MARQUARDT
Medizintechnik

Ankle Fusion Plating System

Clinical Advisor

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Note:

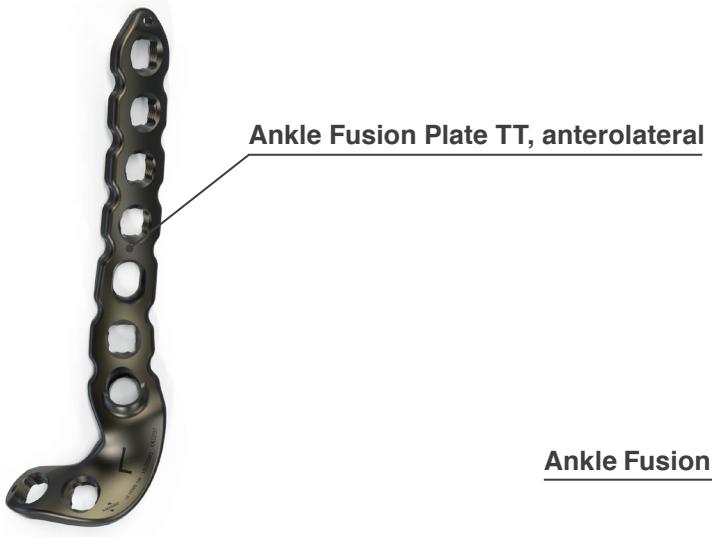
The surgical technique outlined below reflect the surgical procedure usually chosen by the clinical advisor. However, each surgeon must decide which surgical method and which approach is the most successful for his patient.

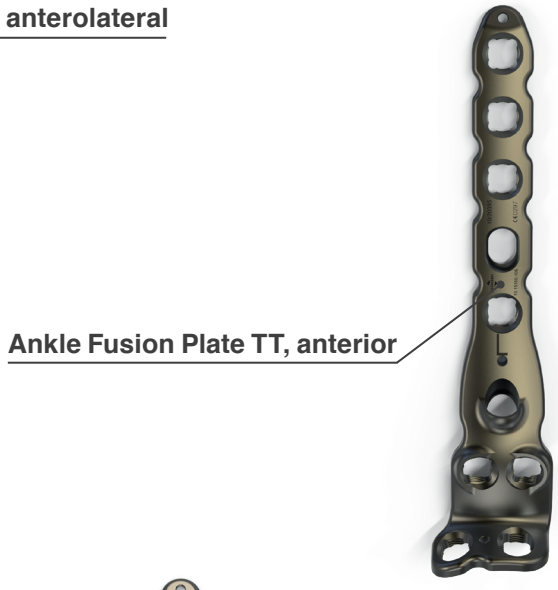
Ankle Fusion Plates

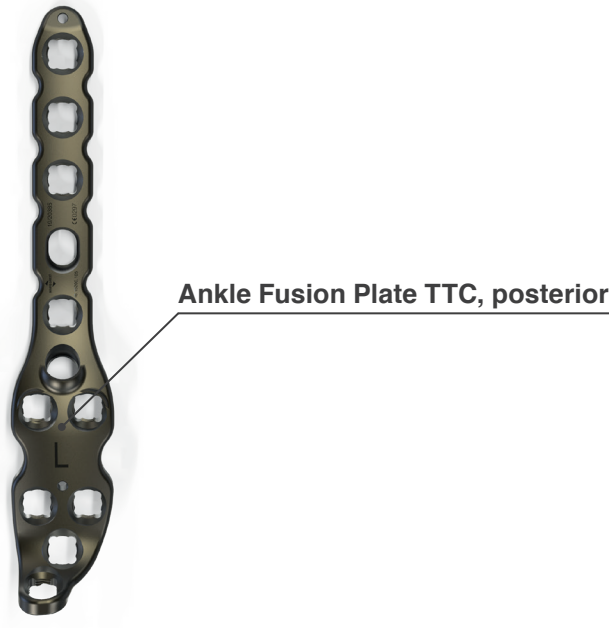
Introduction

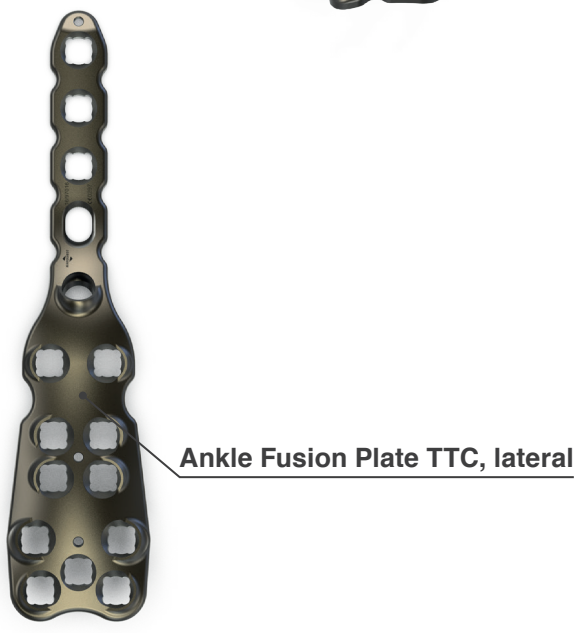
Product Specification

The Marquardt ***Ankle Fusion Plating System*** offers anatomically formed implants for locking fixation. The implants are fixed with self-tapping screws. The screws are available in non-locking and locking versions.







