AGILON® MI

The modular shoulder system

implantcast

Surgical Technique

MI- Metaphyseal Implant

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The following surgical technique was developed
in co-operation with Dr. N. Hellmers, Hamburg.

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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.

Introduction

The modular AGILON® shoulder system was complemented by the stemless Metphyseal Implant. The components are made of additive manufactured EPORE® structure and are availabel in 5 sizes. The highly porous stem is designed with conical 4 fins. A proximal collar rests on the resected bone surface. All anatomical and CTA caps can be combined with the MI components.

proximal view

distal view

side view

Indications and contraindications

The indications are primary omarthrosis, aseptic humeral head necrosis or rheumatoid arthritis, if the metaphyseal bone quality allows implantation. The stemless metaphyseal implant is also suitable for posttraumatic omarthrosis, where a deformity of the meta/ diaphyseal humerus in which an implantation of a stemmed prosthesis is nearly impossible. Contraincikations are generalised osteo porosis with an extensive aseptic necrosis and other degredations which lead to a dercreased bone quality in the fixation area (cystes, tumours etc.). Further contraindications are non-cureable rotator cuff lesions („cuff arthropathy“), pseudarthrosis and fracture of the larger trochanter, Infection and neuroarthropathy („Charcot-Joint“). The stemless prosthesis is not indiucated for revision treatments.

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.

MI implant **MI with cap**

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.
(fig. 1).

figure 1: M/L-view **A/P-view**

figure 4a

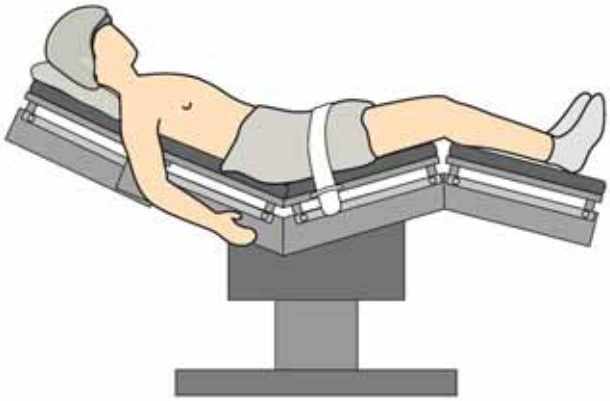


figure 4b

Surgical Technique for the implantation of the AGILON® prosthesis component

Bedding of the patient

The patient should be bedded in the „Beach-chair“-position (fig. 4a and fig. 4b) at the edge of the table to dislocate and extend the arm freely. A movable side table for the forearm enables a stable rotation control and bed for the forearm.

Important information

Prior to surgery the following should be ensured:

- all needed components are available during surgery. An adequate number of various implant components should be available for surgery. It should be determined whether the implantation should be done with or without the use of bone cement.
- all instruments for the implantation are present and are matching the correspong implants. The insertion instruments must be adapted to the implant. The implants may only be used with the instruments of the implantcast GmbH. An exception are exclusively the standardized instruments used during surgery.

Deltoideo-pectoral access

Perform the deltoideopectoral skin incision (fig. 5) from the top of the coracoid, following the front edge of the deltoideus, straight to the humeral beginning of the M. deltoideus.

