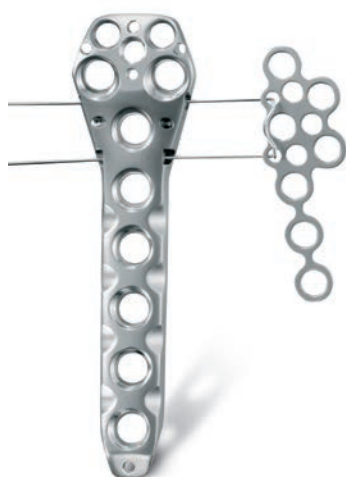


NCB® Proximal Humerus System

Surgical Technique



Surgical Technique NCB Proximal Humerus System

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Introduction

NCB Proximal Humerus Osteosynthesis Plate Solution for Proximal Humerus Fractures

The **NCB-PH (Non-Contact Bridging for the Proximal Humerus)** system is an optimal solution for the treatment of complex fractures of the proximal humerus.

An additional extension T-minus plate can be assembled with cerclage wire technique for fixation of AP lesser tuberosity fractures.

The system allows for polyaxial screw placement (30°) with subsequent screw locking for improved stability, especially in osteopenic bone. Before locking, the screws can act as lag screws and be used for fracture reduction, a benefit which is not offered with standard locking systems.

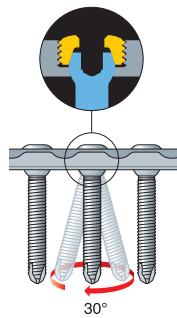
In the locked mode the **NCB-PH** plate acts as an internal fixator without contact between the plate and the bone surface reducing the risk of periosteal blood supply impairment.



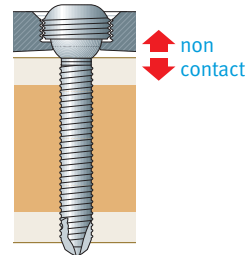
4-, 5- and 7-holes NCB plate



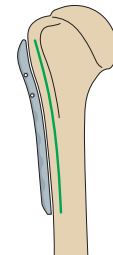
7-holes T-minus plate



Polyaxial screw placement with subsequent locking option for optimal system stability.



Non-Contact Bridging osteosynthesis reduces the risk of periosteal blood impairment.



Anatomically contoured plate. Forged titanium alloy for better mechanical strength.



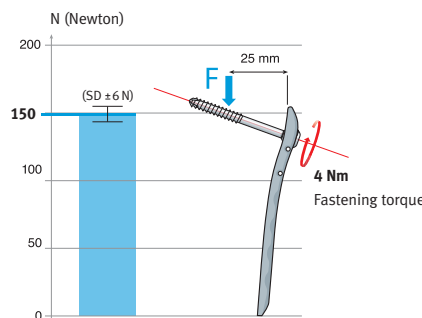
Locking cap Ø 8 mm



Spacer 1 to 3 mm



Blind screw insert



Angular stability of one NCB locked screw



- Self-tapping screws:
- Ø 3.5 mm cortical screws L= 20–40 mm
 - Ø 3.5 mm locking screws L= 20–50 mm
 - Ø 4.0 mm NCB screws L= 14–65mm
 - Ø 4.5 mm NCB cancellous screws L= 30–65mm
 - Ø 4.0 mm NCB MotionLoc® screws L= 24–46mm

Materials: **NCB** plates and screws and 3.5 mm locking screws are made of Ti6Al4V, ISO 5832-3, ASTM F136; the tuberculum minus plate is made of C.P. titanium, ISO 5832-2, ASTM F67. The self tapping cortical screw is made of Ti6Al7Nb, ISO 5832-11, ASTM F1295.

Cable Fixation Options

The following products from the *Zimmer® Cable-Ready®* Cable Grip System are compatible with the *NCB* Proximal Humerus System. See data sheet REF 97-2232-015-00 for more specific instructions.



NCB Locking Plate Cable Button, 2.5mm, Hex Drive

- Sterile
- Material: Ti6Al4V

REF 47-2232-060-00 Color: Gold*
REF 47-2232-060-01 Color: Blue

Application

This Cable Button is threaded directly into the *NCB* Plate hole to provide a positioning point for the Cable.