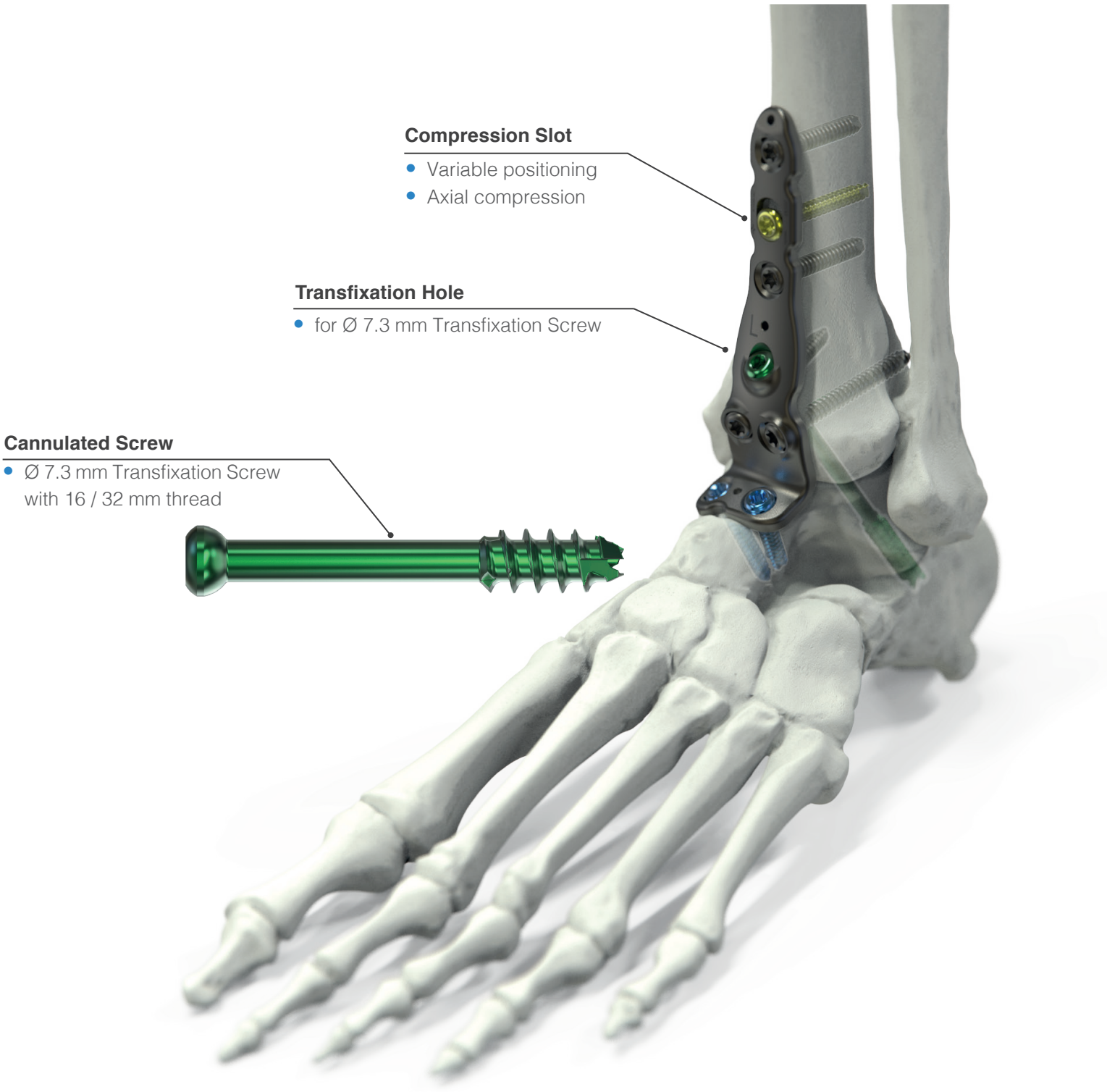


Indication

- Fixation of arthrodesis of the ankle joint, also in conjunction with osteotomies and fractures of distal tibia, talus and calcaneus.

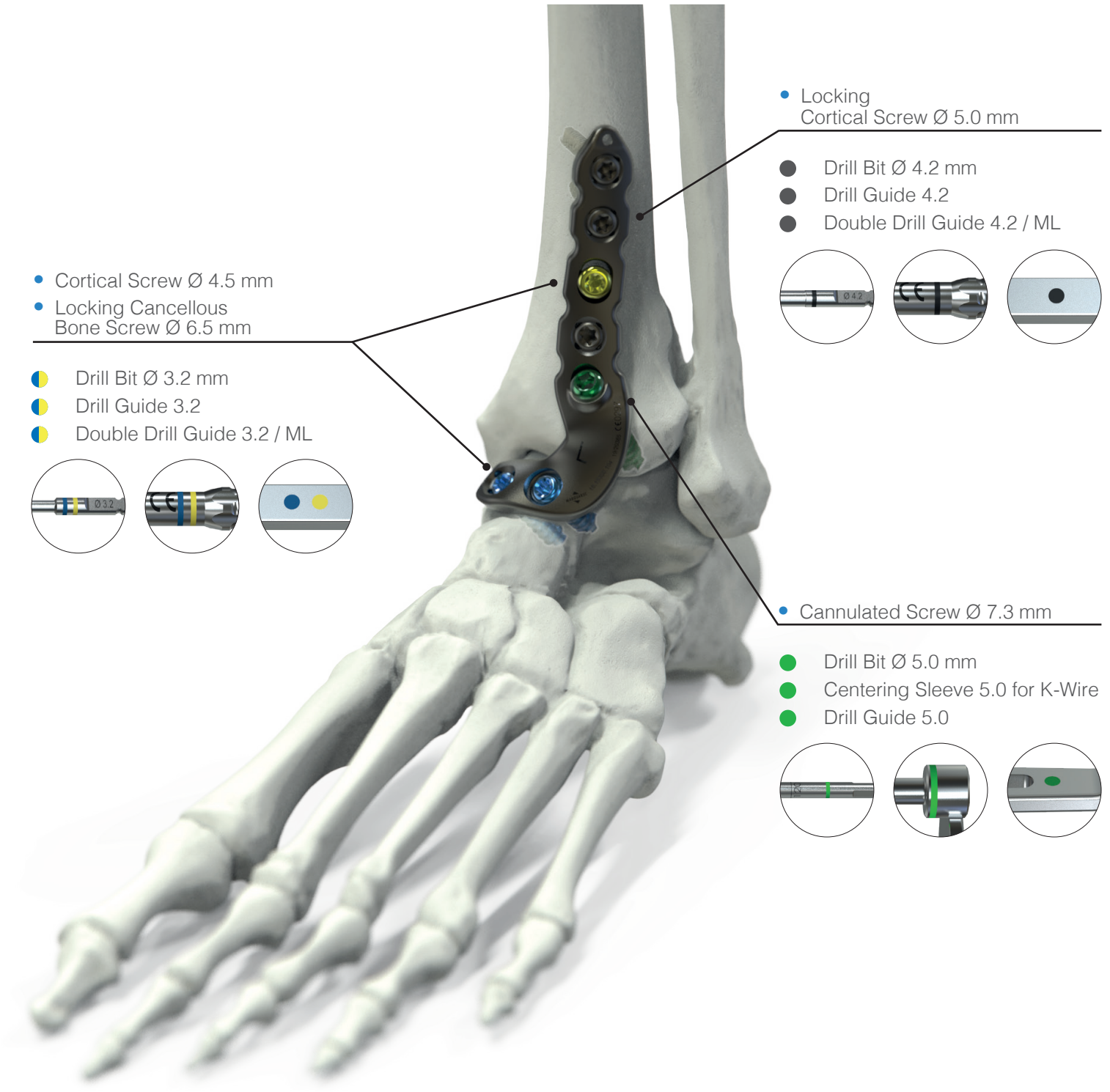
Compression Options

The Marquardt ***Ankle Fusion Plating System*** offers different compression options in one fusion system:



Colour Coding

The colour coding of the ***Ankle Fusion Plating System*** differentiates the insertion of different screw variants in order to ensure faster identification of the instruments during the operation.



Surgical Technique - Ankle Fusion Plate TT, anterolateral

Access

Instruments

REF 11.90020.150 *K-Wire Ø 2.0 mm*

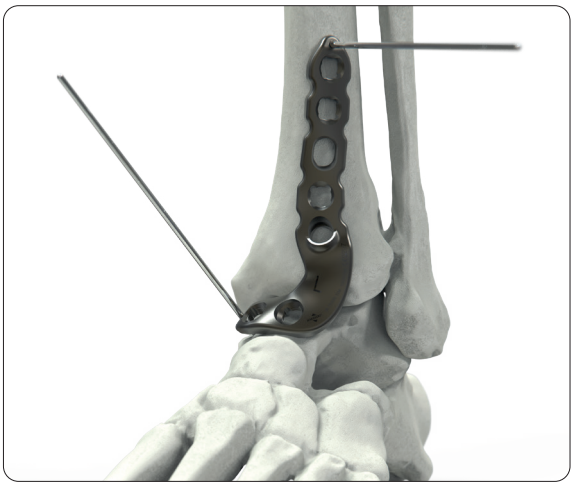
- To expose the ankle joint a standard anterior midline approach is chosen.
- If necessary, prepare joint surfaces using standard resection techniques.

Positioning and Fixation of the Plate

Instruments

REF 11.90020.150 *K-Wire Ø 2.0 mm*

- The required plate size can be determined using the templates.
- The plate is temporarily fixed to the bone with Ø 2.0 mm K-wires and then screwed distally to the talus.

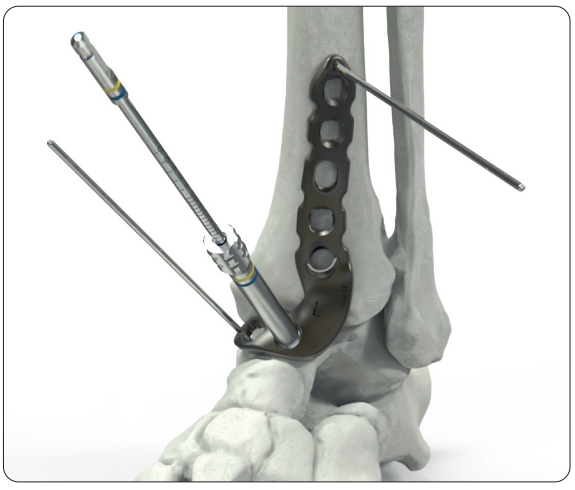


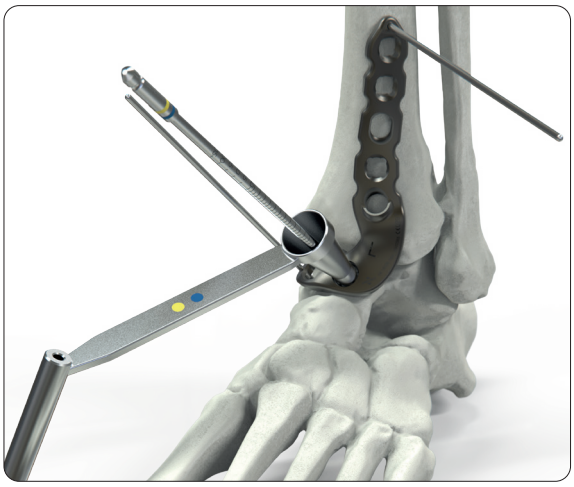
Monoaxial Insertion of Locking Cancellous Bone Screws

Instruments

REF 16.20010.832 *Drill Bit Ø 3.2 mm*
REF 04.20060.090 *Drill Guide 3.2*

- For monoaxial insertion of Ø 6.5 mm locking cancellous bone screws, the drill guide 3.2 is inserted into the screw hole.
- The screw hole is pre-drilled using the Ø 3.2 mm drill bit through the double drill guide.
- The screw length can be determined via the markings of the drill bit.
- If required, it may be necessary to adjust the plate to the individual anatomy of the patient. To do this, the plate can be bent with the bending irons. Bending of the implant across a screw hole should be avoided.



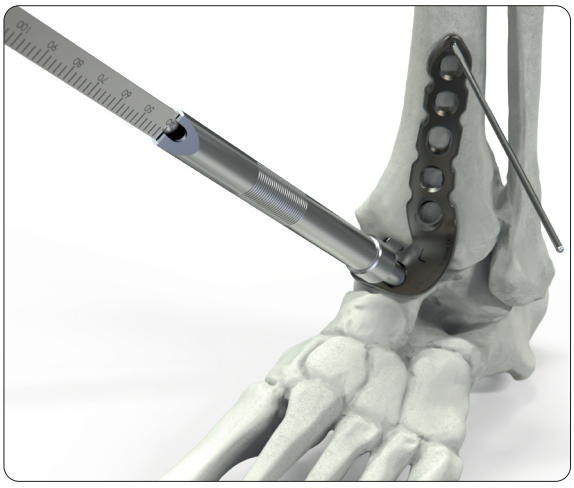


Polyaxial Insertion of Locking Cancellous Bone Screws

Instruments

REF 16.20010.832 *Drill Bit Ø 3.2 mm*
REF 16.20060.332 *Double Drill Guide 3.2 / ML*

