Angular Stable X-Plate and 2-Hole Plate. For osteotomies, arthrodeses and fractures of the foot.

Surgical technique
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Warning
This description alone does not provide sufficient background for direct use of DePuy Synthes products. Instruction by a surgeon experienced in handling these products is highly recommended.

Processing, Reprocessing, Care and Maintenance
For general guidelines, function control and dismantling of multi-part instruments, as well as processing guidelines for implants, please contact your local sales representative or refer to:
http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance
For general information about reprocessing, care and maintenance of Synthes reusable devices, instrument trays and cases, as well as processing of Synthes non-sterile implants, please consult the Important Information leaflet (SE_023827) or refer to:
http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance

See also the surgical technique for the LCP locking compression plate (036.000.019)
Angular Stable X-Plate and 2-Hole Plate. For osteotomies, arthrodeses and fractures of the foot.

System description
The X-plate and 2-hole plate have threaded round holes allowing insertion of 2.7 mm locking screws (head 2.4 mm) without the screw heads protruding.

The angles of the round threaded holes allow insertion of a locking screw through an osteotomy or arthrodesis to correspondingly increase fixation stability.

Angular stability
– Stable connection between plate and screw
**X-shape**
- The plate adapts easily to the anatomy of the foot
- Arms can be easily bent for an adaptable screw path

**Crescentic saw blade guided by Kirschner wire**
- Exact positioning of the osteotomy and precise guidance of the saw using a 1.6 mm Kirschner wire
- Short cutting time
- Minimum shortening of the 1st metatarsal

**Greater deflection of two screw holes**
- Transversing the osteotomy or arthrodesis with a locking screw increases stability
Indications

X-plate

Arthrodesis
  - MTP
  - MTC
  - Talonavicular
  - Calcaneo-Cuboid

Proximal osteotomies
  - Crescentic
  - Ludloff
  - Mau
  - Open wedge
  - Closing wedge

Calcaneal osteotomies

Fractures
  - Single
  - Multifragmental

2-hole plate
  - Akin osteotomy
**Implants**

**X-plate, pure titanium**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>447.711*</td>
<td>X-Locking Plate 2.4/2.7, x-small, 22×14 mm, Pure Titanium</td>
<td></td>
</tr>
<tr>
<td>447.702*</td>
<td>X-Locking Plate 2.4/2.7, small, 24×18 mm, Pure Titanium</td>
<td></td>
</tr>
<tr>
<td>447.704*</td>
<td>X-Locking Plate 2.4/2.7, medium, 30×20 mm, Pure Titanium</td>
<td></td>
</tr>
<tr>
<td>447.706*</td>
<td>X-Locking Plate 2.4/2.7, large, 36×20 mm, Pure Titanium</td>
<td></td>
</tr>
</tbody>
</table>

**X-plate, stainless steel**

<table>
<thead>
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<th>Description</th>
<th>Material</th>
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</thead>
<tbody>
<tr>
<td>247.711*</td>
<td>X-Locking Plate 2.4/2.7, x-small, 22×14 mm, Steel</td>
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<tr>
<td>247.702*</td>
<td>X-Locking Plate 2.4/2.7, small, 24×18 mm, Steel</td>
<td></td>
</tr>
<tr>
<td>247.704*</td>
<td>X-Locking Plate 2.4/2.7, medium, 30×20 mm, Steel</td>
<td></td>
</tr>
<tr>
<td>247.706*</td>
<td>X-Locking Plate 2.4/2.7, large, 36×20 mm, Steel</td>
<td></td>
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</table>

**2-hole plate**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>447.710*</td>
<td>Locking Plate 2.4/2.7, straight, 2 holes, 17×6.0×1.6 mm, Pure Titanium</td>
<td></td>
</tr>
<tr>
<td>247.710*</td>
<td>Locking Plate 2.4/2.7, straight, 2 holes, 17×6.0×1.6 mm, Steel</td>
<td></td>
</tr>
</tbody>
</table>

