






MP Reconstruction Prosthesis

Cementless

Surgical Technique

Explanation of Pictograms			
	Manufacturer		Article number
	Material (number)	RX only	Caution: Federal law restricts this device to sale by or on the order of a physician

MP Reconstruction Prosthesis

Cementless

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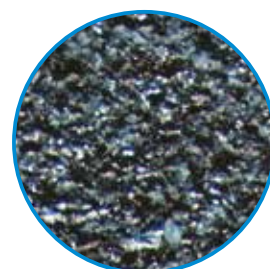
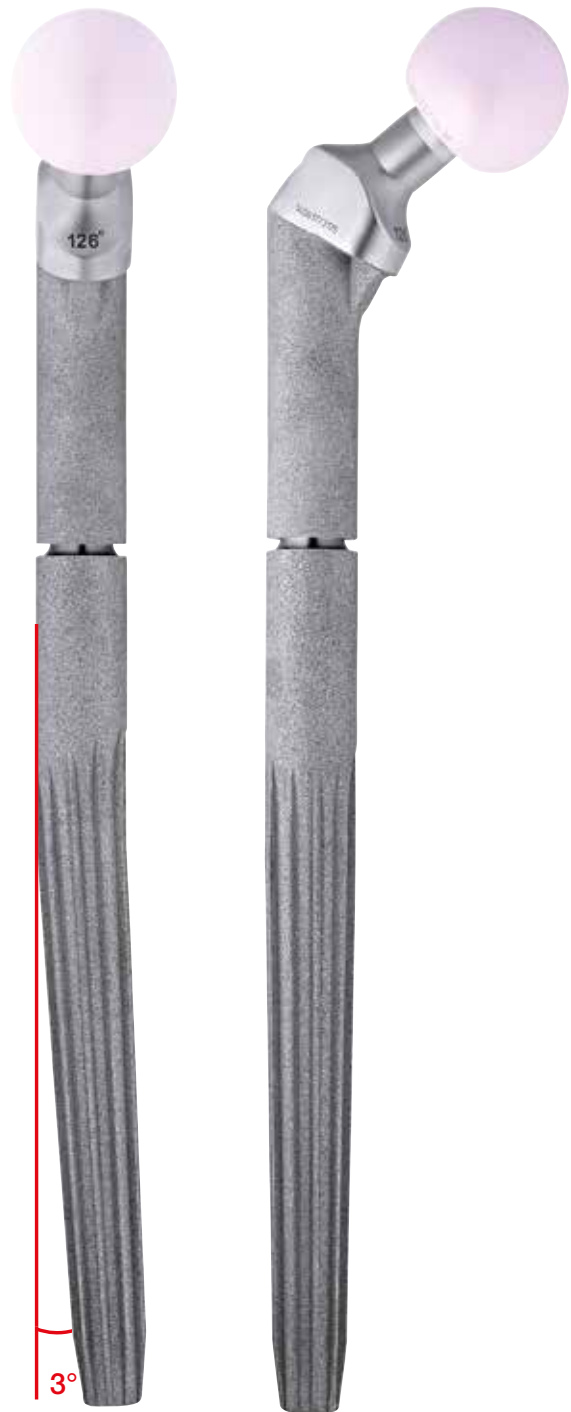
Important information

Hip Revision

In recent years, a considerable increase has been observed in the number of cases of hip prosthesis stem loosening with extensive, generally proximal, femoral defects necessitating stem revision. This is especially true among younger patients.

Cementless prosthesis stems with a microporous surface have been shown to provide stable distal fixation, and the implant evidently does not impede remodeling (osteogenesis) in the proximal femur. Nevertheless, some types of fully coated, non-modular stems, in which material and design create rigidity, tend to promote “stress shielding”.

Furthermore, they are often difficult to remove once osseointegration has taken place. Nor do these stems always offer solutions to problems which can arise during a revision, e.g., compensation of proximal/distal stem size differences, leg length discrepancies, or setting of the correct antetorsion. These problems can be overcome more advantageously with modular hip stems that are also elastic.



Microporous structure
Pore size ~160 µm

System Description

The **MP Reconstruction Stem** is a modular, cementless femoral stem made of **Ti60tan-5** (titanium-aluminum-vanadium alloy).

Modular proximal and distal stem components make it possible to adapt the system to the dimensions of the medullary space. Ribbed, tapered stems reduce rigidity through their material and design, and ensure good primary fixation and rotational stability.

The microporous surface promotes bone ongrowth. The proximal neck segment can be securely fixated in the optimal antetorsion position. The leg length can be corrected using proximal spacers.

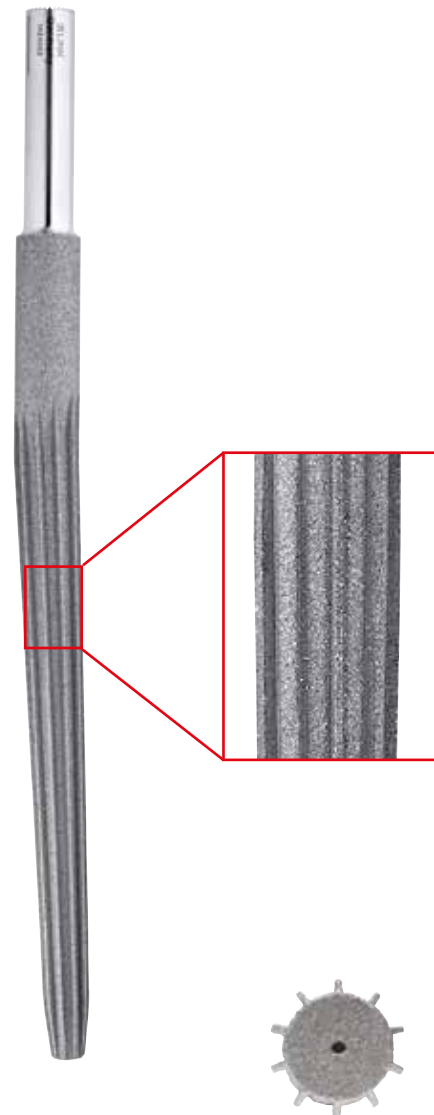
The MP Reconstruction Stem is indicated for hip revisions in cases requiring distal fixation and reconstruction of the proximal femur with a cementless implant due to extensive proximal bone loss.

This prosthesis stem has also proven to be a success in revisions where a stem change became necessary due to periprosthetic or distal fractures.

The MP stem can be used to good advantage in primary implantations, for example in the treatment of hip dysplasia, especially in cases where conventional hip stems cannot guarantee the desired version or leg length.

The stem components are assembled in the prepared femur according to the modular principle.

Together with the fixation screw, the tothing on the proximal end of the stem and in the neck segment allow very secure connection of the stem components in comparison with a simple tapered coupling. The upper section is threaded to take the special fixation screw, which has an expansion-securing property.



The neck segment is the proximal segment of the modular prosthesis. Intramodular neck segments with a microporous surface have a round cross-section. But larger versions as a proximal bone substitute, with suture holes, are also available for the treatment of proximal defects.

The 35 mm long neck segments are used in cases where this makes it possible to preserve bone and no stem extension is planned. The 65 mm long neck segments are intended for the use of proximal spacers, which are employed for leg length adjustment if stem segments are driven in further than originally planned.

There are standard neck segments and neck segments with additional lateralization of **2 mm** in CCD angles of 126° and 135° respectively.

The tothing in the neck segment interlocks with the tothing on the end of the stem. Once the two segments are connected, the expansion bolt is used to secure them.

This mechanism comprising neck segment/stem/toothed connection allows precise and reliable setting of the antetorsion to suit the requirements of the individual patient, independently of the rotational position of the stem in the femoral canal.

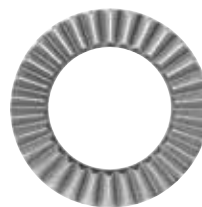
The determination and adjustment of the antetorsion, leg length, and lateralization are performed as described, without the need to loosen a tapered connection or remove an already implanted stem again.

Proximal spacers for leg length correction are inserted between the proximal end of the stem and the neck segment, if required. The 10 mm and 20 mm high proximal spacers can be combined to give an extension of up to 30 mm.

The tothing on the proximal spacers interlocks with the corresponding tothing on the stem and neck segment.

Expansion bolts – the components:

The stem (proximal spacers, if used) and neck segment are connected with a short (41 mm) or long (61 mm) expansion bolt, depending on the selected neck segment length and the number of proximal spacers. The expansion bolts securely fix the MP neck segments to the modular MP prosthesis stems.



Important:

- 65 mm neck segments can be used with proximal spacers.
- 35 mm neck segments must not be used with proximal spacers.

Important:

LINK implants and expansion bolts are designed for single use only.

They can never be reused because the securing mechanism no longer functions after a single use. The torque wrench is supplied with a calibration certificate, and must be subjected to a functional test after 250 uses. To this end, the instrument should be sent to Waldemar Link GmbH & Co. KG.

The torque wrench must never be used to loosen screw connections, as this could have a negative effect on its function.

The **prosthesis heads** have an inner taper of 12/14 mm and can be combined with the male 12/14 mm taper of the MP neck segments. The different head-neck lengths of the available prosthesis heads have an influence on both the leg length and the lateralization. LINK prosthesis heads are available in diameters of 28 mm and 32 mm. Other diameters are available on request.

Modular Components

- **Prosthesis heads**
 - Aluminum oxide ceramic or CoCrMo alloy
 - 28 and 32 mm head diameters with up to 4 head-neck lengths
- **Neck segments**
 - **Ti₆Al₄V** titanium alloy
 - 35 mm and 65 mm
 - Standard and with suture holes for prox. defects
 - CCD angles 126° and 135°
 - Standard or XXL
 - Various sizes for different defect situations
- **Proximal spacers** (optional)
 - EndoDur-S (CoCrMo) alloy
 - Possible leg length correction: 10, 20, 30 mm
- **Cementless prosthesis stems**
 - **Ti₆Al₄V** titanium alloy
 - 6 stem lengths:
 - 160, 180, 210, 250, 290, and 330 mm
 - 7 diameters:
 - 12, 14, 16, 18, 20, 22.5, and 25 mm
- **Expansion bolts**
 - EndoDur-S (CoCrMo) alloy
 - For securing the connection of the neck segment, proximal spacer(s) and stem.

Indications / Contraindications

Note:

See page 34 for specified indications/contraindications.



