

Endo-Model Knee System

Proven – Performance – Trusted

Product Rationale

CE 0482

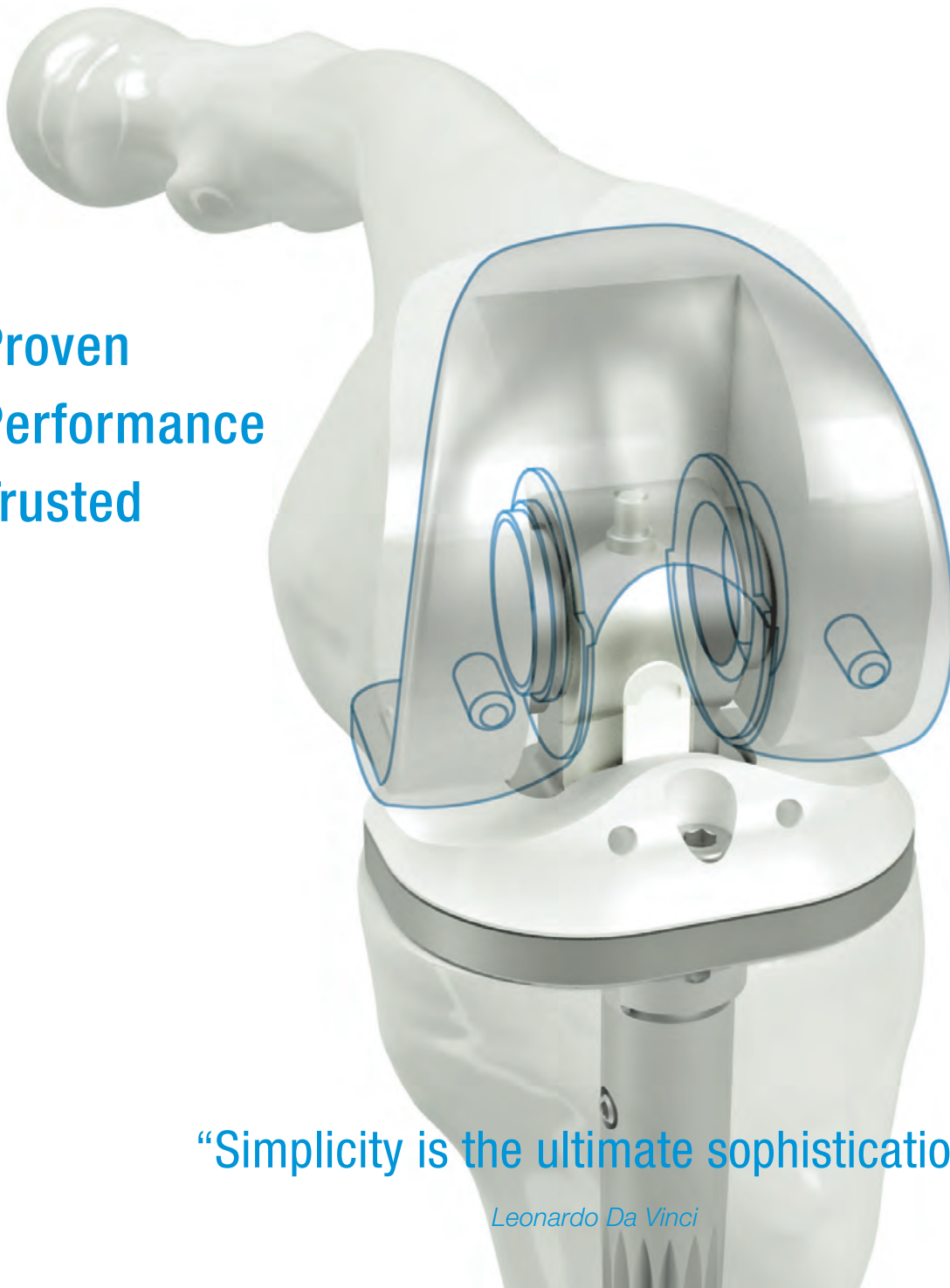
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Proven
Performance
Trusted

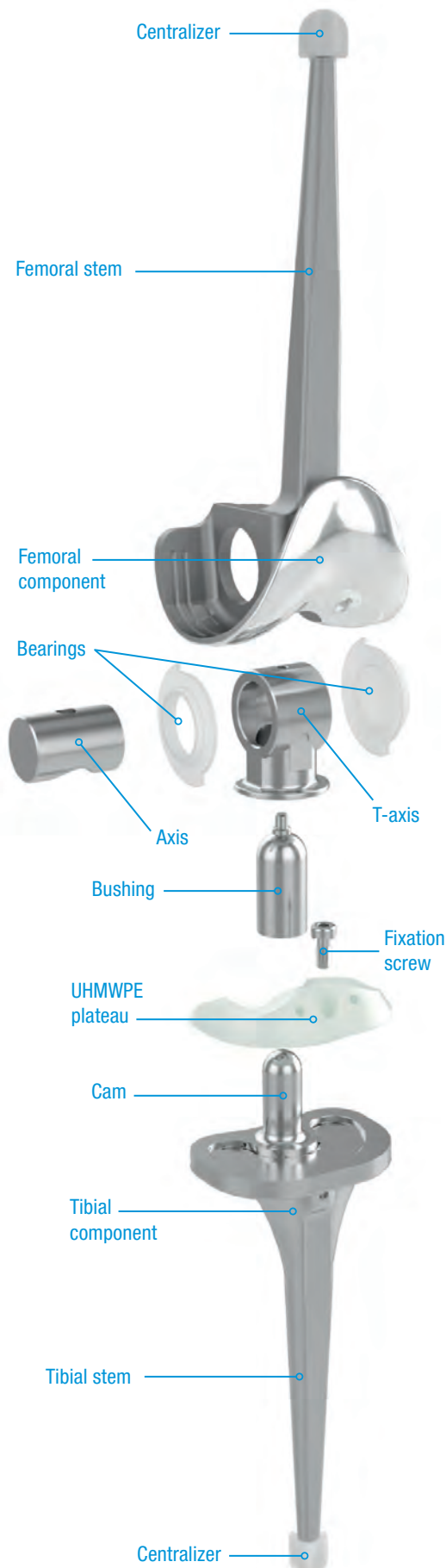


“Simplicity is the ultimate sophistication”

Leonardo Da Vinci

The **Endo-Model Knee System** was introduced in 1979 and since then, the system has had a proven clinical heritage^{1,2}. This has allowed LINK to produce the most used rotating hinge knee in many markets³. The Endo-Model has many reports of outstanding long-term results^{1,4,5} such as **98.5% survival rate after 15 years**⁴.

Based on the unchanged core design,⁷ the Endo-Model Knee System has intrinsic stability^{1,6,8} with excellent kinematics functions⁹. The Endo-Model Knee System offers a comprehensive portfolio including cemented and cementless stems together with a straightforward procedure.^{2,10}



Rotating Hinge Knee

The **Endo-Model Rotating Hinge Knee** consists of different parts: a femoral component, a tibial component, a UHMWPE plateau with fixation screw, bearings and a cross joint consisting of the bushing, T-axis, axis and the cam on the tibia.