**Locking screws**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>402.206–260</td>
<td>LCP Locking Screws Stardrive ⊗ 2.7 mm (head 2.4 mm), self-tapping, length 6–60 mm, TAN</td>
<td></td>
</tr>
<tr>
<td>202.206–260</td>
<td>LCP Locking Screws Stardrive ⊗ 2.7 mm (head 2.4 mm), self-tapping, length 6–60 mm, Steel</td>
<td></td>
</tr>
</tbody>
</table>

* Available sterile and non-sterile
This particular surgical technique is restricted to a crescentic osteotomy at the base of the 1st metatarsal fixed with an X-plate. Preoperative planning is not described. The distal soft tissue release, the removal of the exostosis, and the mobilization of the sesamoid bone are not explained either.

1 Approach to and performance of the osteotomy

If the surgeon does not have the specific instruments cited here, the crescentic osteotomy can also be performed with instruments of his or her choice.

<table>
<thead>
<tr>
<th>Required instruments</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Oscillating Saw Attachment II Crescentic Technique</td>
<td>532.023</td>
</tr>
<tr>
<td>Saw Blade 30 x 17.9 x 0.6 mm, crescentic, for Oscillating Saws, sterile</td>
<td>03.000.313S</td>
</tr>
<tr>
<td>Saw Blade 30 x 21.9 x 0.6 mm, crescentic, for Oscillating Saws, sterile</td>
<td>03.000.316S</td>
</tr>
</tbody>
</table>

The metatarsal I base is approached through a 3-4 cm long dorsal incision. Expose the extensor hallucis longus and the brevis tendons. Hold the latter medially or laterally to the side.

Identify the metatarsal I/cuneiform I articular cavity with a Kirschner wire or the image intensifier.

At an angle as close as possible to 120°, insert a 1.6 mm Kirschner wire into the sagittal plane that runs through the lengthwise axis of the 1st metatarsal. The distance between the osteotomy and the MTC joint should be 1 cm. (a)

A neutral orientation in the mediolateral plane is desirable. Medial orientation of the Kirschner wire may lead to the elevation of the distal metatarsal fragment and pronation of the toe. Conversely, a lateral orientation of the Kirschner wire may lead to the depression of the distal metatarsal fragment and supination of the toe. (b)

Insert the Colibri Power Tool with the oscillating saw attachment over the Kirschner wire. Keep a firm grip on the drilling machine while performing the osteotomy. (c)
2

Correct the intermetatarsal angle

Position both metatarsal fragments with two bone holding forceps or two Kirschner wires by pressing the proximal fragment in a medial direction, and the distal fragment in a lateral direction.

![Diagram showing the correction of the intermetatarsal angle.]

Insert a Kirschner wire running from a medial-distal to a proximal direction to provide temporary fixation.

**Precaution:** Do not elevate the distal metatarsal.
3

Bend the X-plate

Required instruments

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bending Pin for LCP Plates 2.4 and 2.7, with thread</td>
<td>329.922</td>
</tr>
<tr>
<td>Universal Bending Pliers, length 167.5 mm</td>
<td>391.963</td>
</tr>
</tbody>
</table>

With the assistance of 2 bending pins or a forceps and one bending pin, adapt the X-plate to the anatomy.

Warning: Only a slight amount of bending is necessary. Repeatedly bending the plate causes material fatigue and must therefore be avoided.

4

Predrill and fix the plate

Required instruments

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCP Drill Sleeve 2.7 (head LCP 2.4), with Scale up to 60 mm</td>
<td>323.061</td>
</tr>
<tr>
<td>Drill Bit Ø 2.0 mm, with double marking, length 140/115 mm</td>
<td>323.062</td>
</tr>
<tr>
<td>Depth Gauge for Screws Ø 2.7 to 4.0 mm, measuring range up to 60 mm</td>
<td>319.010</td>
</tr>
<tr>
<td>Screwdriver Shaft Stardrive SD8, self-holding</td>
<td>314.467</td>
</tr>
<tr>
<td>Torque Limiter, 0.8 Nm, with AO/ASIF Quick Coupling</td>
<td>511.776</td>
</tr>
<tr>
<td>Handle with Quick Coupling</td>
<td>311.430</td>
</tr>
</tbody>
</table>

The first locking screw is inserted from a distal to proximal direction through the osteotomy.

