MUTARS®

implantcast

Proximal Femur

surgical technique

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MUTARS® was developed in co-operation with
Prof. Dr. W. Winkelmann (former director)
and Prof. Dr. G. Gosheger (director), Clinic and
Polyclinic for General Orthopedics and Tumororthopedics
at the University Hospital of Münster, Germany.
MUTARS® has been in successful clinical use since 1992.

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Nota Bene: The described surgical technique is the suggested treatment for the uncomplicated procedure. In the final analysis the preferred treatment is that which addresses the needs of the individual patient.

***E:** Silver coated, TiN coated and cpTi/HA double coated components are not available in the US.

The *Silver* coating

Infections represent the most severe complications of tumour arthroplastic treatments. Although local and systemic antibiotic treatments are considered, the scientific literature reports of infection rates from 5 to 35 percent [1]. Reasons for these high rates are, for example, the long surgery time, the large incisions and the immunosupression due to chemo therapy and radio therapy as well as the increasing resistance of the bacteria against antibiotic drugs.
Silver, in particular free silver ions, is well known for its broad-spectrum antimicrobial activity. The silver coating has been shown to reduce bacterial colonization on the device surface.
Until now only non-articulating surfaces and surfaces without direct bony contact are coated with silver. In the catalogue information of this surgical technique you can find the supplement *S indicating which MUTARS® components are available in a silver coated version. The eight digit REF number receives an addition after the last digit (e.g. 5220-0020S).

Important intra-operative instructions for the use of silver-coated implants

It is not permitted to flush the wound with antiseptics that contain H_2O_2, Iodine or heavy metals (such as Betaisodona®) and acetic acid during surgery since this can lead to a subsequent loss of effectiveness of the silver coating due to their oxidative properties. Alternatively, solutions such as NaCl or Lavasept® and Prontosan® can be used. The additional use of antibiotic-containing bone cement can be an advantage particular in case of a septic revision.

