MUTARS®

implantcast

Distal Humerus 30mm

Surgical Technique

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MUTARS®

Distal Humerus 30mm

Surgical Technique

MUTARS® was developed in co-operation
with Univ.-Prof. Dr. W. Winkelmann (ex-director) and
Univ.-Prof. Dr. G. Gosheger (director) Department of General Orthopaedics
and Orthopaedic Oncology at the University Hospital of Münster, Germany.
MUTARS® is in successful clinical use since 1992.

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Nota Bene: The herein described surgical technique shows the treatment suggested by the author in uncomplicated surgical procedures. However, it is ultimately the operating surgeon's decision, which approach is the most reasonable and effective for the respective patient.

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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 [1] 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 [2]. Also in clinical practice there have never been any evidence of allergic reactions with implants that have been TiN-coated showing an intact surface [4]. Therefore the TiN-coating on implant components is especially suitable for patients with sensitivity to nickel, chromium or cobalt [3][4].

Since almost all components of the MUTARS® tumour 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).

***N**: Implants are available with TiN coating!

[1] Eben R et al. (2009) Implantatallergieregister - ein erster Erfahrungsbericht. Orthopäde 38: 557-562
[2] Wisbey et al. (1987) Application of PVD TiN coating to Co-Cr-Mo based surgical implants. Biomaterials, 11
[3] 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
[4] Baumann A. (2001) Keramische Beschichtungen in der KTEP Standardlösung für Allergiker. JATROS Orthopädie & Rheumatologie 6: 16-17

Pre-Operative Planning

Pre-operative planning and precise surgical techniques are mandatory for optimal results. The instructions and the procedure given in the surgical technique to the system must be adhered to. Familiarity with the recommended surgical technique and its careful application is essential to achieve the best possible outcome.
Before surgery a surgical planning with regard to the dimensions of the prosthetic model and the positioning of the implant components in the bone has to be carried out by the surgeon.

For this purpose, x-ray templates are available:

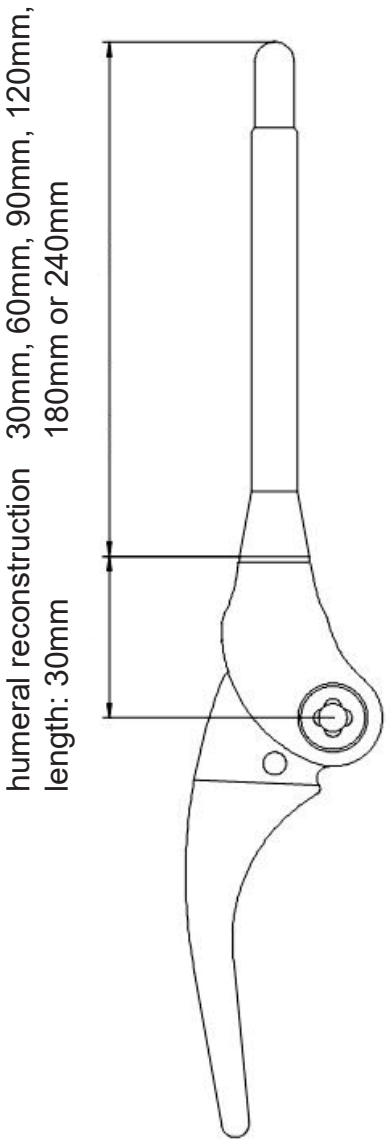
Digital templates: Digital templates are included in the data base of the common planning systems. For missing templates, please contact the provider of the planning software and request for these templates.

Radiographic templates: Alternatively radiographic templates are available in various scale factors, which can be obtained from your local representative.

Picture shown: MUTARS® Distal Humerus 30mm
implant in A/P view

Picture shown: MUTARS® Distal Humerus 30mm
implant in M/L view

System Overview



AGILON® stem

AGILON® stem Cemented	
Length	**Diameter**
60mm	ø 6, 8, 10, 12 mm
90mm	ø 6, 8, 10, 12 mm
120 mm	ø 6, 8, 10, 12 mm

AGILON® stem Cementless	
Length	**Diameter**
30mm[1]	ø 9 - 18 mm
60mm[2]	ø 10 - 18 mm
120mm[2]	ø 10 - 18 mm
180mm[1]	ø 10 - 16 mm
240mm[1]	ø 10 - 16 mm