Note: The angle of the threaded holes identified with two dots is stronger to make it easier to insert a locking screw through the osteotomy.

Screw the LCP drill guide into the plate hole. Predrill the hole with a 2.0 mm drill with a scale. Read the screw length on the drill guide scale.

Precaution: You must use the LCP drill guide for the drill hole and plate thread to be aligned on the same axis.
Alternatively, determine the screw length with the depth gauge.

Introduce the measured length of the 2.7 mm locking screw (2.4 mm head). For the screw to lock properly, manually screw in the last threads using the 0.8 Nm torque limiter.

Insert the other locking screws in the same manner. After predrilling, always first screw in the locking screw before starting on the next hole. Remove the Kirschner wire used for temporary fixation.
Surgical technique – X-plate
1st TMT arthrodesis

The X-plate is for neutralization.

1

Preparing the arthrodesis

Localize the 1st TMT joint with a Kirschner wire or another method. The approach is through a dorsomedial incision. Prepare the joint surfaces for internal fixation.

Temporarily fix the joint with a Kirschner wire or clamp.
2

Compress

Insert a compression screw from a proximal to distal direction or visa versa. (Alternatives: from a plantar-distal to proximal-dorsal direction, or from a plantar-proximal to a distal-dorsal direction). Remove the temporary fixation.

3

Bend the plate

Required instruments
- Bending Pin for LCP Plates 2.4 and 2.7, with thread 329.922
- Universal Bending Pliers, length 167.5 mm 391.963

With the assistance of 2 bending pins or a forceps and one bending pin, adapt the X-plate to the anatomy.

Warning: Only a slight amount of bending is necessary. Repeatedly bending the plate causes material fatigue and must therefore be avoided.
Insert the locking screws

Required instruments

<table>
<thead>
<tr>
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<tr>
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</tr>
<tr>
<td>Handle with Quick Coupling</td>
<td>311.430</td>
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</tbody>
</table>

The locking screws can be inserted in any sequence.

Screw the LCP drill guide into the plate hole. Predrill the hole with a 2.0 mm drill with a double marking. Read the screw length on the drill guide scale.

Alternatively, determine the screw length with the depth gauge.
Introduce the measured length of the 2.7 mm locking screw (2.4 mm head). For the screw to lock properly, manually insert the last threads using the 0.8 Nm torque limiter.

Introduce the other locking screws in the same manner. After predrilling, always first insert the locking screw before proceeding to the next hole.
Surgical technique 2-hole plate
Fixation of an Akin osteotomy

Preoperative planning is not described.

1

Osteotomy
A medial incision is made. Perform the osteotomy. Retain the lateral cortex. Stabilize with a Kirschner wire if necessary.

Precaution: If the lateral cortex is fractured, the osteotomy must be stabilized with a Kirschner wire.

2

Affix the plate

Required instruments

<table>
<thead>
<tr>
<th>Item</th>
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</thead>
<tbody>
<tr>
<td>LCP Drill Sleeve 2.7 (head LCP 2.4), with Scale up to 60 mm</td>
<td>323.061</td>
</tr>
<tr>
<td>Drill bit Ø 2.0 mm, with double marking, length 140/115 mm</td>
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<tr>
<td>Handle with Quick Coupling</td>
<td>311.430</td>
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</table>

In most cases, this plate does not have to be bent.

Screw the LCP drill guide into the plate hole. Predrill the hole with a 2.0 mm drill with a scale. Read the screw length on the drill guide scale. Alternatively, determine the screw length with the depth gauge.

