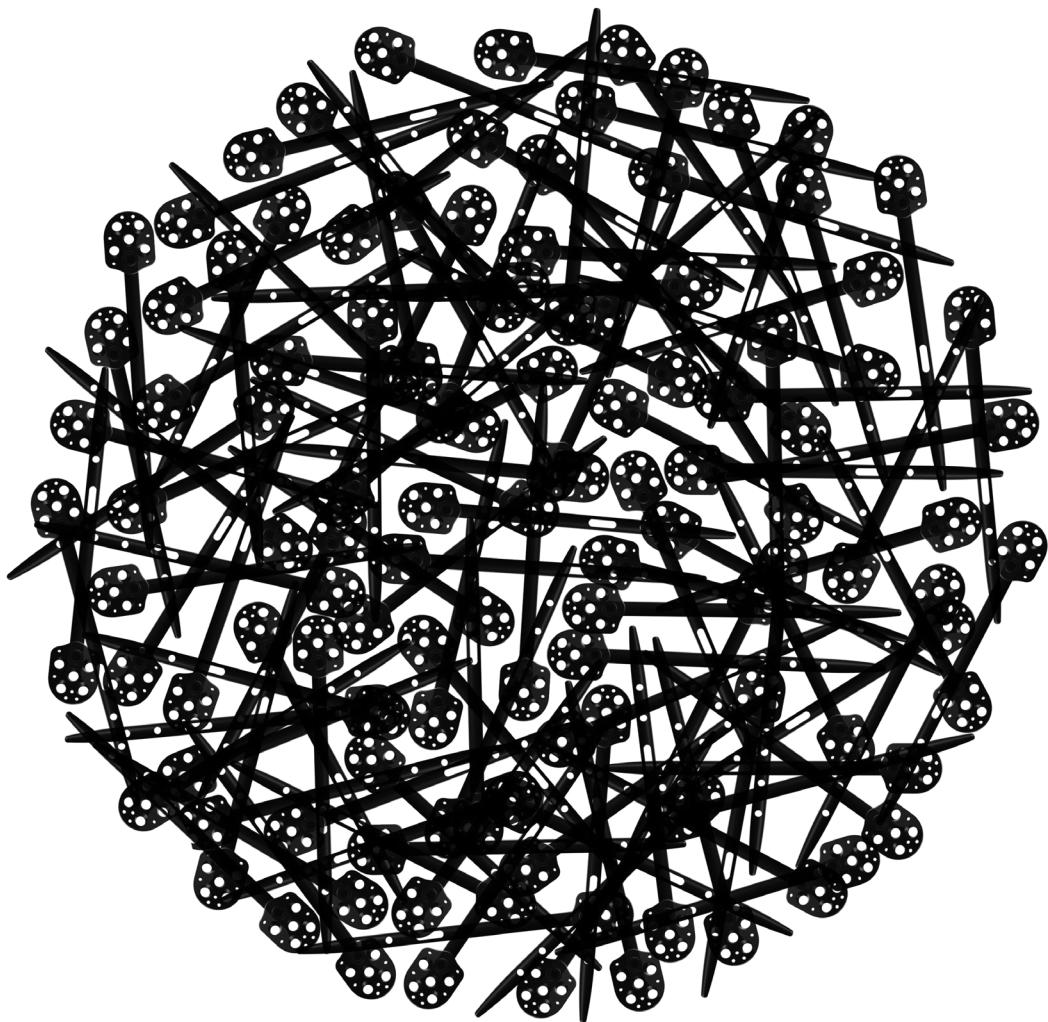


# ITS.

Implants  
trauma



## HNP

Humeral Nail Locking Plate

All ITS plates are preformed anatomically as a matter of principle. If adjustment of the plate to the shape of the bone is required, this is possible by carefully bending gently in one direction once. Particular care is required when bending in the region of a plate hole, as deformation of the plate may lead to a failure of the locking mechanism. The plate must not be buckled or bent several times. This is particularly important in the case of titanium implants, to prevent material fatigue and subsequent failure. The method of bending is the conscious responsibility of the operating doctor; I.T.S. GmbH can accept no liability whatsoever for this.

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# Introduction



## ○ Preface

The newly developed Humeral Nail Locking Plate enables the medical treatment of humeral fractures using a minimal invasive method.

