MARQUARDT
Medizintechnik

WINSTA-E
Elbow 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.

Introduction

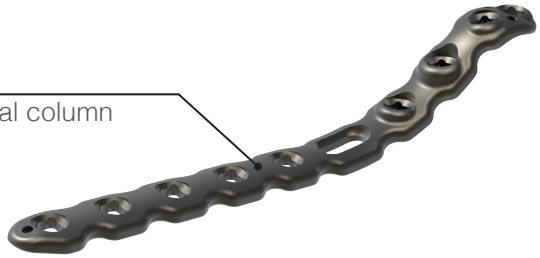
Product Specifications

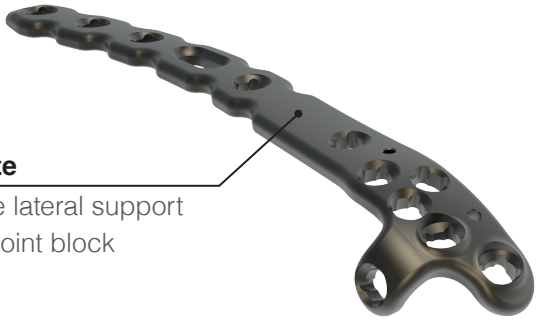
The Marquardt ***WINSTA-E*** System offers anatomically formed plates for fixed-angle locking. The plates enable different screw configurations for fixation of the medial and lateral humerus columns and for fixation of the proximal ulna. The plates are fixed with self-tapping cortical screws. The screws are available in non-locking and locking versions.

Indications (distal humerus)

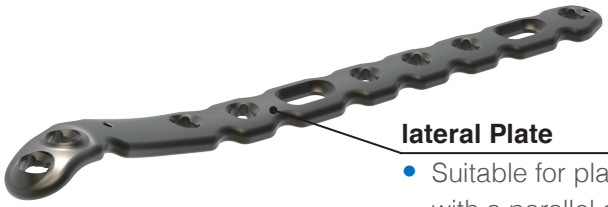
- Intra-articular fractures of distal humerus
- Supra-condylar fractures of distal humerus
- Nonunion (pseudarthrosis) of distal humerus
- Osteotomy of distal humerus

medial Plate
- Supporting the medial column





posterolateral Plate
- The screws of the lateral support point toward the joint block



lateral Plate
- Suitable for plate configurations with a parallel arrangement

Indications (olecranon & proximal ulna)

- Extra- and intra-articular olecranon fractures
- Pseudarthrosis of proximal ulna
- Osteotomies of olecranon

Olecranon Plate
- Locking fixation of the olecranon and the proximal ulna

The following surgical techniques describe the placement of Ø 3.5 mm locking cortical screws. The surgical techniques for the Ø 2.7 mm locking cortical screws are identical in principle but use different instruments (these are stated in brackets).

▶ Surgical Technique - Distal Humerus

Definition of the Plate Configuration

- Depending on the fracture pattern, the suitable plate type and the required plate length are chosen first. This can be realized by using X-ray template and trial implant.

Note:

- On fractures of AO type A and C, two distal humerus plates (supporting the medial and lateral columns) are required to achieve sufficient stability for early mobilization.
- Regardless of the arrangement of the plates, care should be taken to use two plates of different lengths.

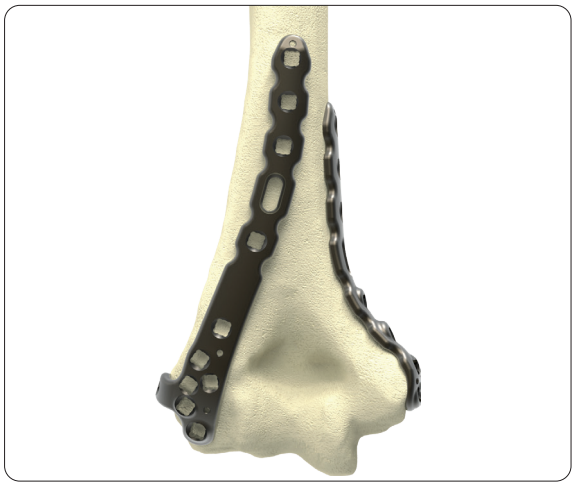
90° arrangement

WINSTA-E medial Plate

- Positioning: medial column, medial
- Alignment of distal screws: mediolateral

WINSTA-E posterolateral Plate

- Positioning: lateral column, dorsal
- Alignment of distal screws: lateromedial, postero-anterior and ascending