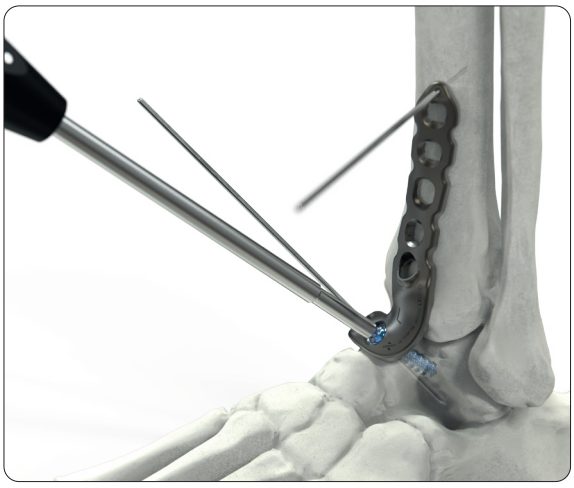
- The double drill guide 3.2 / ML is used for polyaxial insertion of Ø 6.5 mm locking cancellous bone screws. The double drill guide is inserted into the corresponding screw hole and enables stepless polyaxial drilling in a cone of 20°.
- The screw hole is pre-drilled using the Ø 3.2 mm drill bit through the double drill guide.



Instruments

REF 04.20100.210 *Length Determination Instrument for Locking Screws up to 110 mm*

- The screw length is determined with the length determination instrument.

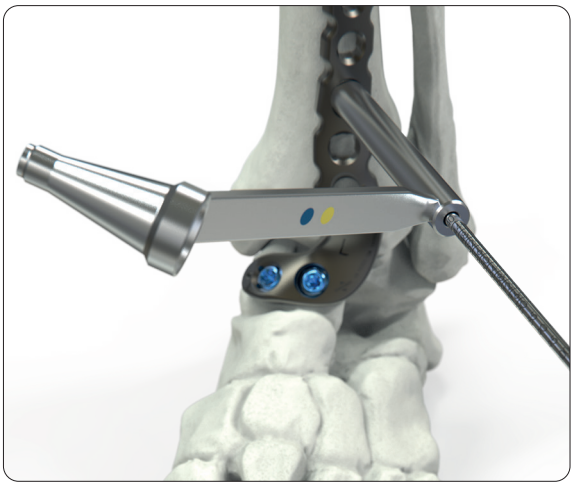


Instruments

REF 04.20040.040 *Screwdriver, T25*

- After the required screw length has been determined, the corresponding locking cancellous bone screw can be inserted with the screwdriver.
- Check the plate position once more and correct it, if necessary, with image amplifier monitoring.
- Once the plate position is correct, the screws are finally tightened, and the plate is thus fixed.

Fixation of the Plate in the Compression Slot



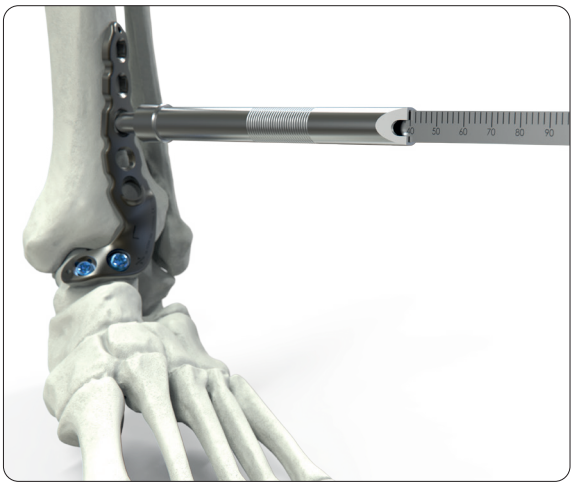
Instruments

REF 16.20010.832 *Drill Bit Ø 3.2 mm*
REF 16.20060.332 *Double Drill Guide 3.2 / ML*

- Afterwards the plate is fixed in the compression slot.
- To do this, a Ø 4.5 mm cortical screw is placed in the compression slot.
- The compression slot is pre-drilled bicortically using the drill bit through the double drill guide.

Note:

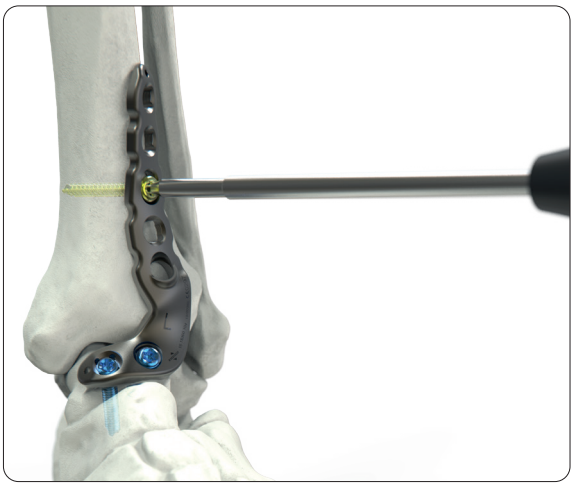
- To achieve compression, set the screw eccentrically at the proximal end of the compression slot.



Instruments

REF 04.20100.210 *Length Determination Instrument for Locking Screws up to 110 mm*

- The length is measured using the length determination instrument.
- The hook is hooked into the opposite cortical bone, and the required screw length is read off the scale.



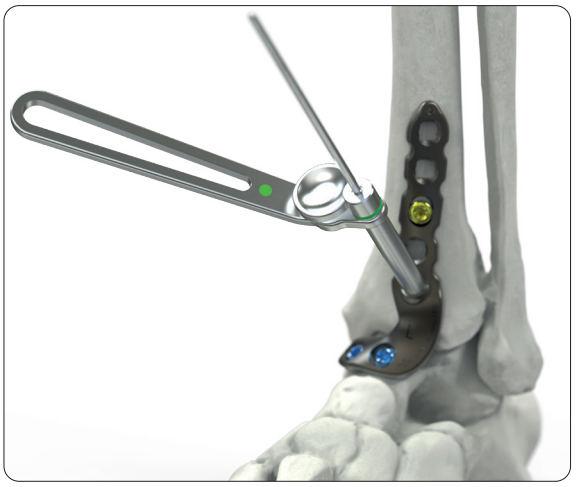
Instruments

REF 04.20040.040 *Screwdriver, T25*

- After the required screw length has been determined, the corresponding cortical screw can be inserted with the screwdriver.