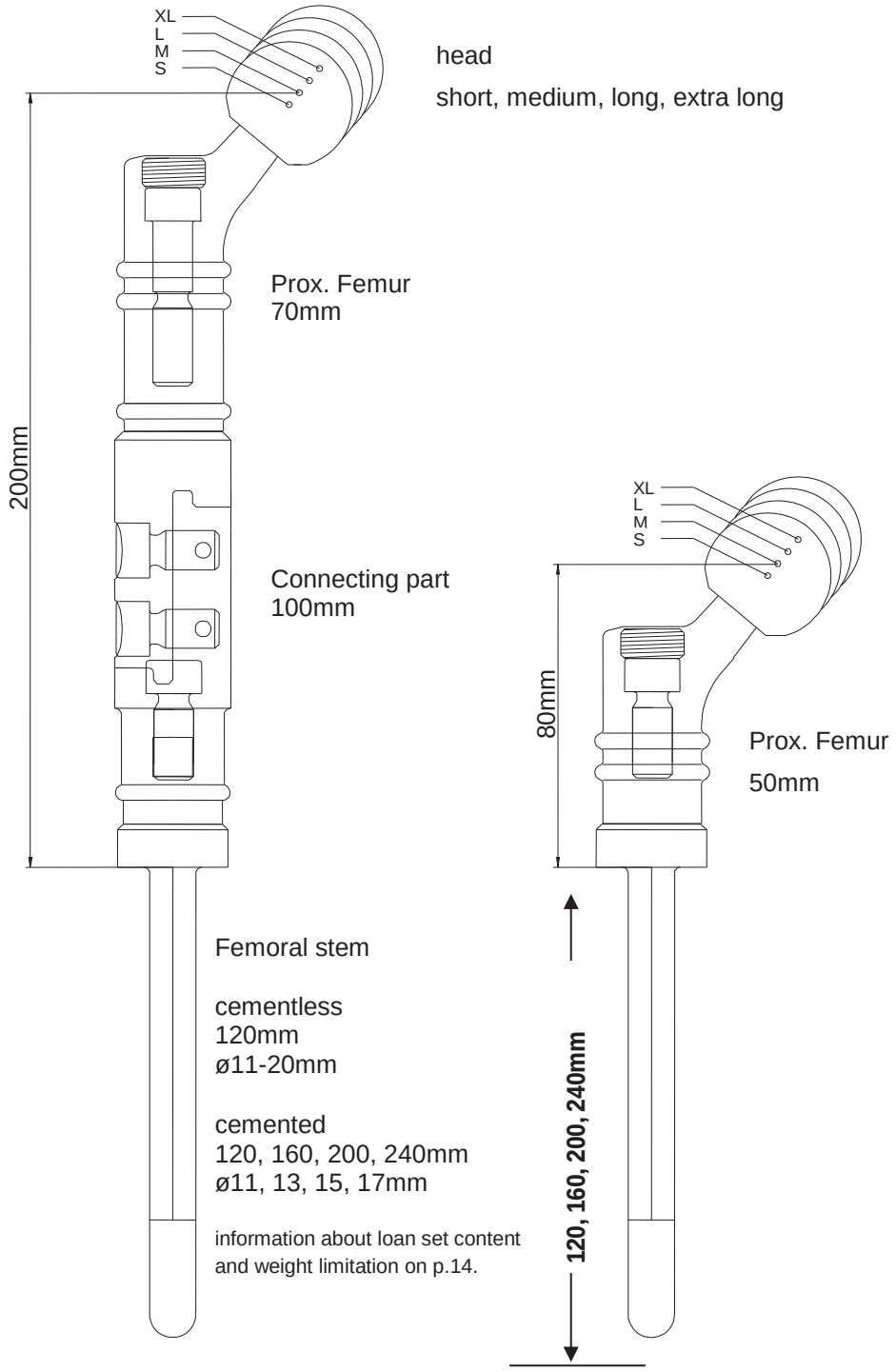
The TiN coating for allergy prophylaxis

All metallic implant components release ions to their environment over time. In some patients such ions can elicit allergic reactions. Nickel, cobalt and chromium, which are elements of the base material CoCrMo of the articulating implant components, are considered the most frequently allergy eliciting metals [2] The TiN-coating is biocompatible and acts like a barrier; the potential release of allergy eliciting ions of the base material is reduced to a minimum [3]. Also in clinical practice there have never been any evidence of allergic reactions with implants that have been TiN-coated showing an intact surface [5]. Therefore the TiN-coating on implant components is especially suitable for patients with sensitivity to nickel, chromium or cobalt [4][5].
Since almost all components of the MUTARS® tumor system consist of titanium alloy, this only concerns those components, which are made of a cast CoCrMo alloy. The REF-numbers of the TiN-coated implants have the suffix N after the last digit (e.g. 5720-0005N). Items which are available with Silver and TiN coating have the suffix SN after the last digit (e.g. 5720-0005SN).

***S**: Implants are available with Silver coating!
***N**: Implants are available with TiN coating!
***SN**: Implants are available with Silver and TiN coating

[1] Gosheger et al. 2004. Silver-coated megaendoprostheses in a rabbit model – an analysis of the infection rate and toxicological side effects. Biomaterials 25, 5547-5556.
[2] Eben R et al. (2009) Implantatallergieregister - ein erster Erfahrungsbericht. Orthopäde 38: 557-562
[3] Wisbey et al. (1987) Application of PVD TiN coating to Co-Cr-Mo based surgical implants. Biomaterials, 11
[4] Prof. Thomas LMU München Final Report Effect of a TiNbN or TiN surface coating on cobaltchromium- molybdenum and stainless steel test specimens regarding the release of nickel, chromium and cobalt: evaluation via eluate analysis and in-vitro cytokine release from peripheral human blood cells, Data on file
[5] Baumann A. (2001) Keramische Beschichtungen in der KTEP Standardlösung für Allergiker. JATROS Orthopädie & Rheumatologie 6: 16-17