The special feature of this implant is the free choice of screw placement.

The user is able to set any desired screw in any proximal hole (either locking or non-locking screw).

The free choice of screw angulation (+/- 15°, see page 19) provides an advantage in fracture treatment, especially in the case of complex fractures.



## ○ Screws

3235I-XX Cortical Screw, D=3.5mm

61273-220 Spiral Drill, D=2.7mm, L=220mm, AO Connector

56252 Screwdriver, WS 2.5, with self-holding sleeve

56252-I50 Screwdriver, WS 2.5, conical head



37422-XX-N Cancellous Screw, locking, D=4.2mm, SH

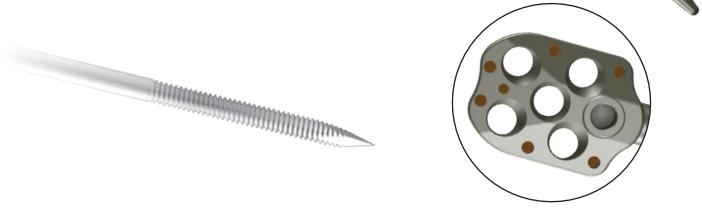
61273-220 Spiral Drill, D=2.7mm, L=220mm, AO Connector

56252 Screwdriver, WS 2.5, with self-holding sleeve

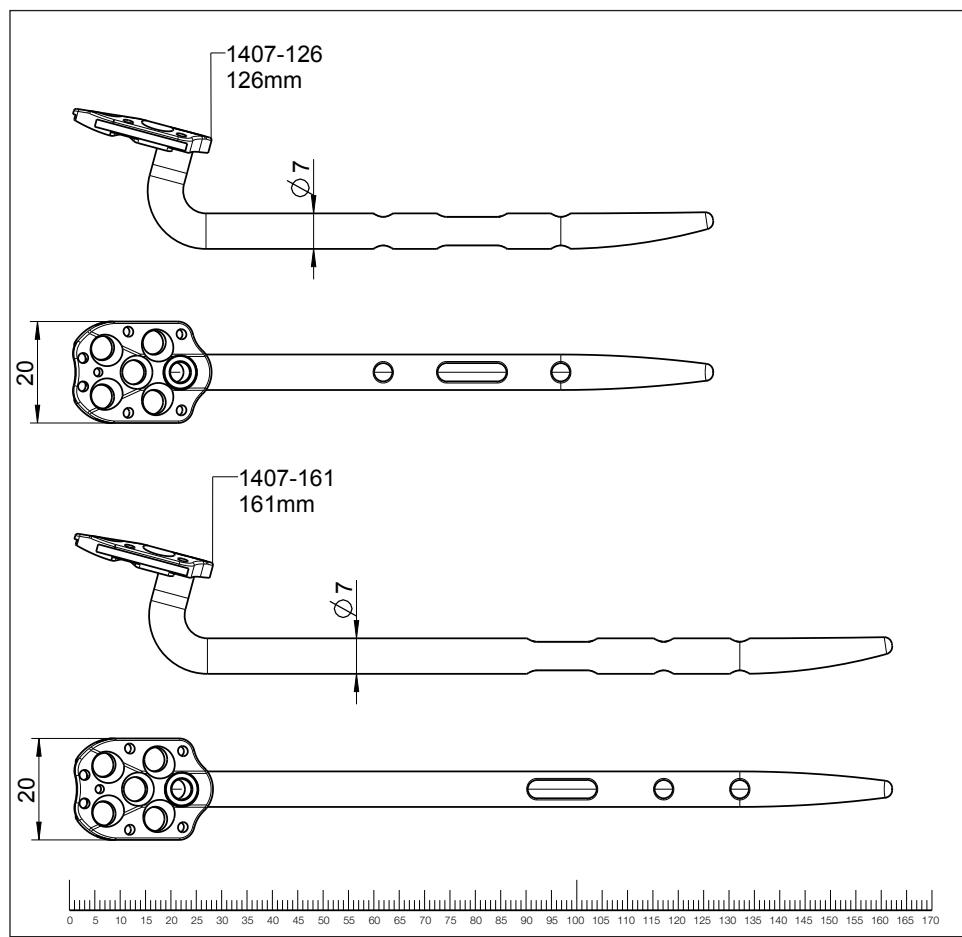
56252-I50 Screwdriver, WS 2.5, conical head