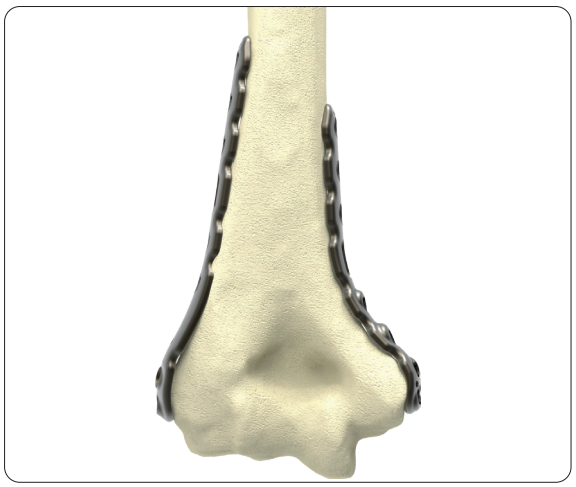
180° arrangement

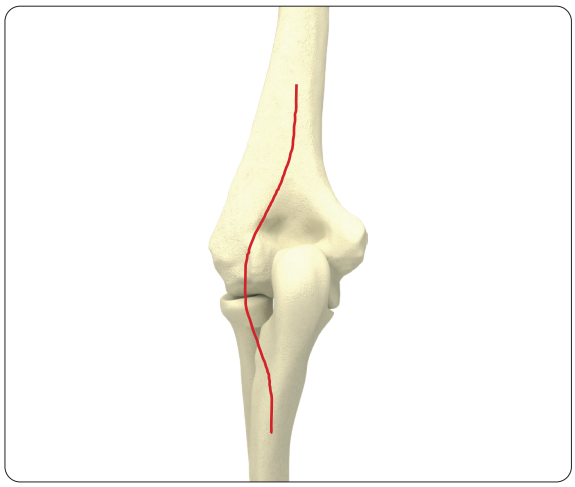
WINSTA-E medial Plate

- Positioning: medial column, medial
- Alignment of distal screws: mediolateral

WINSTA-E lateral Plate

- Positioning: lateral column, lateral
- Alignment of distal screws: lateromedial



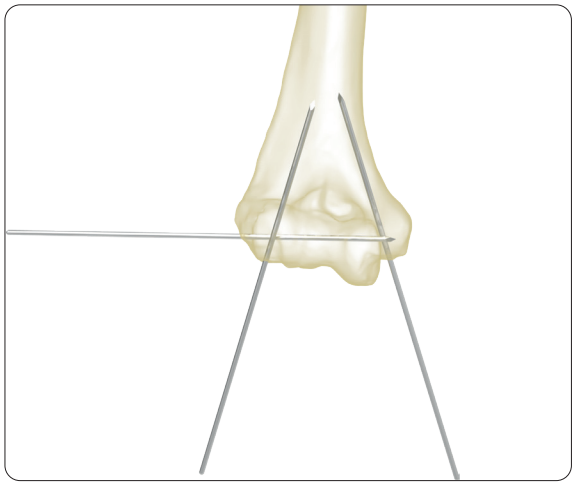


Positioning of the Patient and Access

- Position the patient in a prone position or in a lateral position so that the forearm can be flexed through more than 120°.
- Access is made with a slightly curved posterior incision. Here, the incision should be guided around the olecranon on the radial side.
- Chevron osteotomy of the olecranon can be used to achieve optimal fracture access in the case of a comminuted fracture.

Note:

- Identify and protect the ulnar nerve.



Repositioning of the Fracture

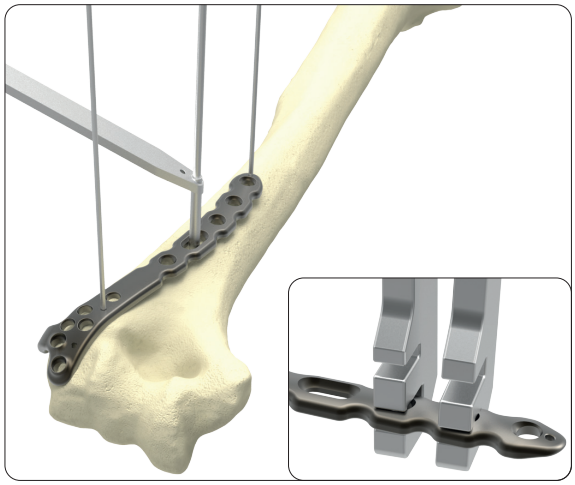
Instruments

REF 11.90020.150 *Kirschner Wire Ø 2.0 mm*

- The fragments of the joint block are initially repositioned and provisionally fixed with K-wires.
- Afterwards, stable fixation of the joint block on the medial and lateral columns of the distal humerus is performed.
- The joint block can be repositioned if necessary using independent screws.