[1] Available on demand

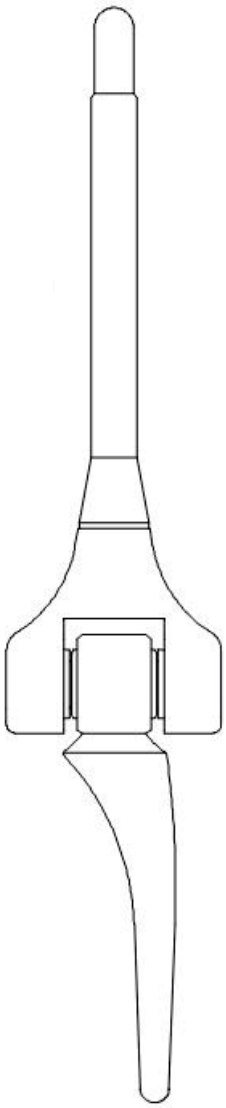
[2] Stems with diameters bigger than ø13mm available on demand

Distal Humerus 30mm

Ulna anchorage

cementless ($TiAl_6V_4$)
length: 70mm

cemented (CoCrMo)
length: 70mm, 100mm



Assembling Options

Components			
Reconstruction (mm)	**Distal Humerus 30 mm (mm)**	**Extension piece (mm)**	**Screw for dist. Humerus 30 mm (mm)**
30	30	-	12,5
37.5	30	7,5	20
40	30	10	22,5
42.5	30	12,5	25
45	30	15	27,5
47.5	30	17,5	30

Note: Please notice that the amount of implants and instruments send 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.

Surgical Technique

Tumour Resection

Measure the size of the resected amount of bone. Compare the length to the preoperative planning.

Remark: In the case that the radius head is free of tumour it does not need to be resected.

Fig. 1

Preparation of the Proximal Ulna

Observe the bony geometry and fit of the ulna anchorage (Fig. 1). Remove obsolete cartilage and bone from the olecranon (Fig. 2).

Fig. 2

Open the medullary cavity at the appropriate position by the use of the 6mm drill with stop (Fig. 3).

Note: The central peg hole is slightly smaller than the central peg of the implant. The central peg will lock by PressFit eventually.

Fig. 3

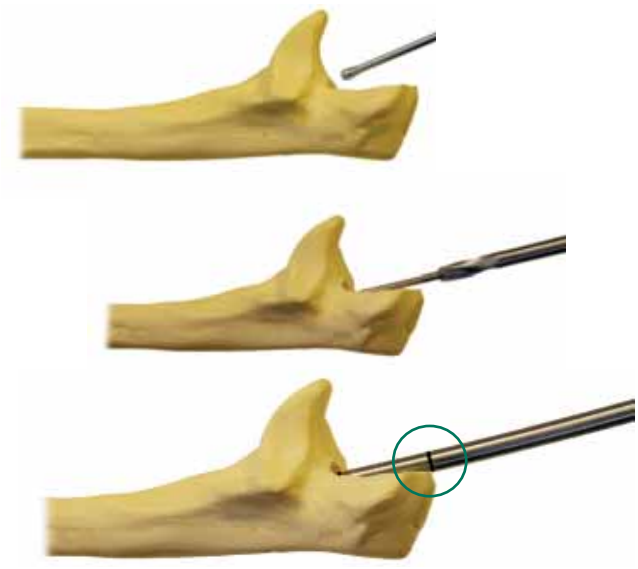


Fig. 4

Fig. 5

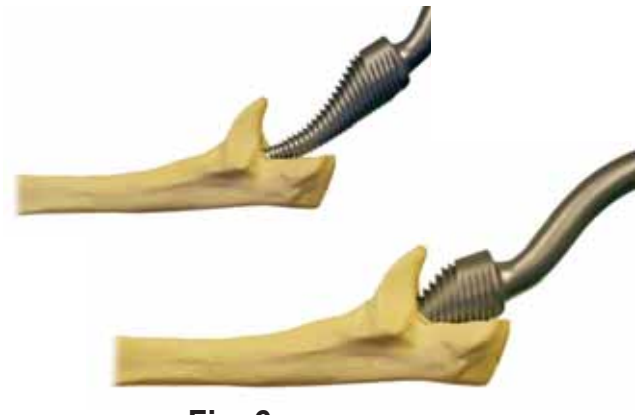


Fig. 6

Insert the guide wire into the medullary canal. Use the flexible drill 5mm guided by the rod until the depth is reached.