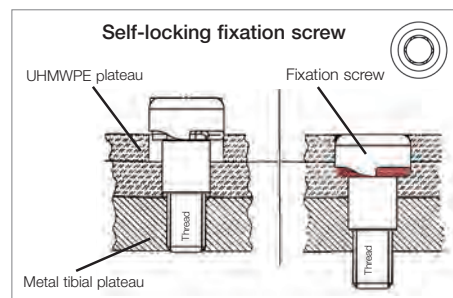
Femoral component: The stem of the femoral component has a 6° valgus angle to fit the anatomical axis. The thickness of the condyles is 3 mm.⁷

Cross joint: The cross joint consists of the bushing, T-axis, axis and the cam on the tibia plateau. These parts of the Endo-Model Knee System allow the various ranges of movement. The cam on the tibia is located 18 mm posterior to the anatomical axis and femoral stem. This allows for good flexion of the implant.⁷ At the anterior part of the T-axis is a small UHMWPE bumper. This design ensures that there is no metal-on-metal contact between the femoral and tibial component.⁷

Bearings: The bearings of UHMWPE protect the sides of the cross joint against cement inflow.⁷

Tibial plateau: The tibial plateau is the sliding partner for the femoral component and it is made from UHMWPE. The tibial plateau is fixed with a screw on the tibial component. In the medial section part of the plateau is an elevation on the plateau. This elevation fits positively against the shape of the femoral component (form fit).⁷

Fixation screw: The UHMWPE plateau is held and secured by the self-locking fixation screw.

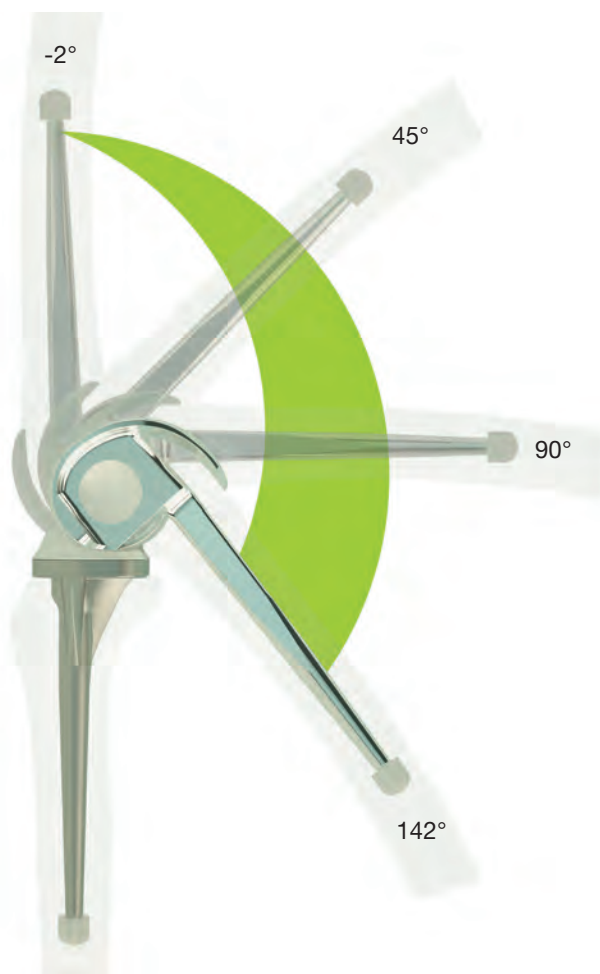


Note:

Tibial component: In the middle of the posterior part of the tibial component is the cam of the cross joint. The cam is 18 mm posterior to the axis of the tibial stem.⁷

Centralizers: Due to the shape of the centralizers, they slide into the soft cement. This allows a central position of the stem in the medullary canal. Additionally, the centralizers prevent contact between the metal stem and the corticalis and therefore stress peaks in the bone in case of a bending load.⁷

Stem: The cross section of the cemented stem offers resistance in the cement against torque.



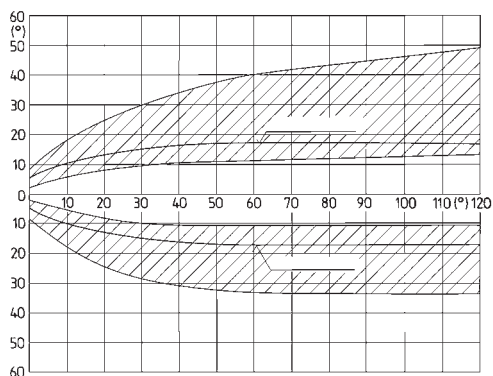
There are **two different types of movements** (rotation and flexion) within the Endo-Model Rotating Hinge Knee System. The flexion is possible because the T-axis can move around the axis in the transverse plane. Because of this, a ROM from -2° up to 142° is possible.⁷

The rotation (vertical plane) is possible because of the bushing and the cam on the tibia. The polished cam sits in the metal-jacket-coated UHMWPE bushing of the cross joint and allows rotation. This mechanism provides for a possible maximum internal and external rotation of 15° at 20° to 30° of flexion.⁷





The **Endo-Model Knee System** has no rotation in extension. This is thanks to the form fit between the anterior shape of the UHMWPE plateau and the femoral condyles in extension. Therefore the Endo-Model Knee System ensures high stability in extension. Rotation becomes possible after only 5° of flexion.⁷

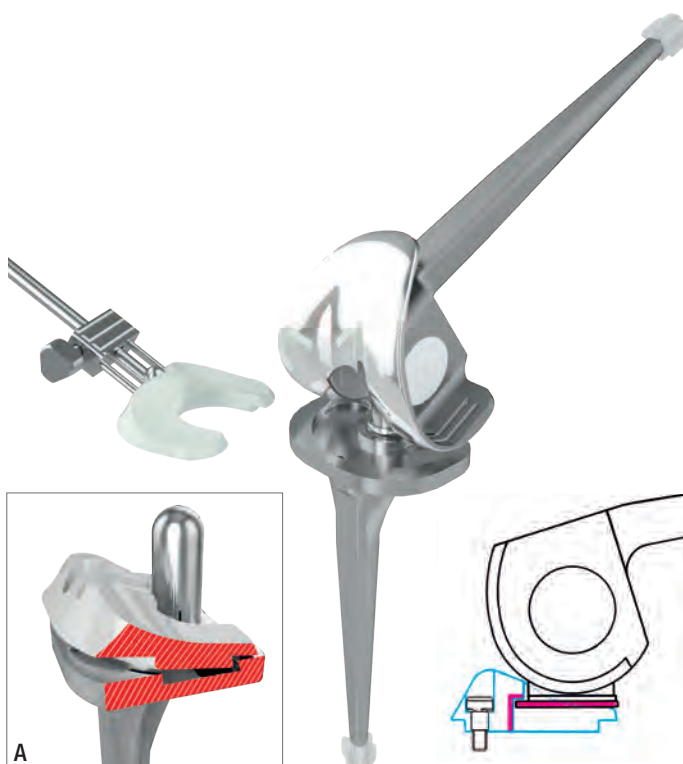


The extent of free rotation is a function of flexion, as is the region of smoothly slowed down rotation (for constructional reasons) (hatched area).