Note:

- The inserted K-wires should not obstruct the subsequent plate positions.



Fixation of the Lateral Column

Instruments

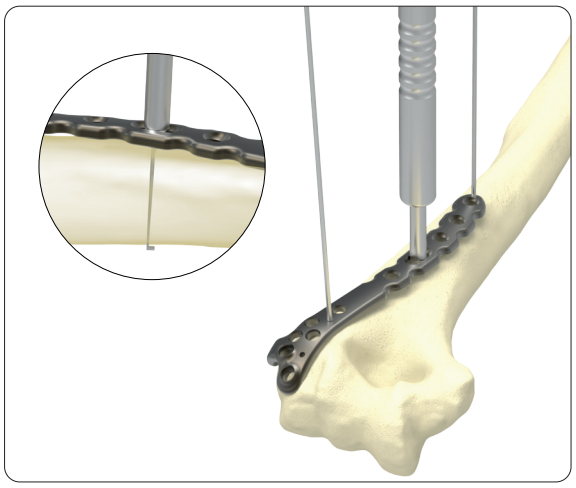
REF 03.20011.125	*Drill Bit Ø 2.5 mm*
(REF 03.20011.120	*Drill Bit Ø 2.0 mm)*
REF 03.20060.025	*Double Drill Guide 2.5 / 3.5*
(REF 02.20060.027	*Double Drill Guide 2.0 / 2.7)*
REF 03.20110.035/135	*Bending Iron*
REF 11.90016.150	*Kirschner Wire Ø 1.6 mm*

- The required plate size can be determined using the templates. The templates are available in all variations.
- The plate is fixed on the bone with Ø 1.6 mm K-wires.
- Afterwards the plate is fixed in the oval hole. To do this, a Ø 3.5 mm cortical screw is placed in the oval hole.
- The screw hole is pre-drilled bicortically using the drill bit through the double drill guide.
- 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.

Instruments

REF 03.20100.060 *Length Determination Instrument, for Screw up to 60 mm*

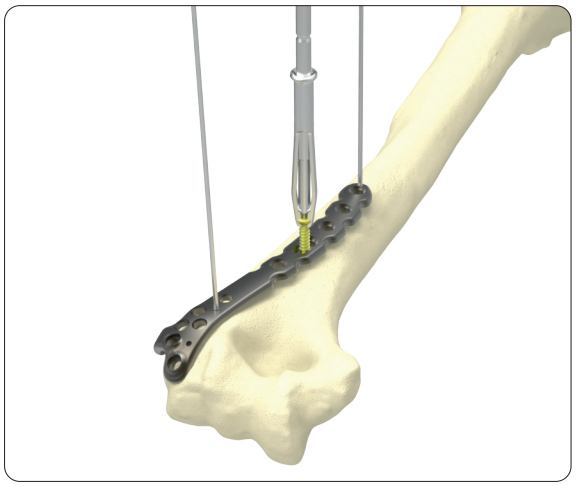
- The length is measured using the length determination instrument.
- The hook is hooked into the opposite cortical bone, and the required screw length is read off the scale.



Instruments

REF 03.20040.025 *Screwdriver, hex 2.5 mm*
REF 03.20040.026 *Holding Sleeve for Screws*

- After the required screw length has been determined, the corresponding cortical screw can be inserted with the screwdriver and the holding sleeve.
- The screw is initially tightened only slightly, so that the plate position can be corrected distally and proximally as required.
- 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.

