

Proximal Humerus Plate 3.5
Surgical Technique

LOCTEC®



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Disclaimer

This surgical technique is exclusively intended for medical professionals, especially physicians, and therefore may not be regarded as a source of information for non-medical persons. The description of this surgical technique does not constitute medical advice or medical recommendations nor does it convey any diagnostic or therapeutic information on individual cases. Therefore, the attending physician is fully responsible for providing medical advice to the patient and obtaining the informed consent of the patient which this surgical technique does not supersede.

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The LOQTEQ® Proximal Humerus Plate 3.5 is part of the LOQTEQ® plate system and unifies angular stability with anatomical plate design.

Material

The LOQTEQ® implants and instruments are manufactured using high-quality materials, which have been proven to be successful in medical technology for decades. The anatomical plates and bone screws are made of titanium alloy.

All materials employed comply with national and international standards. They are characterized by good biocompatibility, a high degree of safety against allergic reactions and good mechanical properties. LOQTEQ® implants show an excellent highly polished surface.

Indications/Contraindications

Indications

- Fractures and fracture dislocations
- Osteotomies
- Non-unions of the proximal humerus, particularly in osteopenic bone

Contraindications

- Infection or inflammation (localized or systemic)
- Allergies against the implant material
- High anesthesia risk patients
- Severe soft tissue swelling impacting normal wound healing
- Insufficient soft tissue coverage
- Fractures in children and adolescents with epiphyseal plates not yet ossified

Processing (Sterilization & Cleaning)

The implants are supplied sterile and non-sterile.

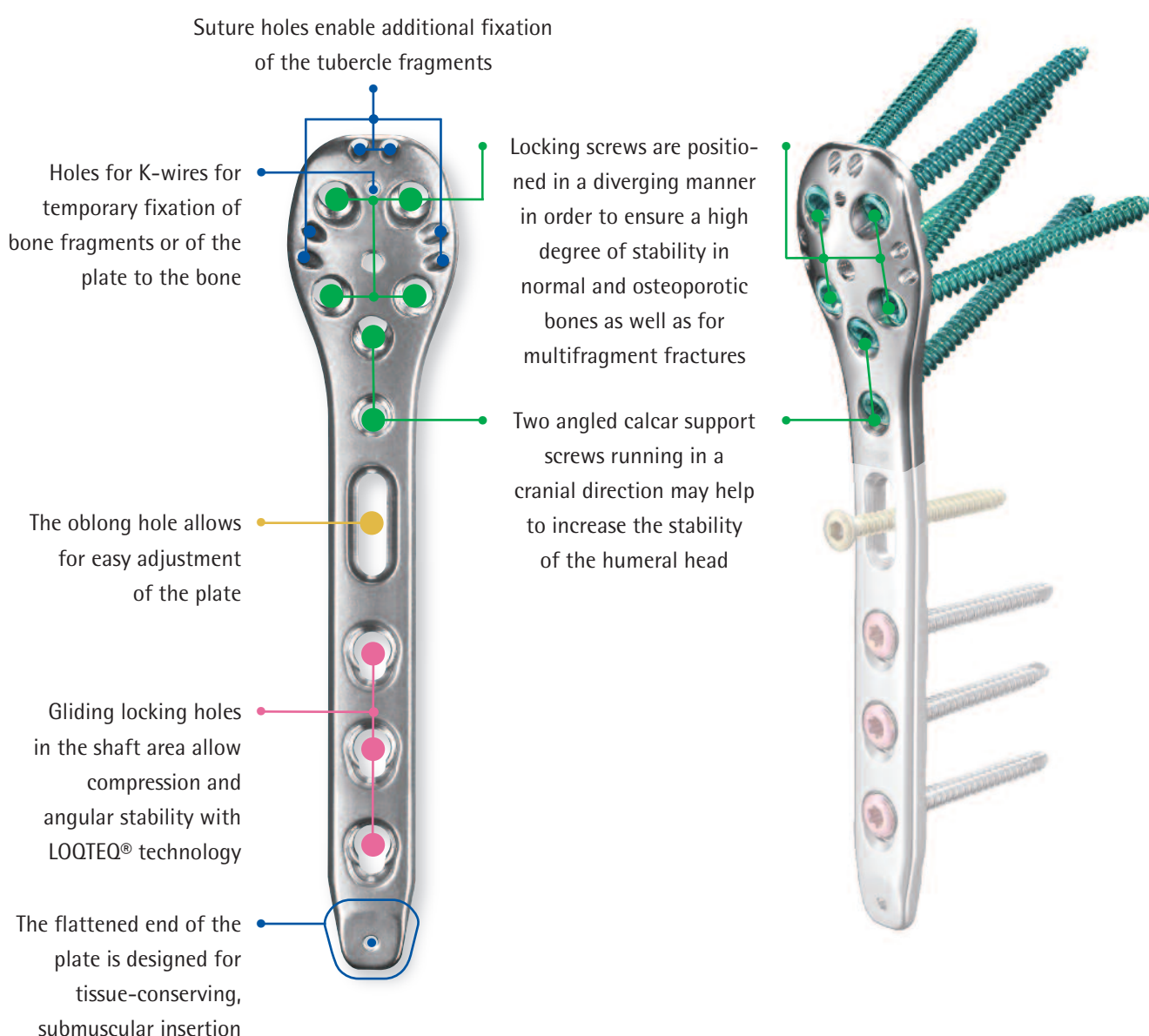
Implants and instruments that are supplied in non-sterile condition must be sterilized before use. For this purpose, please refer to the Instructions for Use that are enclosed with the plates, instruments, and trays.