35164-228 Guide Wire, Steel, D=1.6mm,  
L=228mm, TR, w. thread



## ○ Pre-operative planning



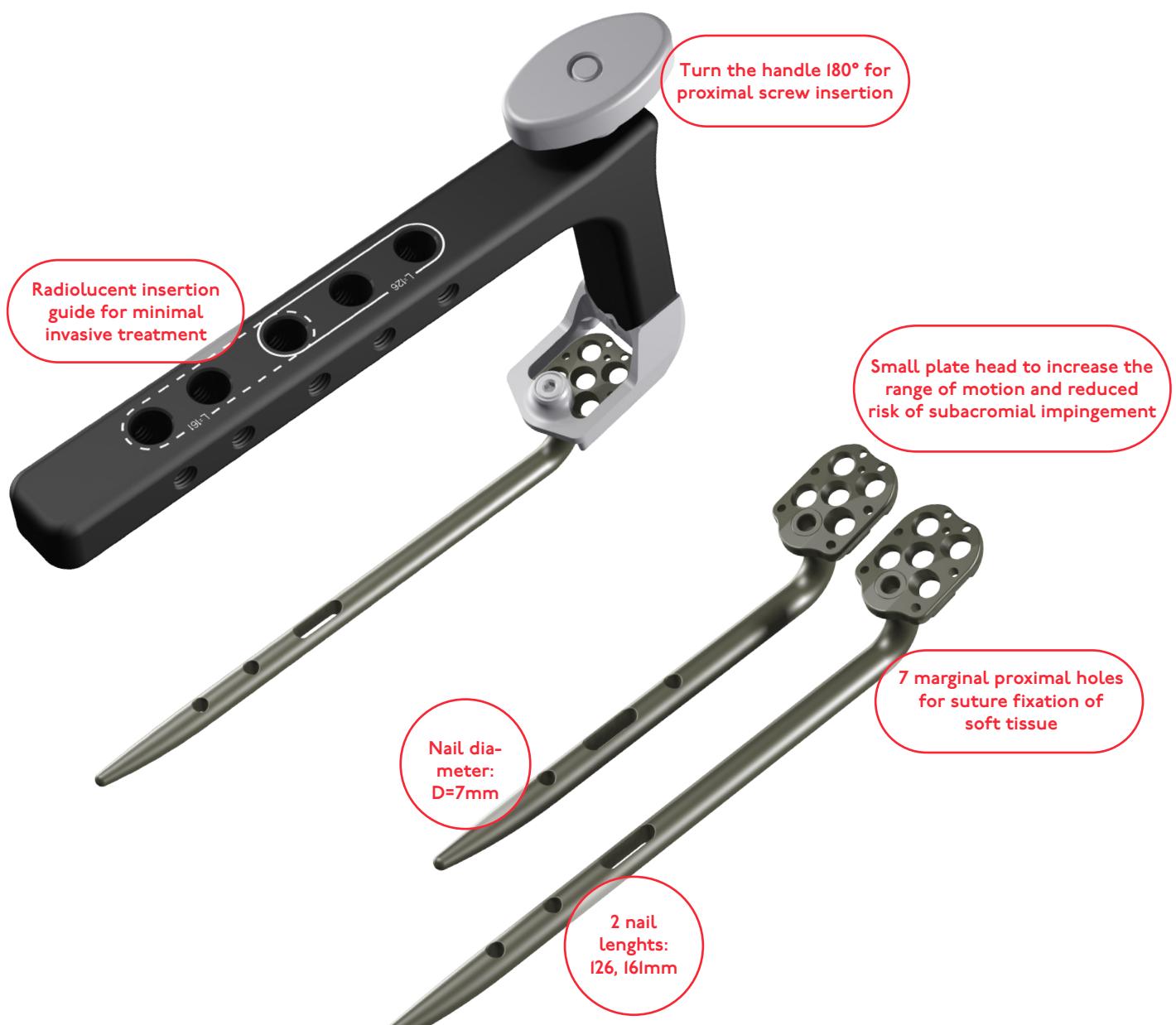
## ○ Properties

### Properties of the material:

- Nail plate material: Titanium
- Material of screws: TiAl6V4 ELI
- Easier removal of the implant after the fracture has healed
- Improved fatigue strength of the implant
- Reduced risk of cold welding
- Reduced risk of inflammation and allergy