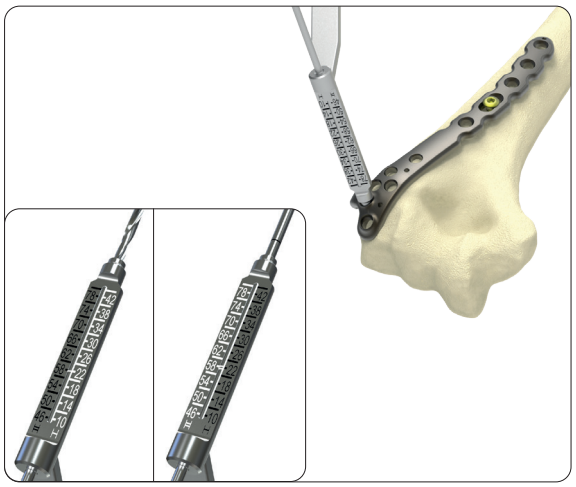


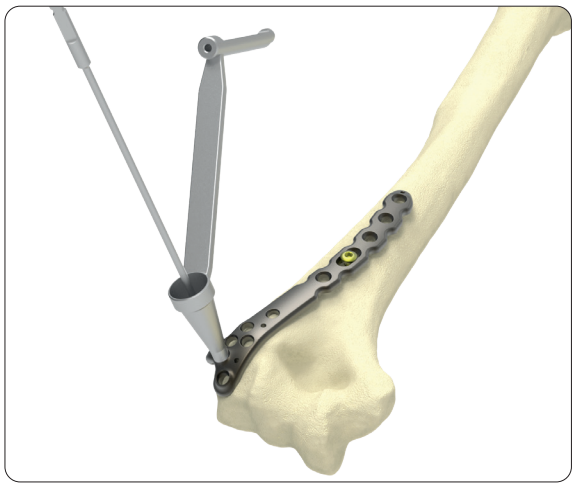
Monoaxial Insertion of Locking Screws

Instruments

REF 03.20011.125 *Drill Bit Ø 2.5 mm*
(REF 03.20011.120 *Drill Bit Ø 2.0 mm)*
REF 03.20060.325 *Double Drill Guide 2.5 / ML*
(REF 03.20010.320 *Double Drill Guide 2.0 / ML)*
REF 03.20040.025 *Screwdriver, hex 2.5 mm*
REF 03.20100.060 *Length Determination Instrument, for Screw up to 60 mm*

- For monoaxial insertion of Ø 3.5 mm locking cortical screws, the double drill guide 2.5 / ML is inserted into the screw hole.
- The screw hole is pre-drilled bicortically using the Ø 2.5 mm drill bit through the double drill guide.
- The screw length can be determined via the markings of the drill sleeve and the drill bit.
- Alternatively, the screw length can be determined with the length determination instrument.
- The locking cortical screw is tightened with the screwdriver.



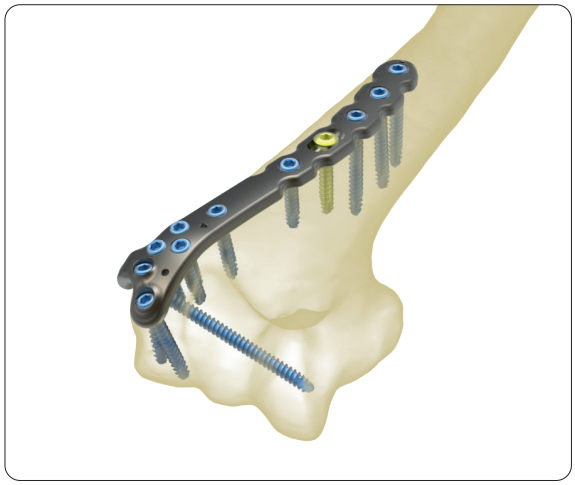


Polyaxial Insertion of Locking Screws

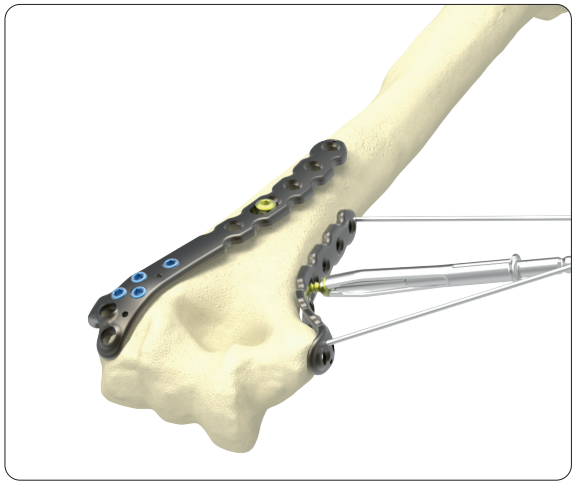
Instruments

REF 03.20011.125 *(REF 03.20011.120*	*Drill Bit Ø 2.5 mm* *Drill Bit Ø 2.0 mm)*
REF 03.20060.325 *(REF 03.20010.320*	*Double Drill Guide 2.5 / ML* *Double Drill Guide 2.0 / ML)*
REF 03.20040.025	*Screwdriver, hex 2.5 mm*
REF 03.20100.060	*Length Determination Instrument, for Screw up to 60 mm*

- The double drill guide 2.5 / ML is used for polyaxial insertion of Ø 3.5 mm locking cortical 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 bicortically using the Ø 2.5 mm drill bit through the double drill guide.
- Afterwards the screw length is determined with the length determination instrument.
- The locking cortical screw is tightened with the screwdriver.