Engelbrecht E.: Die Rotationsendoprothese des Kniegelenks, Springer-Verlag 1984, ISBN: 978-3-642-69819-4 (Print) 978-3-642-69818-7 (Online)

Anti-Luxation Device

The tibial plateau is attached to the inserter and slides between the femoral and tibial components into the joint so that the plateau chamber grips over the flange. It must be ensured that the dovetail-shaped incision (fig. A) on the bottom of the UHMWPE plateau locks into the peripheral groove on the metal tibial support. The capsuloligament apparatus, the muscles and the body weight also prevent a luxation of the implant.⁷



Pure Hinge Knee

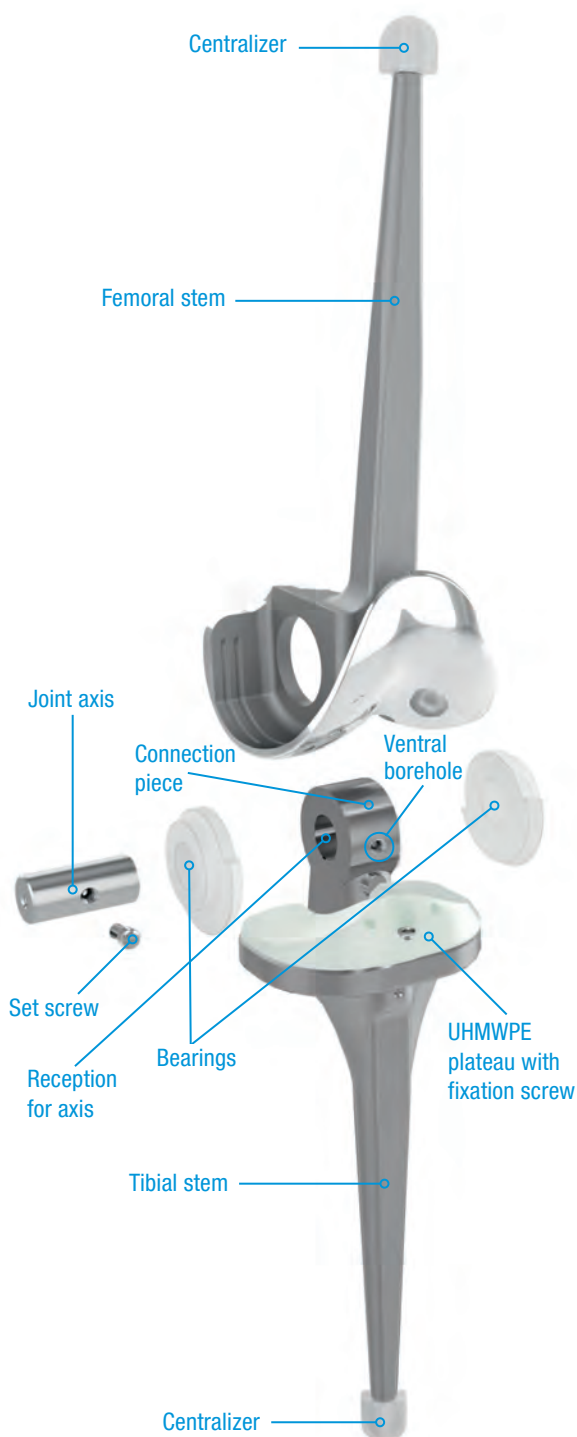
The external shape, dimensions and sizes of the **Endo-Model Pure Hinge Knee Prosthesis** correspond to the **Endo-Model Rotating Hinge Knee Prosthesis**. As the implant beds required for the pure hinge and rotating hinge versions are identical, the decision whether to use a rotating hinge or a more stabilizing pure hinge knee prosthesis can be made intraoperatively.

The pure hinge connecting component, which sits on the tibial component and links it to the femoral component of the pure hinge knee prosthesis, features a borehole for the joint axis. The ventral borehole is provided for the set screw, whose tip fits into the recess at the axis. Once the upper and lower components have been joined, the axis is secured with the set screw.

From inside the intracondylar box, polyethylene bearings for the prosthesis axis are pushed into the medial and lateral recesses. The upper and lower prosthesis components are joined by introducing the tibial connecting piece into the intracondylar box of the femoral component, such that the prosthesis axis can be inserted (always from the medial aspect). Articulation takes place between the prosthesis axis and the two bearings.

The **Endo-Model Pure Hinge Knee Prosthesis** is delivered already assembled.

The package contains two sterile trial bearings. These are inserted into the femoral prosthesis component during surgery; after the trial run, they are exchanged for the definitive bearings. These too can be exchanged, if necessary, in a second intervention. The pure hinge has only two possible movements: flexion and extension. This allows movement in the sagittal plane. The femoral and tibial component of the pure hinge are exactly the same as in the rotating hinge.





Endo-Model Standard



Material:
CoCrMo, or
LINK PorEx (TiNbN)
coated.



Range of motion:
A range of motion from
2° of hyperextension up to
142° of flexion.



Centralizers:
Allow a central position of the stem
in the medullary canal. This prevents
contact between the metal stem and
the corticalis and therefore stress
peaks in the bone in case of bending
load.⁷



Wide range of sizes:
Four different sizes (XS, S, M, L).
No crossover sizing possible!



Mechanism:
Rotating hinge or pure hinge
version available.



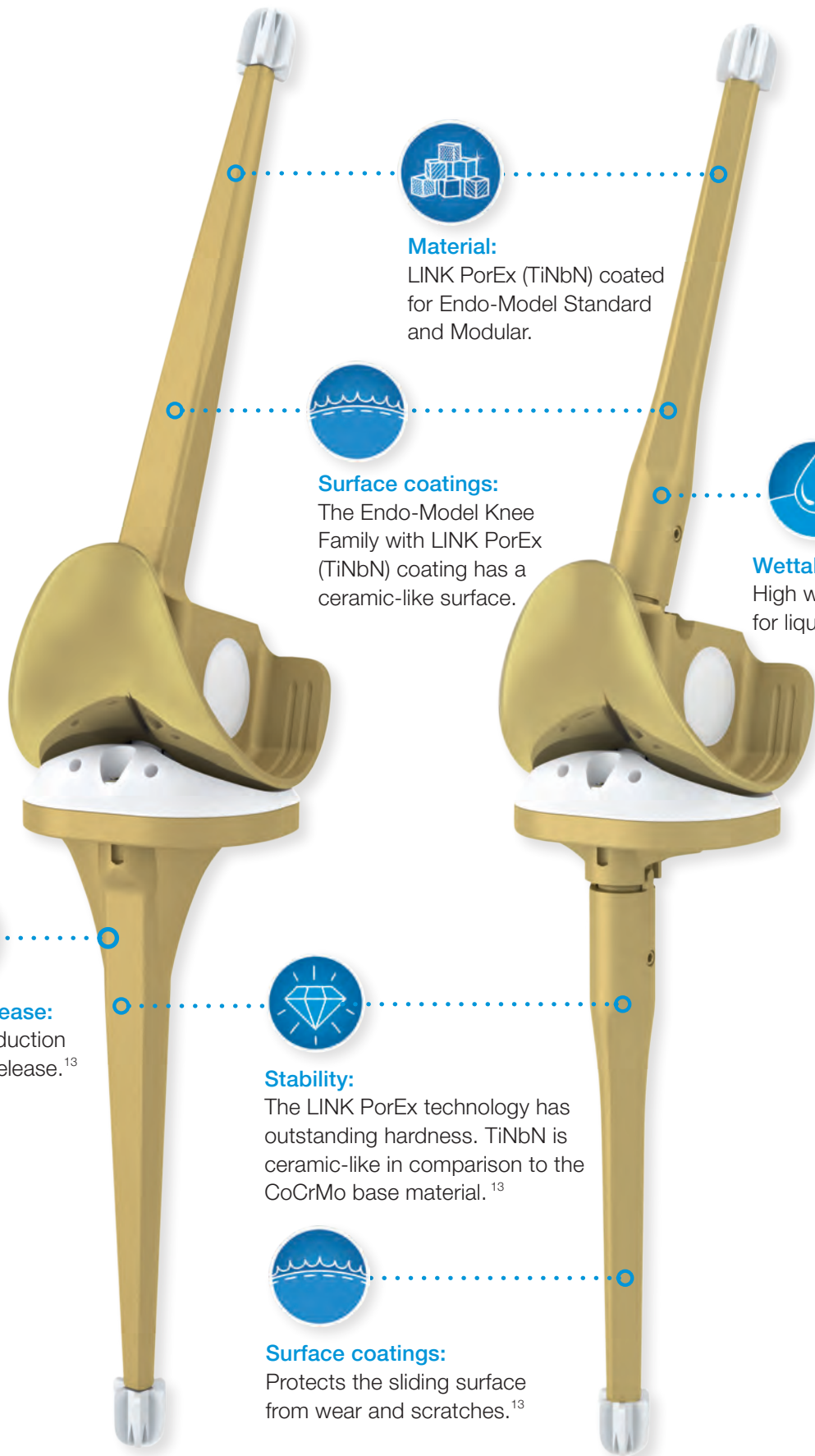
Fixation:
Cemented version only.