Do not use (sterile) implants from damaged or open inner packaging.

Implant components that have come or might have come into contact with infectious fluids (e.g. blood) must not be resterilized and reused in another surgery. They must be returned to the manufacturer. Resterilization is prohibited under any circumstances (see Instructions for Use).

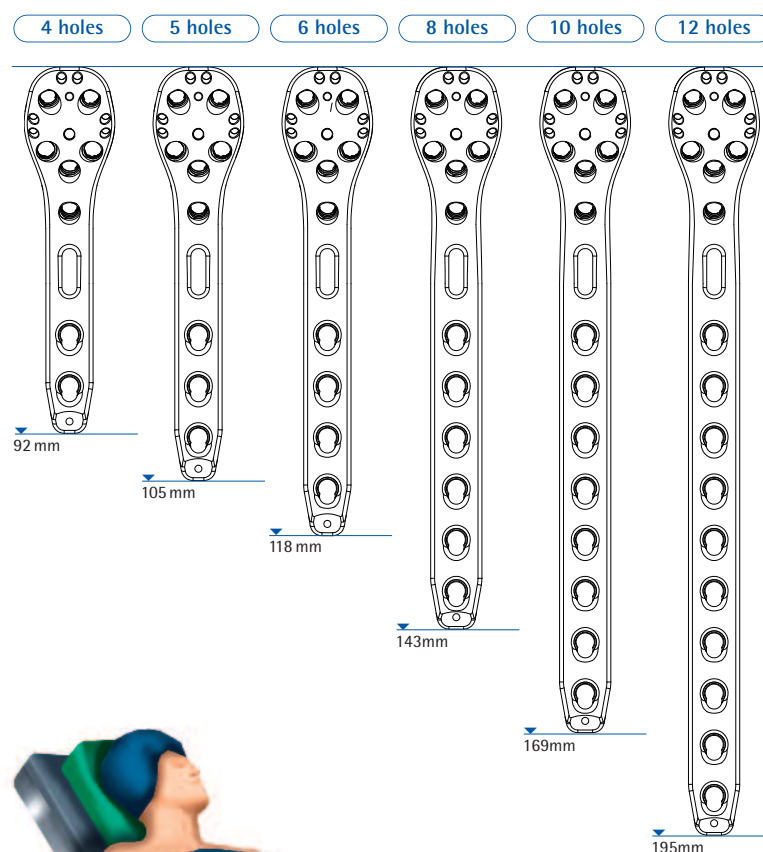
Features & Benefits

- The anatomical plate design minimizes the need for intraoperative plate contouring
- All plate holes, with the exception of the oblong hole, are compatible with locking as well as cortical screws (gold)
- Fitted, radiolucent aiming devices designed for the safe placement of drill guides at a preset angle
- Minor contact undercuts may help to preserve the blood supply to the periosteum



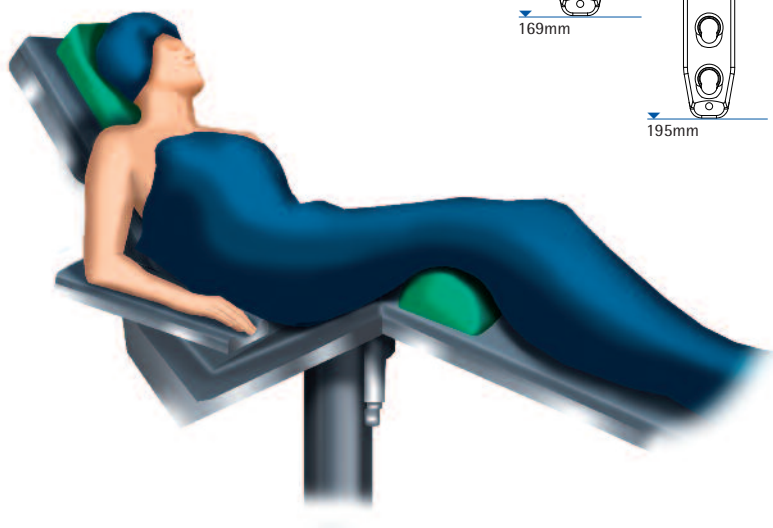
Preoperative planning

- Evaluation of the fracture situation on the basis of an X-ray/CT scan and selection of the appropriate plate length.