Precaution: You must use the LCP drill guide for the drill hole and plate thread to be aligned on the same axis.

Introduce the measured length of the 2.7 mm locking screw (2.4 mm head). For the screw to lock properly, manually insert the last threads using the 0.8 Nm torque limiter.

Use the same procedure for the second locking screw.
3

After internal fixation

If a Kirschner wire was used, remove it now.

Note: If the lateral cortex is fractured, leave the Kirschner wire in place.

Implant Removal

In case the physician decides to remove the implants, implants can be removed by using general surgical instruments. In case of difficult removal circumstances, a Screw Extraction Set is available with corresponding instructions (036.000.917).
### Ordering Information

| 01.282.104 | Compact Foot X-Locking Plate 2.4/2.7 and Locking Plate 2.4/2.7, straight (2 holes), Pure Titanium |
| 01.282.102 | Compact Foot X-Locking Plate 2.4/2.7 and Locking Plate 2.4/2.7, straight (2 holes), Steel |

<table>
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<tr>
<th>Item Number</th>
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<tr>
<td>682.730</td>
<td>Module Compact Foot X-Lock. Plate 2.4/2.7 and Locking Plate 2.4/2.7, straight (2 holes), with Lid, without Contents</td>
<td>1</td>
</tr>
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</table>

### Implants

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
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<td>X-Locking Plate 2.4/2.7, x-small, 22 × 14 mm, Pure Titanium</td>
<td>2</td>
</tr>
<tr>
<td>447.702*</td>
<td>X-Locking Plate 2.4/2.7, small, 24 × 18 mm, Pure Titanium</td>
<td>2</td>
</tr>
<tr>
<td>447.704*</td>
<td>X-Locking Plate 2.4/2.7, medium, 30 × 20 mm, Pure Titanium</td>
<td>2</td>
</tr>
<tr>
<td>447.706*</td>
<td>X-Locking Plate 2.4/2.7, large, 36 × 20 mm, Pure Titanium</td>
<td>2</td>
</tr>
<tr>
<td>447.710*</td>
<td>Locking Plate 2.4/2.7, straight, 2 holes, 17 × 6.0 × 1.6 mm, Pure Titanium</td>
<td>6</td>
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</table>

### Instruments

<table>
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<tr>
<td>312.240</td>
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<tr>
<td>329.922</td>
<td>Bending Pin for LCP Plates 2.4 and 2.7, with thread</td>
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<tr>
<td>323.061</td>
<td>LCP Drill Sleeve 2.7 (head LCP 2.4), with Scale up to 60 mm, for Drill Bits Ø 2.0 mm</td>
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<td>310.870</td>
<td>Countersink 2.7, length 62 mm</td>
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<tr>
<td>323.062</td>
<td>Drill Bit Ø 2.0 mm, with double marking, length 140/115 mm, 3-flute, for Quick Coupling</td>
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<tr>
<td>314.467</td>
<td>Screwdriver Shaft, Stardrive, SD8, self-holding</td>
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<td>310.163</td>
<td>Drill Bit 2.0 mm, with marking, length 110/95 mm, 2-flute, for Jacobs Chuck</td>
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<td>310.200</td>
<td>Drill Bit 2.0 mm, length 85/70 mm, 2-flute, for Jacobs Chuck</td>
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<td>310.260</td>
<td>Drill Bit 2.7 mm, length 100/75 mm, 2-flute, for Quick Coupling</td>
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<td>310.270</td>
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<td>310.534</td>
<td>Drill Bit 2.0 mm, with marking, length 110/85 mm, 2-flute, for Quick Coupling</td>
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<td>313.303</td>
<td>Screwdriver Shaft, Stardrive, SD8, cylinder, with groove, shaft 3.5 mm, for Mini Quick Coupling</td>
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<tr>
<td>313.304</td>
<td>Screwdriver Shaft, Stardrive, SD8, cylinder, with groove, shaft 3.5 mm, for AO/ASIF Quick Coupling</td>
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<tr>
<td>314.039</td>
<td>Screwdriver Shaft, Stardrive, SD8, self-holding</td>
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<td>347.981</td>
<td>Holding Forceps for Plates 1.0 to 2.4</td>
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</table>