System Overview



MUTARS® Proximal Femur

proximal femur replacement
assembling options

by using a head with neck length medium
(length in mm)

reconstruction	components			
	Prox. Femur	connecting part 100 mm	extension piece	bar screw
80mm	50	-	-	25
100mm	70	-	-	45
120mm	50	-	40	65
140mm	50	-	60	85
160mm	50	-	80	105
180mm	50	100		25 + 25
200mm	70	100		25 + 45
220mm	50	100	40	65 + 25
240mm	50	100	60	85 + 25
260mm	50	100	80	105 + 25
280mm	50	100	40 + 60	125 + 25
300mm	70	100	40 + 60	145 + 25
320mm	50	100	60 + 80	165 + 25
340mm	70	100	60 + 80	185 + 25

For resection length 180mm and longer it is recommended to use the MUTARS® connecting part 100mm.

Note: Please notice that the amount of implants and instruments sent with an individual shipment may differ from the information in the catalogue information of this brochure. Please make sure, during the preoperatively planning, that all necessary implants and instruments are available for the surgery.

figure 1

figure 2

Tumor resection

Resect the tumour and measure the length of the explant. The minimum bone resection is 80 mm.

Femoral bone preparation

Prepare the femoral medullary cavity with the MUTARS® medullary cavity reamer (fig. 1).

Cementless fixation

Ream the femoral medullary cavity preferably up to a depth of 130mm with a flexible reamer 1,5mm smaller than the preoperatively chosen femoral stem (fig. 2).

Cemented fixation

Ream the femoral medullary cavity preferably up to a depth of 130mm with a flexible reamer 2mm larger than the preoperatively chosen femoral stem (fig. 2).

Remark
In case no flexible reamers are in the hospital's stock flexible reamers can be provided on special demand.

Rasping of the femoral cavity

Assemble the femur rasp of the appropriate size (see tables below), the sleeve and the slide hammer. Lock the rasp on the slide hammer by using the engineers' wrench.

Remark
The use of a femoral rasp for a **cemented stem** is optional. Generally you can proceed with the trial reduction (see page 6).

Use of cementless stems
Use the femur rasp (fig. 3), of the same size as the preoperatively chosen femoral stem (table 1).

Stem size	Rasp size
12mm	12mm
13mm	13mm
14mm	14mm
15mm	15mm
16mm	16mm
17mm	17mm
18mm	18mm