Ankle Fusion Plates

The surgical technique listed below - **Insertion of the Transfixation Screw** - describes the use of the cannulated screw Ø 7.3 mm.

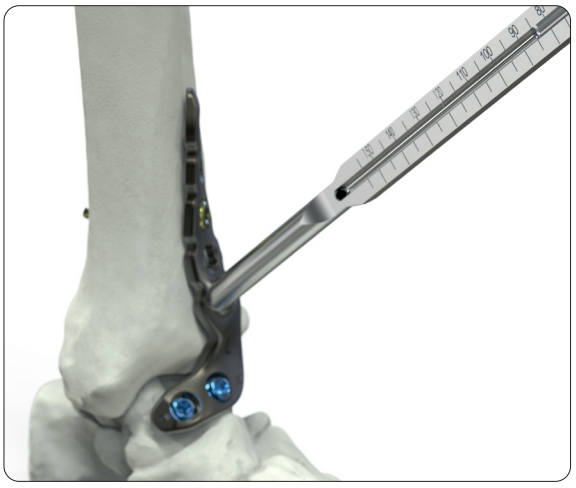


Insertion of the Transfixation Screw

Instruments

REF 11.90028.230	*K-Wire Ø 2.8 mm*
REF 16.20060.050	*Drill Guide 5.0*
REF 16.20060.028	*Centering Sleeve 5.0 for K-Wire Ø 2.8 mm*

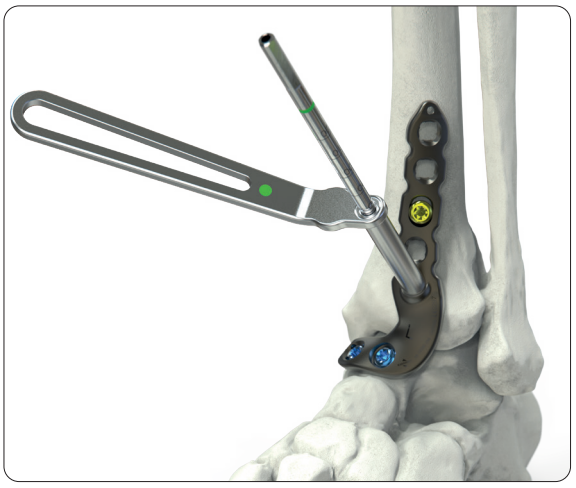
- First, the centering sleeve is inserted into the drill guide.
- Then insert the K-wire through the centering sleeve into the corresponding transfixation hole.



Instruments

REF 16.20100.073	*Length Determination Instrument for K-Wires Ø 2.8 mm*

- The required screw length is determined with the length determination instrument using the inserted K-wire.
- On the scale of the length determination instrument, the end of the K-wire shows the length of the screw required.



Instruments

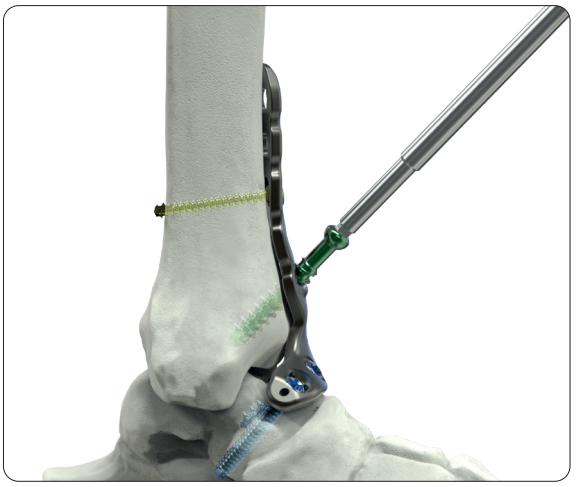
REF 16.20010.050	*Drill Bit Ø 5.0 mm*
REF 16.20060.050	*Drill Guide 5.0*

- The drill guide 5.0 is fixed in the plate hole via the K-wire.
- The drill bit is used to pre-drill over the K-wire and through the drill guide 5.0.

Instruments

REF 16.20040.173 *Screwdriver, hex 4.0 mm*

- Insert the appropriate transfixation screw as a compression or stabilization screw with the screwdriver.



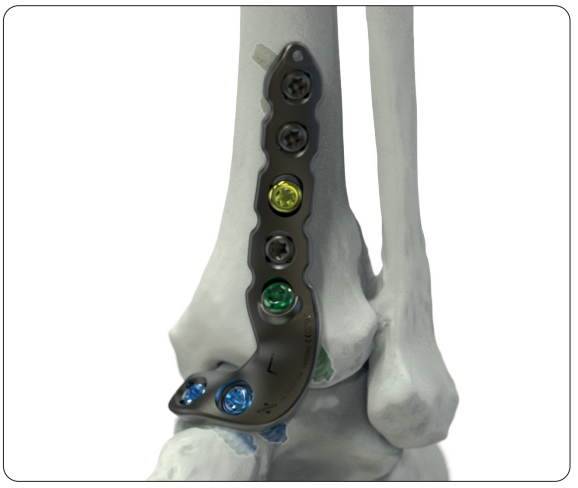
Note:

- To achieve a compression of the upper ankle joint, the screw previously inserted in the compression slot must be loosened. After the desired compression is achieved, the screw is tightened hand-tight in the compression slot.

Instruments

REF 04.20010.842 *Drill Bit Ø 4.2 mm*
REF 04.20060.080 *Drill Guide 4.2*
REF 04.20100.210 *Length Determination Instrument for Locking Screws up to 110 mm*
REF 04.20040.040 *Screwdriver, T25*

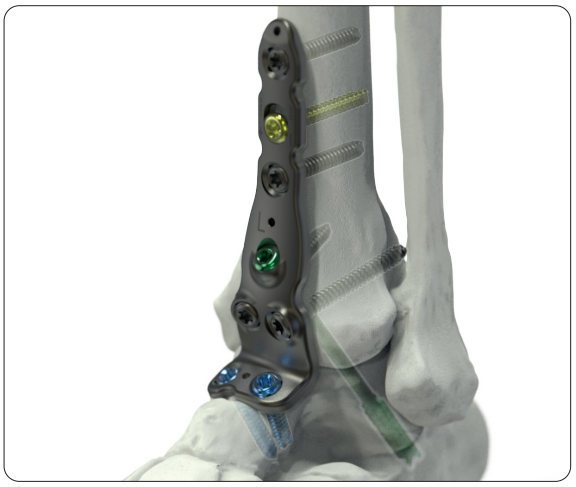
- Then all other shaft holes are filled with locking cortical screws Ø 5.0 using the procedure described above.
- After all plate holes have been fixed with screws, the final radiological check is carried out, in which the plate position and the anatomical reduction of the fracture are checked.