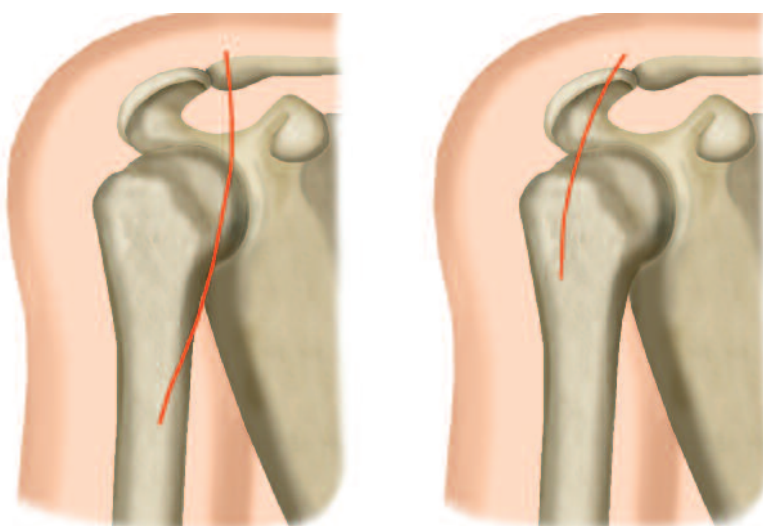
Patient positioning

- The patient is positioned in the „beach chair“ position. This facilitates AP and axial fluoroscopic imaging. Prepare the patients arm so that it can be moved intraoperatively.



Approach

- The deltoidopectoral or lateral transdeltoid approach is recommended.



Preparing the plate

INSTRUMENTS

Aiming device LOQTEQ® Proximal Humerus Plate 3.5
 Fixing screw aiming device LOQTEQ® SFI T15
 Screwdriver Duo, T15, quick coupling

ART.-NO.

IU 8176-01
 IU 8176-03
 IU 7825-56



- Mount the aiming device on the plate using the fixing screw.

◆ NOTE:

A thread holds the fixing screw in the aiming device. For cleaning purposes, the screw must be screwed out of the aiming device. For this purpose, apply slight pressure onto the screw from the underside of the aiming device and remove the screw.

Reduction and primary fixation



INSTRUMENTS

K-wire with trocar point, Ø1.6, L 150
 Aiming device LOQTEQ® Proximal Humerus Plate 3.5
 Fixing screw aiming device LOQTEQ® SFI T15
 Screwdriver Duo, T15, quick coupling
 Large handle, cannulated, quick coupling
 Drill guide for round hole LOQTEQ® 3.5, I-Ø 2.4, green
 Reduction sleeve for K-wire Ø1.6, green

ART.-NO.

NK 0016-15
 IU 8176-01
 IU 8176-03
 IU 7825-56
 IU 7706-00
 IU 8166-30
 IU 8166-15

- Reposition the head fragments and check the repositioning using fluoroscopy. Fixate the repositioned fragments temporarily with K-wires or suture material. Ensure that K-wires do not interfere with subsequent plate placement.

◆ NOTE:

Reposition as gently as possible to prevent additional iatrogenic injury to the blood supply. Repositioning of the head fragments must be completed before fixing the plate in place.

- Depending on the access, carefully insert the plate, and position it at the lateral humeral head and shaft, or place it directly at the bone

◆ CAUTION:

To minimize the risk of subacromial impingement, the plate must be placed approximately 10 - 15mm distal to the greater tuberosity.

- Fixate the plate temporarily with K-wires either through the appropriate holes in the plate or alternatively through a drill guide (green) with a reduction sleeve for K-wire (green).



Insertion of cortical screws (gold)



INSTRUMENTS

Double drill guide, $\varnothing 2.7/3.5$, with spring aided centering
Twist Drill $\varnothing 2.7$, L 150, coil 50, quick coupling
Depth gauge for screws $\varnothing 3.5 - 4.0$, up to L 90
Screw forceps, self-holding
Screwdriver Duo, T15, quick coupling
Large handle, cannulated, quick coupling

ART.-NO.

IU 8116-60
IU 7427-15
IS 7904-20
IU 8004-00
IU 7825-56
IU 7706-00

- For the primary fixation of the plate shaft, a non-locking cortical screw 3.5 mm (gold) can be inserted into the oblong hole. For this purpose use a double drill guide and a twist drill $\varnothing 2.7$ and drill to the desired depth.
- Then determine the length of the screw using the depth gauge and insert a screw of appropriate length by using the screwdriver T15. The plate can be pulled against the bone using this screw.

◆ NOTE:

Securing the oblong hole before inserting screws in other plate holes can facilitate the positioning of the plate on the bone.

◆ NOTE:

If a combination of non-locking cortical screws (gold) and locking compression screws (red) is used, non-locking cortical screws (gold) must be inserted first.

- For inserting a non-locking cortical screw 3.5 mm (gold) in a locking hole, use the double drill guide $\varnothing 2.7/3.5$ in a neutral position, i.e. center in the plate hole by applying slight pressure on the adjustable part. Drill using a twist drill $\varnothing 2.7$, determine the length of the screw using the depth gauge, and insert a non-locking cortical screw 3.5 mm (gold) of the appropriate length.