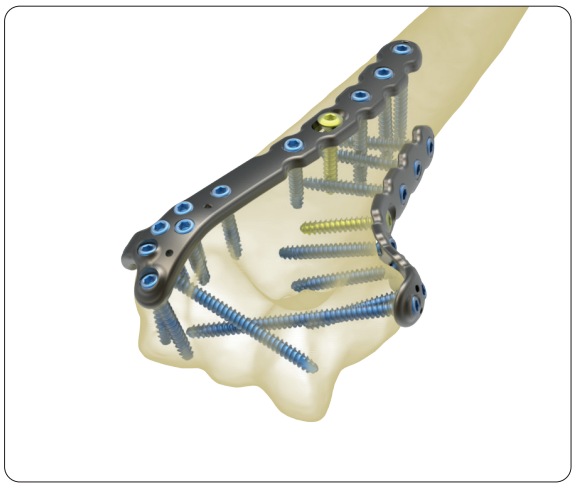
- Repeat the procedure for all shaft holes into which screws are to be inserted.
- Once all of the screw holes have been occupied, a final radiological check is performed.



Fixation of the Medial Column

- The oval hole is filled following the procedure described above using a Ø 3.5 mm non-locking cortical screw.
- Locking cortical screws can also be inserted in the remaining screw holes following the method described above either monoaxially or polyaxially.

- Once all of the plate holes that are to be occupied have been fixed with screws, a final radiological check is performed in which the plate position and the anatomical repositioning of the fracture are checked.



Surgical Technique - Olecranon

Repositioning of the Fracture

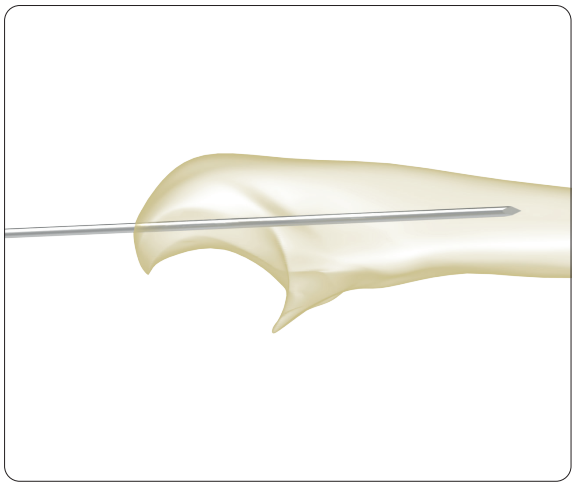
Instruments

REF 11.90020.150 *Kirschner Wire Ø 2.0 mm*

- The fragments are initially repositioned and provisionally fixed with Ø 2.0 mm K-wires.

Note:

- The inserted K-wires should not obstruct the subsequent plate positions.

