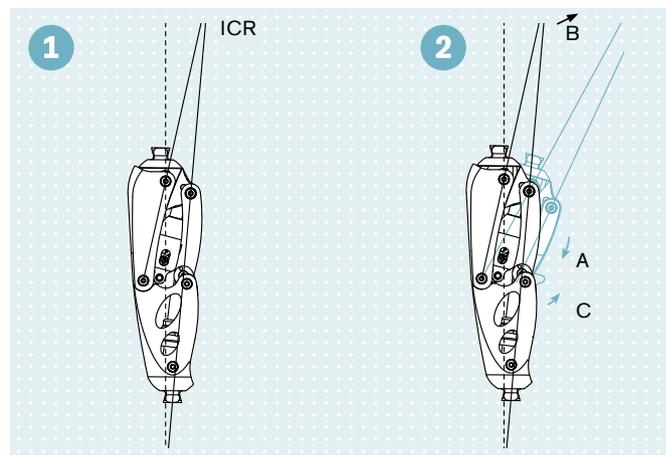
Examining the natural stride while walking, reveals that the human knee joint flexes slightly as soon as the heel impacts the ground. This important process is the basis for the functionality of the 3R60 knee joints.

EBS stands for Ergonomically Balanced Stride and is the core of the 3R60 family of products. With polycentric knee joints, the instantaneous centre of rotation (ICR) is located where the extensions of the posterior and anterior knee axes cross (Fig. 1).

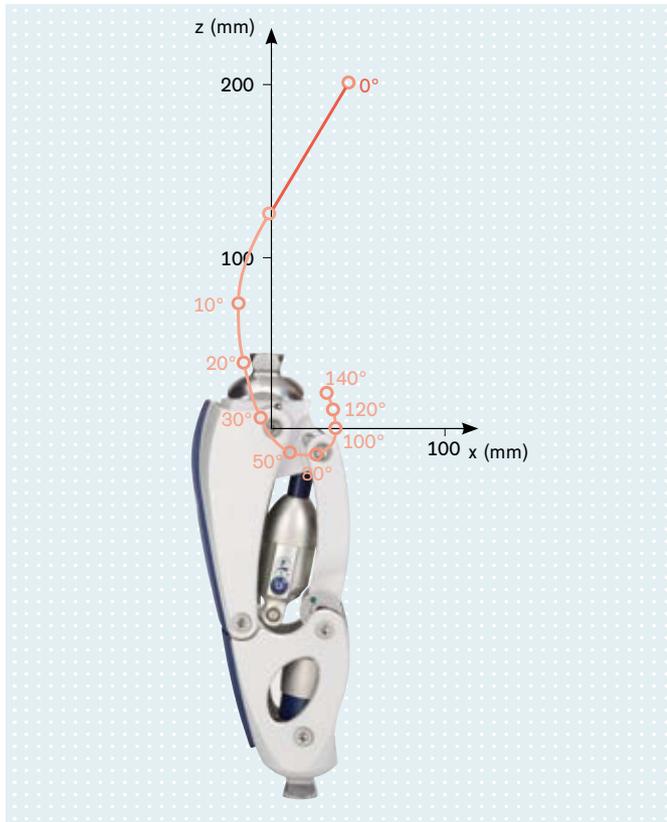
The location of the centre of rotation when placing the foot determines the safety of the prosthesis. In this part of the stance phase, the proximal joint components swing dorsally around the lower axis (Fig. 2), which in turn causes the ICR to be shifted in the proximal and dorsal direction (Fig. 2). Compared to other prosthetic knee joints, the knee safety of the prosthesis increases significantly with knee flexion. In the 3R60, the blue rubber bumper of the EBS unit is compressed and causes the pivoting mount to move up (Fig. 2). This pivoting mount serves as a visual control for measuring the efficiency of the EBS (Fig. 3).

In the 3R60 Pro, the rubber bumpers are replaced by an innovative spring-hydraulic combination. This is individually adjustable and can be precisely customised to the needs of the prosthesis wearer. Progressive EBS resistance makes it possible for this effect to specifically adapt to a large range of walking speeds (Fig. 4). The higher the walking speed, the more the flexion is limited. The lower the walking speed, the lower the effective damping resistance, which ensures greater stance phase flexion. In this way, the function adapts to various day-to-day situations. For the prosthesis wearer, this means enhanced safety and comfort as well as a largely natural gait pattern.