Prosthesis heads A
 [MAT] BIOLOX forte*
 4 head-neck lengths
 Ø 28, 32 mm



Prosthesis heads A
 [MAT] BIOLOX delta*
 4 head-neck lengths
 Ø 28, 32 mm



Prosthesis heads B
 [MAT] CoCrMo alloy
 4 head-neck lengths
 Ø 28, 32 mm

* BIOLOX forte and delta are products from CeramTec GmbH, Plochingen, Germany

Additional neck segments:
 +8.6 - 10.6 mm

XXL 65 + 35 mm **Neck segments with suture holes** 65 + 35 mm

Expansion bolts
 Length 41 + 61 mm

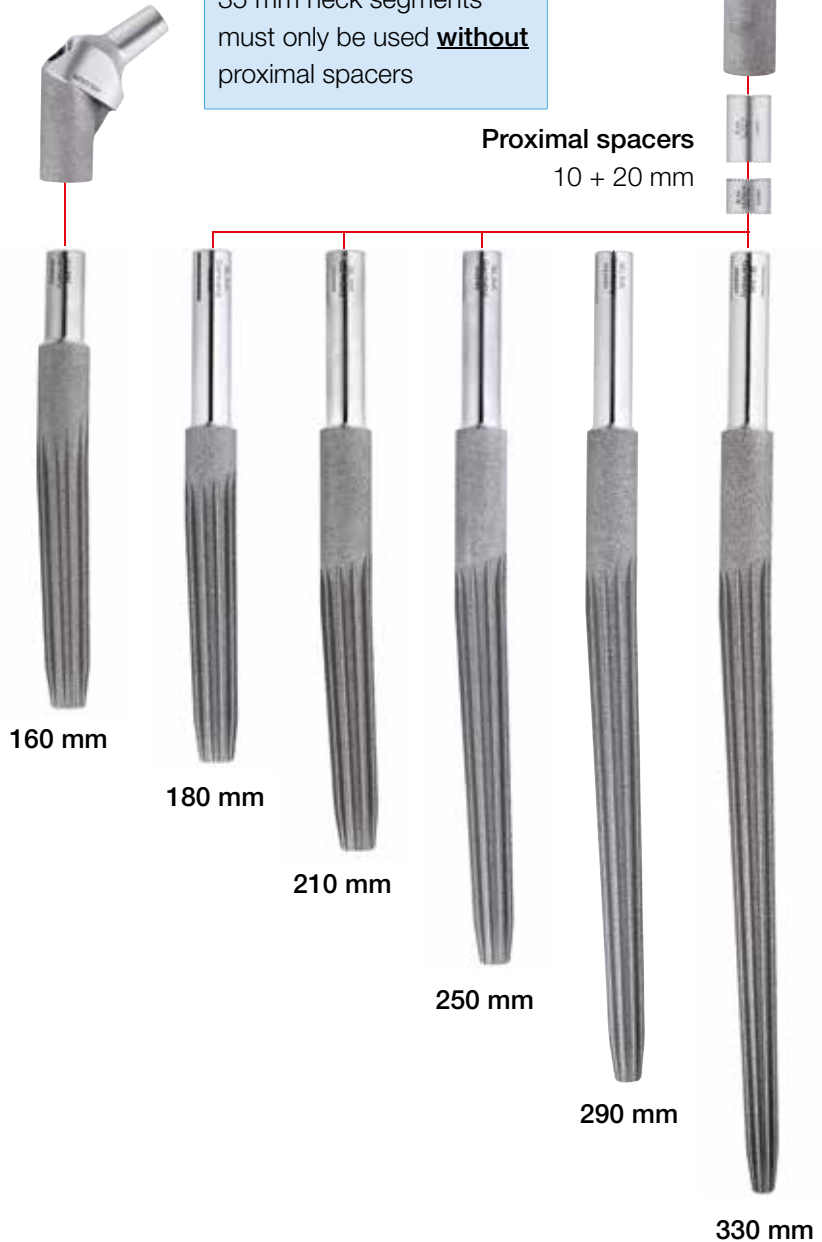


Standard neck segments
 65 + 35 mm

35 mm neck segments must only be used **without** proximal spacers

Proximal spacers
 10 + 20 mm

160 mm stem must **only** be used with 35 mm neck segment and **without** proximal spacers



Prosthesis stems



Prosthesis stems, cementless

MAT *Ti6Al4V-S*

REF microporous	Size	Prox. stem-Ø mm	Dist. stem-Ø mm	Length mm
172-916/14	X S-1	14.0	12.0	160
172-916/16	X S-2	16.0	14.0	160
172-916/18	X S-3	18.0	16.0	160
172-916/20	X S-4	20.0	18.0	160
172-916/22	X S-5	22.5	20.5	160
172-916/25	X S-6	25.0	23.0	160
172-918/12	S-0	12.0	10.0	180
172-918/14	S-1	14.0	12.0	180
172-918/16	S-2	16.0	14.0	180
172-918/18	S-3	18.0	16.0	180
172-918/20	S-4	20.0	18.0	180
172-918/22	S-5	22.5	20.5	180
172-918/25	S-6	25.0	23.0	180
172-921/12	00	12.0	10.0	210
172-921/14	001	14.0	12.0	210
172-921/16	002	16.0	14.0	210
172-921/18	003	18.0	16.0	210
172-921/20	004	20.0	18.0	210
172-921/22	005	22.5	20.5	210
172-921/25	006	25.0	23.0	210
172-925/14	01	14.0	10.5	250
172-925/16	02	16.0	12.5	250
172-925/18	03	18.0	14.5	250
172-925/20	04	20.0	16.5	250
172-925/22	05	22.5	19.0	250
172-925/25	06	25.0	21.5	250
172-929/14	1	14.0	9.0	290
172-929/16	2	16.0	11.0	290
172-929/18	3	18.0	13.0	290
172-929/20	4	20.0	15.0	290
172-929/22	5	22.5	17.5	290
172-929/25	6	25.0	20.0	290
172-930/14	7	14.0	7.5	330
172-930/16	8	16.0	9.5	330
172-930/18	9	18.0	11.5	330
172-930/20	10	20.0	13.5	330
172-930/22	11	22.5	16.0	330
172-930/25	12	25.0	18.5	330

Important:

160 mm long stems must only be used with short neck segments and without proximal spacers.
210 mm stem with a diameter of 12 mm must not be used with proximal spacers.

Neck Segments

Standard Neck Segments

MAT *Ti60tan*, taper 12/14 mm

REF microporous	Length mm	CCD angle
172-964/26	65	126°
172-964/35	65	135°
172-965/26	35	126°
172-965/35	35	135°



XXL Standard Neck Segments

(with 40 mm femoral axis offset)

MAT *Ti60tan*, taper 12/14 mm

REF microporous	Length mm	CCD angle
172-984/26	65	126°
172-984/35	65	135°
172-985/26	35	126°
172-985/35	35	135°



Neck Segments with Suture Holes

MAT *Ti60tan*, taper 12/14 mm

REF microporous	Length mm	CCD angle
99-0984/30	65	126°
99-0984/32	35	126°



XXL Neck Segments with Suture Holes

MAT *Ti60tan*, taper 12/14 mm

REF microporous	Length mm	CCD angle
99-0984/26	65	126°
99-0984/28	35	126°

Proximal Spacers

MAT CoCrMo alloy

REF	Length (mm)
172-950/10	10
172-950/20	20



Expansion Bolts

MAT CoCrMo alloy

REF	Length (mm)
172-947/38	41
172-947/58	61

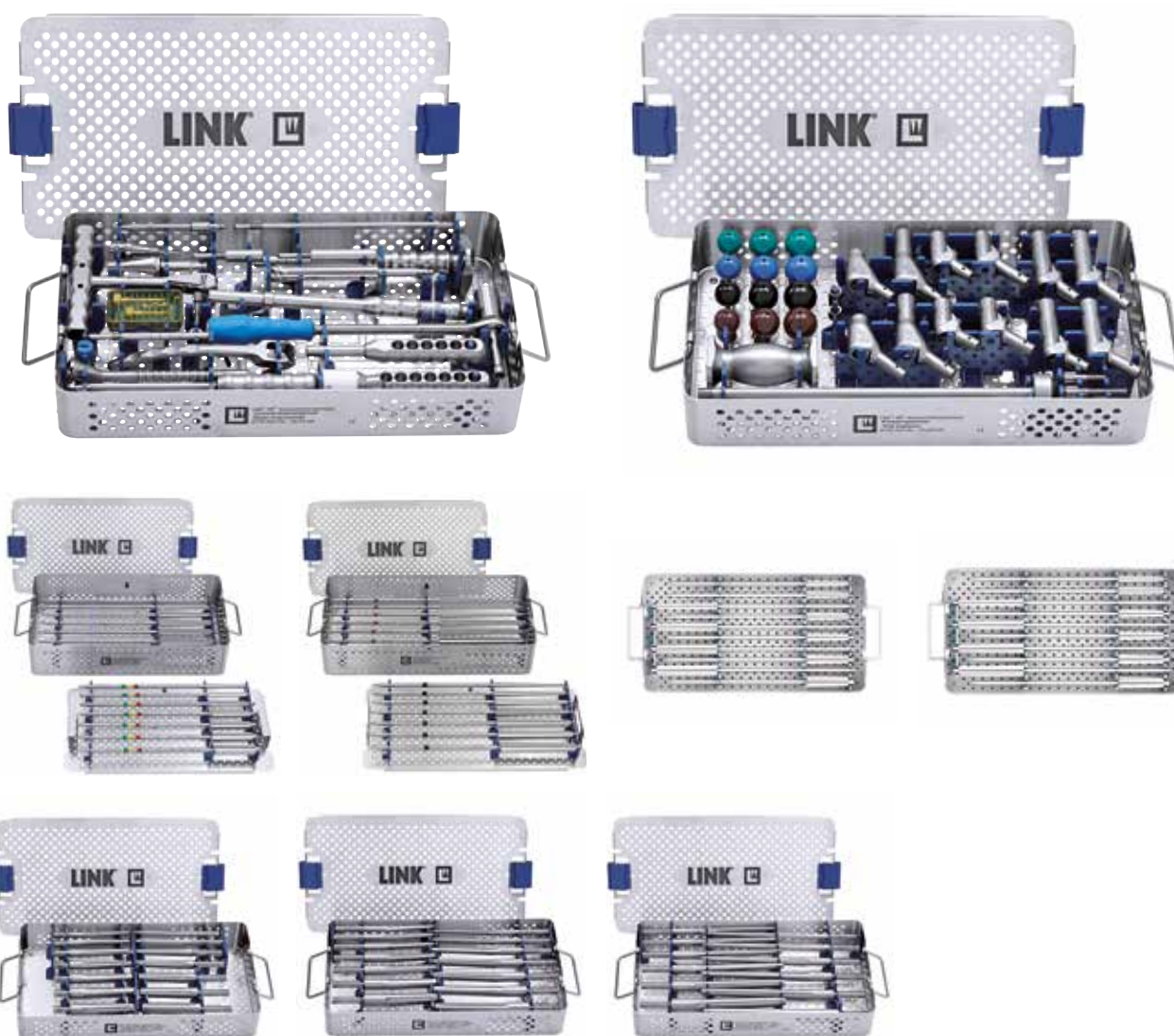


Possible Combinations

Neck Segments Length (mm)	Proximal Spacers		Extension mm	Expansion Bolts Length (mm)
	10 mm	20 mm		
65	-	-	0	41
65	10	-	10	41
65	-	20	20	61
65	10	20	30	61
35 ¹⁾	-	-	-	41

1) Combination with proximal spacer(s) not possible.