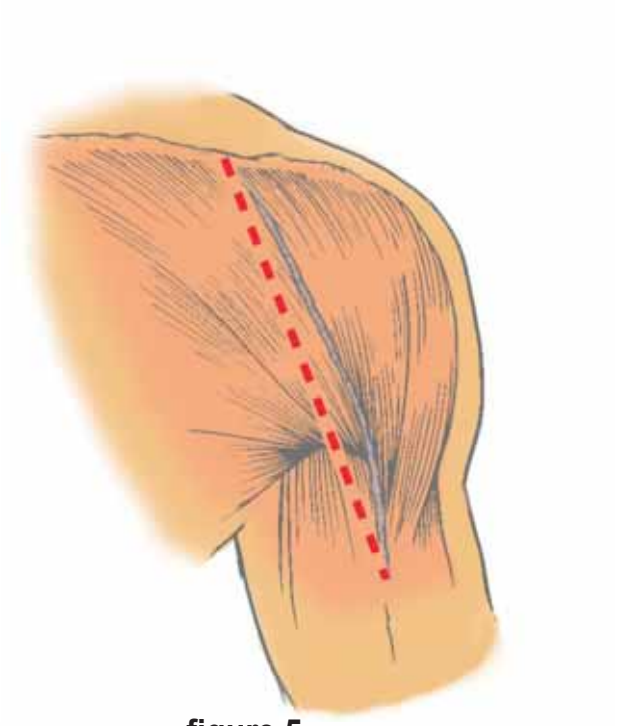


figure 5

After the skin incision and mobilization of the lateral skin flap, andertake the incision of the fascia between M. pectoralis and M. deltoideus in the Sulcus deltoideo-pectoralis by protection and preparation of the V. cephalica laterally (fig. 6).

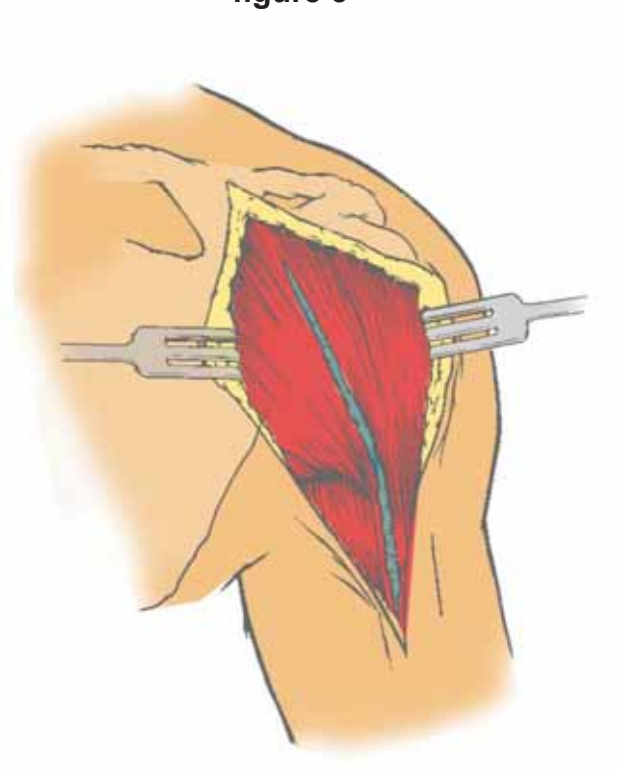


figure 6

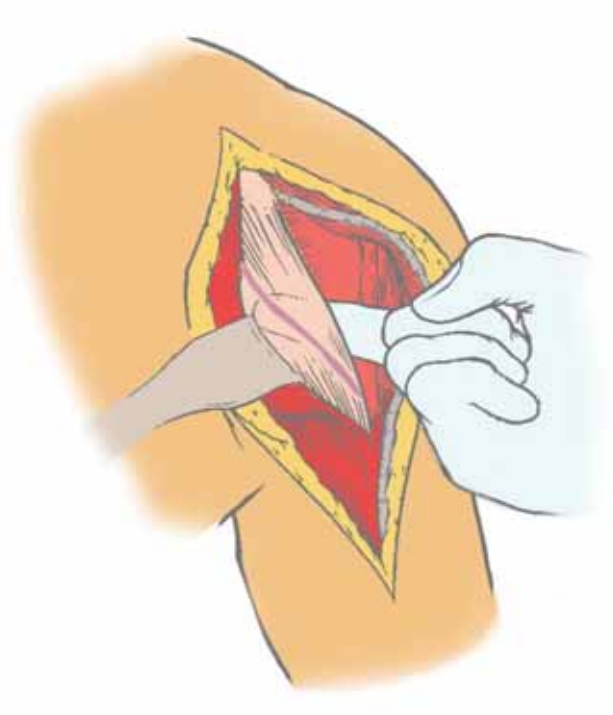


figure 7

Vertical incision of the clavi-pectoral fascia between the long and short biceps fiber up to the Lig. Coracoacromiale. Mobilization of the coracobrachial fiber leg with Caput breve of the M. biceps brachii and the M. musculobrachialis to medial by holg away with the Roux-hook (fig. 7).