Surgical Technique - Ankle Fusion Plate TT, anterior

Access

- To expose the ankle joint a standard anterior midline approach is chosen.
- If necessary, prepare joint surfaces using standard resection techniques.



Positioning and Fixation of the Plate

Instruments

REF 11.90020.150 *K-Wire Ø 2.0 mm*

- The required plate size can be determined using the templates.
- The plate is fixed on the bone with Ø 2.0 mm K-wires.
- The screw holes are filled with locking and non-locking cortical screws according to the procedures described above.
- After all plate holes have been fixed with screws, the final radiological check is carried out, in which the plate position and the anatomical reduction of the fracture are checked.

Note:

- Optionally, an additional lag screw as discribed above can be inserted.

Surgical Technique - Ankle Fusion Plate TTC, posterior

Access

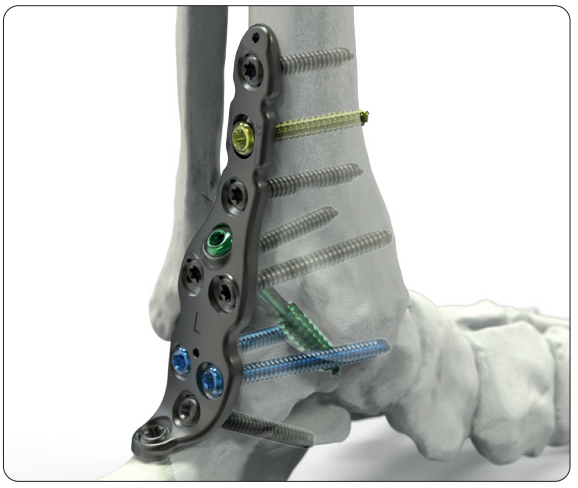
- To expose the ankle joint a standard posterior midline approach with a longitudinal splitting of the Achilles tendon is chosen.
- Stay lateral to the M. flexor hallucis longus to avoid injury to the posterior tibial nerve and posterior tibial artery.
- If necessary, prepare joint surfaces using standard resection techniques.

Positioning and Fixation of the Plate

Instruments

REF 11.90020.150 K-Wire Ø 2.0 mm

- The required plate size can be determined using the templates.
- The plate is fixed on the bone with Ø 2.0 mm K-wires.
- The screw holes are filled with locking and non-locking cortical screws according to the procedures described above.
- After all plate holes have been fixed with screws, the final radiological check is carried out, in which the plate position and the anatomical reduction of the fracture are checked.



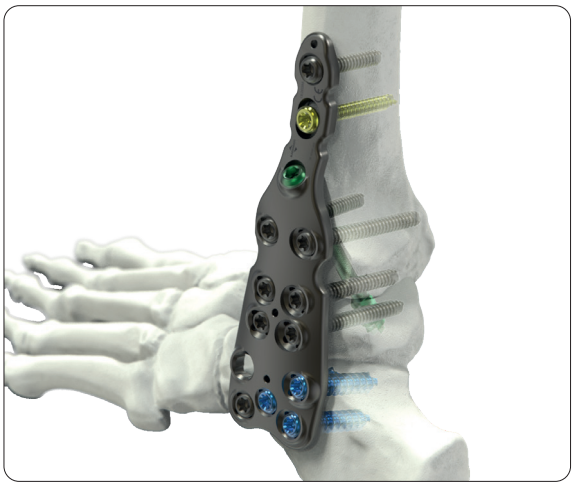
Note:

- Optionally, an additional lag screw as discribed above can be inserted.

Surgical Technique - Ankle Fusion Plate TTC, lateral

Access

- To expose the ankle joint a standard lateral transfibular approch with resection of the fibula is chosen.
- If necessary, prepare joint surfaces using standard resection techniques.



Positioning and Fixation of the Plate

Instruments

REF 11.90020.150 *K-Wire Ø 2.0 mm*

- The required plate size can be determined using the templates.
- The plate is fixed on the bone with Ø 2.0 mm K-wires.
- The screw holes are filled with locking and non-locking cortical screws according to the procedures described above.
- After all plate holes have been fixed with screws, the final radiological check is carried out, in which the plate position and the anatomical reduction of the fracture are checked.

Note:

- Optionally, an additional lag screw as discribed above can be inserted.

Product Information

Implants

Article Number * left	Article Number * right	Holes	Length (mm)
16.15300.104	16.15300.004	4	93
16.15300.106	16.15300.006	6	118

Ankle Fusion Plate TT, anterolateral

- Material: Ti6Al4V
- Anodisation: Type II

Article Number * left	Article Number * right	Holes	Length (mm)
16.15350.103	16.15350.003	3	102
16.15350.105	16.15350.005	5	130

Ankle Fusion Plate TT, anterior

- Material: Ti6Al4V
- Anodisation: Type II

Article Number * left	Article Number * right	Holes	Length (mm)
16.15200.103	16.15200.003	3	108
16.15200.105	16.15200.005	5	136

Ankle Fusion Plate TTC, posterior

- Material: Ti6Al4V
- Anodisation: Type II

Article Number * left / right	Holes	Length (mm)
16.15100.003	3	119
16.15100.005	5	147

Ankle Fusion Plate TTC, lateral

- Material: Ti6Al4V
- Anodisation: Type II

***** All implants are also available in sterile. Therefor, add suffix "S" to article number.

Cortical Screw
Ø 4.5 mm, self-tapping

- Thread diameter: 4.5 mm
- Core diameter: 3.0 mm
- Head diameter: 8.0 mm
- Hexalobe: T25
- Material: Ti6Al4V

Article Number *	Length (mm)	Article Number *	Length (mm)
04.03745.020	20	04.03745.036	36
04.03745.022	22	04.03745.038	38
04.03745.024	24	04.03745.040	40
04.03745.026	26	04.03745.042	42
04.03745.028	28	04.03745.044	44
04.03745.030	30	04.03745.046	46
04.03745.032	32	04.03745.048	48
04.03745.034	34	04.03745.050	50