The cementless implants are available in length of 70mm, the cemented implants are available in the length of 70mm and 100mm.

The example shows the correct depth for a 100mm long implant (Fig. 4). The marking on the reamer should be in line with the tip of olecranon.

To implant the ulna anchorage in the exact depth, the entry has to be extended ventral at the Proc. Coronoideus and dorsal. Use the ulna reamer to ream the core portion of the ulna free hand (Fig. 5).

The olecranon should be preserved, if possible.

Rasp the ulna with the MUTARS® rasp for ulnar anchorage (Fig. 6).

Note:	When choosing the rasp, pay attention to the side (L / R).

Remark:	There is a danger of Via falsa with a cortical bone perforation. An X-Ray control in two planes is advised!

Perform a final x-ray control in two planes.

Humeral Bone Preparation
Cemented Use

Connect the AGILON® trauma shoulder drill to the ic T-handle with the help of the Zimmer adapter A/O. Ream the medullary cavity with the AGILON® trauma shoulder drill (Ø7-13mm, in 1mm steps) stepswise up to the planned diameter and the correct length (Fig. 7).

Note: There are no depth marks on the drills.

Cemented Stem Use

For cemented fixation ream the canal 2mm bigger than the planned stem diameter (see Table 1).

Cementless Stem Use

For the cementless fixation ream up to the planned stem diameter (see Table 1).

Example:

Fig. 7

Table 1 AGILON® stem preparation		
Reamer Ø	**cemented stem** Ø*	**cementless stem** Ø**
Ø 8 mm	Ø 6 mm	-
Ø 9 mm	-	Ø 9 mm
Ø 10 mm	Ø 8 mm	Ø 10 mm
Ø 11 mm	-	Ø 11 mm
Ø 12 mm	Ø 10 mm	Ø 12 mm
Ø 13 mm	-	Ø 13 mm

* Cemented stems are also available with the diameter ø12mm.
**Cementless stems are also available with diameters ø14-ø18mm on demand.

Use additionally the AGILON® reamer tapered when a stem with a smaller diameter than 12mm is planned to complete the bone preparation (Fig.8). Therefor, connect the AGILON® reamer tapered to the ic T-handle Zimmer-Jakobs. The correct depth of reaming is reached when the fins are fully inserted in the bone.

Fig. 8

Fig. 9

Fig. 10

Fixation of the AGILON® trial Stem
Mount the AGILON® stem impactor and the AGILON® impaction sleeve M6 to the AGILON® trial stem of the correct size. Insert the AGILON® trial stem up to the correct depth (Fig. 9).

Remove the AGILON® stem impactor and AGILON® impaction sleeve M6. Prevent the AGILON® trial stem from rotating while loosening the screw connection. Therefor, fixate the AGILON® impaction sleeve M6 with the help of the AGILON® guide rod or the AGILON® trial stem adapter.

Fixation of the MUTARS® distal humerus 30mm trial
Connect the inserted trial stem to the MUTARS® distal humerus 30mm trial and, if used, to the AGILON® trial extension piece. Therefor, use the MUTARS® trial screw for dist. humerus of the correct length (see Table 2; Fig. 10).

Use the torque wrench 15Nm 5mm to tighten the screw. Prevent the humeral trial components from rotating while screwing. Therefor, insert the MUTARS® setting instrument for ulna, straight, into the holes for axle guidance of the MUTARS® distal humerus 30mm trial. Countering and screwing should be conducted by the same person (see Fig. 11).

Fig. 11

Table 2: Overview of extension pieces and screws		
Added length	**Extension Piece**	**Screw**
0 mm	-	12,5 mm
7,5 mm	7,5 mm	20 mm
10 mm	10 mm	22,5 mm
12,5 mm	12,5 mm	25 mm
15 mm	15 mm	27,5 mm
17,5 mm	17,5 mm	30

Ulnar Trial Reduction
Place the trial ulna anchorage into the prepared ulna.

For trialing, the Distal Humerus 30mm trial (Fig. 12) and the trial ulna anchorage will be combined (Fig. 13).

Fig. 12

Fig. 13

Connecting the joint component
Connect the joint components by inserting the trial axle (Fig. 14 and Fig. 15).
Perform a trial range of motion and stability test. Make sure that the correct rotational alignment is achieved.