Palpation of the N. musculocutaneus and keeping aside together with the fibers. Identification and illustration of the N. axillaris at the lower edge of the M. subscapularis (fig. 7) to avoid iatrogenic damages at the further preparation. It must be protected during the whole operation.

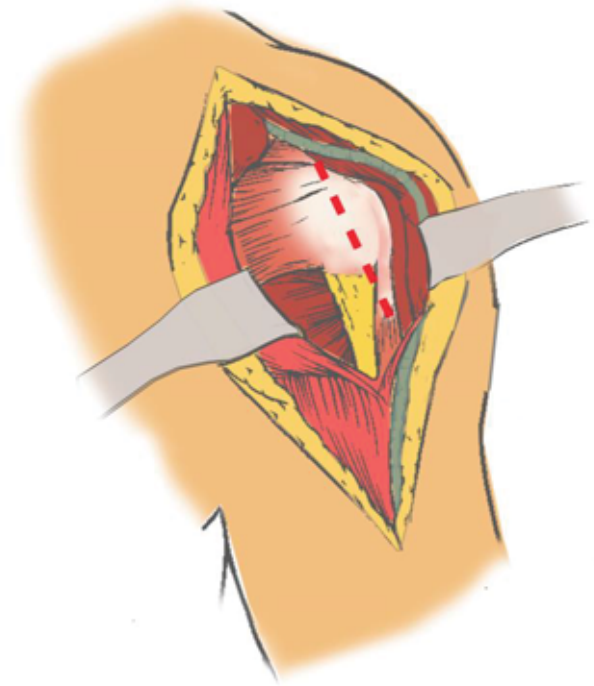


figure 8

Entering through the fractured Tubercula by Incision above the biceps fiber in proximal direction up to the Lig. Coracoacromial and splitting of the rotator cuff in interval between Subscapularis and Supraspinatus (fig. 8). If possible the biceps fiber should be attached. If the biceps fiber is damaged it has to be armed and later it has to be fixed transosseus at the stem.

Choose the appropriate head sizing instrument of the preoperatively planned cap size 44,47, 50 or 53mm (fig. 9).

Place the head sizing instrument on the humerus head. Align to the collum anatomicum. A CCD-angle of app. 125-135° is reasonable (fig. 8).

Insert the guide wire, until the tip of the guide wire has passed the lateral cortex (fig. 9).

Mount the cutting block to the alignment guide (fig. 10). Adjust the cap height by turning the upper lever1. The lowest position means 20mm, the middle 17mm, and the upper position means 14mm cap height. Lock the lever1 anti-clockwise.

Turn the lever2 clockwise to lock the cutting block (fig.12a).

Fix the cutting block to the bone, by two 3,2mm fixation pins (fig. 12b). The resection (fig. 12a and 12b) can be performed from anterior or lateral (fig. 11).