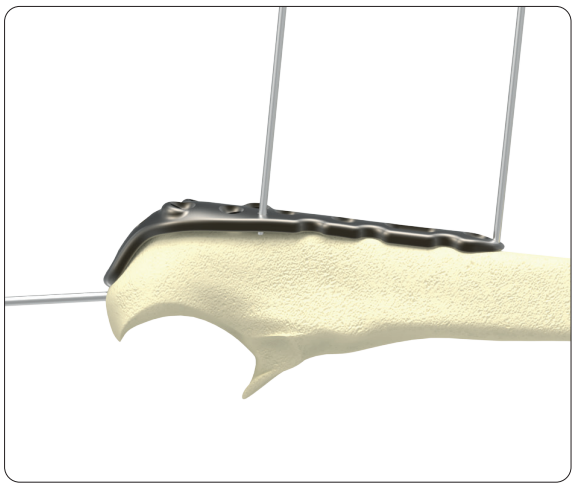


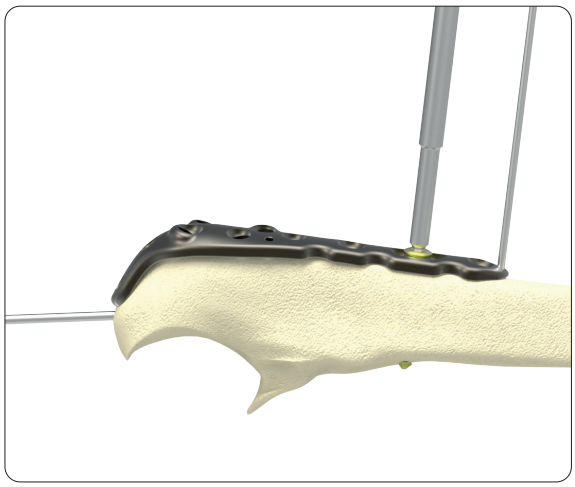
Positioning of the Plate

Instruments

REF 11.90016.150 *Kirschner Wire Ø 1.6 mm*

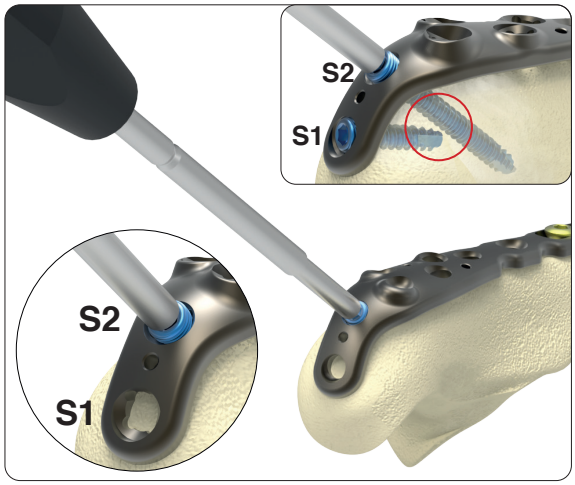
- The plate is fixed on the bone with Ø 1.6 mm K-wires.





Fixation of the Plate

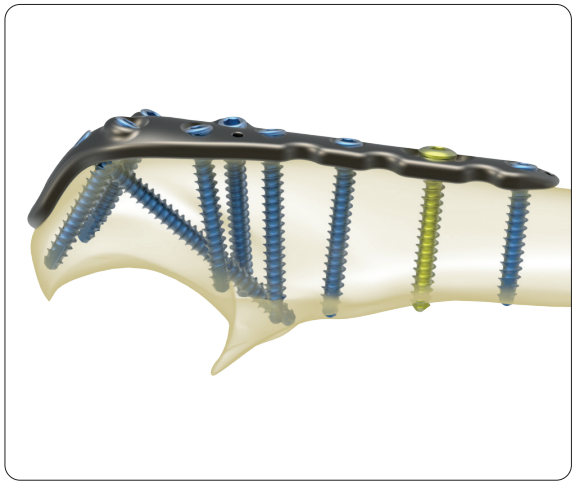
- The oval hole is filled following the procedure described above using a Ø 3.5 mm non-locking cortical screw.



- The locking cortical screws Ø 3.5 mm (Ø 2.7 mm) can also be inserted in the manner described above either monoaxially or polyaxially.

Note:

- If both screw holes (S1 and S2) are occupied, the screw length and the screw orientation for S1 and S2 must be selected so that no collision occurs.



- Once all of the plate holes that are to be occupied have been fixed with screws, a final radiological check is performed in which the plate position and the anatomical repositioning of the fracture are checked.

Product Information

Implants

Article Number * left	Article Number * right	Holes	Length (mm)
15.15100.108	15.15100.008	8	87
15.15100.110	15.15100.010	10	111
15.15100.112	15.15100.012	12	136
15.15100.114	15.15100.014	14	160

WINSTA-E medial Plate

- Material: Ti6Al4V
- Anodisation: Type II

Article Number * left	Article Number * right	Holes	Length (mm)
15.15102.104	15.15102.004	4	84
15.15102.106	15.15102.006	6	108
15.15102.108	15.15102.008	8	135

WINSTA-E lateral Plate

- Material: Ti6Al4V
- Anodisation: Type II

Article Number * left	Article Number * right	Holes	Length (mm)
15.15103.103	15.15103.003	3	91
15.15103.105	15.15103.005	5	115
15.15103.107	15.15103.007	7	139
15.15103.109	15.15103.009	9	162