Removal of Trial Components
After successful trialing, remove the trial axis and all trial components.

For removing the MUTARS® distal humerus 30mm trial and the AGILON® trial extension piece, unscrew the MUTARS® trial screw for dist. humerus with the torque wrench 15Nm 5mm. Use the MUTARS® setting instrument for ulna, straight, to secure the trial components from rotating while unscrewing. Therefor, insert the MUTARS® setting instrument for ulna, straight, into the holes for axle guidance of the MUTARS® distal humerus 30mm trial.

Connect the AGILON® impaction sleeve M6 and the AGILON® stem impactor to the AGILON® trial stem. Fix the AGILON® trial stem adapter or the AGILON® guide rod to the Impaction Sleeve M6 to prevent rotation of the stem while screwing. In the following, remove the AGILON® trial stem.

Fig. 14

Fig. 15

Fig. 16

Fig. 17

Fig. 18

Fig. 19

Ulna Anchorage Implantation and Screw Fixation of the Ulna Anchorage

It is recommended to enhance the fixation of the ulna anchorage by adding a bone screw, both for the cementless and the cemented implantation.

If a cemented implantation is planned, clean the ulnar cavity and insert some cement. Insert and impact the ulna anchorage cemented or cementless. Use either the straight or the cranked setting instrument for impaction (Fig. 16).

Please follow the steps shown on the left.
Drill with the 2mm drill (Fig. 17), measure the length of the 4 mm screw (Fig. 18) and insert the screw (Fig. 19).

Remark: Ulna anchorages that have been fixed witout cancellous screw have shown elevated loosening rates. Use of cortical screws with transcortikal anchorage can lead to skin perforation.

The proper positioning of the implant is as shown in (Fig. 20).

Fig. 20

Implantation of the AGILON® Stem
cemented

Mount the AGILON® stem impactor and the AGILON® impaction sleeve M6 to the AGILON® stem cemented of the correct size. Prepare the intramedullary cavity with bone cement. Afterwards, insert the AGILON® stem cemented up to the marking into the previously prepared medullary cavity (Fig. 21).

Unscrew the AGILON® stem impactor, AGILON® impaction sleeve M6 and AGILON® stem assembly while cement hardening. Prevent the AGILON® stem from rotating in the humerus while loosening of the screw connection. Therefor, fix the AGILON® impaction sleeve M6 to the AGILON® guide rod or the AGILON® trial stem adapter.

cementless

Mount the AGILON® stem impactor and the AGILON® impaction sleeve M6 to the AGILON® stem cementless of the correct size. Insert the AGILON® stem cementless up to the marking into the medullary cavity (Fig. 21).

Unscrew the AGILON® stem impactor, AGILON® impaction sleeve M6 and AGILON® stem assembly. Prevent the AGILON® stem from rotating in the humerus while loosening the screw connection. Therefor, fix the AGILON® impaction sleeve M6 to the AGILON® guide rod or the AGILON® trial stem adapter.

Abb. 21

Fig. 22

Fig. 23

Fig. 24

Mounting of the Distal Humerus 30mm

Connect the implanted AGILON® stem to the MUTARS® distal humerus 30mm and, if used, to the AGILON® extension piece. Use the screw for distal humerus M6 of the correct length for connecting the components (see table 2, p.9).

Use the torque wrench 15Nm 5mm to tighten the screw. Prevent the humeral components from rotating while screwing. Therefor, insert the MUTARS® setting instrument for ulna, straight, into the holes for axle guidance of the MUTARS® distal humerus 30mm. Countering and screwing should be conducted by the same person (Fig. 22).

Screw the safety screw with the MUTARS® socket wrench small into the thread of the MUTARS® distal humerus 30mm to counter the screw for distal humerus. (Fig. 23)

Impact the ulna stop with the impaction instrument (Fig. 24) or a punch.

The ulna stop has to be fully seated to achieve a full range of motion of the joint without metal-on-metal contact of the components.

Final Reduction

Connect the MUTARS® distal humerus 30mm to the ulna anchorage by inserting the articulating axle (Fig. 25).

Locking of the Hinge Mechanism

After coupling of the joint components (Fig. 26) please insert the locking screws on both sides in order to cover the articulating mechanism and to protect the axle. Therefore the MUTARS® socket wrench small is used (Fig. 27 and Fig. 28).