Endo-Model – M



Endo-Model Standard/Endo-Model – M with LINK PorEx coating



Material:
LINK PorEx (TiNbN) coated
for Endo-Model Standard
and Modular.



Surface coatings:
The Endo-Model Knee
Family with LINK PorEx
(TiNbN) coating has a
ceramic-like surface.



Wettability:
High wettability
for liquids.¹³



Metal ion release:
Significant reduction
of metal ion release.¹³

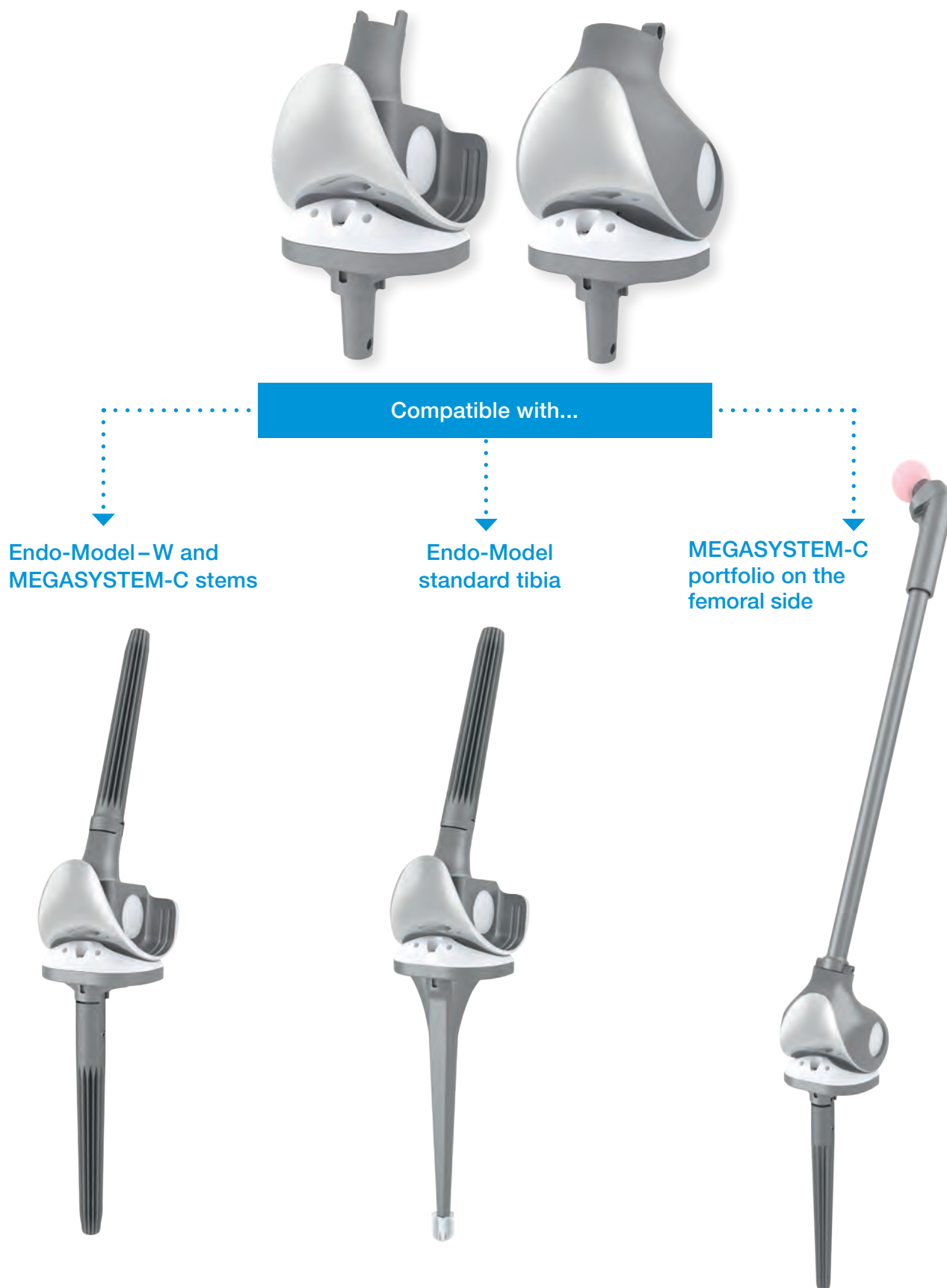


Stability:
The LINK PorEx technology has
outstanding hardness. TiNbN is
ceramic-like in comparison to the
CoCrMo base material.¹³



Surface coatings:
Protects the sliding surface
from wear and scratches.¹³

MEGASYSTEM-C Endo-Model Modular Joint Components:
Condylar replacement and intracondylar version



Endo-Model Modular Joint Components:
Endo-Model–M and Endo-Model–W, different tapers



Compatible with MEGASYSTEM-C,
push-through stems and modular stems



AORI Classification of Bone Defects



Type 1 defect:

In a Type 1 defect the metaphysis has intact bone. The defects have no effect on the stability of the implant.¹²



Type 2a defect:

In a Type 2a defect only one condylar side is concerned. Normally a primary knee implant can solve the defects. To balance the defect, it is possible to use modular augments. The augments are also helpful for restoring the joint line.¹²



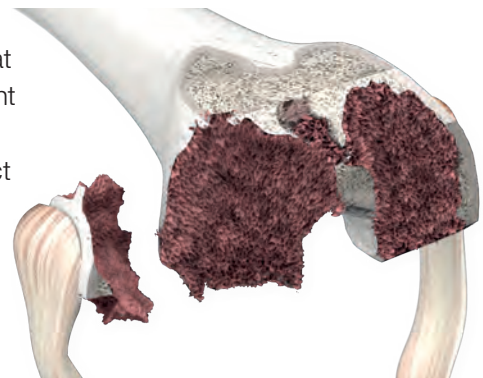
Type 2b defect:

In a Type 2b defect both condylar sides are concerned. It is necessary to reconstruct the bone with cement, augments or with bone. Reasons for a Type 2b defect can be multiple revisions or a failure of stemmed femoral components.¹²



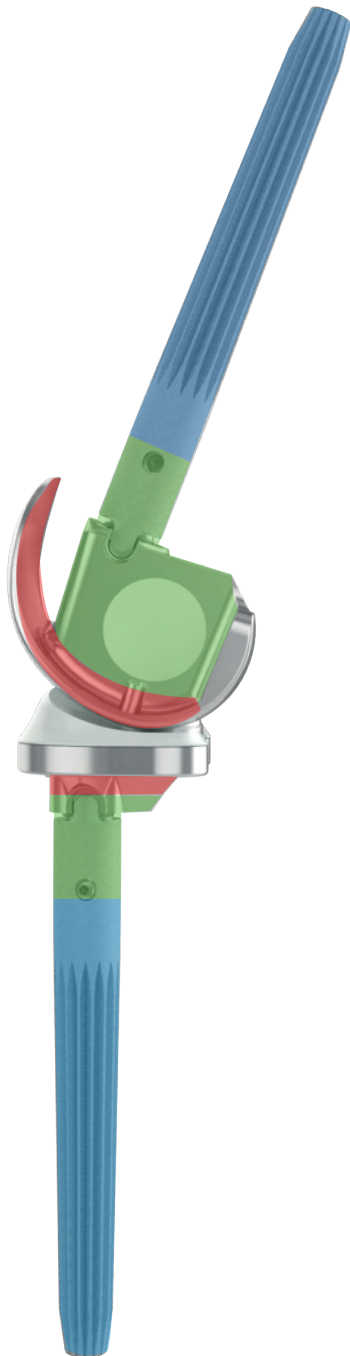
Type 3 defect:

In a Type 3 defect it is possible that one or both condyles have significant structural bone loss. With hinged devices it is possible to reconstruct the bone. It is important to restore the normal joint line. Therefore a plateau with normal thickness is very helpful.¹²



Zone Fixation in Revision Cases

For a solid anchorage, the implant should be fixed in at least two of three zones. **Zone 1** is the epiphysis (joint surface), **Zone 2** is the metaphysis and **Zone 3** is the diaphysis. Most revision knee systems provide 2-zone fixation in Zone 1 and Zone 3. The Endo-Model Knee System provides a fixation in Zone 2 as well. It is possible to have fixation in the following zones:



Zone 1 fixation:

The illustration shows fixation with cement. It is also possible to use cement, bone grafts or metal augments in bone defects. In these cases it is necessary to have at least one additional fixation in another zone to gain stability.¹¹



Zone 2 fixation:

LINK offers tibial and femoral* TrabecuLink cones. The cones have high primary stability in the meta-physeal region, both for the cone itself and for the tibial component in the cone. This allows good Zone 2 fixation. The metaphyseal fixation between prosthesis and cone is achieved using cement.¹¹



* Not available in the U.S.

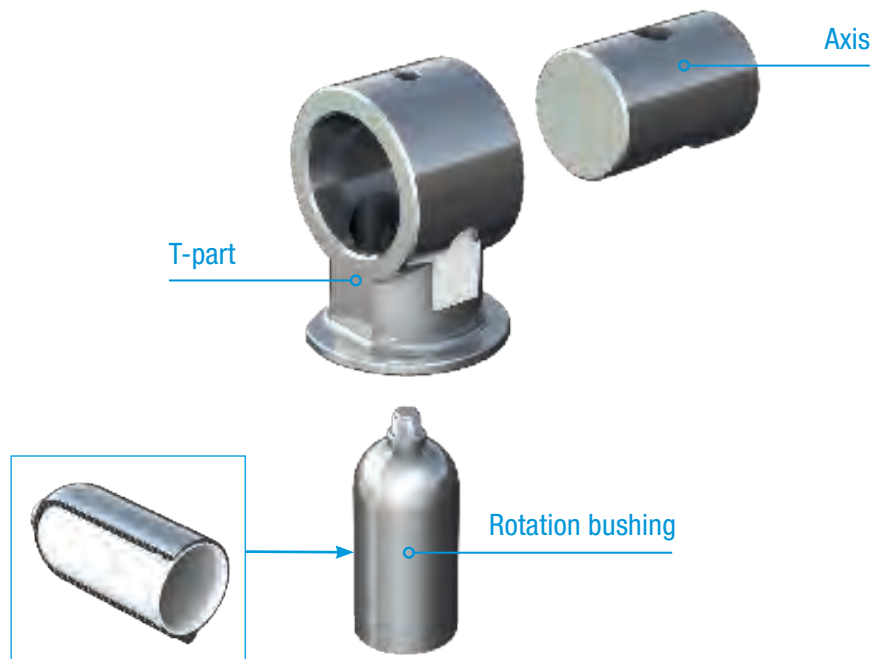
Zone 3 fixation:

Zone 3 fixation can be achieved with diaphyseal stems. Zone 3 fixation can off-load the metaphysis and reduce risk of implant cement mantle failure.¹¹



With the Endo-Model Rotating Hinge, it is possible to change only the bushing or rather the entire mechanism. It is not necessary to change the entire implant in case of bushing failure.

Bushing (V02)



LINK offers different bushing exchange possibilities:

1. Change only the bushing (rotating hinge):

It is possible to change only the bushing. Here it is not necessary to drill through the condyles. With the bushing the only step is to unscrew the bushing and remove it from the femur.

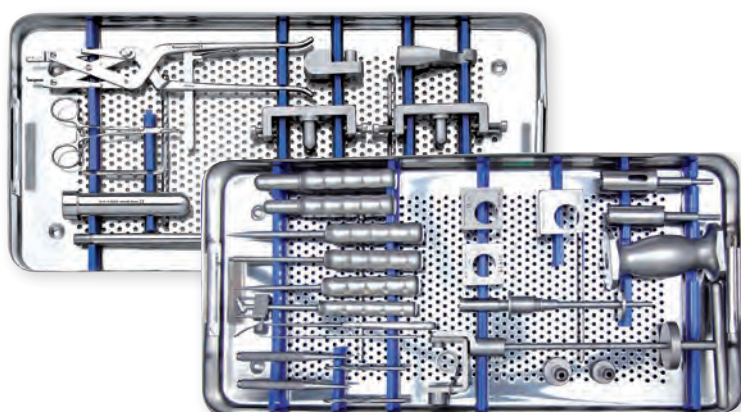
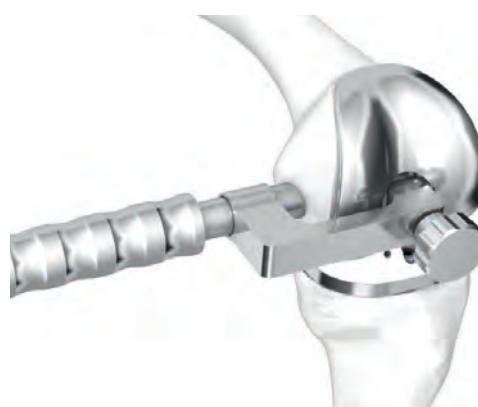


2. Change the whole cross joint (rotating hinge):

It is necessary to drill through the condyles. This step is mandatory to get access to the cross joint.



3. Change to pure hinge:



Instrument set for bushing exchange

History of the Endo-Model Knee System

Proven over 40 years:

The Endo-Model Knee System was developed in 1979. Since then, the core design of the implant is still unchanged. Because of this, the Endo-Model Knee System has a long and proven heritage.