The EBS unit also hydraulically dampens the extension movement towards the end of the stance phase and therefore ensures more comfortable walking.

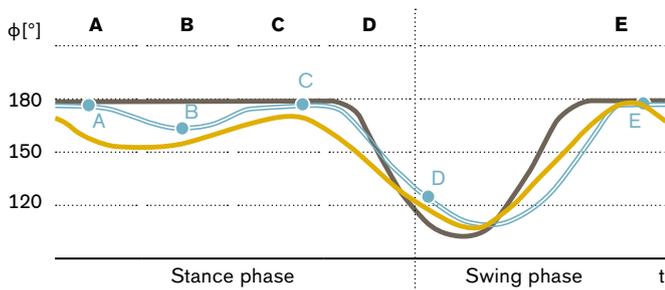


● 3R60 Pro – progression of the EBS resistance

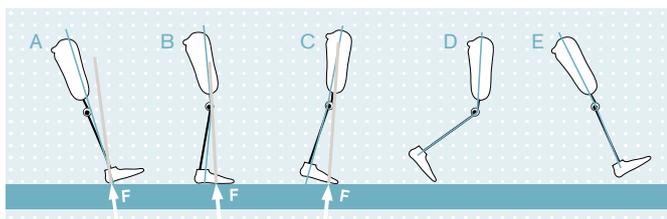


Course of current rotation centre during swing phase mode

Knee angle



- 3R60 Family
- Physiological Movement
- Prosthetic knee joint without stance phase flexion



Optimised swing phase control

Innovative hydraulics control the behaviour of the knee joint during the swing phase. The damping values of the hydraulic system are based on gait analysis investigations. For the user, this mainly means that he or she can easily initiate the swing phase and can use a wide range of walking speeds. Flexion and extension movements can be separately and individually customised to the requirements of the prosthesis wearer. The special polycentric structure makes it possible to sit down easily without targeted load relief, and also offers more ground clearance during swing-through. This offers enhanced safety and more comfort for the user. Each joint – the 3R60 and the 3R60 Pro – is also available in four modular connection versions supporting the fitting of all amputation heights. The sole exception is the 3R60 Vacuum, which is only available with a proximal pyramid connection.

Biomechanical aspects

The objective is to approximate the natural gait pattern as closely as possible. The direct comparison of the knee angle curves in graphic E serves to illustrate this: The load and movement of both legs is more even and the gait therefore more symmetrical. This not only relieves strain on the affected side but also on the sound side, and reduces potential long-term damage to the locomotor system.

Connecting systems

technical data

Indication and field of application

The 3R60 and 3R60 Pro knee joints are suitable for amputees with knee disarticulation, transfemoral amputation, hip disarticulation and hemipelvectomy, with low to moderate activity levels. The 3R60 Vacuum is intended exclusively

for transfemoral amputees. For amputees of all age groups, all of them offer a high level of safety and excellent wearer comfort for a wide range of everyday activities. Four different connection systems allow optimum adjustment to the patient's individual amputation level.

					
Article Numbers	3R60	3R60=KD	3R60=ST	3R60=HD	3R60=VC*
Field of application	Transfemoral amputation	Knee disarticulation	Transfemoral amputation – Long residual limb	Hip disarticulation Hemipelvectomy	Transfemoral amputation
Mobis					
Proximal Connection	Pyramid adapter (sliding)	Lamination anchor	Threaded connection	Pyramid adapter (angled 10° to anterior)	Pyramid adapter
Distal Connection	Pyramid adapter	Pyramid adapter	Pyramid adapter	Pyramid adapter	Pyramid adapter
Knee flexion angle	175°	145°	125°	175°	173°
Weight	845 g	940 g	845 g	880 g	890 g
System Height	171 mm	193 mm	189 mm	174 mm	174 mm
Proximal system height up to the alignment reference point	-2 mm	20 mm	16 mm	1 mm	1 mm
Distal system height up to the alignment reference point	173 mm	173 mm	173 mm	173 mm	173 mm

• ***Ottobock recommends the following socket system for the 3R60 Vacuum:**

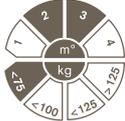
ProSeal Ring (452A1=*) combined with a textile liner (e.g. 6Y81 Skeo liner) and the vacuum connection (2R119).