table 1

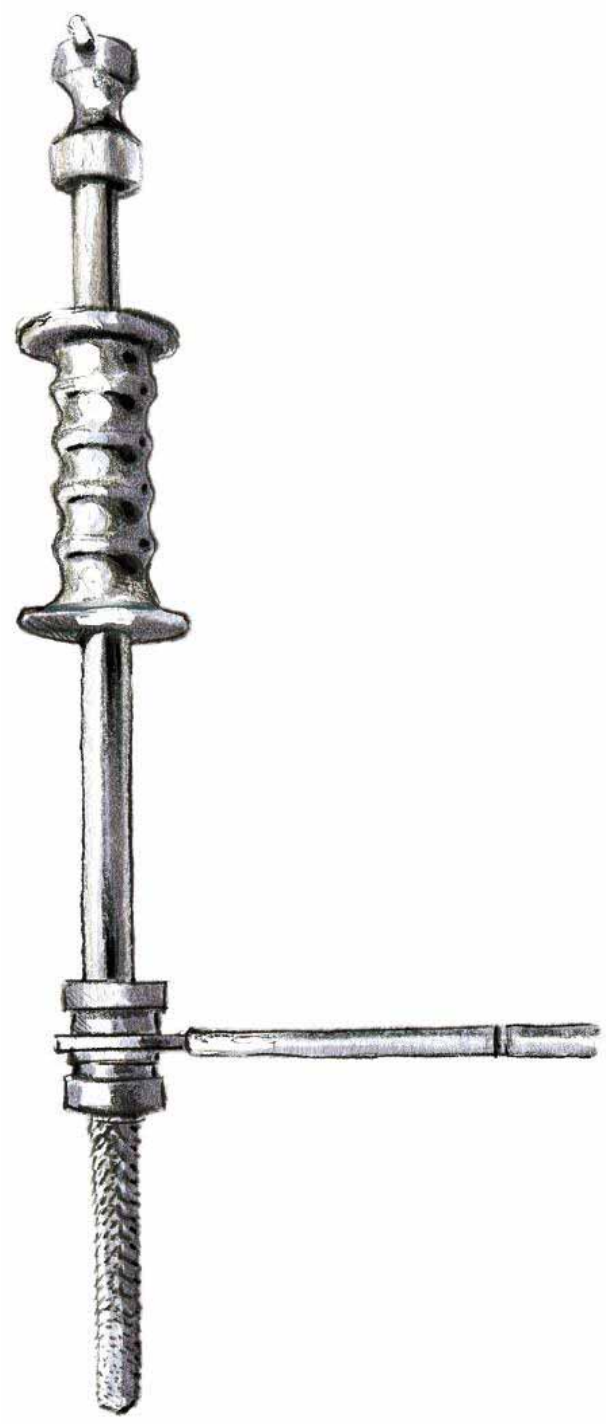


figure 3

figure 4a and 4b

Mark the anterior aspect of the femoral bone to meet the correct antecurvation of the femur (fig. 4a).

Rasp the medullary cavity with the chosen femoral rasp (fig. 4b). A carefully use of the slide hammer is recommended.

Remark
It is recommended to clean the rasp of bone chips during the rasping.

Leave the femoral rasp in the bone for the trialing.

Optional technique for the use of cemented stems
If you want to prepare for a cemented stem with the femoral rasp, please use the rasp which is 2mm larger than the preoperatively chosen cemented femoral stem.

This will provide a cement mantle of 1mm thickness (table 2). Use the 18mm rasp to prepare for the 17mm stem.

Stem size	Rasp size
11mm	13mm
13mm	15mm
15mm	17mm
17mm	18mm

table 2

Trial reduction

Mount the Proximal trial femur and the possibly needed trial extension pieces (possible enlargement from 20 to 260mm; see table page 2) onto the top of the rasp (fig. 5a).

Remark
For the **cemented procedure** bone rasps are usually not available. Please insert the cemented stem (without cement) for trialing purposes (fig. 5b).

Insert a trial screw of the correct length (see table on page 2) (fig. 5a and 5b).

figure 5a

figure 5b

Place the medium trial head on the neck (fig. 6)

Do a trial reduction and check the muscle tension, the joint stability and the leg length.

Please check the rotational alignment. If necessary, adjust the rotation in steps of 5°.

Remove all trial components and the femoral rasp.