WINSTA-E posterolateral Plate

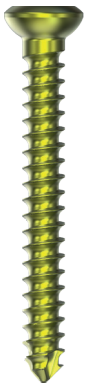
- Material: Ti6Al4V
- Anodisation: Type II

Article Number * left	Article Number * rigth	Holes	Length (mm)
15.15200.103	15.15200.003	3	81
15.15200.105	15.15200.005	5	105
15.15200.107	15.15200.007	7	132
15.15200.109	15.15200.009	9	156

WINSTA-E Olecranon Plate

- Material: Ti6Al4V
- Anodisation: Type II

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



Cortical Screw, self-tapping

	Ø 2.7 mm	Ø 3.5 mm
• Thread diameter:	2.7 mm	3.5 mm
• Core diameter:	1.9 mm	2.4 mm
• Head diameter:	5.0 mm	6.0 mm
• Hexagon socket:	2.5 mm	2.5 mm
• Material:	Ti6Al4V	Ti6Al4V

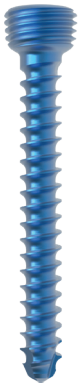
Article Number Ø 2.7 mm	Article Number * Ø 3.5 mm	Length (mm)
03.03527.010(S)	03.03612.010	10
03.03527.012(S)	03.03612.012	12
03.03527.014(S)	03.03612.014	14
03.03527.016(S)	03.03612.016	16
03.03527.018(S)	03.03612.018	18
03.03527.020(S)	03.03612.020	20
03.03527.022(S)	03.03612.022	22
03.03527.024(S)	03.03612.024	24
03.03527.026(S)	03.03612.026	26
03.03527.028(S)	03.03612.028	28
03.03527.030(S)	03.03612.030	30
03.03527.032(S)	03.03612.032	32
03.03527.034(S)	03.03612.034	34
03.03527.036(S)	03.03612.036	36
03.03527.038(S)	03.03612.038	38
03.03527.040(S)	03.03612.040	40
03.03527.045	03.03612.045	45
03.03527.050(S)	03.03612.050	50
	03.03612.055	55
	03.03612.060	60

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

Article Number * Ø 2.7 mm	Article Number * Ø 3.5 mm	Length (mm)
03.05527.010	03.05612.010	10
03.05527.012	03.05612.012	12
03.05527.014	03.05612.014	14
03.05527.016	03.05612.016	16
03.05527.018	03.05612.018	18
03.05527.020	03.05612.020	20
03.05527.022	03.05612.022	22
03.05527.024	03.05612.024	24
03.05527.026	03.05612.026	26
03.05527.028	03.05612.028	28
03.05527.030	03.05612.030	30
03.05527.032	03.05612.032	32
03.05527.034	03.05612.034	34
03.05527.036	03.05612.036	36
03.05527.038	03.05612.038	38
03.05527.040	03.05612.040	40
03.05527.042	03.05612.042	42
03.05527.044	03.05612.044	44
03.05527.046	03.05612.046	46
03.05527.048	03.05612.048	48
03.05527.050	03.05612.050	50
03.05527.052	03.05612.052	52
03.05527.054	03.05612.054	54
03.05527.056	03.05612.056	56
03.05527.058	03.05612.058	58
03.05527.060	03.05612.060	60

Locking Cortical Screw, self-tapping

	Ø 2.7 mm	Ø 3.5 mm
• Thread diameter:	2.7 mm	3.5 mm
• Core diameter:	1.9 mm	2.4 mm
• Head diameter:	4.75 mm	4.75 mm
• Hexagon socket:	2.5 mm	2.5 mm
• Material:	Ti6Al4V	Ti6Al4V



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

Templates

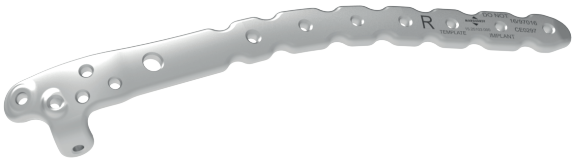
WINSTA-E medial Plate

Article Number left / right	Holes
15.25100.108	8
15.25100.112	12

WINSTA-E lateral Plate

Article Number left	Article Number rigth	Holes
15.25102.104	15.25102.004	4

WINSTA-E posterolateral Plate



Article Number left	Article Number rigth	Holes
15.25103.103	15.25103.003	3
15.25103.107	15.25103.007	7