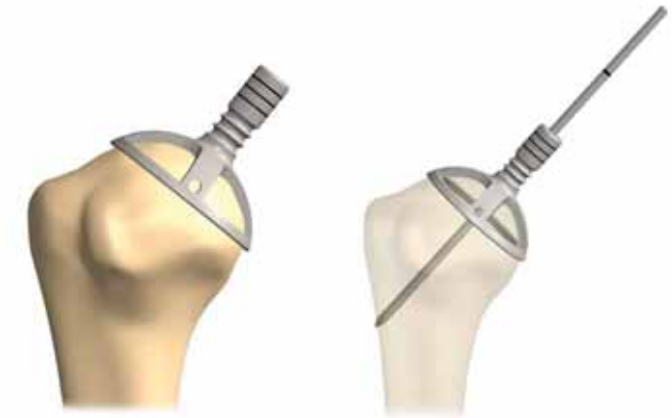


figure 8 and 9

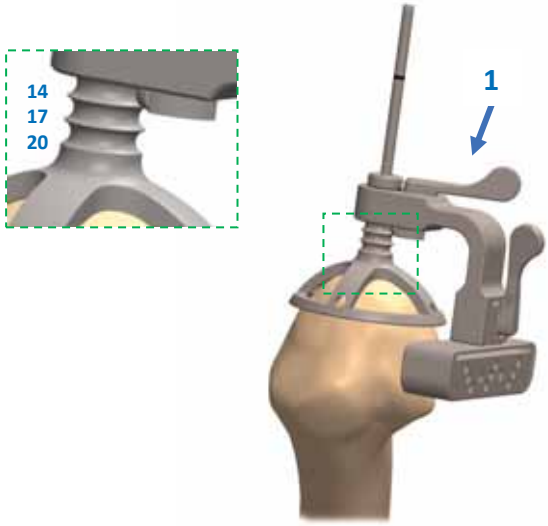


figure 10

figure 11

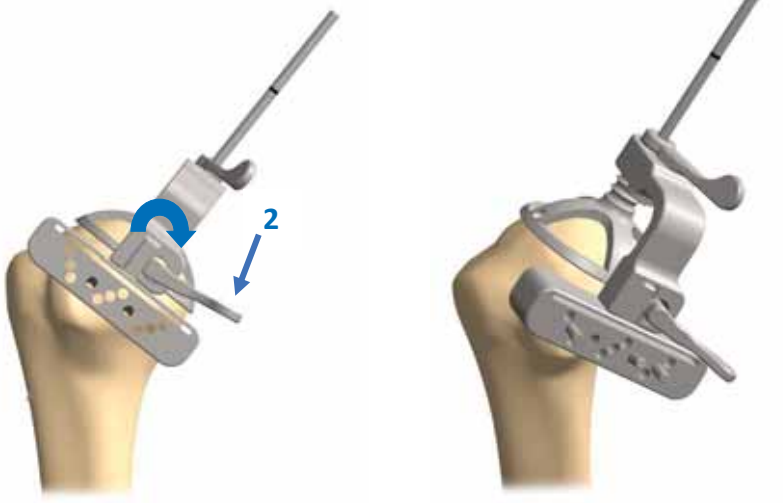


figure 12a and 12b

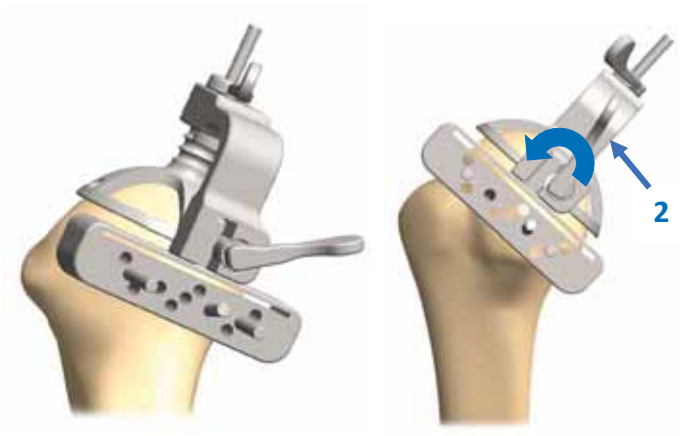


figure 13a and 13b

After the cutting block was fixed to the bone (fig. 13a), unlock the adapter by turning the lever$_2$ anti-clockwise (fig. 13b).

Remove the guide wire and the alignment guide.

A shift by one pin level lead to an increase or decrease of the resection by 3mm. So the switch from on to another cap height can be done precisely.

Please use the 1,47mm saw blade to resect through the slotted block (fig. 14a and 14b).

After the resection you may determine the exact cap size by measuring the resected head with the template (see below).

figure 14a

figure 14b

Reinsert the guide wire (fig. 15).

Notice: Please make sure that the marking on the tip of the guide wire is place half way out of the lateral cortical bone (reference to the figure below).

figure 15

Make sure that the initially chosen position of the guide wire is reached again. Determine the implant size with the sizing guide (fig. 16).
If in between sizes, please choose the smaller of both sizes.