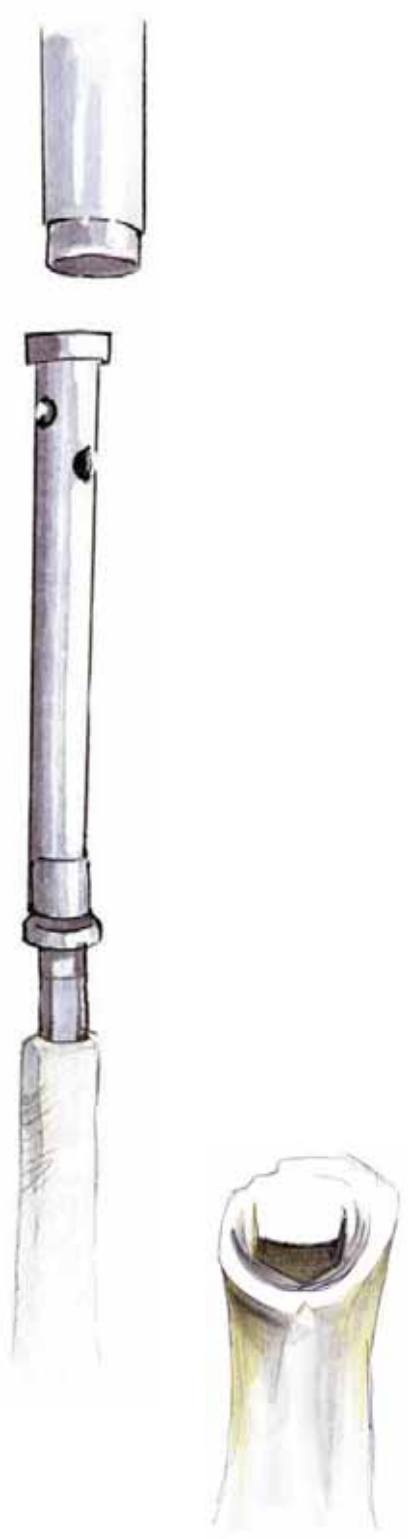


figure 7

Implantation of the femoral stem

Impact the femoral stem (fig. 7).

Insert the stem of the same size as the rasp if a **cementless stem** is used.
To prevent fractures of the cortical bone it is helpful to fix a bone forceps around the femoral bone during impaction.

If a cemented implantation is planned, insert the intramedullary plug, the cement and insert a **cemented stem** which is 2mm smaller than the previously used reamer or rasp.

Remove all instruments during the cement hardening to prevent bending moments.

Implantation of the proximal components

Combine the proximal implant components on the femoral stem. Insert the bar screw of the correct length (see table on page 2).

Tighten the bar screw with the socket wrench (fig. 8).

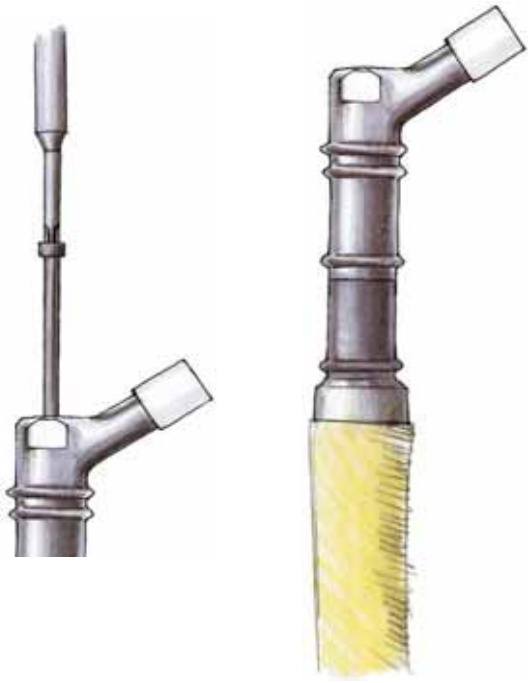


figure 8

Final trialing

Once more, use the trial head to control the muscle tension (fig. 9).

Please check the rotational alignment. If necessary adjust the rotation in steps of 5°.

Remove the trial head when sufficient tension is achieved.

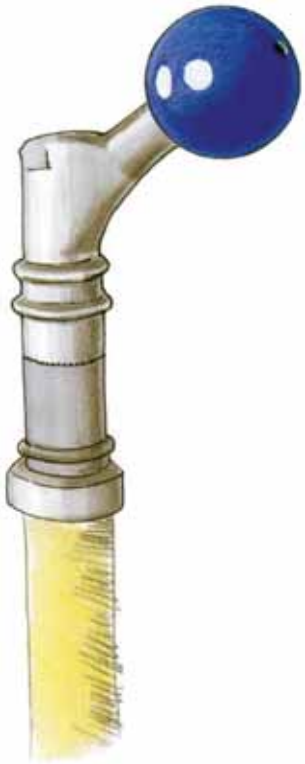


figure 9

figure 10

figure 11

Final implant assembling

Lock the bar screw with the MUTARS® swing wrench (fig. 10).
Secure the assembly with the engineers' wrench (fig. 11).

Lock the safety screw in the same way.

The use of the attachment tube

For soft tissue refixation to the implant, suitable mesh products available on the market can be used.