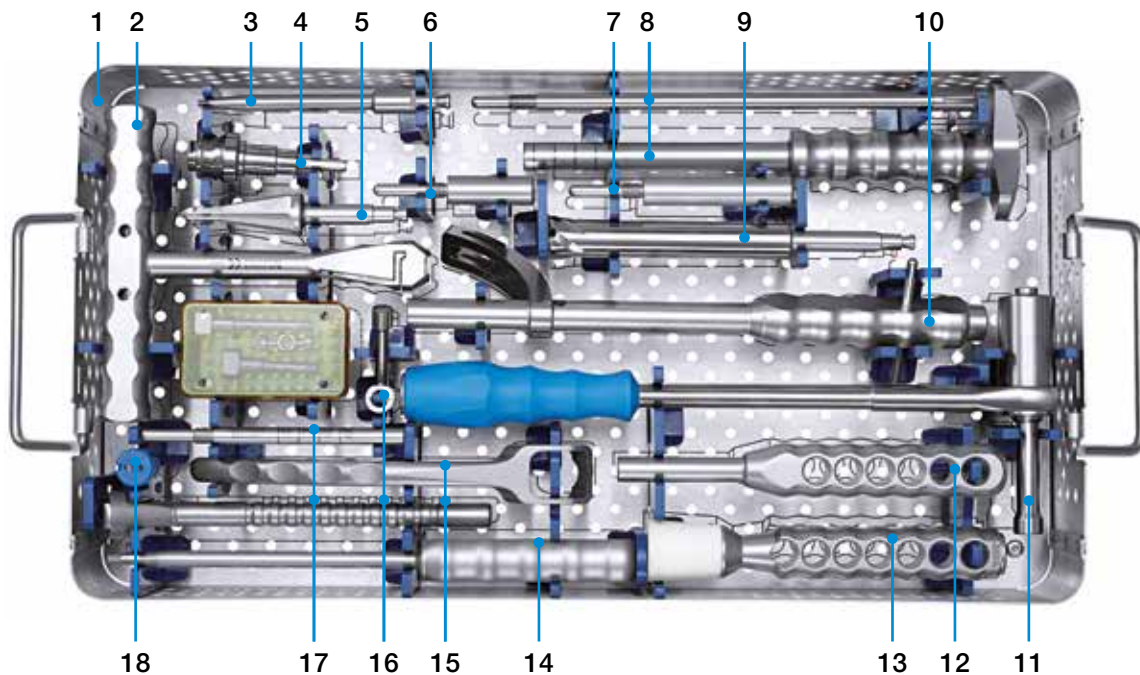




REF	Complete instrument set (incl. trays 1, 2, 3 and 4)
	Set in 4 instrument trays, comprising:
134-010/00	Instrument tray 1, basic instrument set
134-020/00	Instrument tray 2, trial implants
134-030/00	Instrument tray 3, tapered reamers 160 - 250 mm
134-040/00	Instrument tray 4, tapered reamers 290 - 330 mm

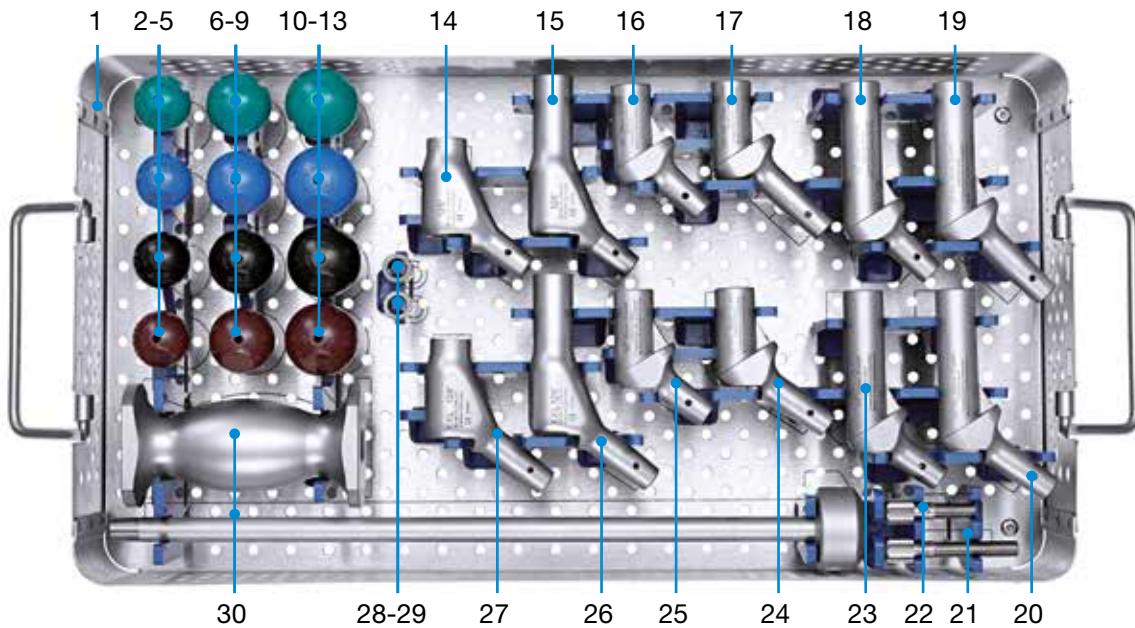
REF	Additional instruments, trays 5, 6, 7, 8, 9 and 10
134-050/00	Instrument tray 5, tapered reamers, uneven, 160 - 250 mm
134-060/00	Instrument tray 6, tapered reamers, uneven, 290 - 330 mm
134-070/00	Instrument tray 7, trial stems 160 - 180 mm
134-080/00	Instrument tray 8, trial stems 210 - 250 mm
134-090/00	Instrument tray 9, trial stems 290 - 330 mm

134-010/00 Instrument Tray 1, basic instrument set



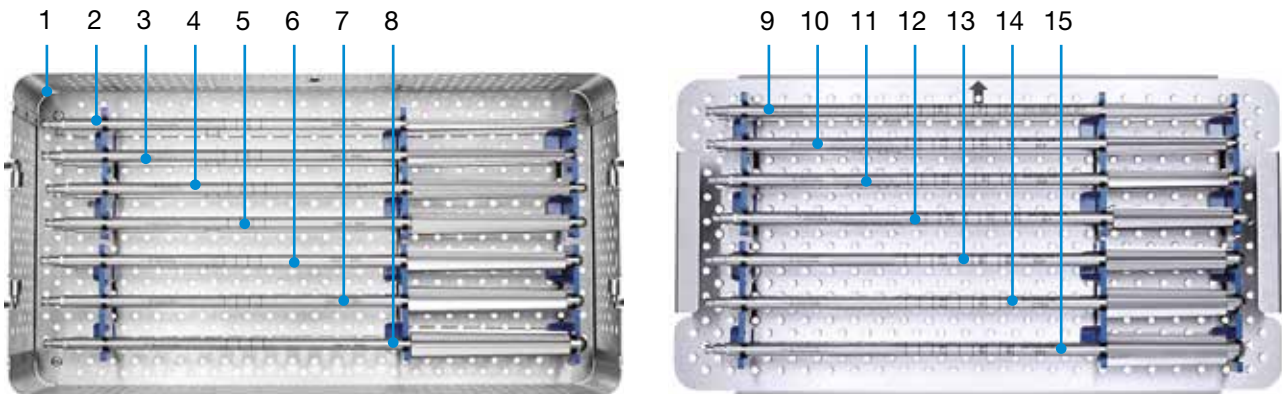
REF	Description
1 134-011/00	Instrument tray 1 , empty, 485 x 253 x 80 mm
2 15-6053/00	T-handle , Hudson
3 134-105/00	Screwdriver , size 3.5, Hudson
4	Adapter , optional
16-3283/00	Adapter , Hudson female / triangular male
16-3284/00	Adapter , Hudson female / AO male
16-3286/00	Adapter , Hudson male / Harris female
5 15-6037/00	Start drill
6 134-204/35	Reamer guide , for standard neck segment
7 134-204/65	Reamer guide , for short neck segment
8 134-210/00	Inserters for stems
9 134-200/00	Hollow reamer , Hudson
10 131-379/00	Inserters for neck segments, plus box
11 134-140/00	Torque wrench , size 8 mm, 380 mm
12 131-385/01	Screwdriver , size 8 mm, 185 mm
13 130-600	Driver for prosthesis heads
14 64-8008/02	Screwdriver , size 3.5 mm
15 134-141/00	Insertion forceps for MP neck segments
16 134-202/00	Caliper
17 134-201/00	Guide rod
18 131-830/04	Taper cap