- Check plate position using fluoroscopy and adjust if required.



Insertion of locking screws (green)



INSTRUMENTS

K-wire with trocar point, Ø1.6, L 150
 Drill guide for round hole LOQTEQ® 3.5, I-Ø 2.4, green
 Reduction sleeve for K-wire Ø1.6, green
 Screwdriver Duo, T15, quick coupling

ART.-NO.

NK 0016-15
 IU 8166-30
 IU 8166-15
 IU 7825-56



- The six proximal plate holes are secured with LOQTEQ® cancellous screws 3.8 mm (green).

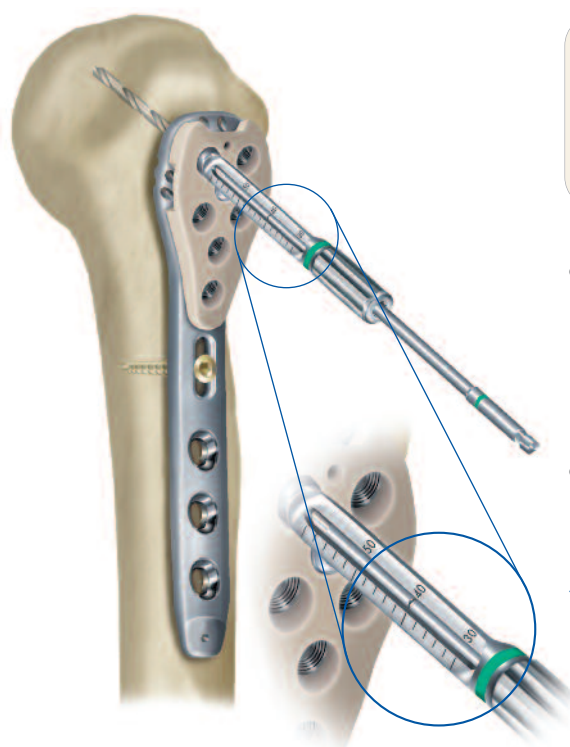
- Before inserting the screws, check the subsequent position of the screws using K-wires. For this purpose, insert one drill guide for round hole (green) each in both the proximal and the distal head area in a plate hole. Insert the reduction sleeve for K-wire (green). Insert the K-wire through the reduction sleeve up to the far cortical bone.

- Check the position of the K-wires using fluoroscopy.



◆ NOTE:

Using the screwdriver duo, T15 can facilitate screwing in, or later unscrewing, the drill guide (green).



INSTRUMENTS

K-wire with trocar point, ø1.6, L 150
 Reduction sleeve for K-wire ø1.6, green
 Twist Drill ø2.3, L 180, coil 50, quick coupling
 Drill guide for round hole LOQTEQ® 3.5, I-ø 2.4, green
 Direct measuring device LOQTEQ®, green, for K-wire L 150

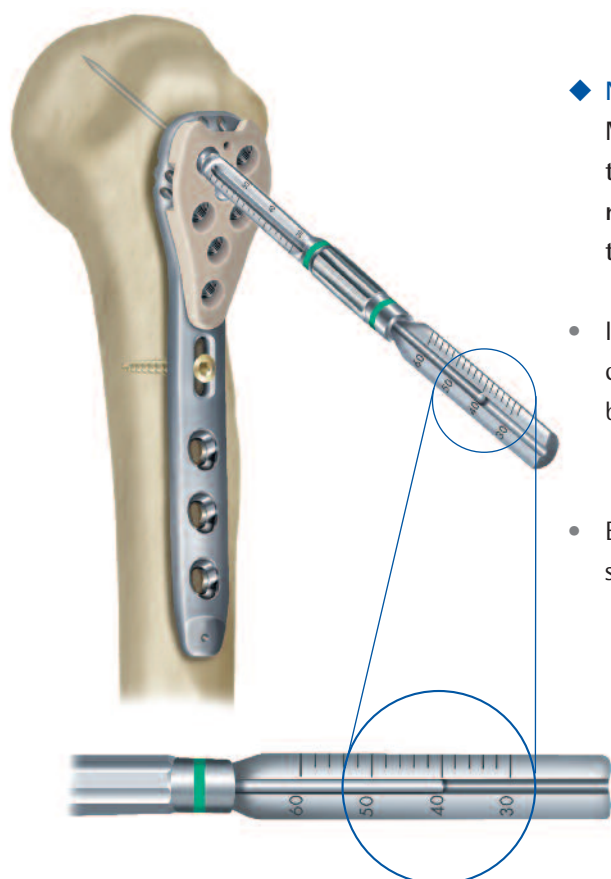
ART.-NO.

NK 0016-15
 IU 8166-15
 IU 7423-18
 IU 8166-30
 IU 7915-10

- To insert a LOQTEQ® cancellous screw 3.8 mm (green), remove the K-wire and the reduction sleeve for K-wire (green) and pilot drill with a twist drill ø2.3 (green) to the required depth, up to the subchondral zone.
- The penetration depth of the drill in the bone can be read off from the drill guide (green) to determine the required screw length.