1969

First Generation of the St. Georg

Only one size of implant. Stems were straight without valgus angle in the femur.



1975

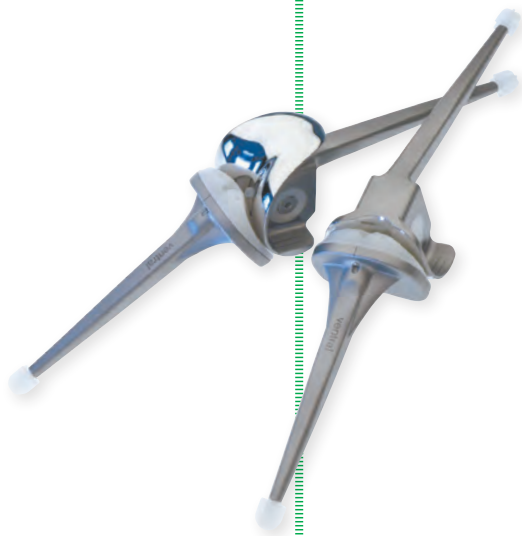
Third Generation of the St. Georg

First implant with support for the condyles and the femoral stem has a 6° valgus angle.

1979

Endo-Model

The core design of the Endo-Model as it is known today was born.



1992

Endo-Model-M

LINK established the Endo-Model Modular System. This system has the option of using cemented and cementless stems compatible with the MEGASYSTEM-C.



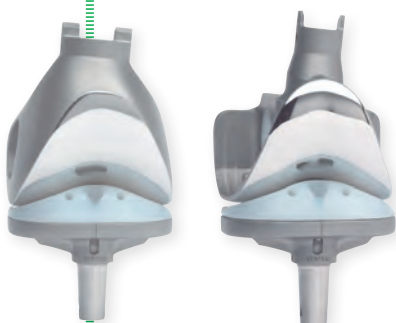
1970

1990

2008

Endo-Model-W

This system is fully compatible with the MEGASYSTEM-C.



2013

Endo-Model Standard and Endo-Model-M with LINK PorEx

The Endo-Model Knee System with LINK PorEx technology.



2012

Endo-Model V02

LINK changes the design of the bushing.



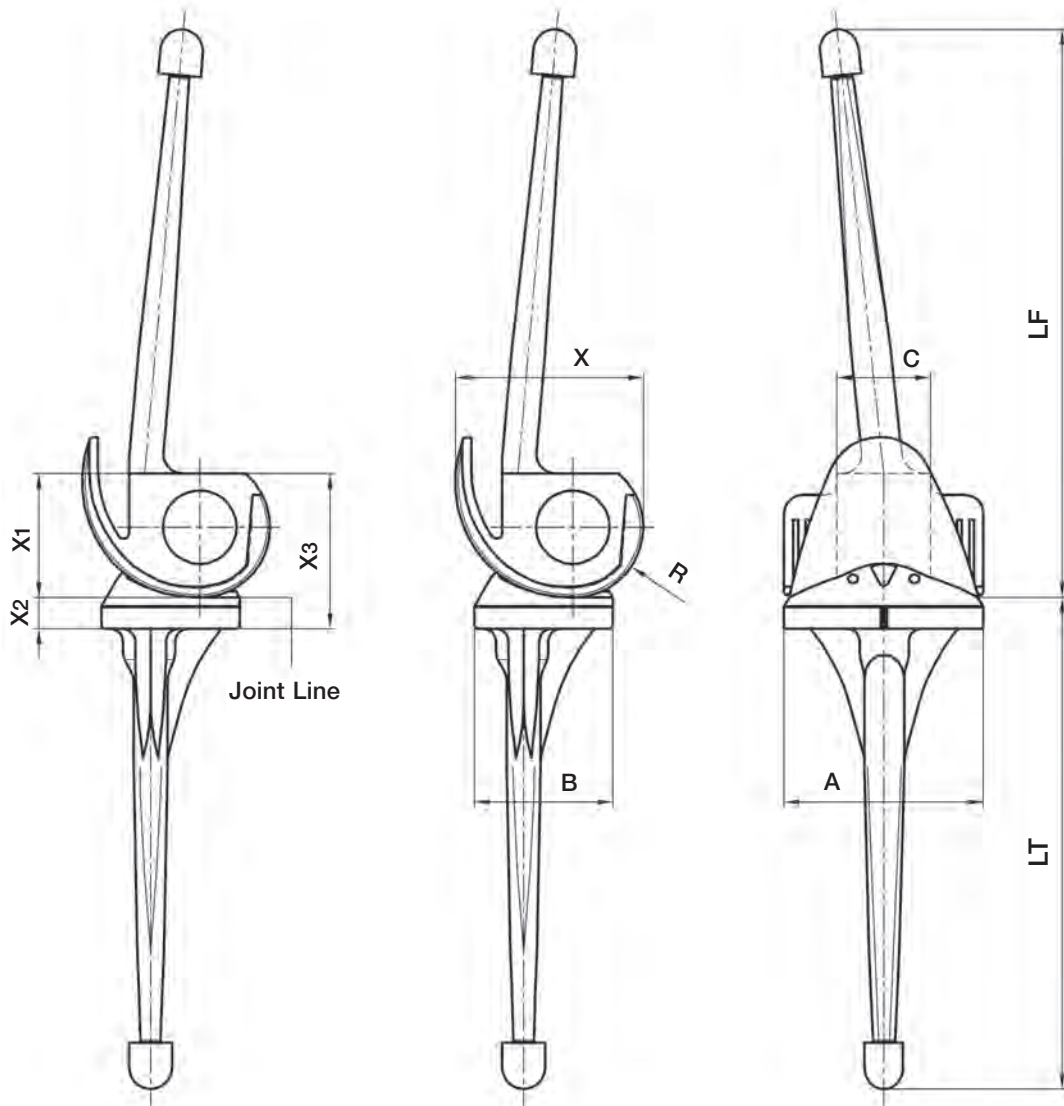
2013

MIRETO Instrumentation

Instruments are available for the Endo-Model Knee System. The instruments provide a bone-sparing reliable and precise resection for the user.



Endo-Model Standard

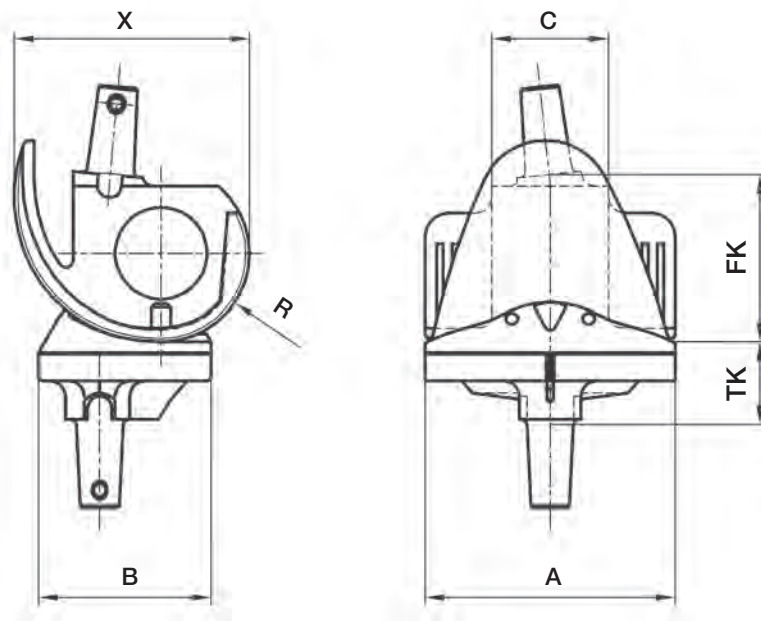


| Size | A mm | B mm | C mm | X mm | R mm |
|-----------|---------|---------|---------|---------|---------|
| XS | 55 | 42 | 28 | 50 | 17 |
| S | 60 | 45 | 30 | 57 | 20 |
| M | 65 | 45 | 30 | 62 | 23 |
| L | 75 | 48 | 35 | 65 | 25 |