Indications 3R60 Vacuum

- Volume-based fluctuations of the circumference of the residual limb up to 2 cm
- Diabetes and occlusive arterial diseases
- Prominent bone structures and difficult scar conditions
- Need for better adhesion due to higher activity level

Contraindications 3R60 Vacuum

- Interim fittings
- Dialysis patients
- Residual limbs that are not able to bear weight at the distal end
- Neuroma, preventing patients from being able to bear pressure on the residual limb
- Missing cognitive abilities of the patient to manage the system

				
Article Numbers	3R60-PRO	3R60-PRO=KD	3R60-PRO=ST	3R60-PRO=HD
Field of application	Transfemoral amputation	Knee disarticulation	Transfemoral amputation – Long residual limb	Hip disarticulation Hemipelvectomy
Mobis				
Proximal Connection	Pyramid adapter (sliding)	Lamination anchor	Threaded connection	Pyramid adapter (angled 10° to anterior)
Distal Connection	Pyramid adapter	Pyramid adapter	Pyramid adapter	Pyramid adapter
Knee flexion angle	175°	145°	125°	175°
Weight	770 g	840 g	750 g	770 g
System Height	150 mm	169 mm	165 mm	150 mm
Proximal system height up to the alignment reference point	2 mm	21 mm	17 mm	2 mm
Distal system height up to the alignment reference point	148 mm	148 mm	148 mm	148 mm

Knee-foot combination options

Depending on the patient's functional requirements, Ottobock recommends the following combinations with prosthetic feet:

	3R60		3R60 PRO		3R60 Vacuum	
Knee joint						
	1D35 Dynamic Motion	1C30 Trias	1C40 C-Walk	1C60 Triton	1C61 Triton Vertical Shock	1C63 Triton Low Profile
Prosthetic Foot options						

Overview

3R60, 3R60 Pro, 3R60 Vacuum

Common features

- EBS function, individually adjustable to the weight and activity of the user, for comfortable walking and a high level of safety – also on uneven terrain or inclines up to 10°
- During heel impact, the knee can be flexed at an angle of up to 15° in a controlled and stabilising manner, just as the natural version – a unique feature for a mechanical knee joint. This flexion not only results in comfortable foot placement, but also improves knee safety.
- The 3R60 and 3R60 Pro knee joints offer four modular connection versions for fitting various amputation levels.
- High ground clearance in the swing phase due to multi-axial joint design
- Swing phase hydraulics that are very easy to adjust, with easy initiation of the swing phase, optimum progressive damping for natural movement and comfortable end position damping for a large range of walking speeds
- Stress reduction for both limbs; reduction of the forces acting upon the residual limb, pelvis, and spine; and close approximation to a sound, natural gait pattern
- The design offers greater protection in high-risk situations: the wearer can always flex the joint in a controlled manner without delay or prior full extension, so there is less risk of falling than with locking knee joints.
- Knee dimensions and function permit an attractive and natural cosmetic appearance.

Special features

3R60 Pro

- The 3R60 Pro has a movable pyramid adapter (10 mm in the a/p direction) for alignment optimisation/correction or adaptation to hip flexion contractures
- Progressive stance phase damping, also in the flexion direction, for harmonious, natural movements under load and adaptation of movements to various everyday situations
- Compact joint dimensions: smaller, thinner and lighter, cosmetically advantageous, supports a very large flexion angle

3R60 Vacuum

- Vacuum generation in the socket ensures active volume management and improves the connection between the prosthesis and residual limb with reduced fluctuations in volume, improved adhesion, reduced forces in the socket and improved proprioception
- Vacuum also generated when cycling
- Cosmetically advantageous fitting as the pump is fully integrated in the knee joint, no increase in structural height due to separate pump
- Purely mechanical pump = durable and robust
- Compatible with existing vacuum socket systems