When a tube-formed mesh is used, cut a small portion of the mesh proximally, in order to allow visual contact to the acetabulum, once the mesh is fixed to the hip joint capsule. This facilitates joint reduction through the mesh.

figure 12

Fix the mesh to the limbus / rest of the hip joint capsule first dorsally and then medially and laterally. The mesh needs to be folded outwards, towards the limbus / rest of the hip joint capsule (fig. 12). Use non-resorbable suture material.

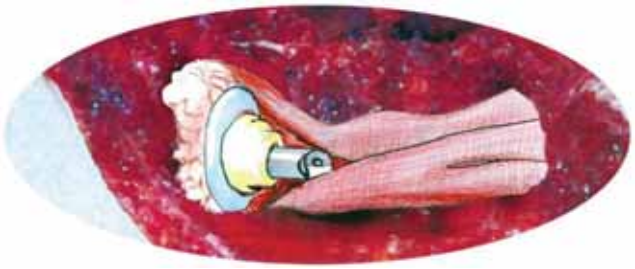


figure 13

Put the femoral head onto the proximal femur and reduce the joint (fig. 13). Fix the mesh to the rest of the capsule wall with sutures

When a flat mesh is used (not a tube), wrap it around the implant and suture the ends of the mesh to form a tube over the implant. Subsequently, tighten and fix the tube or the mesh above and below the retention rings of the MUTARS® components (fig. 14) to the implant. The mesh should be folded and turned up inward on the distal end of the implant.

figure 14

Suture the muscles and tendon tissues to the mesh. (fig. 15)

figure 15

IMPLANTS

***S**: For anti-infective treatment, silver coated implants are available.
***N**: For anti-allergic treatment, TiN coated implants are available.
***SN:** Implants with Silver and TiN coating!

MUTARS® Proximal Femur incl. safety screw *S

mat.: implatan®; $TiAl_6V_4$ acc. to ISO 5832-3

5710-0205	50mm
5710-0207	70mm

MUTARS® extension piece *S

mat.: implatan®; $TiAl_6V_4$ acc. to ISO 5832-3

5772-2504	40mm
5772-2506	60mm
5772-2508	80mm
5772-2510	100mm

MUTARS® connecting part *S

mat.: implatan®; $TiAl_6V_4$ acc. to ISO 5832-3

5730-0100	100mm

MUTARS® screw

mat.: implatan®; $TiAl_6V_4$ acc. to ISO 5832-3

5792-1002	M10x 25mm
5792-1004	M10x 45mm
5792-1006	M10x 65mm
5792-1008	M10x 85mm
5792-1010	M10x105mm
5792-1012	M10x125mm
5792-1014	M10x145mm
5792-1016	M10x165mm
5792-1018	M10x185mm
5792-1020	M10x205mm
5792-1022	M10x225mm
5792-1024	M10x245mm

IMPLANTS

MUTARS® femoral stem cemented *N

mat.: implavit®; CoCrMo-casting alloy acc. to ISO 5832-4

5760-0011	11 x 120mm	(max. 75 kg)
5760-0013	13 x 120mm	
5760-0015	15 x 120mm	
5760-0017	17 x 120mm	
5760-1116*	11 x 160mm**	(max. 75 kg)
5760-1316*	13 x 160mm**	
5760-1516*	15 x 160mm**	
5760-1716*	17 x 160mm**	
5760-1120*	11 x 200mm**	(max. 75 kg)
5760-1320*	13 x 200mm**	
5760-1520*	15 x 200mm**	
5760-1720*	17 x 200mm**	
5760-1124*	11 x 240mm**	(max. 75 kg)
5760-1324*	13 x 240mm**	
5760-1524*	15 x 240mm**	
5760-1724*	17 x 240mm**	

***with locking holes for Ø 4,5mm screws**

****stems with this size are not included in loan set and have to be ordered separately.**

MUTARS® femoral stem cementless

mat.: implatan®; $TiAl_6V_4$ acc. to ISO 5832-3 and HA-coating acc. to ISO 13779-2

5760-0111	11mm*	(max. 60 kg)
5760-0012	12mm	
5760-0113	13mm	
5760-0014	14mm	
5760-0115	15mm	
5760-0016	16mm	
5760-0117	17mm	
5760-0018	18mm	
5760-0019	19mm	
5760-0020	20mm	

***stems with this size are not included in loan set and have to be ordered separately.**

Available without HA coating on request.