| Size | LT* mm | LF* mm | A mm | J mm |
|-----------|-----------|-----------|---------|---------|
| XS | 120 | 160 | 55 | 14 |
| S | 160 | 182 | 60 | 14 |
| M | 160 | 185 | 65 | 14 |
| L | 160 | 190 | 75 | 14 |

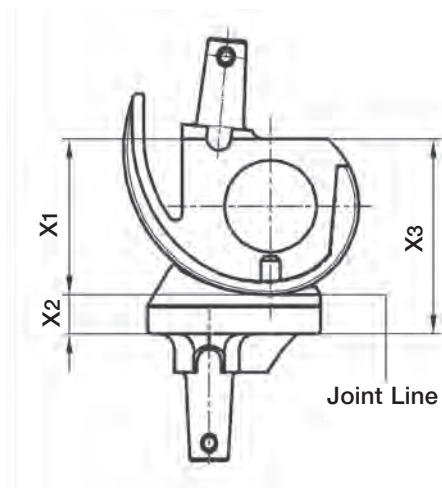
| Box Dimensions Size | X1 mm | X2 mm | X3 mm |
|---------------------------|----------|----------|----------|
| XS | 33 | 10 | 43 |
| S | 36.5 | 10 | 46.5 |
| M | 40.5 | 10 | 50.5 |
| L | 44.5 | 10 | 54.5 |

Endo-Model – M



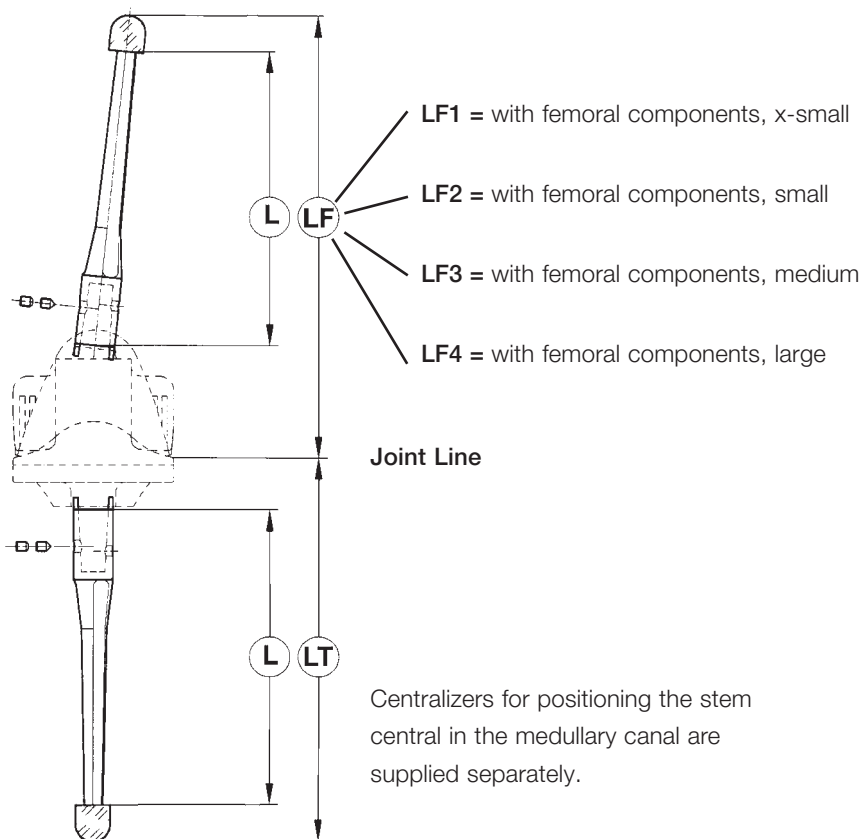
| Size Version | A mm | B mm | C mm | FK mm | X mm | TK mm | R mm |
|--------------|------|------|------|-------|------|-------|------|
| XS | | | | | | | |
| right | 55 | 42 | 28 | 39 | 50 | 22 | 17 |
| left | 55 | 42 | 28 | 39 | 50 | 22 | 17 |
| S | | | | | | | |
| right | 60 | 45 | 30 | 42 | 57 | 22 | 20 |
| left | 60 | 45 | 30 | 42 | 57 | 22 | 20 |
| M | | | | | | | |
| right | 65 | 45 | 30 | 46 | 62 | 22 | 23 |
| left | 65 | 45 | 30 | 46 | 62 | 22 | 23 |
| L | | | | | | | |
| right | 75 | 48 | 35 | 50 | 65 | 22 | 25 |
| left | 75 | 48 | 35 | 50 | 65 | 22 | 25 |

Endo-Model Standard/Endo-Model – M



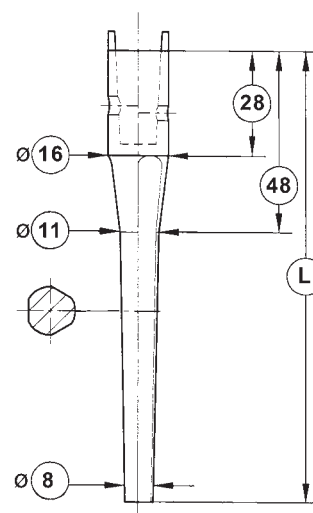
| Box Dimensions Size | X1 mm | X2 mm | X3 mm |
|---------------------|-------|-------|-------|
| XS | 33 | 10 | 43 |
| S | 36.5 | 10 | 46.5 |
| M | 40.5 | 10 | 50.5 |
| L | 44.5 | 10 | 54.5 |

Endo-Model – M Stems



Endo-Model – M Stems, conical cemented

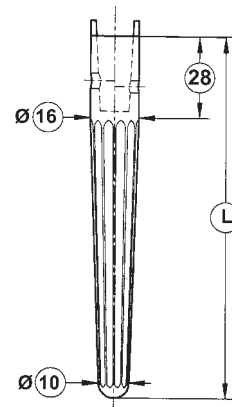
| L mm | Assembly length** | | | | |
|----------|-------------------|-----------|-----------|-----------|--|
| | Tibia | Femur | | | |
| LT mm | LF1 mm | LF2 mm | LF3 mm | LF4 mm | |
| 87 | 104 | 107 | 111 | 114 | |
| 117 | 134 | 137 | 141 | 144 | |
| 132 | 149 | 152 | 156 | 159 | |
| 157 | 174 | 177 | 181 | 184 | |
| 172 | 189 | 192 | 196 | 199 | |
| 197 | 214 | 217 | 221 | 224 | |
| 237 | 254 | 257 | 261 | 264 | |
| 277 | 294 | 297 | 301 | 304 | |
| 317 | 334 | 337 | 341 | 344 | |