134-020/00 Instrument Tray 2, trial implants



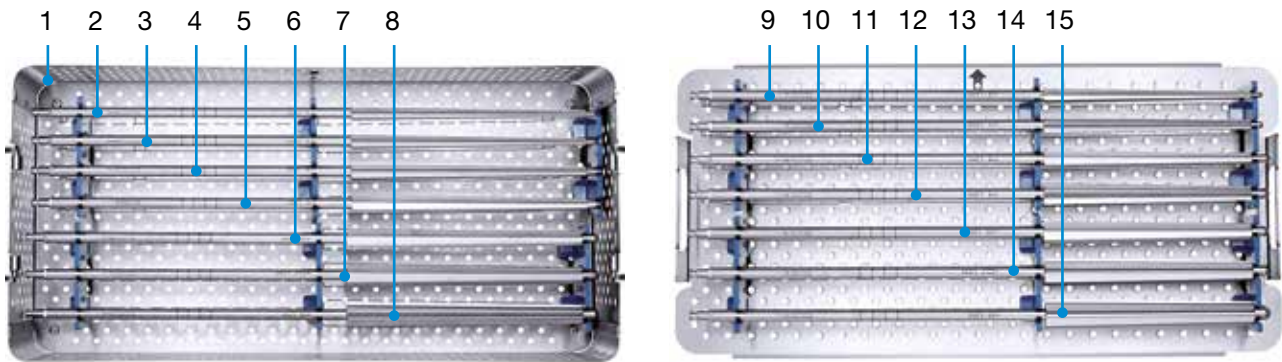
REF	Description
1	134-021/00 Instrument tray 2, empty
2	175-928/11 Trial head, 28 mm, S
3	175-928/12 Trial head, 28 mm, M
4	175-928/13 Trial head, 28 mm, L
5	175-928/14 Trial head, 28 mm, XL
6	175-932/11 Trial head, 32 mm, S
7	175-932/12 Trial head, 32 mm, M
8	175-932/13 Trial head, 32 mm, L
9	175-932/14 Trial head, 32 mm, XL
10	175-936/11 Trial head, 36 mm, S
11	175-936/12 Trial head, 36 mm, M
12	175-936/13 Trial head, 36 mm, L
13	175-936/14 Trial head, 36 mm, XL
14	99-0984/33 Trial neck segment, 35 mm, 126° with suture hole
15	99-0984/31 Trial neck segment, 65 mm, 126° with suture hole
16	131-395/35 Trial neck segment, 35 mm, 135°
17	131-393/35 Trial XXL neck segment, 35 mm, 135°
18	131-396/35 Trial neck segment, 65 mm, 135°
19	131-394/35 Trial XXL neck segment, 65 mm, 135°
20	131-394/26 Trial XXL neck segment, 65 mm, 126°
21	134-100/61 Trial fixation screw, long
22	134-100/41 Trial fixation screw, short
23	131-396/26 Trial neck segment, 65 mm, 126°
24	131-393/26 Trial XXL neck segment, 35 mm, 126°
25	131-395/26 Trial neck segment, 35 mm, 126°
26	99-0984/27 Trial XXL neck segment, 65 mm, 126° with suture hole
27	99-0984/29 Trial XXL neck segment, 35 mm, 126° with suture hole
28	131-398/10 Trial proximal spacer, 10 mm
29	131-398/20 Trial proximal spacer, 20 mm
30	317-661 Threaded rod with slap hammer

134-030/00 Instrument Tray 3, tapered reamers 160 - 250 mm



	REF	Description
1	134-031/00	Instrument tray 3, empty
2	134-600/00	Tapered reamer, Ø 12 mm, for stem size 250 mm
3	134-600/01	Tapered reamer, Ø 14 mm, for stem size 250 mm
4	134-600/02	Tapered reamer, Ø 16 mm, for stem size 250 mm
5	134-600/03	Tapered reamer, Ø 18 mm, for stem size 250 mm
6	134-600/04	Tapered reamer, Ø 20 mm, for stem size 250 mm
7	134-600/05	Tapered reamer, Ø 22.5 mm, for stem size 250 mm
8	134-600/06	Tapered reamer, Ø 25 mm, for stem size 250 mm
9	134-500/00	Tapered reamer, Ø 12 mm, for stem size 160 - 210 mm
10	134-500/01	Tapered reamer, Ø 14 mm, for stem size 160 - 210 mm
11	134-500/02	Tapered reamer, Ø 16 mm, for stem size 160 - 210 mm
12	134-500/03	Tapered reamer, Ø 18 mm, for stem size 160 - 210 mm
13	134-500/04	Tapered reamer, Ø 20 mm, for stem size 160 - 210 mm
14	134-500/05	Tapered reamer, Ø 22.5 mm, for stem size 160 - 210 mm
15	134-500/06	Tapered reamer, Ø 25 mm, for stem size 160 - 210 mm

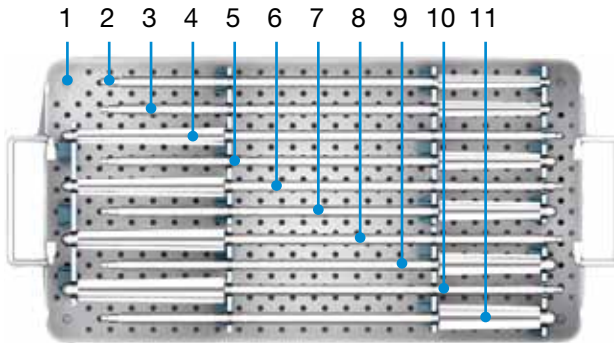
134-040/00 Instrument Tray 4, tapered reamers 290 - 330 mm



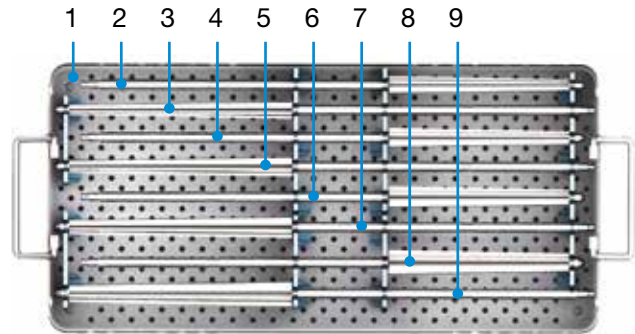
	REF	Description
1	134-041/00	Instrument tray 4, empty
2	134-800/00	Tapered reamer, Ø 12 mm, for stem size 330 mm
3	134-800/01	Tapered reamer, Ø 14 mm, for stem size 330 mm
4	134-800/02	Tapered reamer, Ø 16 mm, for stem size 330 mm
5	134-800/03	Tapered reamer, Ø 18 mm, for stem size 330 mm
6	134-800/04	Tapered reamer, Ø 20 mm, for stem size 330 mm
7	134-800/05	Tapered reamer, Ø 22.5 mm, for stem size 330 mm
8	134-800/06	Tapered reamer, Ø 25 mm, for stem size 330 mm
9	134-700/00	Tapered reamer, Ø 12 mm, for stem size 290 mm
10	134-700/01	Tapered reamer, Ø 14 mm, for stem size 290 mm
11	134-700/02	Tapered reamer, Ø 16 mm, for stem size 290 mm
12	134-700/03	Tapered reamer, Ø 18 mm, for stem size 290 mm
13	134-700/04	Tapered reamer, Ø 20 mm, for stem size 290 mm
14	134-700/05	Tapered reamer, Ø 22.5 mm, for stem size 290 mm
15	134-700/06	Tapered reamer, Ø 25 mm, for stem size 290 mm

Additional Instrument Set, tapered reamers 5 and 6, odd

134-050/00 Instrument Tray 5
Tapered reamers, odd
160 - 250 m



134-060/00 Instrument Tray 6
Tapered reamers, odd
290 - 330 mm

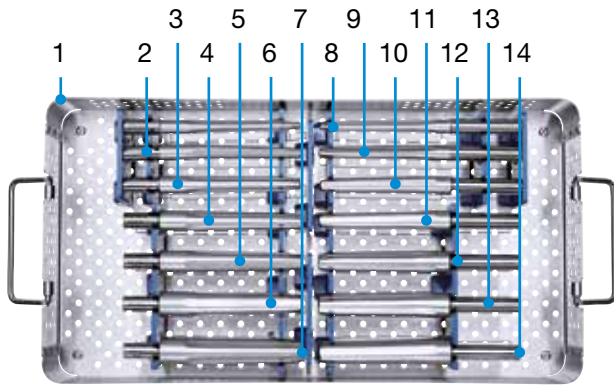


	REF	Description
1	134-051/00	Instrument tray 5, empty
2	134-500/07	Tapered reamer, Ø 13 mm for stem size 160 mm - 210 mm
3	134-500/08	Tapered reamer, Ø 15 mm for stem size 160 mm - 210 mm
5	134-500/09	Tapered reamer, Ø 17 mm for stem size 160 mm - 210 mm
7	134-500/10	Tapered reamer, Ø 19 mm for stem size 160 mm - 210 mm
9	134-500/11	Tapered reamer, Ø 21 mm for stem size 160 mm - 210 mm
11	134-500/12	Tapered reamer, Ø 24 mm for stem size 160 mm - 210 mm
4	134-600/09	Tapered reamer, Ø 17 mm for stem size 250 mm
6	134-600/10	Tapered reamer, Ø 19 mm for stem size 250 mm
8	134-600/11	Tapered reamer, Ø 21 mm for stem size 250 mm
10	134-600/12	Tapered reamer, Ø 24 mm for stem size 250 mm

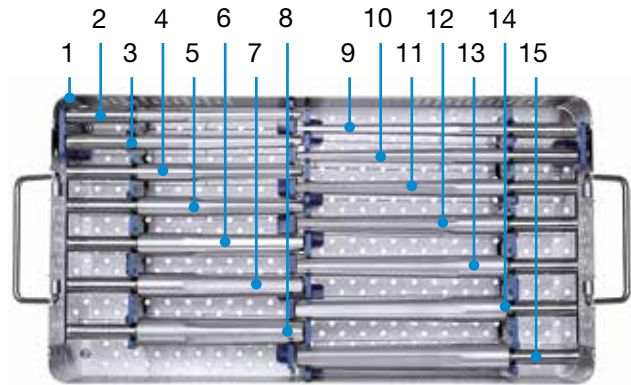
	REF	Description
1	134-061/00	Instrument tray 6, empty
2	134-700/09	Tapered reamer, Ø 17 mm for stem size 290 mm
4	134-700/10	Tapered reamer, Ø 19 mm for stem size 290 mm
6	134-700/11	Tapered reamer, Ø 21 mm for stem size 290 mm
8	134-700/12	Tapered reamer, Ø 24 mm for stem size 290 mm
3	134-800/09	Tapered reamer, Ø 17 mm for stem size 330 mm
5	134-800/10	Tapered reamer, Ø 19 mm for stem size 330 mm
7	134-800/11	Tapered reamer, Ø 21 mm for stem size 330 mm
9	134-800/12	Tapered reamer, Ø 24 mm for stem size 330 mm