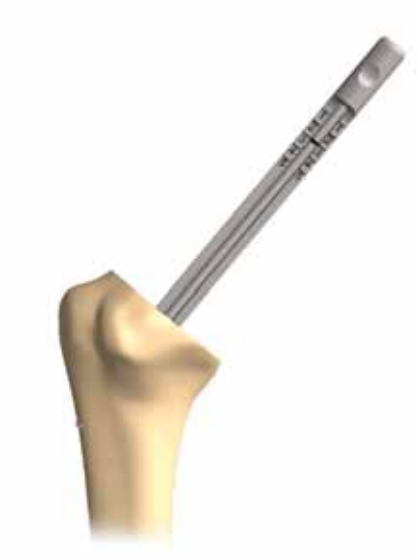


figure 16

Prepare the peg hole by the use of the cannulated reamer. Respect the mark of the size (fig. 17).
Remove the guide wire.

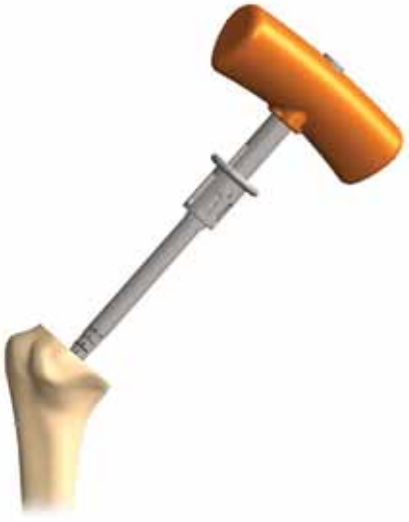
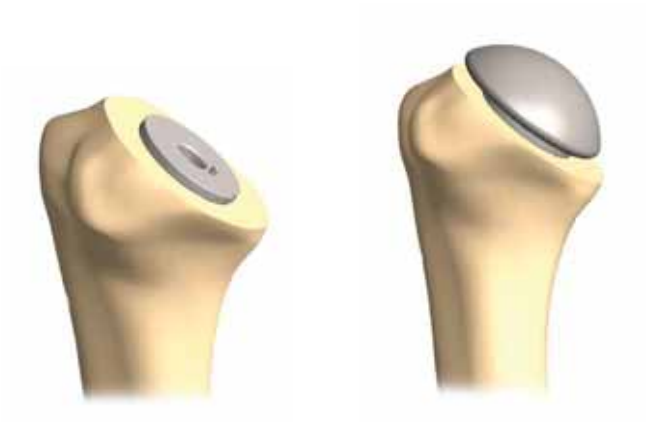


figure 17

Choose the trial component and combine it with the impactor. Impact the trial component with gently strokes, until the collar of the trail has reached the bone surface (fig. 18a).

The bone preparation for the fins are finished by inserting the trial components (fig. 18b).

figure 18a and 18b



Unlock the impactor from the trial component and leave the trial in place (fig. 19a).

Add the trial cap of the previously determined size and height and perform a trial reduction (fig. 19b).

figure 19a and 19b

Remove the trial component by the use of the M8x1 adapter and the slap hammer (fig. 20).

figure 20

Lock the impactor to the implant of the correct size. Impact the implant with gently strokes until the collar has reached the bone surface (fig. 21a and 21b).

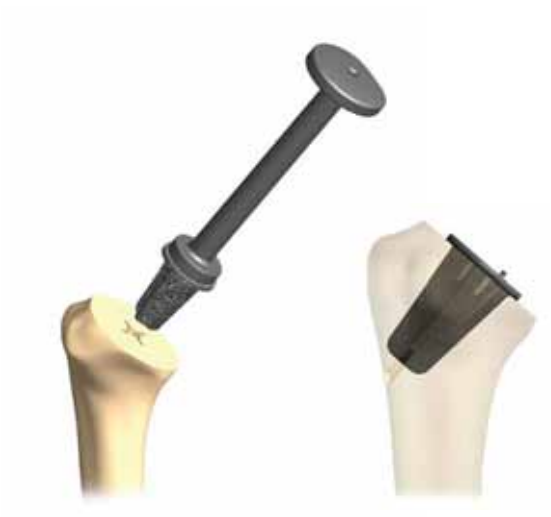


figure 21a and 21b

Put the humeral cap to the implant and impact by the use of the head impactor (fig. 22a and 22b).