Locking Cortical Screw
Ø 5.0 mm, self-tapping

- Thread diameter: 5.0 mm
- Core diameter: 4.0 mm
- Head diameter: 7.40 mm
- Hexalobe: T25
- Material: Ti6Al4V

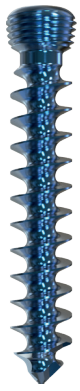
Article Number *	Length (mm)	Article Number *	Length (mm)
04.05755.020	20	04.05755.042	42
04.05755.022	22	04.05755.044	44
04.05755.024	24	04.05755.046	46
04.05755.026	26	04.05755.048	48
04.05755.028	28	04.05755.050	50
04.05755.030	30	04.05755.052	52
04.05755.032	32	04.05755.054	54
04.05755.034	34	04.05755.056	56
04.05755.036	36	04.05755.058	58
04.05755.038	38	04.05755.060	60
04.05755.040	40		

***** All implants are also available in sterile. Therefor, add suffix "S" to article number.

Article Number *	Length (mm)	Article Number *	Length (mm)
04.05800.020	20	04.05800.042	42
04.05800.022	22	04.05800.044	44
04.05800.024	24	04.05800.046	46
04.05800.026	26	04.05800.048	48
04.05800.028	28	04.05800.050	50
04.05800.030	30	04.05800.052	52
04.05800.032	32	04.05800.054	54
04.05800.034	34	04.05800.056	56
04.05800.036	36	04.05800.058	58
04.05800.038	38	04.05800.060	60
04.05800.040	40		

Locking Cancellous Bone Screw
Ø 6.5 mm, self-tapping

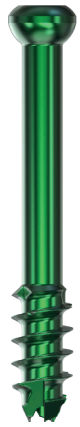
- Thread diameter: 6.5 mm
- Core diameter: 3.0 mm
- Head diameter: 8.0 mm
- Hexalobe: T25
- Material: Ti6Al4V



Article Number * 16 mm thread	Length (mm)	Article Number * 32 mm thread	Length (mm)	Article Number * fully threaded	Length (mm)
08.03916.045	45				
08.03916.050	50	08.03932.050	50	08.03900.050	50
08.03916.055	55	08.03932.055	55	08.03900.055	55
08.03916.060	60	08.03932.060	60	08.03900.060	60
08.03916.065	65	08.03932.065	65	08.03900.065	65
08.03916.070	70	08.03932.070	70	08.03900.070	70
08.03916.075	75	08.03932.075	75	08.03900.075	75
08.03916.080	80	08.03932.080	80	08.03900.080	80
08.03916.085	85	08.03932.085	85	08.03900.085	85
08.03916.090	90	08.03932.090	90	08.03900.090	90
08.03916.095	95	08.03932.095	95	08.03900.095	95
08.03916.100	100	08.03932.100	100	08.03900.100	100

Cannulated Screw
Ø 7.3 mm, self-tapping

- Thread diameter: 7.3 mm
- Core diameter: 4.5 mm
- Head diamter: 8.0 mm
- Hexagon socket: 4.0
- Material: Ti6Al4V