MUTARS® attachment tube

mat.: polyethylenterephtalat

5900-0300	35mm
5900-0310	55mm

IMPLANTS

ic-head CoCrMo

mat.: implavit®; CoCrMo acc. to ISO 5832-12

2387-2800	28mm, S
2387-2805	28mm, M
2387-2810	28mm, L
2387-2815	28mm, XL
2387-3200	32mm, S
2387-3205	32mm, M
2387-3210	32mm, L
2387-3215	32mm, XL
2387-3600	36mm, S
2387-3605	36mm, M
2387-3610	36mm, L
2387-3615	36mm, XL

ic-head Titanium

mat.: implatan®; $TiAl_6V_4$ acc. to ISO 5832-3 with TiN-coating

2787-2800	28mm, S
2787-2805	28mm, M
2787-2810	28mm, L
2787-2815	28mm, XL
2787-3200	32mm, S
2787-3205	32mm, M
2787-3210	32mm, L
2787-3215	32mm, XL
2787-3600	36mm, S
2787-3605	36mm, M
2787-3610	36mm, L
2787-3615	36mm, XL

The ic-heads Titan and CoCrMo with neck lengths of XXL and XXXL are available on special demand.

ic-head Biolox® delta

mat.: Al_2O_3 and ZrO_2 acc. to ISO 6474-2

2586-2800	28mm, S
2586-2805	28mm, M
2586-2810	28mm, L
2586-3200	32mm, S
2586-3205	32mm, M
2586-3210	32mm, L
2586-3215	32mm, XL
2586-3600	36mm, S
2586-3605	36mm, M
2586-3610	36mm, L
2586-3615	36mm, XL

IMPLANTS

ic- bipolar head CoCrMo

mat.: implavit®; CoCrMo acc. to ISO 5832-4 and UHMW-PE (ISO 5834-2)

2151-0044	28/44mm
2151-0046	28/46mm
2151-0048	28/48mm
2151-0050	28/50mm
2151-0052	28/52mm
2151-0054	28/54mm
2151-0056	28/56mm
2151-0058	28/58mm
2151-0060	28/60mm

PE-cup Müller type II

mat.: UHMW-PE acc. to ISO 5834-2

1021-2844	28/44mm
1021-2846	28/46mm
1021-2848	28/48mm
1021-2850	28/50mm
1021-2852	28/52mm
1021-2854	28/54mm
1021-2856	28/56mm
1021-2858	28/58mm
1021-3244	32/44mm
1021-3246	32/46mm
1021-3248	32/48mm
1021-3250	32/50mm
1021-3252	32/52mm
1021-3254	32/54mm
1021-3256	32/56mm
1021-3258	32/58mm

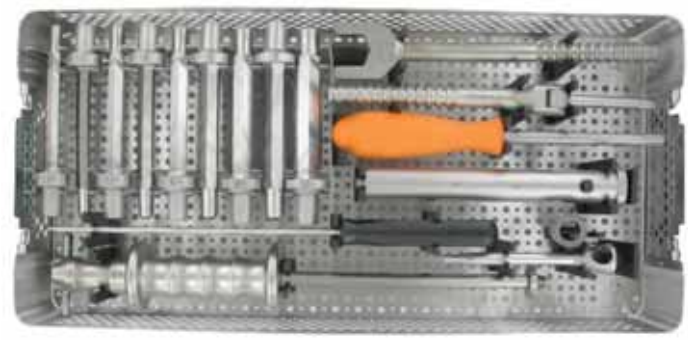
The PE cups are also available with snap mechanismn to lower the risk of subluxations.