Add suffix "s" to the article number to order sterile product.
01.282.004 LCP Compact Foot Basic Instrument Set and Screws Ø 2.7 mm, Titanium

682.733 Insert, size 1/2, Compact Foot Instruments (Basic Instrument Set) 1
391.962 Bending/Cutting Pliers 1
391.963 Universal Bending Pliers, length 167.5 mm 2
319.005 Depth Gauge for Screws Ø 2.0 and 2.4 mm, measuring range up to 40 mm 1
319.010 Depth Gauge for Screws Ø 2.7 to 4.0 mm, measuring range up to 60 mm 1
311.012 Handle, medium, with Mini Quick Coupling 1
311.430 Handle with Quick Coupling, length 110 mm 1
682.735 Rack for LCP Locking Screws Ø 2.7 mm (head LCP 2.4) 1
682.736 Rack for Cortex Screws Ø 2.7 mm 1
511.776 Torque Limiter, 0.8 Nm, with AO/ASIF Quick Coupling 1
511.777 Torque Limiter, 0.4 Nm, with AO/ASIF Quick Coupling 1
402.210–402.240 LCP Locking Screw Stardrive Ø 2.7 mm (head LCP 2.4), self-tapping, length 10–40 mm, TAN 3
402.242–402.260 LCP Locking Screw Stardrive Ø 2.7 mm (head LCP 2.4), self-tapping, length 42–60 mm, TAN 2
402.870–402.900 Cortex Screw Stardrive Ø 2.7 mm, self-tapping, length 10–40 mm, TAN 3
402.964–402.969 Cortex Screw Stardrive Ø 2.7 mm, self-tapping, length 45–60 mm, TAN 2

Optional

313.300 Combined Holding Sleeve for Cortex Screws Stardrive Ø 2.4/2.7 mm, SD8 1
313.301 Holding Sleeve for LCP Screws Stardrive Ø 2.4/2.7 mm (head LCP 2.4), SD8 1
03.100.000 Handle, lockable, with Mini Quick Coupling 1
314.121 X-ray symbol Stardrive Ø 50 mm, thickness 0.5 mm, steel 1
402.206 LCP Locking Screw Stardrive Ø 2.7 mm (head LCP 2.4), self-tapping, length 6 mm, TAN 1
402.208 LCP Locking Screw Stardrive Ø 2.7 mm (head LCP 2.4), self-tapping, length 8 mm, TAN 1

Accessories for the Colibri machine system (532.001)

532.023 Oscillating Saw Attachment II Crescentic Technique 1
03.000.3135 Saw Blade 30 x 17.9 x 0.6 mm, crescentic, for Oscillating Saws, sterile 1
03.000.3165 Saw Blade 30 x 21.9 x 0.6 mm, crescentic, for Oscillating Saws, sterile 1