Instructions

To insert, use the 2.5mm hex screwdriver to thread the cable button in to the plate hole. Do not fully tighten to allow the slots in the button to align with the cable.

To remove, use 2.5mm hex screwdriver to unthread the cable button from the plate hole.



Hex Button, 3.5mm

- Sterile
- Material: C.P. Titanium

REF 00-2232-002-35

Application

This Hex Button fits into the standard hex in the screw head (3.5mm hex). Therefore, it can be inserted into the *NCB* Screw head or into the *NCB* Locking Cap.

Note: The Hex button is incompatible with the 2.5 mm Hex of the 3.5 mm locking screws (REF 00-2369-0xx-35 and 47-2369-0xx-35) and Cortical, self-tapping screws (REF 02.03131.0xx).



Cable Assembly Cerclage, 1.8mm

- Sterile
- Material: CoCr

REF 00-2232-002-28
REF 00-2232-004-18



Cable Fixation Options



Cable Fixation with Cable Button



Cable Fixation with Hex Button

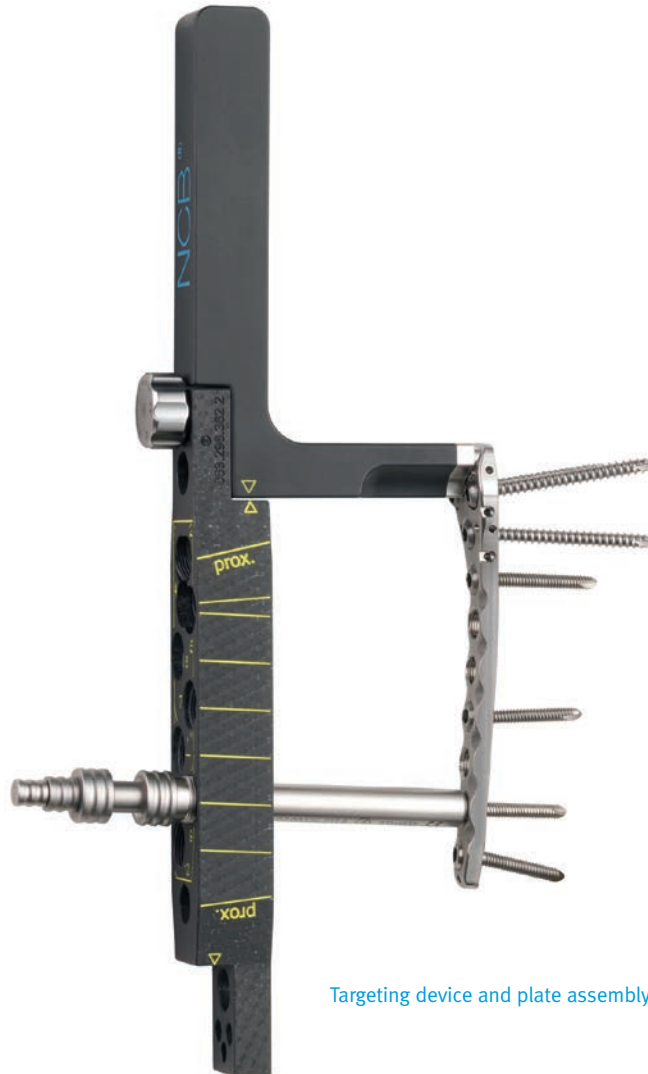
* Not available in Europe, Middle East, and Africa

The *NCB* instrumentation is based on well-known standard surgical techniques and osteosynthesis instruments.

The *NCB*-PH plate can be applied in the MIS* technique using a fully radiolucent targeting device and cannulated cortical and cancellous screws with cannulated instruments.