Intramedullary plug

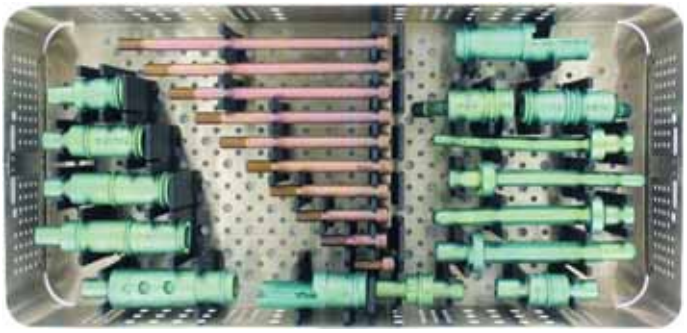
mat.: UHMW-PE according to ISO 5834-2

0299-4000	small
0299-4010	large

INSTRUMENTS



MUTARS® basic container
7999-5712



MUTARS® trial container
7999-7701

ic- bipolar container
7960-9999

INSTRUMENTS

Content MUTARS® basic container
7999-5712

MUTARS® universal impactor
7210-0000

MUTARS® impact and extract sleeve
7230-0000

MUTARS® socket wrench
7420-0000

alternatively
MUTARS® socket wrench
7421-0000

MUTARS® swing wrench
7411-0000

MUTARS® engineers‘ wrench SW 24
7490-0000

MUTARS® slide hammer
7220-0001

MUTARS® rasp for femoral stem

7760-0112	12mm
7760-0113	13mm
7760-0114	14mm
7760-0115	15mm
7760-0116	16mm
7760-0117	17mm
7760-0118	18mm
7760-0119	19mm
7760-0120	20mm

handle for intramedullary plug
7512-4001

MUTARS® medullary cavity reamer cross-hole
4220-0000

INSTRUMENTS

Content MUTARS® trial component tray
7999-7701

MUTARS® Trial Prox. Femur

7710-0205	50mm
7710-0207	70mm

MUTARS® trial reducer

7730-0220	20mm
7730-0230	30mm

MUTARS® trial connecting part

7730-0100	100mm

MUTARS® trial extension piece for mod. prox. tibia

7750-0105	105mm
7750-0125	125mm

MUTARS® trial extension piece

7772-2504	40mm
7772-2506	60mm
7772-2508	80mm
7772-2510	100mm

MUTARS® Trial femoral stem

7760-0011	11mm
7760-0013	13mm
7760-0015	15mm
7760-0017	17mm

MUTARS® Trial bar screw

7792-1002	M10x 25mm
7792-1004	M10x 45mm
7792-1006	M10x 65mm
7792-1008	M10x 85mm
7792-1010	M10x105mm
7792-1012	M10x125mm
7792-1014	M10x145mm
7792-1016	M10x165mm
7792-1018	M10x185mm
7792-1020	M10x205mm

INSTRUMENTS

Content ic bipolar head container
7960-9999

handle for bipolar sizing shell
7960-6000

head impactor
7512-4444

trial head snap taper 12/14mm

7962-2800	28mm short
7962-2805	28mm medium
7962-2810	28mm long
7962-2815	28mm extra long

alternatively

7965-2800	Ø28mm, K/S
7965-2805	Ø28mm, M
7965-2810	Ø28mm, L
7965-2815	Ø28mm, XL

bipolar head sizing shell

7960-0044	28/44mm
7960-0046	28/46mm
7960-0048	28/48mm
7960-0050	28/50mm
7960-0052	28/52mm
7960-0054	28/54mm
7960-0056	28/56mm
7960-0058	28/58mm
7960-0060	28/60mm

ic-forceps for bipolar head
7960-6020

implantcast GmbH
Lüneburger Schanze 26
D-21614 Buxtehude
Germany
phone: +49 4161 744-0
fax: +49 4161 744-200
e-mail: info@implantcast.de
internet: www.implantcast.de

CE 0428

Your local distributor:

MUTA1OPE-291019