***** All implants are also available in sterile. Therefor, add suffix "S" to article number.

Templates

Ankle Fusion Plate TT, anterolateral

Article Number left	Article Number right	Holes
16.25300.104	16.25300.004	4

Ankle Fusion Plate TT, anterior

Article Number left	Article Number right	Holes
16.25350.103	16.25350.003	3

Ankle Fusion Plate TTC, posterior

Article Number left	Article Number right	Holes
16.25200.103	16.25200.003	3

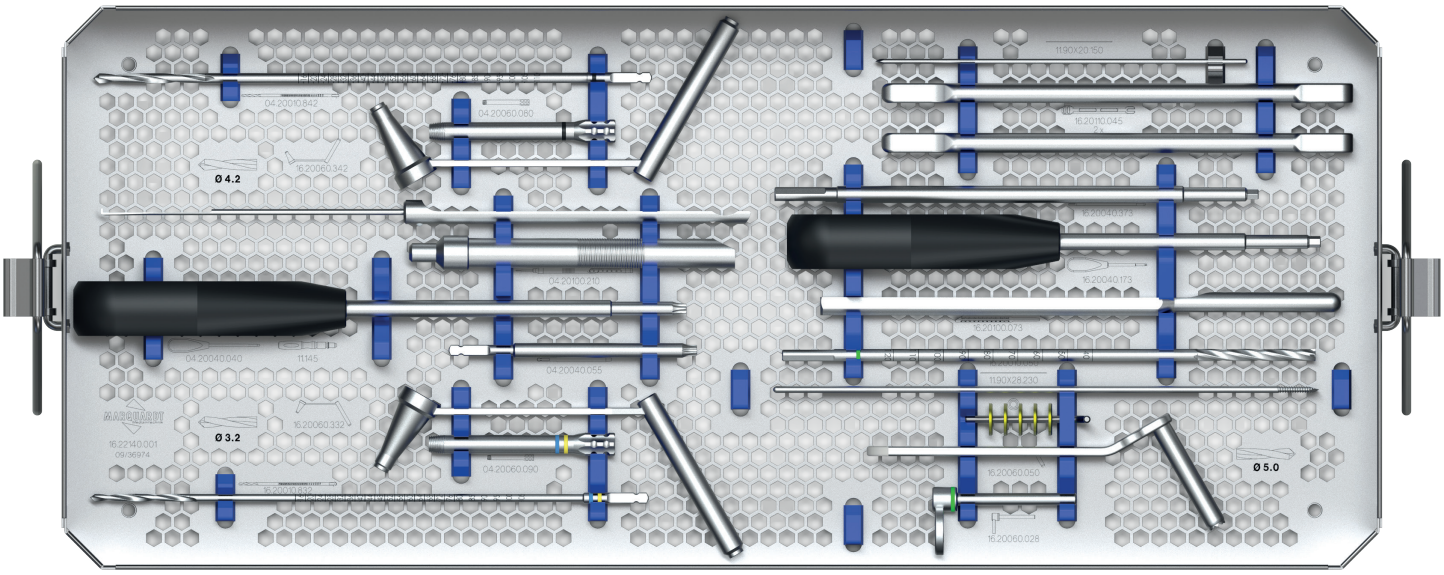
Ankle Fusion Plate TTC, lateral

Article Number left / right	Holes
16.25100.003	3

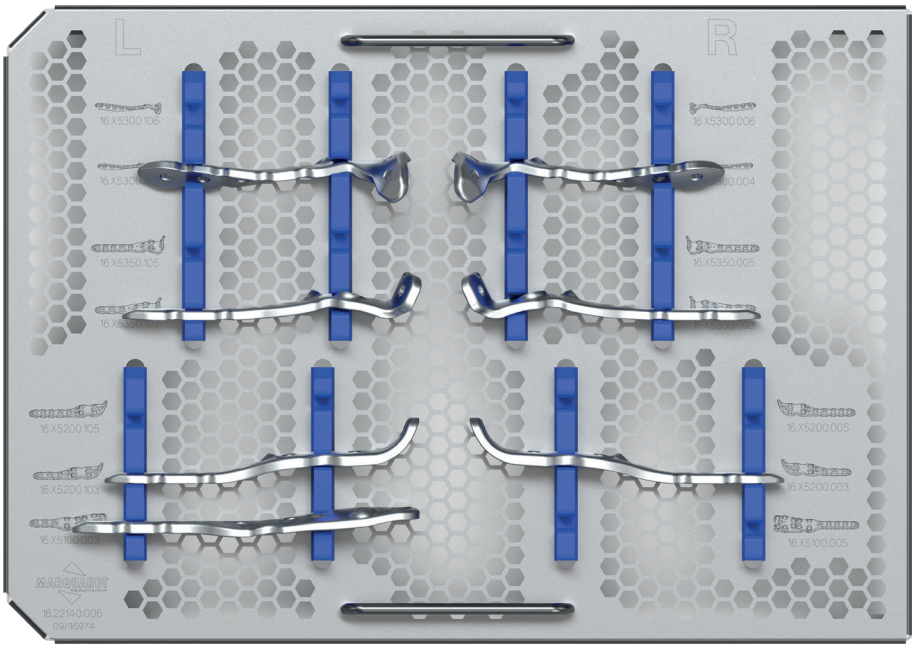
Instrument Storage

- Compact instrument set with clear arrangement
- Easy handling due to colour-coded instruments
- Low weight

Instruments



Templates



Instruments

11.90020.150 Kirschner Wire ø 2.0mm, trocar tip, L 150mm

11.90028.230 Kirschner Wire ø 2.8mm, trocar tip, L 230mm

16.20010.832 Drill Bit ø 3.2mm, scaled, AO Coupling, L 225/195mm

04.20010.842 Drill Bit ø 4.2mm, scaled, AO Coupling, L 225/195mm

16.20010.050 Drill Bit ø 5.0/2.8mm, cannulated, scaled, Jacobs Chuck, L 220mm

16.20040.173 Screwdriver, hex 4.0mm, cannulated, L 215/100mm

16.20040.373 Screwdriver Shaft, hex 4.0mm, cannulated, Jacobs Chuck, L 195/170mm

04.20040.040 Screwdriver, T25, L 247/137mm

04.20040.055 Screwdriver Shaft, T25, AO Coupling, L 100/70mm

04.20100.210 Length Determination Instrument for Locking Screws up to 110mm

16.20100.073 Length Determination Instrument for Kirschner Wires ø 2.8mm x 230mm

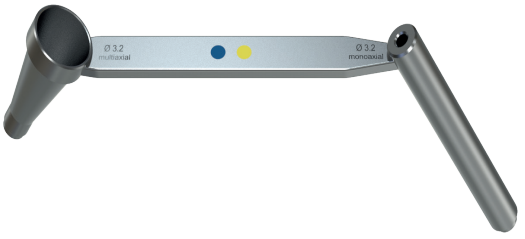
04.20060.090 Drill Guide 3.2 for Locking Plates

04.20060.080 Drill Guide 4.2 for Locking Plates

16.20060.028 Centering Sleeve 5.0 for Kirschner Wires ø 2.8mm

16.20060.050 Drill Guide 5.0

16.20060.332 Double Drill Guide 3.2/ML



16.20060.342 Double Drill Guide 4.2/ML

16.20110.045 Bending Iron for Large Fragment Plates

MRI Safety Information

Non-clinical testing has demonstrated that the plates range from Marquardt Medizintechnik is MR Conditional in accordance with the ASTM F2503 standard definitions. A patient with this device can be safely scanned in an MR system meeting the following conditions:

- Cylindrical-bore
- Horizontal magnetic field (B_0)
- Spatial field gradient lower than or equal to
  - **1.5 T:** 23.45 T/m (2345 G/cm)
  - **3.0 T:** 11.75 T/m (1175 G/cm)
- Radiofrequency (RF) field exposure:
  - RF excitation: Circularly Polarized (CP)
  - RF transmit coil: whole-body transmit coil
  - RF receive coil type: whole-body receive coil
  - Maximum permitted whole-body averaged specific absorption rate (SAR): Normal Operating Mode, 2 W/kg.
  - Scan duration and wait time:

    1.5 T: 2 W/kg whole-body average SAR for **8min and 15s** of continuous RF (a sequence or back-to-back series/scan without breaks) followed by a wait time of **8min and 15s** if this limit is reached.

    3.0 T: 2 W/kg whole-body average SAR for **6min and 19s** of continuous RF (a sequence or back-to-back series/scan without breaks) followed by a wait time of **6min and 19s** if this limit is reached.
- The plates are expected to produce a maximum temperature rise of 8.5 °C at 1.5 T and 6.9 °C at 3 T both after the scanning periods presented above.
- The presence of this implant may produce an image artifact. Some manipulation of scan parameters may be needed to compensate for the artifact. In non-clinical testing, the image artifact caused by the device extends approximately 83 mm from the device edge when imaged with a spin echo pulse sequence and 65 mm with a gradient echo, both at 1.5 T.
- Patients with uncompromised thermoregulation and under uncontrolled conditions or patients with compromised thermoregulation (all persons with impaired systemic or reduced local thermoregulation) and under controlled conditions (a medical doctor or a dedicated trained person can respond instantly to heat induced physiological stress).

Note:

Undergoing an MRI scan, there is a potential risk for patients with a metallic implant. The electromagnetic field created by an MRI scanner can interact with the metallic implant, resulting in displacement of the implant, heating of the tissue near the implant, or other undesirable effects.

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