◆ CAUTION:

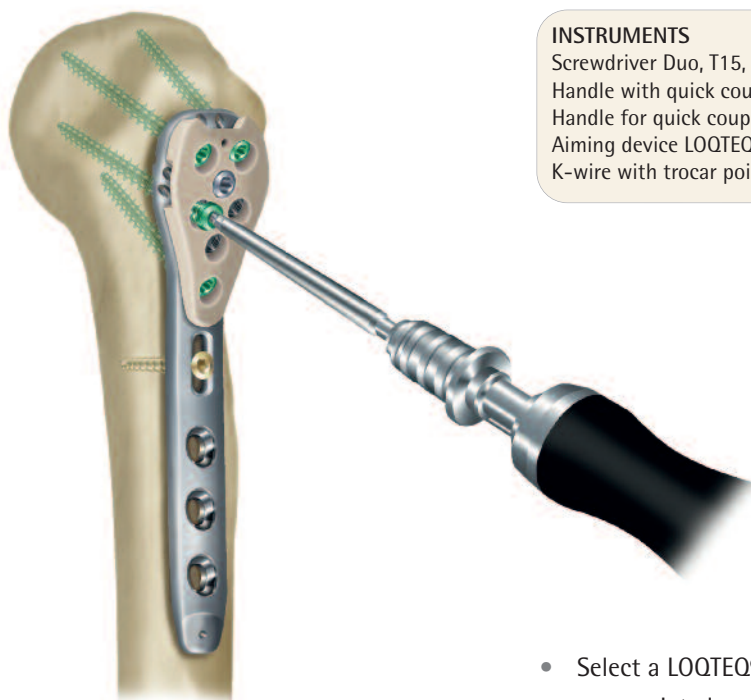
When determining the screw length, the probability of bone resorption and sintering of screws at the fracture site must be taken into account. Ensure that the screw tip is an adequate distance away from the subchondral zone.



◆ NOTE:

Measuring of the screw length via the K-wire is possible prior to drilling. Slide the direct measuring device (green) on the reduction sleeve for K-wire (green), and determine the length of the required screw.

- It is recommended to check the position of the K-wire by fluoroscopy before measuring, so that the determined screw length can be adjusted, if necessary.
- Before measuring the screw length, the total length of the K-wire should be checked using the scale on the screw rack.



INSTRUMENTS

Screwdriver Duo, T15, quick coupling
 Handle with quick coupling, with torque limiter, 2.0 Nm
 Handle for quick coupling large, cannulated
 Aiming device LOQTEQ® Proximal Humerus Plate 3.5
 K-wire with trocar point, Ø1.6, L 150

ART.-NO.

IU 7825-56
 IU 7707-20
 IU 7706-00
 IU 8176-01
 NK 0016-15

- Select a LOQTEQ® cancellous screw 3.8 mm (green) of the appropriate length and loosely insert with screwdriver T15. Finally, tighten the screw with the torque limiter 2.0 Nm. Optimal fixation is achieved when an audible click is heard.
- Secure all proximal plate holes in this way. Then remove the aiming device and any remaining K-wires.

◆ NOTE:

As soon as the head of the screw reaches the plate hole it is compulsory to switch to the torque limiter.



Insertion of locking compression screws (red) without compression



INSTRUMENTS

Drill guide for gliding hole LOQTEQ® 3.5, I-ø 2.8, red
Twist Drill ø2.7, L 150, coil 50, quick coupling
Depth gauge for screws ø3.5 - 4.0, up to L 90
Screwdriver Duo, T15, quick coupling
Handle with quick coupling, with torque limiter, 2.0 Nm
Large handle, cannulated, quick coupling

ART.-NO.

IU 8166-10
IU 7427-15
IS 7904-20
IU 7825-56
IU 7707-20
IU 7706-00



- Screw the drill guide for gliding hole (red) into the desired plate hole and pilot drill to the desired depth using the twist drill ø2.7 (blue-red). Remove the drill guide for gliding hole (red) and determine the required screw length using the depth gauge. Loosely insert a LOQTEQ® cortical screw 3.5 mm (red) of the appropriate length using screwdriver T15 and tighten the screw with the torque limiter 2.0 Nm. Optimal fixation is achieved when an audible click is heard.

◆ NOTE:

As soon as the head of the screw reaches the plate hole it is compulsory to switch to the torque limiter. In cases of very hard bone in the diaphysis it is necessary to make sure that the screw head is flush to the plate. Therefore, it is permissible in exceptionally hard bone of the diaphysis to finish the screw without the torque limiter.

- For an optimal plate-to-screw connection, it is necessary to use the drill guide for gliding hole LOQTEQ® for the insertion of locking screws. If the locking screw is inserted obliquely, the angular stability may be reduced.