Additional Instrument Sets

134-070/00 Instrument Tray 7,
trial stems 160 - 180 mm



134-080/00 Instrument Tray 8,
trial stems 210 - 250 mm

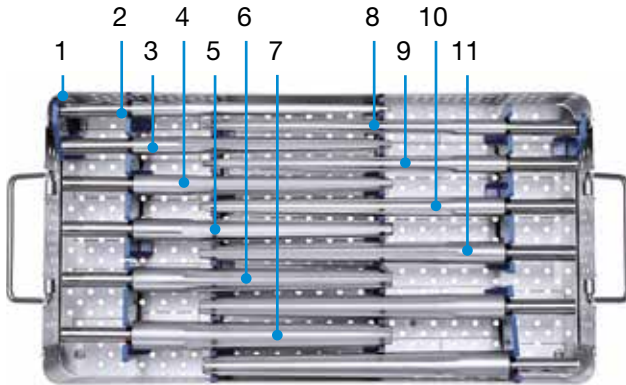


	REF	Description
1	134-071/00	Instrument tray 7, empty
2	134-900/14	Trial stem, Ø 14 mm, 160 mm
3	134-900/16	Trial stem, Ø 16 mm, 160 mm
4	134-900/18	Trial stem, Ø 18 mm, 160 mm
5	134-900/20	Trial stem, Ø 20 mm, 160 mm
6	134-900/22	Trial stem, Ø 22.5 mm, 160 mm
7	134-900/25	Trial stem, Ø 25 mm, 160 mm
8	99-0155/12	Trial stem, Ø 12 mm, 180 mm
9	99-0155/14	Trial stem, Ø 14 mm, 180 mm
10	99-0155/16	Trial stem, Ø 16 mm, 180 mm
11	99-0155/18	Trial stem, Ø 18 mm, 180 mm
12	99-0155/20	Trial stem, Ø 20 mm, 180 mm
13	99-0155/22	Trial stem, Ø 22.5 mm, 180 mm
14	99-0155/25	Trial stem, Ø 25 mm, 180 mm

	REF	Description
1	134-081/00	Instrument tray 8, empty
2	99-0142/12	Trial stem, Ø 12 mm, 210 mm
3	99-0142/14	Trial stem, Ø 14 mm, 210 mm
4	99-0142/16	Trial stem, Ø 16 mm, 210 mm
5	99-0142/18	Trial stem, Ø 18 mm, 210 mm
6	99-0142/20	Trial stem, Ø 20 mm, 210 mm
7	99-0142/22	Trial stem, Ø 22.5 mm, 210 mm
8	99-0142/25	Trial stem, Ø 25 mm, 210 mm
9	99-0143/12	Trial stem, Ø 12 mm, 250 mm
10	99-0143/14	Trial stem, Ø 14 mm, 250 mm
11	99-0143/16	Trial stem, Ø 16 mm, 250 mm
12	99-0143/18	Trial stem, Ø 18 mm, 250 mm
13	99-0143/20	Trial stem, Ø 20 mm, 250 mm
14	99-0143/22	Trial stem, Ø 22.5 mm, 250 mm
15	99-0143/25	Trial stem, Ø 25 mm, 250 mm

Additional Instrument Sets

**134-090/00 Instrument Tray 9,
trial stems 290 - 330 mm**



REF	Description
1 134-091/00	Instrument tray 9, empty
2 99-0144/14	Trial stem, Ø 14 mm, 290 mm
3 99-0144/16	Trial stem, Ø 16 mm, 290 mm
4 99-0144/18	Trial stem, Ø 18 mm, 290 mm
5 99-0144/20	Trial stem, Ø 20 mm, 290 mm
6 99-0144/22	Trial stem, Ø 22.5 mm, 290 mm
7 99-0144/25	Trial stem, Ø 25 mm, 290 mm
8 99-0145/14	Trial stem, Ø 14 mm, 330 mm
9 99-0145/16	Trial stem, Ø 16 mm, 330 mm
10 99-0145/18	Trial stem, Ø 18 mm, 330 mm
11 99-0145/20	Trial stem, Ø 20 mm, 330 mm
12 99-0145/22	Trial stem, Ø 22.5 mm, 330 mm
13 99-0145/25	Trial stem, Ø 25 mm, 330 mm

Preoperative Planning

In the interests of quality assurance, preoperative planning is advantageous and important, both in terms of the surgical procedure and for determining suitable prosthesis components for the particular situation. The goal is the anatomically correct positioning of the center of rotation, the correct leg length, and the preservation or restoration of sufficient musculature by avoiding medialization of the femur.

Attention to the anatomically correct CCD angle for the particular situation and the head-neck length are of major importance. The neck segments are available with CCD angles of 126° and 135° and the prosthesis heads with up to four head-neck lengths.

The suitable prosthesis size is determined with the aid of X-ray templates. This is done by positioning the templates on the X-ray or drawing in such a way that it is possible to obtain both the necessary distal fixation length of the prosthesis stem in the diaphysis and the proximal prosthesis length required to achieve the anatomically correct leg length.

As a general rule, the prosthesis stem should be measured in such a way that a positive-fit anchoring of the prosthesis is created over a length of at least 80 mm. To this end, it is necessary to make allowance for reaming of the cortical bone. The reduction of the cortical wall thickness caused by the reaming should not exceed 1.5 mm in the planning.

The basis for the planning should consist of two X-rays: a full pelvic view and a mediolateral view of the hip to be treated. For the full pelvic X-ray, it is important to ensure that:

1. Both femurs are depicted with sufficient length;
2. The femurs are parallel to each other and, if possible, in about 5° internal rotation;
3. The gonads are shielded carefully, but so sparingly that the important skeletal landmarks required for the planning – inferior borders of the obturator foramen/ inferior borders of the pelvic teardrops – are not concealed.

Measurements based on the X-rays must take into account the distortion in the X-ray. This is determined by two factors (Fig. 1):

1) Focal distance

Focal point X-ray tube $\leftarrow X \rightarrow$ Film cassette
A focal distance of 100 cm leads to magnification of the structures by about 10%.

The available X-ray templates are designed accordingly.

2) Object distance

Femoral axis $\leftarrow X \rightarrow$ Film cassette

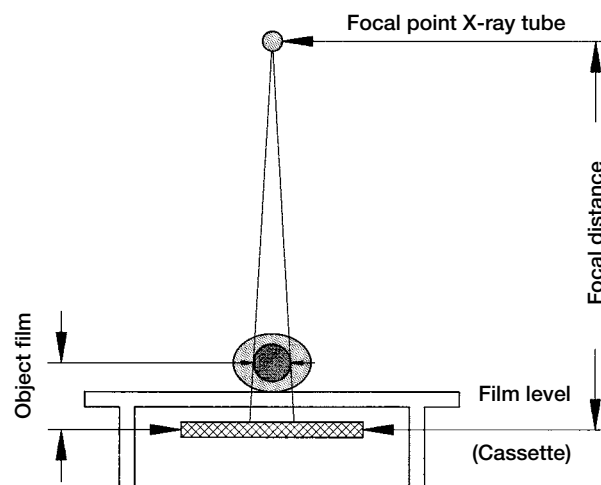


Fig. 1

Procedure

First, geometrical measurements of the situation are taken on the basis of the full pelvic X-ray. This can be done on the X-ray itself or with a suitable planning software (Fig. 2). Alternatively, the skeletal contours can be traced onto tracing paper (Fig. 3).

First, a horizontal reference line is drawn, e.g., at the inferior border of the obturator foramen, then a vertical reference line through the center of the pubic symphysis. Taking these lines as a basis, all the other important measurements for the pivot/head, leg length difference, left/right femoral distances, distance between the left/right muscle T lever arms, etc., are entered using the parallel displacement technique.

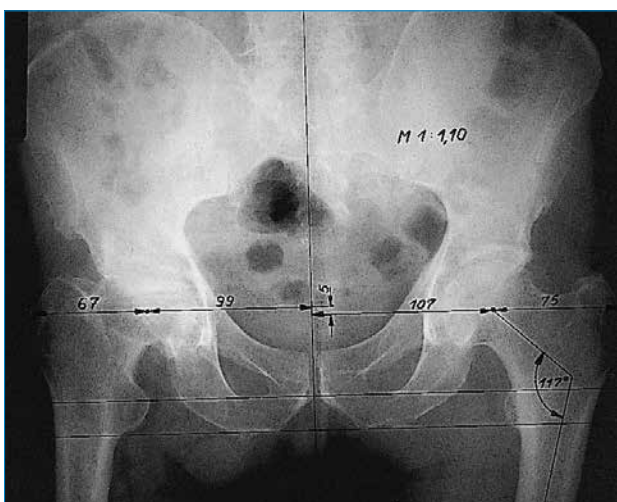


Fig. 2

Once the dimensions have been entered, the X-ray templates are used to select the best implant components for the particular case.

The X-ray template is positioned in such a way that the center of rotation of the head coincides with the anatomical center of rotation as determined in the drawing. When selecting the prosthesis components, attention must also be paid to selecting items which sufficiently correct any anatomical insufficiencies identified from the measurements.

In addition to the A-P full pelvic view X-ray, the medio-lateral X-ray is used to determine the stem design and size of the femoral prosthesis as seen from the side.

This gives an overview, which also provides information for the surgical procedure, e.g., transfer of dimensional references to the bone, in the form of landmarks. It must always be remembered, however, that the measurements on the X-ray include a magnification effect, which must be allowed for when the measurements are transferred to the bone. If the magnification is 10%, measurements taken from the X-ray must be divided by 1.1; e.g., 60 mm apparent \div 1.1 = 54.5 mm actual measurement.

Other magnifications must be similarly allowed for, e.g., at 15% magnification a measurement of 60 mm on the X-ray \div 1.15 = 52.2 mm actual measurement.

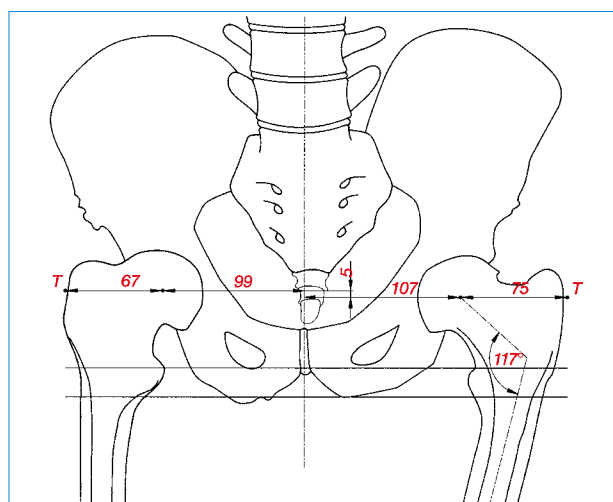


Fig. 3

The planned result becomes clearer when the transparent sheet with the traced skeletal contours, measurements, and sketched-in position of the acetabular element is placed on top of the X-ray and adjusted so that the femur in the X-ray is in the desired outcome position in relation to the drawing of the pelvis. This position is then traced onto the tracing paper, preferably in a different color (Fig. 4). The same procedure can also be performed using planning software.