Notice: If the treatment with glenoid replacement is planned, please refer to the AGILON® Surgical Technique REF AGOAOOPE.

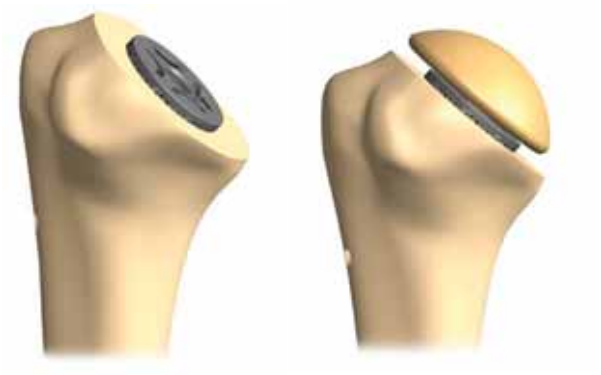


figure 22a and 22b

For explantation of an implant, a special chisel is offered (fig. 23a). After using the chisel the implant can be removed by the use of the M8x1 adapter and the slap hammer (fig. 23b).

figure 23a and 23b

Postoperative treatment and X-Ray controls after AGILON® MI

1. day:	o **Gilchrist's bandage** o **isometric exercises** o **decongestant (ice) and tonus-lowering actions on the neck, shoulder girdle and arm**
2. day:	o **removal of the redon drains** o **bearing of the arm on an abduction pad for 3 weeks at 30° secured inner rotation of the forearm** o **1. x-ray control in a.p.-layer**
3. – 10. day:	o **isometric exercises** o **decongestant (ice, lymphatic drainage) and tonus-lowering actions on the neck, shoulder girdle and arm** o **mobilization of the adjacent joints and scapula pattern**
10. day:	o **beginning of passive physiotherapy:** **30° abd., 30° flex., 60° iro, 0° aro** o **2. x-ray control in 2 layers for the control of the position of the prosthesis and the tubercular. If a dislocation of the tubercular is detected, the revisional operation has to be made immediately**
21. day:	o **passive physiotherapy:** **60° abd., 60° flex., 60° iro, 0° aro** o **3. x-ray control in 2 layers for the control of the postion of the prosthesis and the tubercular.**
35. day:	o **active assistive physiotherapy:** **90° abd., 90° flex., 60° iro, 30° aro** o **water aerobics without water resistance**
42. day:	o **liberalization of full range of motion** o **active physiotherapy without resistance** o **occupational therapy** o **4. x-ray control in 2 layers for the control of the position of the prosthesis and the tubercular**
42. – 84. day:	o **the intention is to reach a humane and fully function of the shoulder**

IMPLANTS

AGILON® MI Metaphyseal Implant
mat.: EPORE®, $TiAl_6V_4$ acc. to ISO 5832-3

3820-6001	size 1
3820-6002	size 2
3820-6003	size 3
3820-6004	size 4
3820-6005	size 5

AGILON® cap
mat.: implatan®;$TiAl_6V_4$ acc. to ISO 5832-3 with TiNcoating

REF	size
3800-4414	44/14mm
3800-4417	44/17mm
3800-4420	44/20mm
3800-4714	47/14mm
3800-4717	47/17mm
3800-4720	47/20mm
3800-5014	50/14mm
3800-5017	50/17mm
3800-5020	50/20mm
3800-5314	53/14mm
3800-5317	53/17mm
3800-5320	53/20mm

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

REF	size
3822-4414	44/14mm
3822-4417	44/17mm
3822-4420	44/20mm
3822-4714	47/14mm
3822-4717	47/17mm
3822-4720	47/20mm
3822-5014	50/14mm
3822-5017	50/17mm
3822-5020	50/20mm
3822-5314	53/14mm
3822-5317	53/17mm
3822-5320	53/20mm

Notice:
Loan shipments do not include CTA implants and the glenoid components. Please order those implants and the needed instruments separately!