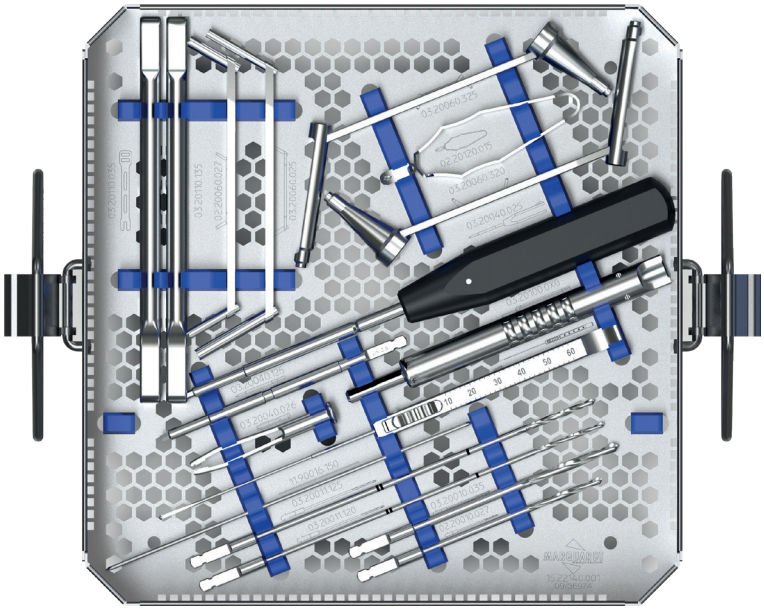
WINSTA-E Olecranon Plate

Article Number left	Article Number rigth	Holes
15.25200.103	15.25200.003	3
15.25200.107	15.25200.007	7

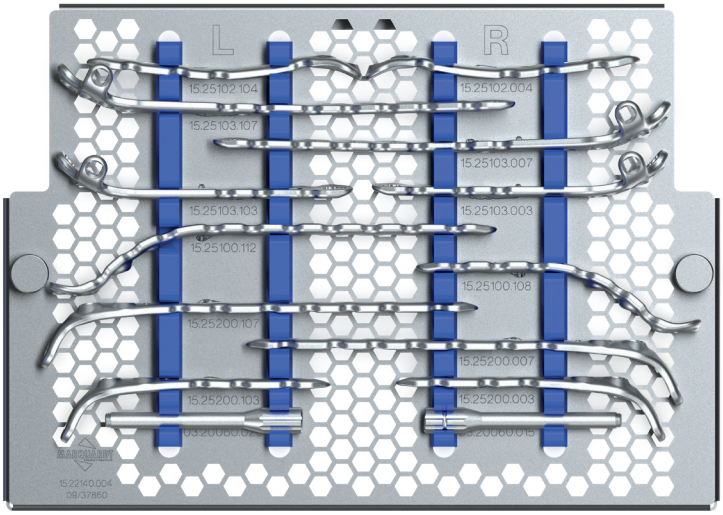
Instrument Storage

- Compact instrument set with clear arrangement
- Easy handling
- Low weight

Instruments



Templates



Instruments

11.90016.150 Kirschner Wire Ø 1.6 mm, trocar tip, L 150 mm, stainless steel

02.20010.027 Drill Bit Ø 2.7 mm, AO Coupling, L 100 / 70 mm

03.20010.035 Drill Bit Ø 3.5 mm, AO Coupling, L 110 / 80 mm

03.20011.120 Drill Bit Ø 2.0 mm, AO Coupling, L 165 / 135 mm

03.20011.125 Drill Bit Ø 2.5 mm, AO Coupling, L 165 / 135 mm

03.20060.015 Drill Guide Ø 2.0 for Locking Plates

03.20060.020 Drill Guide Ø 2.5 for Locking Plates

03.20060.320 Double Drill Guide 2.0 / ML

03.20060.325 Double Drill Guide 2.5 / ML

02.20060.027 Double Drill Guide 2.0 / 2.7

03.20060.025 Double Drill Guide 2.5 / 3.5

03.20100.060 Length Determination Instrument, for Screws up to 60 mm

03.20040.125 Screwdriver Shaft, hex 2.5 mm, AO Coupling, L 100 / 70 mm

03.20040.025 Screwdriver, hex 2.5 mm, L 200 / 85 mm

03.20040.026 Holding Sleeve for Screws Ø 2.7 - 4.0 mm

02.20120.015 Screw Forceps, self-holding

03.20110.035 Bending Iron for Plates 2.7 to 3.5, right
03.20110.135 Bending Iron for Plates 2.7 to 3.5, left

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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