01.282.002 LCP Compact Foot Basic Instrument Set and Screws Ø 2.7 mm, Steel

682.733 Insert, size 1/2, Compact Foot Instruments (Basic Instrument Set) 1
391.962 Bending/Cutting Pliers 1
391.963 Universal Bending Pliers, length 167.5 mm 2
319.005 Depth Gauge for Screws Ø 2.0 and 2.4 mm, measuring range up to 40 mm 1
319.010 Depth Gauge for Screws Ø 2.7 to 4.0 mm, measuring range up to 60 mm 1
311.012 Handle, medium, with Mini Quick Coupling 1
311.430 Handle with Quick Coupling, length 110 mm 1
682.735 Rack for LCP Locking Screws Ø 2.7 mm (head LCP 2.4) 1
682.736 Rack for Cortex Screws Ø 2.7 mm 1
511.776 Torque Limiter, 0.8 Nm, with AO/ASIF Quick Coupling 1
511.777 Torque Limiter, 0.4 Nm, with AO/ASIF Quick Coupling 1
202.210–202.240 LCP Locking Screw Stardrive Ø 2.7 mm (head LCP 2.4), self-tapping, length 10–40 mm, Steel 3
202.242–202.260 LCP Locking Screw Stardrive Ø 2.7 mm (head LCP 2.4), self-tapping, length 42–60 mm, Steel 2
202.870–202.900 Cortex Screw Stardrive Ø 2.7 mm, self-tapping, length 10–40 mm, Steel 3
202.964–202.969 Cortex Screw Stardrive Ø 2.7 mm, self-tapping, length 45–60 mm, Steel 2

Optional

313.300 Combined Holding Sleeve for Cortex Screws Stardrive Ø 2.4/2.7 mm, SD8 1
313.301 Holding Sleeve for LCP Screws Stardrive Ø 2.4/2.7 mm (head LCP 2.4), SD8 1
03.100.000 Handle, lockable, with Mini Quick Coupling 1
314.121 X-ray symbol Stardrive Ø 50 mm, thickness 0.5 mm, steel 1
202.206 LCP Locking Screw Stardrive Ø 2.7 mm (head LCP 2.4), self-tapping, length 6 mm, Steel 1
202.208 LCP Locking Screw Stardrive Ø 2.7 mm (head LCP 2.4), self-tapping, length 8 mm, Steel 1

Vario Cases

689.537 Lid (Stainless Steel), size 1/2, for Vario Case 1
689.538 Lid (Stainless Steel), size 1/1, for Vario Case 2
682.640 Insert, size 1/4, for Additional Instruments 1

Vario Cases have space for:
LCP Compact Foot Basic Instrument Set (Art. No. 01.282.004 or 01.282.002) 3 Implant Modules + 1 Insert, size 1/4, for Additional Instruments (Art. No. 682.640)
LCP Compact Foot Basic Instrument Set (Art. No. 01.282.004 or 01.282.002) and 4 implant modules.
Osteotomies of the First Metatarsal


Akin osteotomy


Proximal Metatarsal Osteotomy


Arthrodeses

MRI Information

**Torque, Displacement and Image Artifacts according to ASTM F 2213-06, ASTM F 2052-06e1 and ASTM F2119-07**

Non-clinical testing of worst case scenario in a 3 T MRI system did not reveal any relevant torque or displacement of the construct for an experimentally measured local spatial gradient of the magnetic field of 3.69 T/m. The largest image artifact extended approximately 169 mm from the construct when scanned using the Gradient Echo (GE). Testing was conducted on a 3 T MRI system.

**Radio-Frequency-(RF-)induced heating according to ASTM F2182-11a**

Non-clinical electromagnetic and thermal testing of worst case scenario lead to peak temperature rise of 9.5 °C with an average temperature rise of 6.6 °C (1.5 T) and a peak temperature rise of 5.9 °C (3 T) under MRI Conditions using RF Coils [whole body averaged specific absorption rate (SAR) of 2 W/kg for 6 minutes (1.5 T) and for 15 minutes (3 T)].

**Precautions:** The above mentioned test relies on non-clinical testing. The actual temperature rise in the patient will depend on a variety of factors beyond the SAR and time of RF application. Thus, it is recommended to pay particular attention to the following points:

- It is recommended to thoroughly monitor patients undergoing MR scanning for perceived temperature and/or pain sensations.
- Patients with impaired thermo regulation or temperature sensation should be excluded from MR scanning procedures.
- Generally it is recommended to use a MR system with low field strength in the presence of conductive implants. The employed specific absorption rate (SAR) should be reduced as far as possible.
- Using the ventilation system may further contribute to reduce temperature increase in the body.