### Properties of the implant:

- Multi-directional Locking
- Anatomical nail plate design
- 5 proximal plate holes for optimal reconstruction of the humeral head
- Distal end of the nail is inclined 10° for easier insertion



## ○ Indications, Contraindications & Time of operation

### Indications:

- ◆ Proximal metaphyseal fractures of the humerus
- ◆ Humeral head fractures

### Contraindications:

- ◆ Severe osteoporosis
- ◆ Existing infections in the area of the fracture
- ◆ In cases of skin and soft tissue problems
- ◆ Obesity
- ◆ Lack of patient compliance

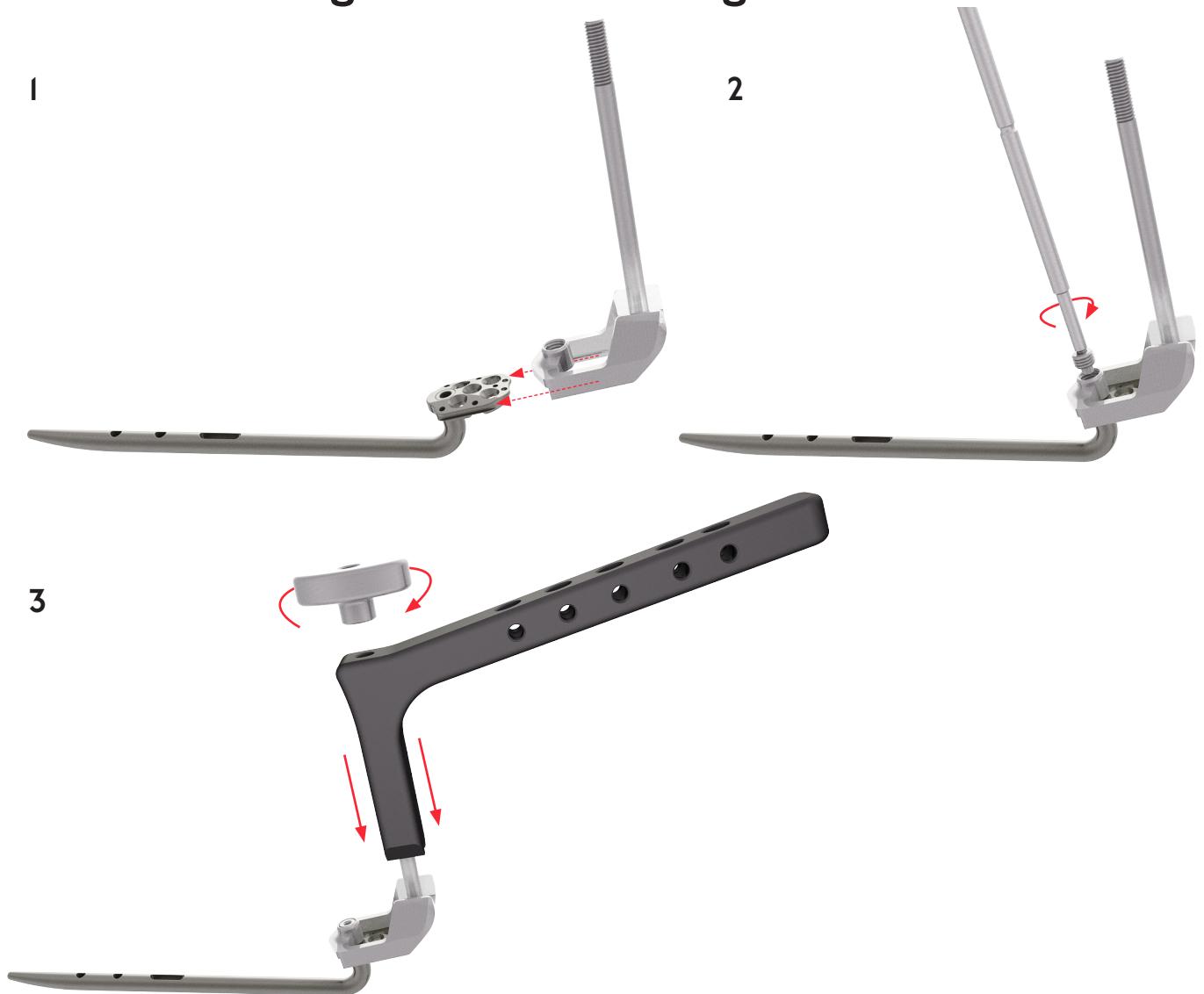
### Time of operation:

- ◆ Primary as well as secondary after swelling subsides and after temporary fixation

# Surgical Technique

2

## ○ Assembling of the insertion guide



## ○ Utilization of the insertion guide

The humeral nail plate system includes two nail lengths.

When using the short version ( $L=126\text{mm}$ ), the 3 jig holes marked with the solid border must be used.



When using the long version ( $L=161\text{mm}$ ), the 3 jig holes marked with the dashed border must be used.



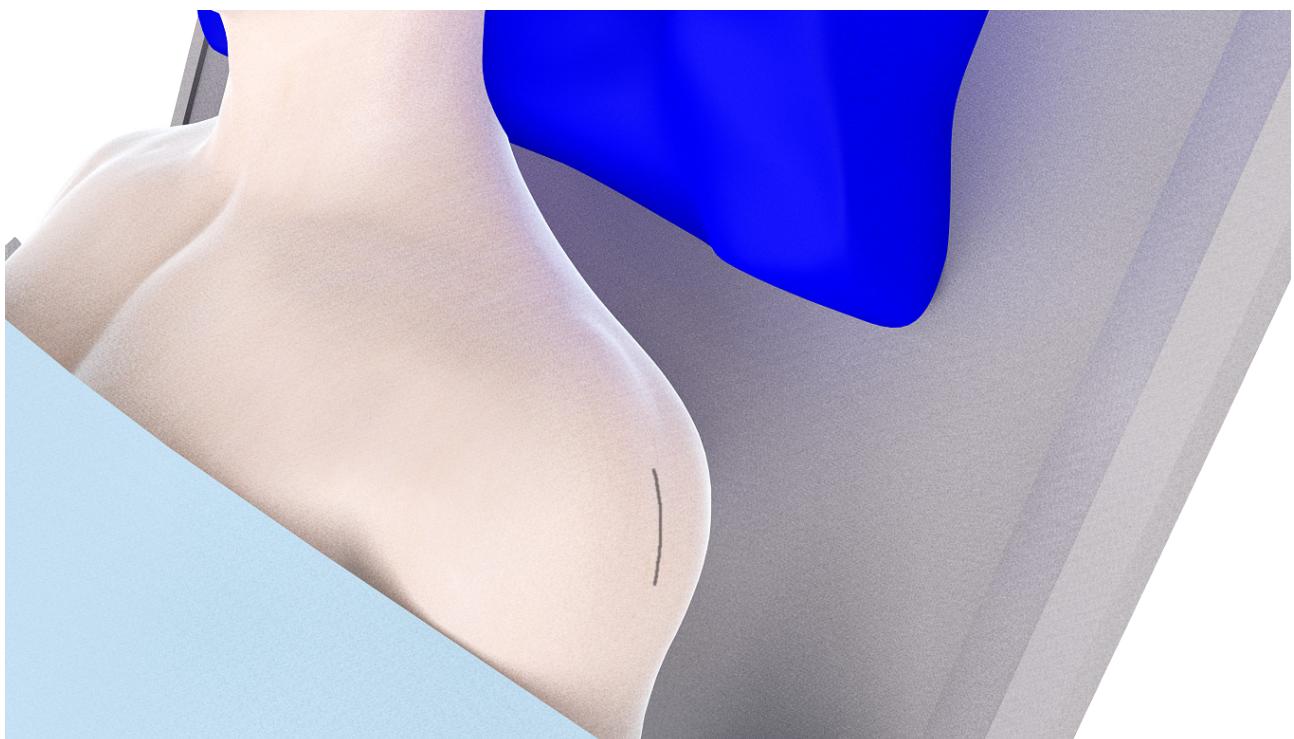
## ○ Pre-operative patient preparation

- Positioning on a radiolucent surgical table
- Semi-sitting angle of about 30° - 40°, shoulder should be freely moveable (optional shoulder table)
- The arm should be freely moveable to allow fracture reduction
- General anaesthesia, regional anaesthesia or combination can be used

## ○ Exposure

### Anterolateral access:

- Skin incision parallel to the anterior acromion and extension 5cm distally in fiber direction of the M. deltoideus.
- Detachment of the pars acromialis of the M. deltoideus.