IMPLANTS

Glenoid cementless anatomical
mat.: pure titanium (cpTi) acc. to ISO 5832-2 with implaFix® HA, HA-coating acc. to ISO 13779-2

REF	size
3800-4028	2 short
3800-4029	2 long
3800-4009	3 short
3800-4010	3 long

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

REF	size
3803-1028	2
3803-1032	3
3803-1036	4

cancellous screw angle stable lock Ø 4,2mm
mat.: implatan®; $TiAl_6V_4$ acc. to ISO 5832-3

5794-4220	20 mm
5794-4222	22 mm
5794-4224	24 mm
5794-4226	26 mm
5794-4228	28 mm
5794-4230	30 mm
5794-4232	32 mm
5794-4234	34 mm
5794-4236	36 mm
5794-4238	38 mm
5794-4240	40 mm

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

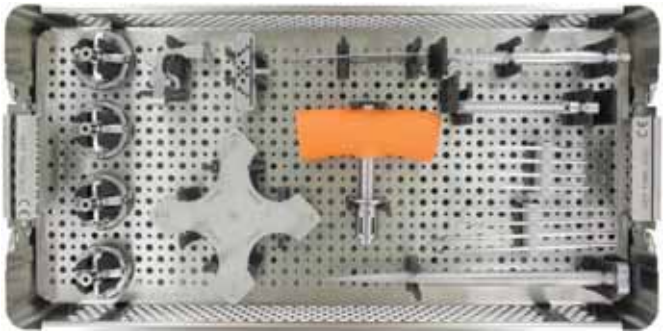
REF	size
3803-0032	2
3803-0036	3
3803-0040	4

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

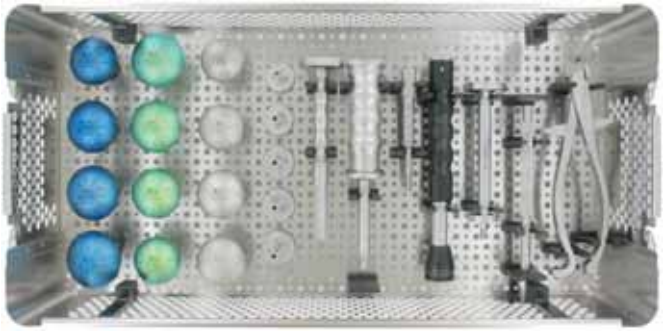
5793-4026	26 mm
5793-4028	28 mm
5793-4030	30 mm
5793-4032	32 mm
5793-4034	34 mm

INSTRUMENTS

AGILON® MI container upper tray
7999-3820



AGILON® MI container lower tray
7999-3820



AGILON®	**trial cap**
REF	size
7800-4414	44/14mm
7800-4417	44/17mm
7800-4420	44/20mm
7800-4714	47/14mm
7800-4717	47/17mm
7800-4720	47/20mm
7800-5014	50/14mm
7800-5017	50/17mm
7800-5020	50/20mm
7800-5314	53/14mm
7800-5317	53/17mm
7800-5320	53/20mm

AGILON® MI trial component

7820-6001	size 1
7820-6002	size 2
7820-6003	size 3
7820-6004	size 4
7820-6005	size 5

AGILON® MI impactor
7801-4080

AGILON® MI head alignment guide

7801-0044	44mm
7801-0047	47mm
7801-0050	50mm
7801-0053	53mm

AGILON® MI alignment guide
7801-0060

INSTRUMENTS

AGILON® MI cutting block
7801-0061

AGILON® MI sizing guide
7801-0062

AGILON® MI cannulated core reamer
7801-0065

ic-hmueral head extractor
8003-6101

AGILON® MI explantation chisel
7801-0070

ic T-handle
4223-0023

Head impactor
7512-4444

Adapter for slap hammer M6
7801-0024

slap hammer short
4223-0031

AGILON® humeral head template
7800-4015

resection check
4223-0009

pin extractor
7512-0800

AGILON® MI guide wire (2x)
7801-0064

3,2mm drill length: 126mm (2x)
4221-0019

fixation pins 3,2mm Länge: 77mm (4x)
4223-0029

Pin inserter
4223-0006

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