Insertion of locking compression screws (red) with compression



INSTRUMENTS

Basic Insert for load drill guide LOQTEQ® 3.5
 Load Drill guide LOQTEQ® 3.5, compression 1 mm
 Load Drill guide LOQTEQ® 3.5, compression 2 mm
 Twist Drill ø2.7, L 150, coil 50, quick coupling
 Depth gauge for screws ø3.5 - 4.0, up to L 90
 Screwdriver Duo, T15, quick coupling
 Handle with quick coupling, with torque limiter, 2.0 Nm
 Large handle, cannulated, quick coupling

ART.-NO.

IU 8166-05
 IU 8166-01
 IU 8166-02
 IU 7427-15
 IS 7904-20
 IU 7825-56
 IU 7707-20
 IU 7706-00

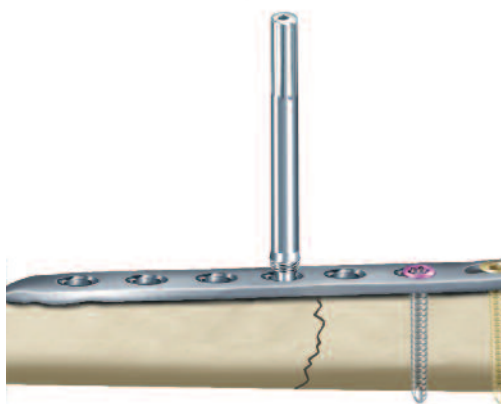
OPTIONAL

Load drill guide LOQTEQ® 3.5, adjustable up to 2 mm

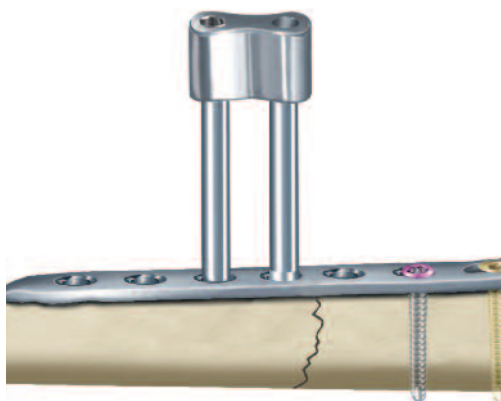
IU 8166-03



- For combined shaft fractures, the required fracture compression can be achieved by inserting a non-locking cortical screw 3.5 mm (gold) or LOQTEQ® locking compression screw 3.5 mm (red) into the compression position.



- Screw the basic insert for load drill guide (IU 8166-05) into a shaft hole near the fracture line or, if necessary, above the fracture line. Choose a load drill guide in accordance with the compression distance (1mm or 2mm) and position on the basic insert away from the fracture gap.



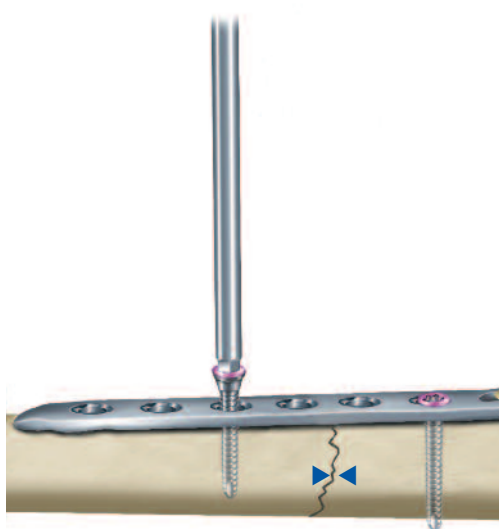
- Alternatively, the adjustable load drill guide (IU 8166-03) can be used. The fracture gap serves as orientation in setting the compression distance (max. 2mm). For this purpose, turn the wheel of the load drill guide until an appropriate gap forms in the upper part of the instrument and position the drill guide on the basic insert for load drill guide away from the fracture gap.



- Drill to the desired depth using a twist drill $\varnothing 2.7$ (blue/red) and determine the depth with the depth gauge.
- Loosely insert a LOQTEQ® locking compression screw 3.5 mm (red) of the appropriate length with screwdriver T15 and finally tighten the screw with the torque limiter 2.0 Nm.
Optimal fixation is achieved when an audible click is heard.

◆ NOTE:

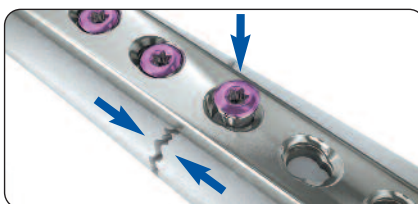
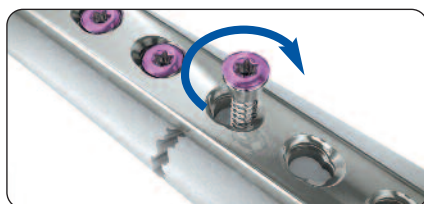
Care should be taken to select the proper compression distance (1 or 2mm). If the fracture gap is too small and the bone very hard, excessive compression may prevent full locking of the angle stable screw.



◆ NOTE:

As soon as the head of the screw reaches the plate hole it is compulsory to switch to the torque limiter. In cases of very hard bone in the diaphysis it is necessary to make sure that the screw head is flush to the plate. Therefore, it is permissible in exceptionally hard bone of the diaphysis to finish the screw without the torque limiter.