The divergences on the planning documentation, e.g., actual and planned positions of the femurs, provide the visual overview required both for surgical planning and for precise selection of the prosthetic components using the X-ray templates or for custom-designing prostheses if necessary (Fig. 5).

Materials required:

1. Transparent paper
2. Transparent rule 1:1
3. Transparent protractor
4. Transparent radius/hole template
 \varnothing 24 to 58 mm in 2 mm increments or suitable planning software

Note:

Preoperative planning may be time-consuming, but the time spent results in better intraoperative support and enhanced quality assurance.

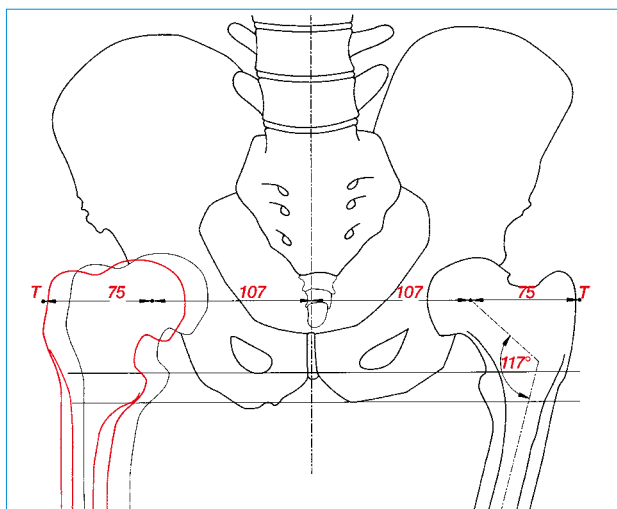


Fig. 4

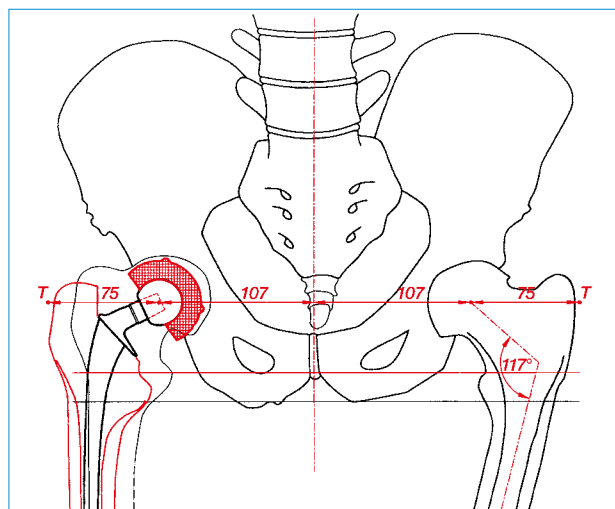


Fig. 5



Fig. 6



Fig. 7

The surgical instructions below for reconstructing a damage hip joint using the MP Reconstruction Prosthesis depict an idealized surgical situation. However, every revision procedure has individual particularities, and the surgeon decides during the surgery which method can be expected to achieve the most success in the current case.

Prosthesis Removal

In-situ implants and the bone cement must be completely removed before implanting an MP Reconstruction Prosthesis. When doing so, always use the instruments specifically designed for the implant being revised or the LINK revision instrument set 130-698/01.

Reaming of Medullary Canal

The reaming of the femoral canal begins with a **tapered reamer** corresponding to the planned prosthesis stem length (A), but with a diameter 1-2 sizes smaller than the planned stem diameter; this does not apply when using the smallest diameter (Ø12 mm 160 - 250 mm).

The reaming depth is determined by the position of the ring markings on the shaft of the tapered reamer. The marking should be in relation to an anatomical landmark on the bone, determined during the preoperative planning.

If no proximal spacers are used, the position of the lower marking ring should be at the medial level of the original femoral neck resection (Fig. 8). This landmark can be easily identified on the X-ray, enabling a reference marking to be determined for the surgery.

Note:

The fourth ring is approximately at the level of the tip of the greater trochanter, and the lower ring a thumb's breadth above the lesser trochanter – always without the use of proximal spacers.

The tapered reamers should only ever be screwed into the femoral canal as far as indicated by the position of the marking ring to the specified landmark.

The reaming must be performed carefully. The tapered reamer must not become hot to the touch. For this reason, we urgently recommend performing the reaming by hand.

The last tapered reamer is used to prepare the medullary canal until contact is made with the endosteal cortical bone. The minimum contact height of 80 mm targeted for stable fixation of the prosthesis stem in the bone must be verified intraoperatively by means of radioscopic control (Fig. 8).

In addition, the surgeon can check whether contact surface is sufficiently large when the last tapered reamer is carefully removed clockwise. Bone particles on the tapered reamer shaft can provide information on the reaming distance, which should generally not be below 80 mm.

The last reaming step must always be performed with a diameter identical to that of the implant stem. For example, if an implant with Ø 18 mm is used, the last reaming step must be performed with a Ø 18 mm tapered reamer.

Reaming depth without proximal spacer(s)

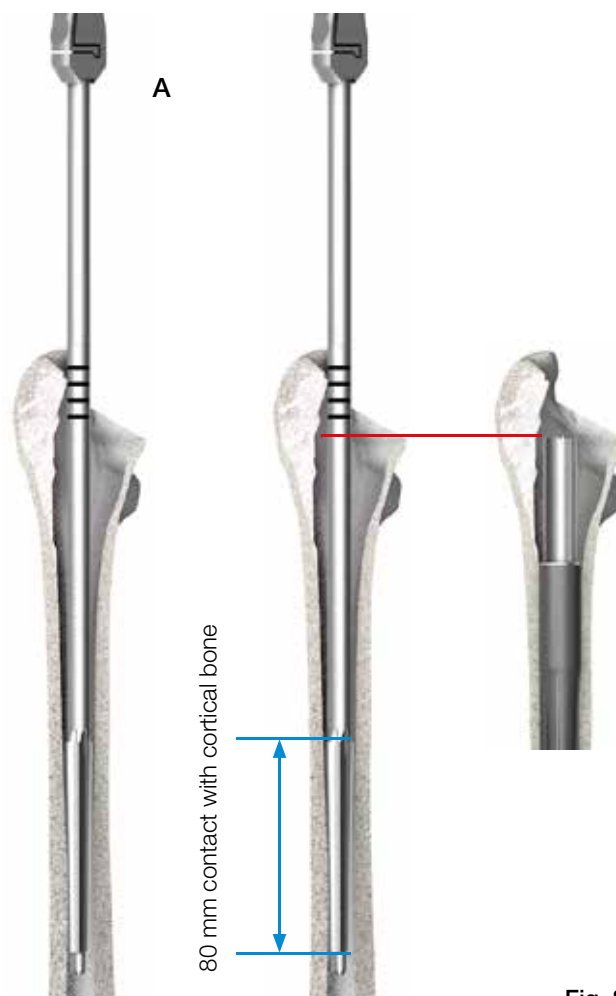


Fig. 8

Insertion of the Prosthesis Stem

The selected **MP stem** (B), which corresponds to the size of the last tapered reamer used, is screwed tightly to the **inserter for stems** (C).

The line marking on the stem identifies the side of the stem which indicates the 3° angle (Fig. 10, center). The orientation of the marking is used for a better overview when inserting the stem. The arrow on the striking surface now indicates where the angle of the stem is. This makes it possible to insert the MP stem into the femoral canal precisely aligned to the natural curvature of the femur (Fig. 10/with curvature).

The stem is then carefully driven in to the final depth using a mallet. The final position must be verified by means of radioscopic control (Figs. 11 and 12).

The MP stem must not be driven in deeper than intended in the preoperative planning. Should it prove impossible to achieve stable fixation of the stem at the intended depth due to poor bone quality, any shortening of the leg that results from driving the stem in deeper can be compensated by using proximal spacers of up to 30 mm (10 mm, 20 mm, or 20 + 10 mm).

Intentional lengthening of the leg is also possible with a proximal spacer (Fig. 9).

Secure fixation of the MP prosthesis stem in the medullary canal is always given utmost priority.



Fig. 9



Preparation of the Metaphyseal Medullary Space

If required, a special **hollow reamer (134-200/00)** is used to prepare the implant bed for the neck segment (Fig. 14).

There are **two guides and stops** available for positioning the reamer on the in-situ stem. Their length must be selected according to the neck segment being used (Fig. 13).

Short reamer guide --> long neck segment (x)

Long reamer guide --> short neck segment (y)

The reamer guide can be screwed into the stem by hand or using the hex screwdriver.

The reamer guide also serves as a stop to avoid the teeth of the hollow reamer from coming into contact with the edge of the lower portion of the stem.

Irrigation is recommended to avoid overheating of the bone.

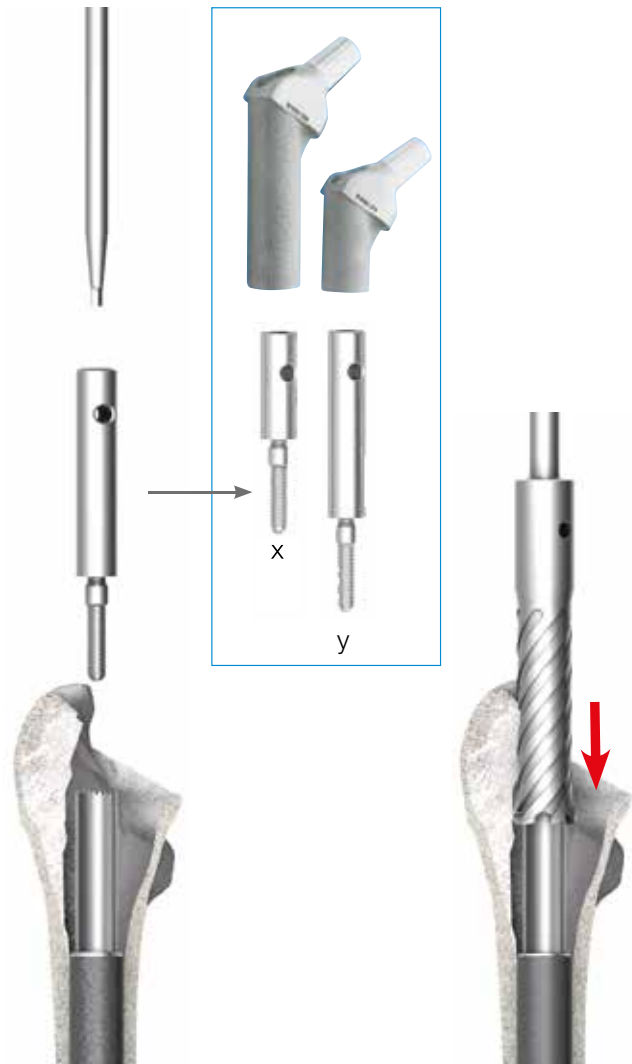


Fig. 13

Fig. 14

Trial Reduction

The **guide rod (G)**, which simplifies positioning of the **trial neck segment (H)** and, where used, the trial proximal spacers, is screwed into the thread of the implanted stem and fixed in place using a hex screwdriver (Fig. 15).