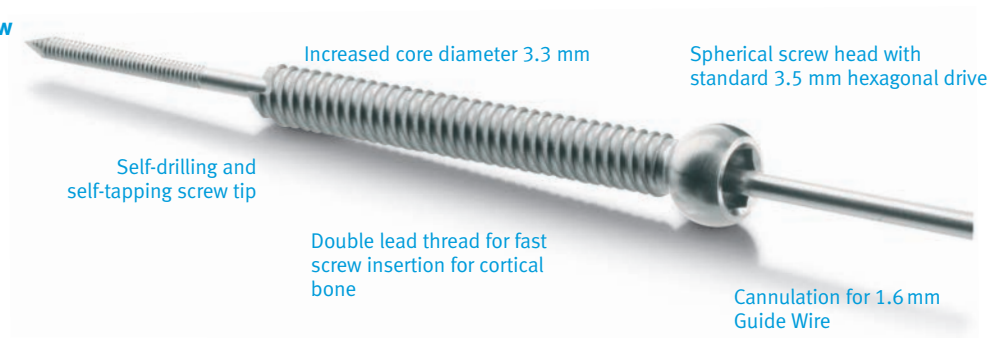
MIS radiolucent targeting device

MIS technique with a fully radiolucent targeting device



Targeting device and plate assembly

Ø 4.0 mm *NCB* cannulated screw



Increased core diameter 3.3 mm
 Spherical screw head with standard 3.5 mm hexagonal drive
 Self-drilling and self-tapping screw tip
 Double lead thread for fast screw insertion for cortical bone
 Cannulation for 1.6 mm Guide Wire

Ø 4.5 mm *NCB* cannulated cancellous screw



Cancellous bone thread
 Fully threaded cancellous screws

*MIS Minimally Invasive Solutions™ Technique by Zimmer

System Features

Divergent Screw Alignment

The targeting device ensures divergent screw alignment for increased pull-out resistance in the metaphyseal and diaphyseal regions.



3.5 mm Locking Screws

In order to increase the stabilization of the proximal humeral head, two additional locking screws (i.e. uniaxial locking screws) may be placed in the proximal humeral head.

The screws are positioned in convergent manner, in order to increase the pull-out resistance in the humeral head.



Oblique Holes for Sutures

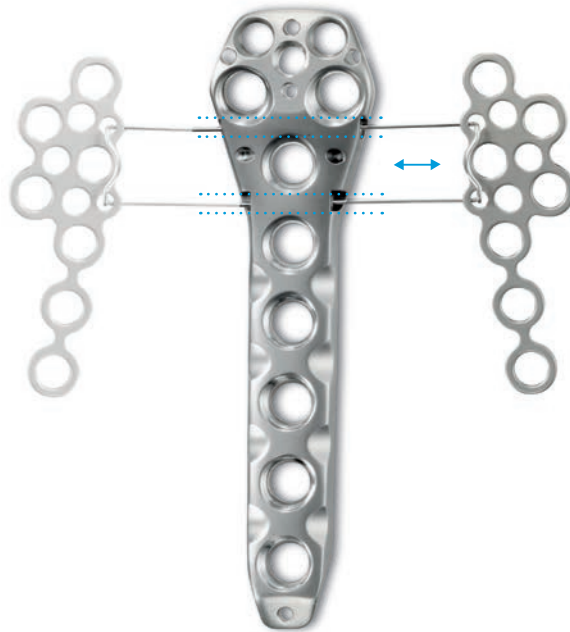
Oblique holes \varnothing 2 mm can be used for sutures after plate osteosynthesis.



T-Minus Plate with Cerclage Wire

The plate is assembled to the *NCB* humerus plate with a pre-bent U-shaped cerclage wire \varnothing 0.8 mm through two holes at the side of the *NCB* plate.

The same plate can be used for left and right.



Indications

The *NCB* Polyaxial Locking Plate System is indicated for temporary internal fixation and stabilization of fractures and osteotomies of long bones.

Note: The *NCB* Proximal Humerus plate from the *NCB* Polyaxial Locking Plate System is specifically designed for the proximal humerus.

Contraindications

- All concomitant diseases that may impair the fixation of the implant and/or the success of the intervention.
- Lack of bone substance or poor bone quality which makes stable seating of the implant impossible.
- Acute or chronic, local or systemic infections.
- Allergy to the implanted material.
- Severe muscular, neural or vascular diseases that endanger the extremities involved.