- Alternatively, a non-locking cortical screw (gold) can be placed as a compression screw. For this purpose, use the double drill guide in offset position (do not apply pressure on the drill guide) and drill using a twist drill $\varnothing 2.7$ (see page 10).
- When all required screws have been inserted, perform final check using fluoroscopy, AP and lateral, and close the wound.



Reattachment of the tuberosities



- If required, sutures can be sewn through the suture holes available at the plate periphery to facilitate reattachment of the tuberosities. The oblique suture holes are specially aligned to the direction of tension.
- Before closing the wound, make a final check on the repositioning result, the plate position and the screw lengths using fluoroscopy in all planes. Ensure that the screws do not penetrate the articular surface.

INSTRUMENTS

Explantation screwdriver, T15, round handle

ART.-NO.

IU 7811-15



◆ NOTE:

Use the appropriate explantation screwdriver T15 (IU 7811-15) for a safe screw removal. The explantation screwdrivers are not self-holding and allow for higher torque transmission during screw removal. They should be ordered separately.

The screwdrivers T15 in the set (IU 7825-56) are self-holding and should not be used for screw explantation.

- Place an incision on the old scar. Manually undo all screws and sequentially remove them.

◆ NOTE:

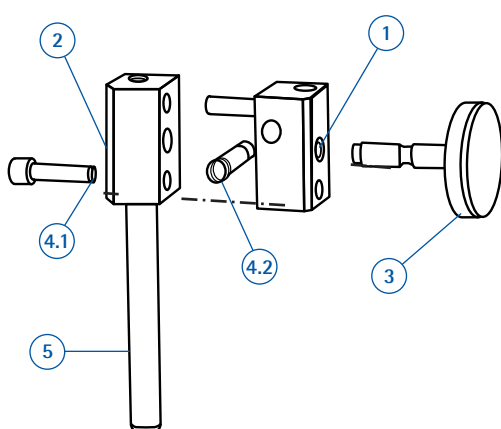
After manually unlocking all screws, the removal can be performed using a power tool.

- The load drill guide facilitates setting a variable compression path. It can be disassembled and reassembled in only a few steps.

◆ **NOTE:**

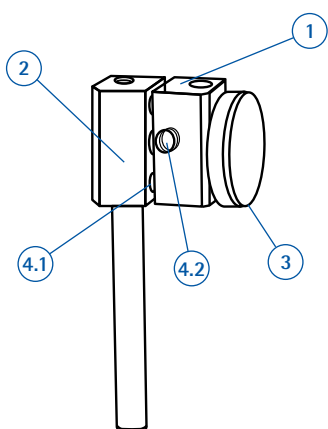
When ordering the adjustable load drill guide LOQTEQ® 3.5 (IU 8166-03), please add a screwdriver hexagonal 2.5 (IU 7825-00) together with your order.

Disassembly



- Remove screws (item 4) using a hexagonal screwdriver 2.5
- Unscrew the set screw (item 3)
- Pull the compression block apart (items 1 and 2)

Assembly



- Fit together the compression block (items 1 and 2)
- Insert the set screw (item 3) into the compression block, middle hole
- Insert the retaining screws (items 4.1 and 4.2) using a hexagonal screwdriver 2.5





LOQTEQ® Proximal Humerus Plate 3.5

HOLES	LENGTH (mm)	
4	92	PH 3510-04-2
5	102	PH 3510-05-2
6	118	PH 3510-06-2
8	143	PH 3510-08-2
10	169	PH 3510-10-2
12	195	PH 3510-12-2

For ordering of the sterile plates please add „S“ to the article number,
e.g. PH 3510-04-2S



Aiming device LOQTEQ® Proximal Humerus Plate 3.5
Fixing screw aiming device LOQTEQ® SFI T15

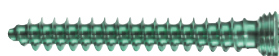
IU 8176-01
IU 8176-03

**LOQTEQ® Cortical Screw 3.5,
T15, self-tapping**



L 12	SK 3525-12-2
L 14	SK 3525-14-2
L 16	SK 3525-16-2
L 18	SK 3525-18-2
L 20	SK 3525-20-2
L 22	SK 3525-22-2
L 24	SK 3525-24-2
L 26	SK 3525-26-2
L 28	SK 3525-28-2
L 30	SK 3525-30-2
L 32	SK 3525-32-2
L 34	SK 3525-34-2
L 36	SK 3525-36-2
L 38	SK 3525-38-2
L 40	SK 3525-40-2
L 42	SK 3525-42-2
L 45	SK 3525-45-2
L 50	SK 3525-50-2
L 55	SK 3525-55-2
L 60	SK 3525-60-2
L 65	SK 3525-65-2
L 70	SK 3525-70-2