For the functional test, a **trial neck segment (H)** is mounted on the **insertor (I)**, then pushed over the **guide rod (G)** and onto the implanted prosthesis stem. The teeth inside the trial neck segment must fit into the tothing on the stem.

The trial neck segment can be simply tested by turning it backward and forward (Fig. 16).

The secure seating should be checked with the **caliper (K)**, which is placed on the **trial neck segment (H)**. The connection is secure if – when no trial proximal spacers are used – the **“0” gauge mark** on the scale of the guide rod is visible in the recess on the caliper.

The same applies accordingly for the **“10” gauge mark** when a 10 mm trial proximal spacer is used (Fig. 17).

The caliper and the guide rod are removed once the trial neck segment is in position. Depending on whether/which trial proximal spacers are used, a short trial screw (for no trial proximal spacer or a 10 mm trial proximal spacer) or a long trial screw (for a 20 mm trial proximal spacer or a combination of 10 mm and 20 mm trial proximal spacers) is screwed through the neck segment and into the stem and tightened with a screwdriver (Fig. 18), ensuring that the neck segment is aligned in the correct antetorsion.

Following positioning of a colored **trial head (P)**, the hip can be reduced and its function checked (Fig. 19):

- Joint stability
- Range of movement
- Impingement



Fig. 15

Fig. 16

Fig. 17

Fig. 18

Fig. 19

Leg Length and Lateralization

Leg length can be corrected by 10 mm, 20 mm, or 30 mm (combination of 10 mm and 20 mm proximal spacers) by using trial proximal spacers (Fig. 20 + 21).

Fine tuning of the leg length and different lateralization of the prosthesis stem can be achieved by selecting:

- Neck segment with 126° or 135° CCD angle (Fig. 21) in standard neck length or XXL neck length (Fig. 22) or
- Trial head with suitable head-neck length (Fig. 23)

A long trial neck segment is obligatory when trial proximal spacers are used.

Short trial neck segments must not be used with trial proximal spacers (Fig. 21).

Antetorsion

The antetorsion angle can be corrected by turning the trial neck segment after loosening the fixation screw. The desired position should then be marked on the bone so that the final neck segment can be positioned correctly.

Trial fixation screws

A short trial fixation screw is required if no trial proximal spacer or a 10 mm trial proximal spacer is used. If a 20 mm trial proximal spacer, or a combination of a 20 mm and a 10 mm proximal spacer, is used, then only the long trial fixation screw may be used (Fig. 24).

Use of a Longer Trial Neck Segment

Replacing an originally used 35 mm trial neck segment with a 65 mm trial neck segment can require the use of the hollow reamer due to the longer tubular neck of the 65 mm segment.

Once the leg length, antetorsion and joint stability have been checked, the trial prostheses can be removed.



Fig. 20

Fixation screws (trial + implant)
 Proximal spacers (trial + implant)

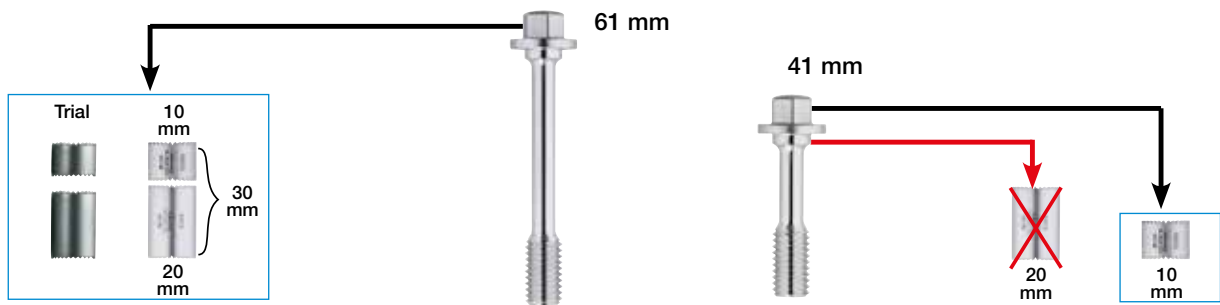


Fig. 21

Neck segments (trial + implant)
 Proximal spacers (trial + implant)

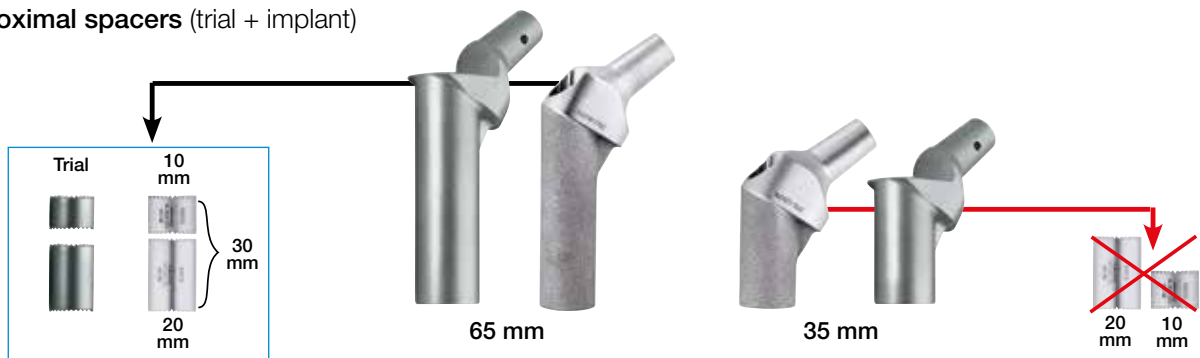


Fig. 22

Final Assembly

Assembly of Neck Segment

The guide rod (G) is screwed onto the stem again (Fig. 23).

The neck segment and proximal spacers (if used) are placed over the **guide rod** (G) onto the stem using the **inserter** (I) (Fig. 20). A marking made on the bone during the trial run is used to align the neck segment in the correct antetorsion position.

Only the 65 mm neck segment may be used in combination with proximal spacers. A 35 mm neck segment may only be used without proximal spacers.

It is imperative to ensure that the teeth of the proximal stem interlock with the teeth of the proximal spacers or (in the absence of proximal spacers) the neck segment. This can easily be checked by turning the neck segment gently to and fro with the aid of the inserter. There must be no bone particles or soft tissue between the teeth.

The secure seating of the neck segment is checked with the **caliper** (K) in the same way as for the trial implant (Fig. 25). The connection is secure if, when no proximal spacers are used, the “0” mark on the scale of the guide rod is visible in the “window” of the caliper. The “10”, “20”, or “30” scale marking must be visible when 10 mm, 20 mm, or a combination of 10 mm and 20 mm, proximal spacers are used.

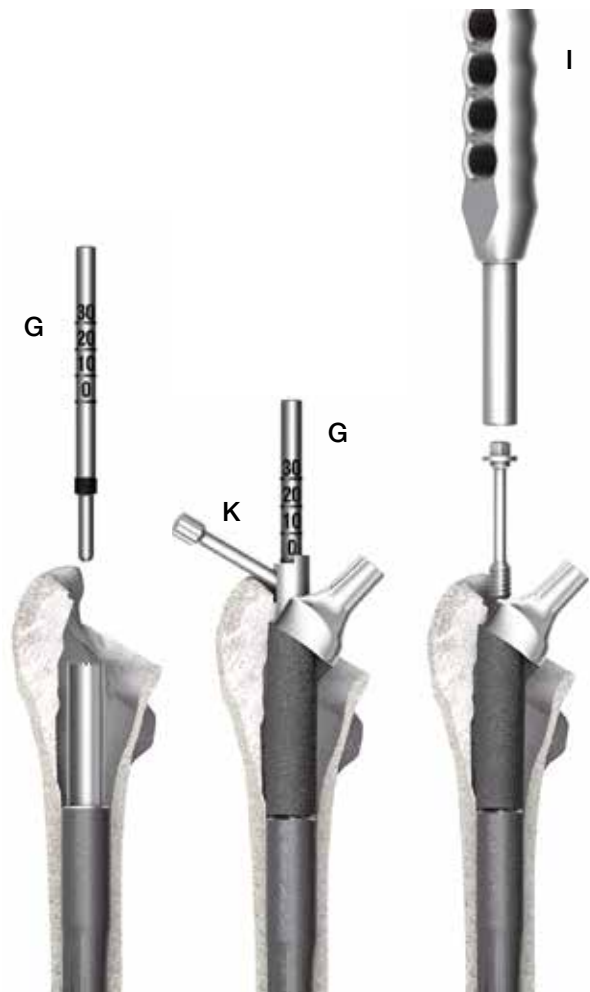


Fig. 23

Fig. 24

Fig. 25

Expansion Bolts

The stem, proximal spacers if used, and neck segment are connected with a short (41 mm) or long (61 mm) expansion bolt (M), depending on the selected neck segment length and the number of proximal spacers (Fig. 26). The bolt fixes the MP neck segments securely to the modular MP prosthesis stems.

LINK implants and expansion bolts can only be used once. It is not possible to reuse them because no expansion occurs when the bolt is tightened a second time. The torque wrench (N) is supplied with a calibration certificate and separate instructions for use, and must be subjected to a functional test after 250 uses.

To this end, the instrument should be sent to Waldemar Link GmbH & Co. KG.

The torque wrench must never be used to loosen screw connections, as this could have a negative effect on its function.

Important:

There are two screw lengths available:

41 and 61 mm

- Use of the short screw (41 mm):
no proximal spacer or a 10 mm proximal spacer
- Use of the long screw (61 mm):
a 20 mm proximal spacer or combination of a 10 mm and a 20 mm proximal spacer (30 mm in total)

The screwdriver (I) (page 28) is used to screw the expansion bolt in all the way and tighten it gently (Fig. 26). The neck segment is then gripped by the taper using the inserter forceps (M) and the expansion bolt is tightened using the torque wrench (N).

Once the necessary torque is reached, the torque wrench emits a loud snap.