## ○ Reduction

- ◆ Anatomical reduction of the fracture under fluoroscopy.

## ○ Plate insertion

- ◆ Insert the nail plate, assembled with the insertion guide (recommended in Z position)
- ◆ Insert the distal end of the nail plate intramedullary
- ◆ Align the proximal end of the nail plate approx. 3cm distal to the Tuberculum majus
- ◆ Verify the correct nail plate position. Optional temporary fixation with guide wires, steel, D=1.6mm, L=228mm, TR, w. thread (**35164-228**) into proximal guide wire holes.

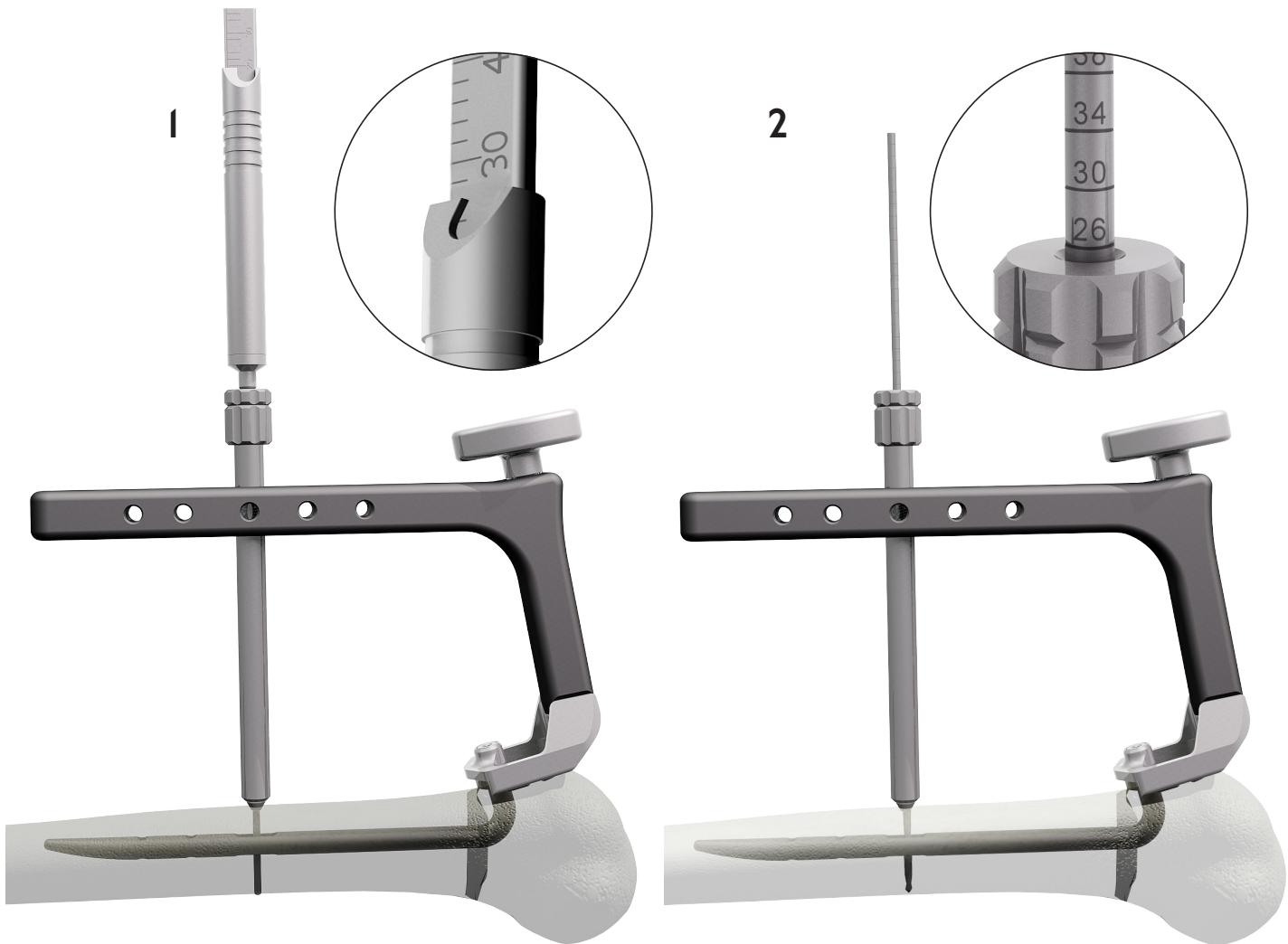


## ○ Intraoperative identification of screw length

1. Insert the depth gauge for humeral systems (**59222**) after drilling screw holes. Then, hook into the far medial cortices and read off the required screw length.

2. Drill screw holes under fluoroscopy guidance through the far medial cortices. Then, read off the required screw length at the calibrated spiral drill D=2.7mm, L=220mm (**61273-220**).

**Note:** In the proximal area, the screw length is determined using the depth gauge, solid small fragment screws (**59022**).



## ○ Placement of the screws

After insertion of the nail plate with mounted jig in Z position, unscrew the clamping nut (**II8004-3**) with about 4 turns, then turn the handle (**II8004-II**) 180 ° and tighten the clamping nut by hand.

Fix the nail plate temporarily to the bone and drill with the spiral drill, D=2.7mm, L=220mm, AO Connector (**6I273-220**) in the long hole. Drilling is performed through the D=2.8mm drill sleeve (**II8005-10**) that was placed in the tissue protection sleeve (**II8005-8**). Then, the drill sleeve is removed and a D=3.5mm cortical screw (**3235I-XX**) (appropriate length measured before) is inserted through the tissue protection sleeve.



**Advice:** For optimal alignment of the nail plate to the humeral length, we recommend to first occupy the oblong hole.

Then using the spiral drill, D=2.7mm, L=220mm, AO Connector (**61273-220**) to drill through the drill guide, D=2.7/2.0mm (**62202**) into a proximal plate hole.