Fig. 25

Fig. 26

Fig. 27

Fig. 28

Implants

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

AGILON® stem cemented *N *E
mat.: implavit®; CoCrMo according to ISO 5832-4

3840-6006	60mm	Ø 6 mm
3840-6008	60mm	Ø 8 mm
3840-6010	60mm	Ø10 mm
3840-6012	60mm	Ø12 mm
3840-9006	90mm	Ø 6 mm
3840-9008	90mm	Ø 8 mm
3840-9010	90mm	Ø10 mm
3840-9012	90mm	Ø12 mm
3841-2006	120mm	Ø 6 mm
3841-2008	120mm	Ø 8 mm
3841-2010	120mm	Ø10 mm
3841-2012	120mm	Ø12 mm

AGILON® stem cementless
mat.: implatan®; $TiAl_6V_4$ according to ISO 5832-3

3850-6009	60mm	Ø 9mm
3850-6010	60mm	Ø10mm
3850-6011	60mm	Ø11mm
3850-6012	60mm	Ø12mm
3850-6013	60mm	Ø13mm
3851-2009	120mm	Ø 9mm
3851-2010	120mm	Ø10mm
3851-2011	120mm	Ø11mm
3851-2012	120mm	Ø12mm
3851-2013	120mm	Ø13mm

Cementless Stems with length of 60mm with the diameters Ø14mm to Ø18mm and with the length of 120mm with the diameters Ø14mm to Ø16mm are available on demand.

Cementless Stems with length of 30mm (Ø10mm to Ø18mm), 180mm (Ø10mm to Ø16mm) and 240mm (Ø10mm to Ø16mm) are available on demand.

MUTARS® Distal Humerus 30 mm incl. axle, covers and safety screw
mat.: implatan®; $TiAl_6V_4$ according to ISO 5832-3
axle CoCrMo according to ISO 5832-12
bushing CoCrMo according to ISO 5832-12
5250-2300

Implants

Screw for Distal Humerus M6
mat.: implatan®; $TiAl_6V_4$ according to ISO 5832-3

5230-0125	12,5mm, SW5
5230-0200	20mm, SW5
5230-0225	22,5mm, SW5
5230-0250	25mm, SW5
5230-0275	27,5mm, SW5
5230-0300	30mm, SW5

MUTARS® ulna stop
mat.: UHMWPE according to ISO 5834-2
5250-1100

MUTARS® ulna anchorage cementless
mat.: implatan®; $TiAl_6V_4$ according to ISO 5832-3 with cpTi and HA-coating
bushing CoCrMo according to ISO 5832-12

5250-1015	left	70mm
5250-1020	right	70mm

MUTARS® ulna anchorage cemented *TiNbN
mat.: implavit®; CoCrMo according to ISO 5832-4
bushing CoCrMo according to ISO 5832-12

5250-5070	left	70mm
5250-0070	right	70mm
5250-5100	left	100mm
5250-0100	right	100mm

cancellous screw 4mm
mat.: implatan®; $TiAl_6V_4$ according to ISO 5832-3

5793-4026	26mm
5793-4028	28mm
5793-4030	30mm
5793-4032	32mm
5793-4034	34mm

AGILON® extension piece
mat.: implatan®; $TiAl_6V_4$ according to ISO 5832-3

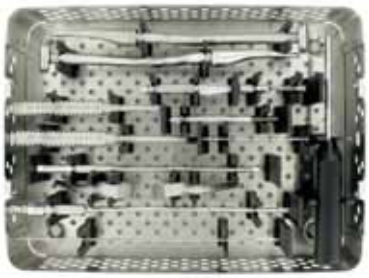
3821-0075	7,5mm
3821-0100	10mm
3821-0125	12,5mm
3821-0150	15mm
3821-0175	17,5mm

MUTARS® Distal Humerus 30mm

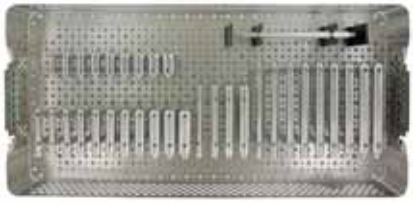
Instruments

MUTARS® Distal Humerus 30mm M6 Long Fit Container - upper tray
7999-5203

MUTARS® Distal Humerus 30mm M6 Long Fit Container - bottom tray
7999-5203



MUTARS® Distal Humerus Container
7999-5150 left and right
7999-5151 left
7999-5152 right