A final trial reduction with a suitable trial head is then performed to determine the final head-neck length.

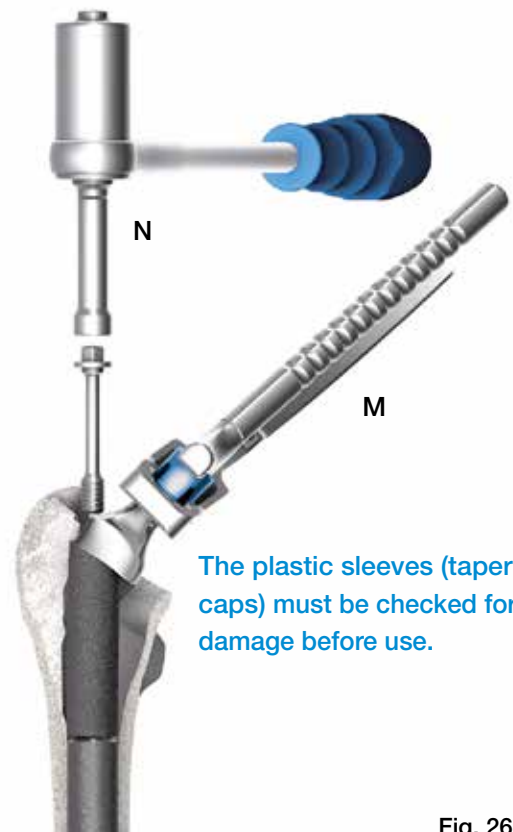


Fig. 26

The final prosthesis head is positioned on the carefully cleaned and dried taper of the neck segment and secured in place with a gentle blow on the inserter (Fig. 27).

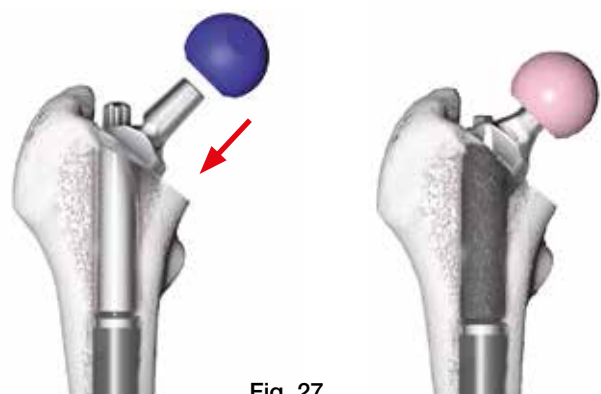


Fig. 27

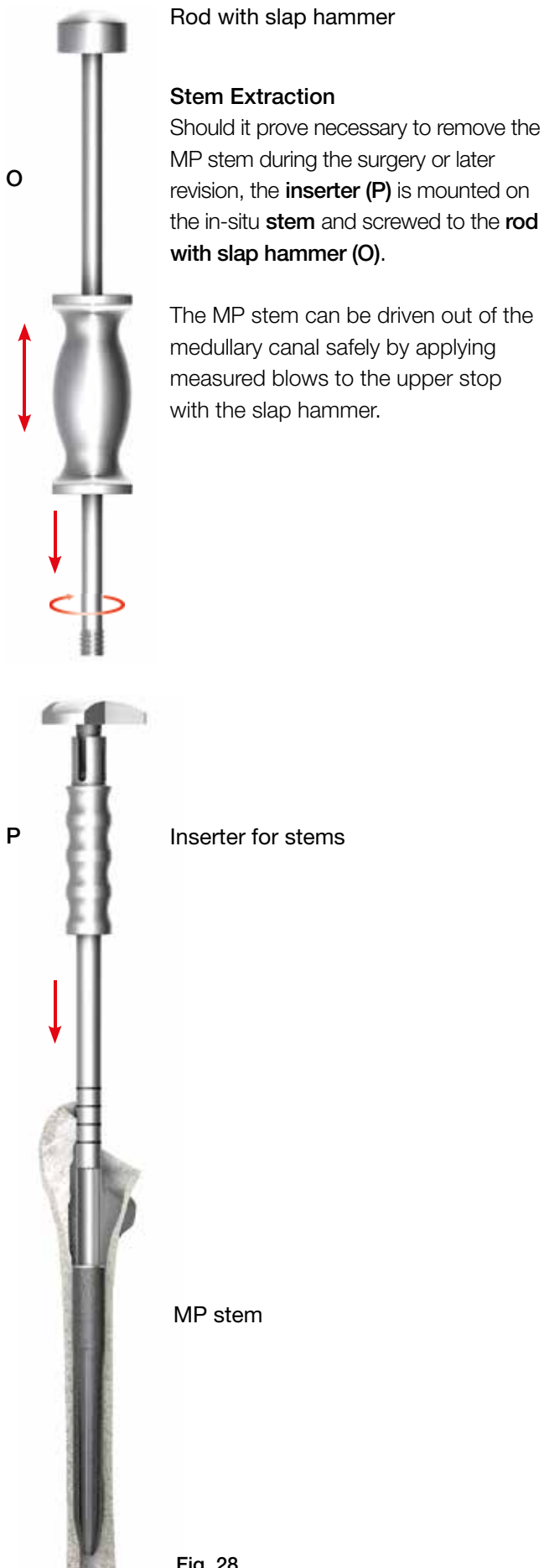


Fig. 28

Accessories

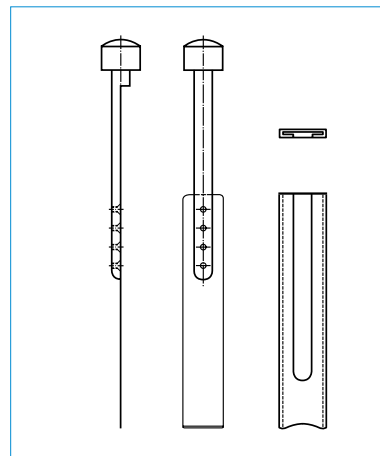
Additional Instruments

(not included in instrument set)



Blade Chisel with Sheath, 250 mm

REF	Width mm	Working length mm
65-1700/20	20	65
65-1700/25	25	65



X-ray Templates

X-ray Templates

REF	CCD angle	Head-Ø mm	Neck length	for stem length mm	Set
175-870/02	126°	32	Short (S)	160	7 plates
175-870/05	135°	32	Short (S)	160	7 plates
175-870/08	126°	32	Medium (M)	180	7 plates
175-870/11	135°	32	Medium (M)	180	7 plates
175-870/14	126°	32	Long (L)	210-330	7 plates
175-870/17	135°	32	Long (L)	210-330	7 plates

Cleaning and Care Instructions

Specific instructions for instruments are available on request from info@linkbio.com

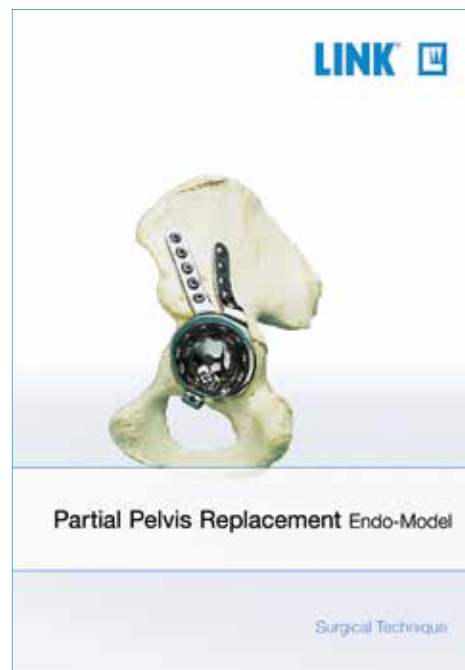
MEGASYSTEM-C Tumor and Revision System

The modular reconstruction system for tumor and revision surgery, **MEGASYSTEM-C**, was developed in cooperation with Prof. Dr. Capanna of the Orthopedic Traumatology Center of Florence.

The high degree of modularity of this system allows both partial bone replacement in the proximal and distal femur regions in 10 mm increments and also customized total femur replacement. For knee arthroplasty, the **Endo-Model SL Knee Replacement System** is integrated in the MEGASYSTEM-C. The modularity means that physicians are able to respond flexibly to intraoperative situations as they arise.

The incorporation of biomechanical loading and anchoring principles plus the many years of experience gained from the use of proven implant components ensure a maximum degree of system reliability and thus the best possible prospects for the surgical outcome.

- Maximum intraoperative flexibility thanks to highly modular implant components, without the expense of a custom-made prosthesis
- System-integrated thanks to compatibility with standard implant systems (MP hip revision system and Endo Model knee components)
- Knee components based on the successful Endo Model knee implants with many years of clinical experience
- Decades of experience with proven and clinically successful coupling mechanisms
- Cementable and cementless fixation stems
- Intraoperative length adjustment in 10 mm steps
- Microporous or CaP-coated implant surfaces
- Simple, system-integrated instrument set



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The Journal of Arthroplasty, In Press, Corr. Proof, Av. online 19 Oct 2012 (H174)

Indications/Contraindications

Specified Indications and Contraindications: MP Reconstruction System
General indications
Mobility-limiting diseases, fractures or defects of the hip joint and the proximal femur which cannot be treated by conservative or osteosynthetic procedures.
Indications
Revision arthroplasty due to juxta-articular bone defects
Revision of loosened femoral prosthesis components involving extensive bone resorption of the proximal femur and widening of the medullary cavity or marked thinning of proximal femoral cortical bone
Revision of loosened femoral prosthesis components by peri-/subprosthetic fracture
Deformed proximal femur due to fractures or osteotomies
Correction of bone deficiencies, e.g. due to tumors
Large post-revision and post-trauma segmental bone defects
Contraindications
Acute or chronic infections, local and systemic
Allergies to (implant) materials
Revision in septic environment
For preparation of the prosthesis bearing insufficient length of intact diaphysis (less than 80 mm)
Distinctive muscular, nerve, vascular or other diseases which put the affected limb at risk.
Insufficient bone integrity which prevents a stable anchorage of the prosthesis.
Relative contraindications
Adiposity
Lacking or foreseeable not assured compliance
Foreseeable overload/overstressing of joint prosthesis

The LINK MP Reconstruction Prosthesis is for cementless use only.

The above indications and contraindications are based on standard cases. The final decision regarding an implant must be made by the surgeon for each patient on the basis of the surgeon's individual analysis and experience.

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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The Surgical Technique described has been written to the best of our knowledge and belief, but it does not relieve the surgeon of his/her responsibility to duly consider the particularities of each individual case.

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