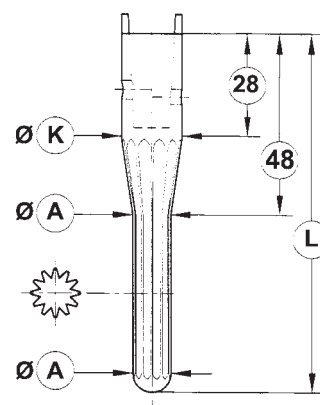
** Assembly length incl. centering star unit joint line

Endo-Model – M Stems, conical cementless

| L mm | Assembly length** | | | | |
|---------|-------------------|-----------|-----------|-----------|-----------|
| | Tibia | | Femur | | |
| | LT mm | LF1 mm | LF2 mm | LF3 mm | LF4 mm |
| 50 | 50 | 89 | 92 | 96 | 99 |
| 80 | 80 | 119 | 122 | 126 | 129 |
| 95 | 95 | 134 | 137 | 141 | 144 |
| 120 | 120 | 159 | 162 | 166 | 169 |
| 135 | 135 | 174 | 177 | 181 | 184 |
| 160 | 160 | 199 | 202 | 206 | 209 |
| 200 | 200 | 239 | 242 | 246 | 249 |
| 240 | 240 | 279 | 282 | 286 | 289 |
| 280 | 280 | 319 | 322 | 326 | 329 |



| L mm | Ø A mm | Ø K mm | Assembly length** | | | | |
|---------|-----------|-----------|-------------------|-----------|-----------|-----------|-----|
| | | | Tibia LT mm | Femur | | | |
| | | | LF1 mm | LF2 mm | LF3 mm | LF4 mm | |
| 60 | 10 | 16 | 82 | 99 | 102 | 106 | 109 |
| 60 | 12 | 16 | 82 | 99 | 102 | 106 | 109 |
| 60 | 14 | 16 | 82 | 99 | 102 | 106 | 109 |
| 60 | 16 | 16 | 82 | 99 | 102 | 106 | 109 |
| 60 | 18 | 18 | 82 | 99 | 102 | 106 | 109 |
| 120 | 12 | 16 | 142 | 159 | 162 | 166 | 169 |
| 120 | 14 | 16 | 142 | 159 | 162 | 166 | 169 |
| 120 | 16 | 16 | 142 | 159 | 162 | 166 | 169 |
| 120 | 18 | 18 | 142 | 159 | 162 | 166 | 169 |
| 160 | 12 | 16 | 182 | 199 | 202 | 206 | 209 |
| 160 | 14 | 16 | 182 | 199 | 202 | 206 | 209 |
| 160 | 16 | 16 | 182 | 199 | 202 | 206 | 209 |
| 160 | 18 | 18 | 182 | 199 | 202 | 206 | 209 |
| 200 | 12 | 16 | 222 | 239 | 242 | 246 | 249 |
| 200 | 14 | 16 | 222 | 239 | 242 | 246 | 249 |
| 200 | 16 | 16 | 222 | 239 | 242 | 246 | 249 |
| 200 | 18 | 18 | 222 | 239 | 242 | 246 | 249 |
| 240 | 12 | 16 | 262 | 279 | 282 | 286 | 289 |
| 240 | 14 | 16 | 262 | 279 | 282 | 286 | 289 |
| 240 | 16 | 16 | 262 | 279 | 282 | 286 | 289 |
| 240 | 18 | 18 | 262 | 279 | 282 | 286 | 289 |
| 280 | 12 | 16 | 302 | 319 | 322 | 326 | 329 |
| 280 | 14 | 16 | 302 | 319 | 322 | 326 | 329 |
| 280 | 16 | 16 | 302 | 319 | 322 | 326 | 329 |
| 280 | 18 | 16 | 302 | 319 | 322 | 326 | 329 |



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2. E.Nieder et al.; **Mid-term results of 1837 cases at Primary Knee Arthroplasty Follow-up period 2-12 years (mean 6.6 years)**
Scientific Exhibition: 20th SCIOT World Congress, 1996
3. NJR 2017 Report
4. A.N. Mavrodontidis, S.I. Andrikoula, V.A. Kontogeorgakos, G.C.Babis, T.A. Xenakis, A.E. Beris; **P.N. Soucacos Application of the Endo-Model Rotating Hinge Knee Prosthesis for Knee**; *Osteoarthritis Journal of surgical orthopaedic advances*, 2008
5. T. Gehrke, D. Kendoff, C. Haasper; **The role of hinges in primary total knee replacement**; *THE BONE & JOINT JOURNAL*, 2014
6. F. Sanguineti et al.; **Total knee arthroplasty with rotating-hinge Endo-Model prosthesis: clinical results in complex primary and revision surgery**; *Arch Orthop Trauma Surg*, 2014
7. Engelbrecht; **Die Rotationsendoprothese des Kniegelenks**; *Springer Verlag, 1984 (Page 53-65)*
8. L. Felli, M. Coviello, M. Alessio-Mazzola, M. Cutolo; **The Endo-Model rotating hinge for rheumatoid knees Orthopäde**; 2016
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- 11 Morgan-Jonhes et al.; **Zonal fixation in revision total knee arthroplasty**; *THE BONE AND JOINT JOURNAL*, 2015
- 12 Giles R. Scuderi, Alfred J. Tria; **Knee Arthroplasty Handbook: Techniques in Total Knee and Revision Arthroplasty, Chapter 9: Classification of Bone Defects Femur and Tibia (Gerard A. Engh)**; *Springer Science & Business Media*, 22.06.2006
- 13 Bader et al., **Alternative Werkstoffe und Lösungen in der Knieendoprothetik für Patienten mit Metallallergie**, *Orthopäde*, 2008

Further Information



For more information please register for our LINK Media Library (linkorthopaedics.com)

Please note the following regarding the use of our implants:

1. Choosing the right implant is very important.

The size and shape of the human bone determines the size and shape of the implant and also limits the load capacity. Implants are not designed to withstand unlimited physical stress. Demands should not exceed normal functional loads.

2. Correct handling of the implant is very important.

Under no circumstances should the shape of a finished implant be altered, as this shortens its life span. Our implants must not be combined with implants from other manufacturers. The instruments indicated in the Surgical Technique must be used to ensure safe implantation of the components.

3. Implants must not be reused.

Implants are supplied sterile and are intended for single use only. Used implants must not be used again.

4. After-treatment is also very important.

The patient must be informed of the limitations of the implant. The load capacity of an implant cannot compare with that of healthy bone!

5. Unless otherwise indicated, implants are supplied in sterile packaging.

Note the following conditions for storage of packaged implants:

- Avoid extreme or sudden changes in temperature.
- Sterile implants in their original, intact protective packaging may be stored in permanent buildings up until the "Use by" date indicated on the packaging.
- They must not be exposed to frost, dampness or direct sunlight, or mechanical damage.
- Implants may be stored in their original packaging for up to 5 years after the date of manufacture. The "Use by" date is indicated on the product label.
- Do not use an implant if the packaging is damaged.

6. Traceability is important.

Please use the documentation stickers provided to ensure traceability.

7. Further information on the material composition is available on request from the manufacturer.

Follow the instructions for use!

Waldemar Link GmbH & Co. KG, Hamburg

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