Determine appropriate length using the depth gauge, solid small fragment screws (**59022**). Insert a D=4.2mm locking cancellous screw (**37422-XX-N**) with the screwdriver, WS 2.5 (**56252/56252-I50**).



The remaining shaft holes are then filled with cortical screws.  
Determine appropriate lengths of the screws (see page I3).  
Insert D=3.5mm cortical screws (**32351-XX**) with the screwdriver, WS 2.5 (**56252/56252-150**) through the tissue protection sleeve (**II8005-8**).

Subsequent control of nail plate position under fluoroscopy.



## ○ Disassembling of the insertion guide

To remove the insertion guide unscrew the clamping nut (**II8004-3**) and remove the handle (**II8004-II**). Release the fixing screw (**II8004-5**) with the screwdriver, WS 2.5 (**56252/56252-I50**) and push the jig (**II8004-10**) proximally.



## ○ Postoperative treatment

- As a rule, physical therapy immediately after surgery (passive motion exercises)
- Active motion exercises after 3-9 weeks
- In case of poor bone quality or insecure fixation, immobilization for a maximum of 3 weeks

## ○ Explantation

- Removal is possible, if desired by the patient. This is facilitated by the fact that cold welding never occurs.
- Implant removal is performed 6 months post-operative and if the fracture has healed
- Vice versa of implantation
- Skin incision following the old scar
- Assemble the insertion guide onto the nail plate
- Stab incision and remove the screws with the screwdriver, WS 2.5 (**56252/56252-150**)
- The problem of cold welding was resolved by using a special surface treatment (for further information see page 19)

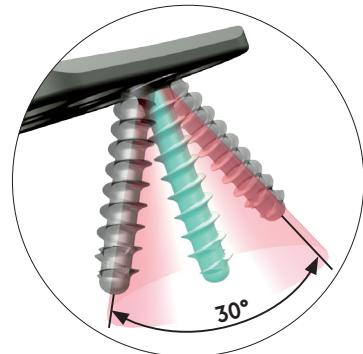
## Information



## ○ Locking

Locking works because:

- Screw material (TiAlV) is slightly harder than plate material (Titanium Grade 2)
- Screw head **forms** thread into the plate (no cutting)



Benefits:

- $\pm 15^\circ$  and Locking
- No pre threading
- No cold welding
- No debris
- You can re-set the screw up to 3 times

## ○ Dotize®

Chemical process - anodization in a strong alkaline solution\*

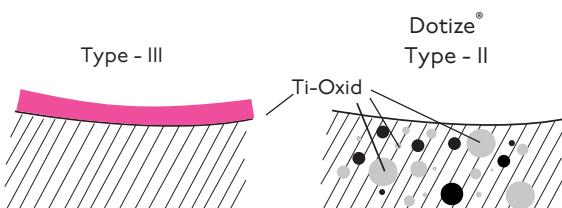
### Type III anodization

- Layer thickness 60-200nm
  - + Different colors
  - Implant surface remains sensitive to:  
Chipping  
Peeling  
Discoloration

### Dotize

### Type II anodization

- Layer thickness 2000-10 000nm
  - + Film becomes an interstitial part of the titanium
  - No visible cosmetic effect



Anodization Type II leads to following benefits\*

- Oxygen and silicon absorbing conversion layer
- Decrease in protein adsorption
- Closing of micro pores and micro cracks
- Reduced risk of inflammation and allergy
- Hardened titanium surface
- Reduced tendency of cold welding of titanium implants
- Increased fatigue resistance of implants
- Improved wear and friction characteristics

## ○ Order list

Humeral Nail Plate, D=7mm, L=126mm Humeral Nail Plate, D=7mm, L=161mm	1407-126 1407-161	
Cortical Screw, D=3.5mm, L=20mm Cortical Screw, D=3.5mm, L=22mm Cortical Screw, D=3.5mm, L=24mm Cortical Screw, D=3.5mm, L=26mm Cortical Screw, D=3.5mm, L=28mm Cortical Screw, D=3.5mm, L=30mm Cortical Screw, D=3.5mm, L=32mm Cortical Screw, D=3.5mm, L=34mm Cortical Screw, D=3.5mm, L=36mm	32351-20 32351-22 32351-24 32351-26 32351-28 32351-30 32351-32 32351-34 32351-36	
Cancelloous Screw, Locking, D=4.2mm, L=38mm, SH Cancelloous Screw, Locking, D=4.2mm, L=40mm, SH Cancelloous Screw, Locking, D=4.2mm, L=42mm, SH Cancelloous Screw, Locking, D=4.2mm, L=44mm, SH Cancelloous Screw, Locking, D=4.2mm, L=46mm, SH Cancelloous Screw, Locking, D=4.2mm, L=48mm, SH Cancelloous Screw, Locking, D=4.2mm, L=50mm, SH Cancelloous Screw, Locking, D=4.2mm, L=55mm, SH Cancelloous Screw, Locking, D=4.2mm, L=60mm, SH	37422-38-N 37422-40-N 37422-42-N 37422-44-N 37422-46-N 37422-48-N 37422-50-N 37422-55-N 37422-60-N	
Screwdriver, WS 2.5, With Self-Holding Sleeve Screwdriver, WS 2.5, Conical Head	56252 56252-150	
Depth Gauge, Solid Small Fragment Screws Depth Gauge, F. Humeral Systems	59022 59222	
Drill Guide, D=2.0/2.7mm	62202	
Spiral Drill, D=2.7mm, L=220mm, AO Connector	61273-220	
Guide Wire, Steel, D=1.6mm, L=228mm, TR, w. thread	35164-228	
Insertion Guide, Humeral Nail Plate	118004A	
Sterilization Tray	50264	

**Special sizes & instruments optional on request \***

Jig Nail, Humeral Nail Plate	118004-10	
Handle, Humeral Nail Plate	118004-11	
Clamping Nut, Humeral Nail Plate	118004-3	
Fixing Screw, Humeral Nail Plate	118004-5	

For detailed cleaning and sterilization instructions, please refer to package insert.

Clamping Screw, Humeral Nail Plate	118004-6	
Tissue Protection Sleeve, Proximal Humeral Plate	118005-8	
Drill Sleeve, D=1.7mm, Proximal Humeral Plate	118005-9	
Drill Sleeve, D=2.8mm, Proximal Humeral Plate	118005-10	
Temporary Plate Holder	58164-150	

## Tray setting



## ○ Notes





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