AGILON® trial stem container
7999-3833

MUTARS® Distal Humerus 30mm for M6 Long Fit Container
7999-5203

AGILON® stem impactor
REF 7801-0009

AGILON® guide rod
REF 7801-0115

torque wrench 15Nm 5mm
REF 7512-0025

AGILON® reamer tapered
REF 7801-0019

MUTARS® socket wrench small
REF 7608-1010

ic T-handle Zimmer-Jakobs
REF 4223-0023

AGILON® trauma shoulder drill
REF 7820-0007 7 mm
REF 7820-0008 8 mm
REF 7820-0009 9 mm
REF 7820-0010 10 mm
REF 7820-0011 11 mm
REF 7820-0012 12 mm
REF 7820-0013 13 mm

AGILON® impaction sleeve M6
REF 7801-0125

MUTARS® distal humerus 30mm trial
REF 7250-2300

MUTARS® trial screw for dist. humerus
REF 7230-1125 M6 x 12,5mm, SW5
REF 7230-0200 M6 x 20mm, SW5
REF 7230-0225 M6 x 22,5mm, SW5
REF 7230-0250 M6 x 25mm, SW5
REF 7230-0275 M6 x 27,5mm, SW5
REF 7230-0300 M6 x 30mm, SW5

AGILON® trial extension piece
REF 7821-0075 7,5mm
REF 7821-0100 10mm
REF 7821-0125 12,5mm
REF 7821-0150 15mm
REF 7821-0175 17,5mm

Zimmer adapter A/O
REF 7701-0001

MUTARS® distal humerus container 7999-5150

MUTARS® broach for ulna component
REF side
7420-0009 left
7420-0010 right

MUTARS® setting instrument for ulna, straight
7420-0013

MUTARS® setting instrument for ulna anchorage, angular
7420-0014

MUTARS® trial axle for distal humerus
7420-0015

depth gauge small
0270-1015

MUTARS® drill for three jaw chuck 2mm
7520-0000

hexagon screw driver 2,5mm
7608-1001

flexible drill
7701-2005

MUTARS® patella drill
7351-0000

guide wire for flexible drill
7512-0039 2,2 / 250 mm

Ulna reamer
7420-0016

MUTARS® ulna trial anchorage
REF side
7710-1281 left
7710-1282 right

MUTARS® patella drill
7351-0000

AGILON® trial stem container
7999-3833

AGILON® trial stem adapter
REF 7801-2430

AGILON® trial stem

REF 7850-3010	Ø10 x 30mm
REF 7850-3011	Ø11 x 30mm
REF 7850-3012	Ø12 x 30mm
REF 7850-3013	Ø13 x 30mm
REF 7850-3014	Ø14 x 30mm
REF 7850-3015	Ø15 x 30mm
REF 7850-3016	Ø16 x 30mm
REF 7850-3017	Ø17 x 30mm
REF 7850-3018	Ø18 x 30mm
REF 7850-6008	Ø8 x 60mm
REF 7850-6009	Ø9 x 60mm
REF 7850-6010	Ø10 x 60mm
REF 7850-6011	Ø11 x 60mm
REF 7850-6012	Ø12 x 60mm
REF 7850-6013	Ø13 x 60mm
REF 7850-6014	Ø14 x 60mm
REF 7850-6015	Ø15 x 60mm
REF 7850-6016	Ø16 x 60mm
REF 7850-6017	Ø17x 60mm
REF 7850-6018	Ø18x 60mm
REF 7850-9008	Ø8 x 90mm
REF 7850-9010	Ø10 x 90mm
REF 7850-9012	Ø12 x 90mm
REF 7850-9014	Ø14 x 90mm
REF 7851-2008	Ø8 x 120mm
REF 7851-2009	Ø9 x 120mm
REF 7851-2010	Ø10 x 120mm
REF 7851-2011	Ø11 x 120mm
REF 7851-2012	Ø12 x 120mm
REF 7851-2013	Ø13 x 120mm
REF 7851-2014	Ø14 x 120mm
REF 7851-2015	Ø15 x 120mm
REF 7851-2016	Ø16 x 120mm

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 0482

Your local distributor:

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