**LOQTEQ® Cancellous Screw 3.8,
T15**



L 28	SP 3825-28-2
L 30	SP 3825-30-2
L 32	SP 3825-32-2
L 34	SP 3825-34-2
L 36	SP 3825-36-2
L 38	SP 3825-38-2
L 40	SP 3825-40-2
L 42	SP 3825-42-2
L 44	SP 3825-44-2
L 46	SP 3825-46-2
L 48	SP 3825-48-2
L 50	SP 3825-50-2
L 52	SP 3825-52-2
L 54	SP 3825-54-2
L 56	SP 3825-56-2
L 58	SP 3825-58-2
L 60	SP 3825-60-2
-	-
-	-
-	-
-	-
-	-

**Cortical Screw 3.5,
T15, self-tapping**



L 12	SK 3514-12-2
L 14	SK 3514-14-2
L 16	SK 3514-16-2
L 18	SK 3514-18-2
L 20	SK 3514-20-2
L 22	SK 3514-22-2
L 24	SK 3514-24-2
L 26	SK 3514-26-2
L 28	SK 3514-28-2
L 30	SK 3514-30-2
L 32	SK 3514-32-2
L 34	SK 3514-34-2
L 36	SK 3514-36-2
L 38	SK 3514-38-2
L 40	SK 3514-40-2
L 42	SK 3514-42-2
L 45	SK 3514-45-2
L 50	SK 3514-50-2
L 55	SK 3514-55-2
L 60	SK 3514-60-2
L 65	SK 3514-65-2
L 70	SK 3514-70-2

For ordering of the sterile screws please add „S“ to the article number,
e.g. SK 3525-12-2S



Depth gauge for screws ø3.5 - 4.0, up to L 90

IS 7904-20



Twist drill ø2.3, L 180, coil 50, quick coupling

IU 7423-18*

Twist drill ø2.7, L 150, coil 50, quick coupling

IU 7427-15*

Twist drill ø3.5, L 110, coil 50, quick coupling

IU 7435-00*

* For ordering single use drills please add „-1U“ to the article number
(e.g. IU 7425-00-1U)



Large handle, cannulated, quick coupling

IU 7706-00



Handle with quick coupling, with torque limiter 2.0Nm

IU 7707-20



Screwdriver Duo, T15, quick coupling

IU 7825-56



Direct measuring device LOQTEQ®, green

IU 7915-10



Screw forceps, self-holding

IU 8004-00



Double drill guide $\varnothing 2.7/3.5$, with spring aided centering

IU 8116-60



Load drill guide LOQTEQ® 3.5, compression 1mm

IU 8166-01

Load drill guide LOQTEQ® 3.5, compression 2mm

IU 8166-02

Load drill guide LOQTEQ® 3.5, adjustable up to 2mm

IU 8166-03

Basic insert for load drill guide LOQTEQ® 3.5

IU 8166-05



Drill guide for gliding hole LOQTEQ® 3.5, l- \varnothing 2.8, red

IU 8166-10



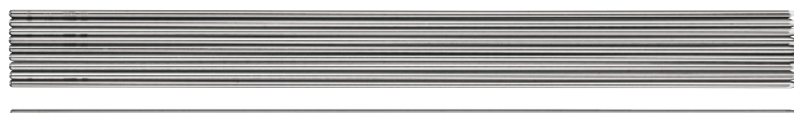
Reduction sleeve for K-wire $\varnothing 1.6$, green

IU 8166-15



Drill guide for round hole LOQTEQ® 3.5, l- \varnothing 2.4, green

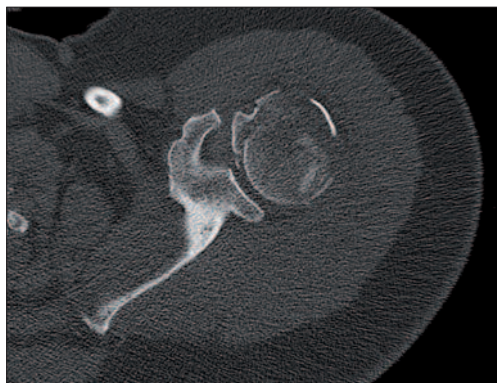
IU 8166-30



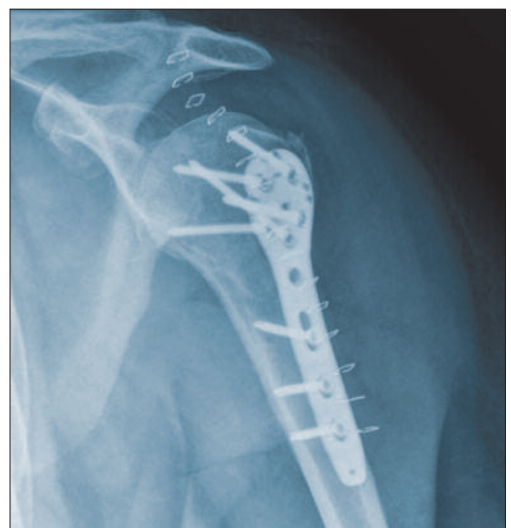
K-wire with trocar point, $\varnothing 1.6$, L 150

NK 0016-15

Preoperative



Postoperative



Subject to technical modifications,
errors and misprints.

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