Fracture Classifications

Indications for Open Technique (Deltoid Pectoral Incision)

- Neer classification: 2-, 3-, 4-part displaced fractures (anatomical neck, surgical neck, tuberculum majus, tuberculum minus and head splitting).
- AO classification: type 11 A, extracapsular, 2 fragments; type 11 B, partially intracapsular, 3 fragments; type 11 C, – intracapsular.

Indications for MIS Technique* (Anterior/Lateral Deltoid Split Incision)

- Neer classification: 2-part displaced fractures.
- AO classification: type 11 A, extracapsular, 2 fragments.



Preoperative Planning

An X ray of the injured shoulder on the anteroposterior plane is essential for preoperative planning. In addition, a “Y” view, (perpendicular to the anteroposterior view of the scapula is also required).

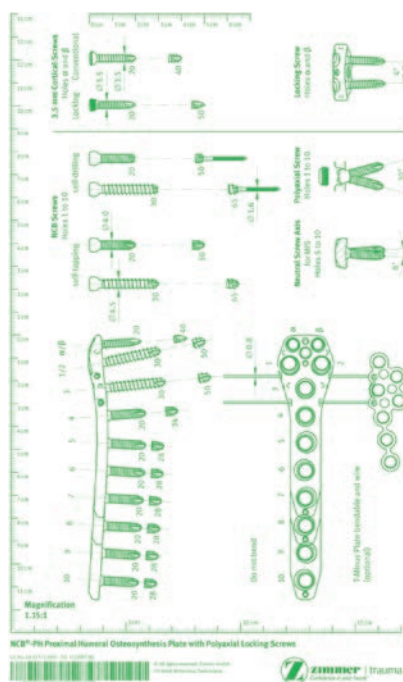
A CT scan can also provide information concerning the tuberosities. The use of the X ray template (REF 06.01511.000) is recommended for preoperative planning.

Positioning of the Patient

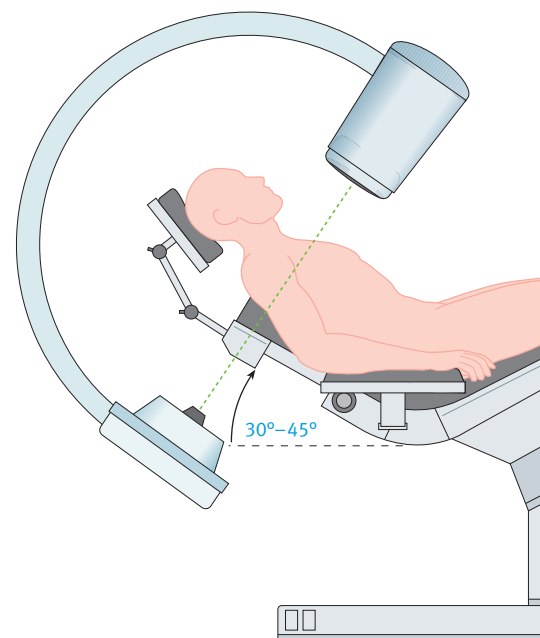
The patient is placed on the operating table in the beachchair position.

After the patient is in the correct position, the C-arm must be adjusted so as to achieve the widest possible view of the proximal humerus.

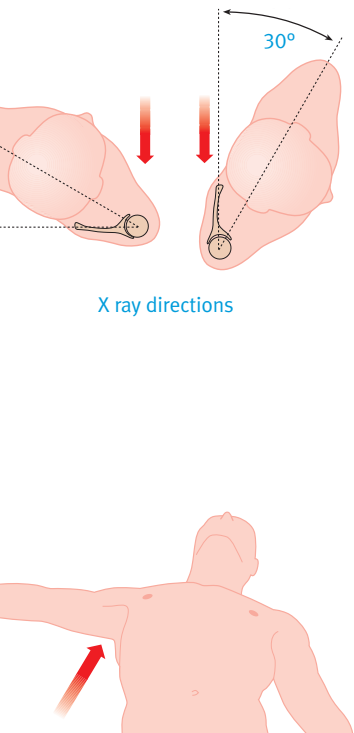
Preoperative Planning and Patient Positioning



X ray template REF 06.01511.000



Patient positioning



Sample Cases



Preoperative



Postoperative, MIS* operation technique



Preoperative



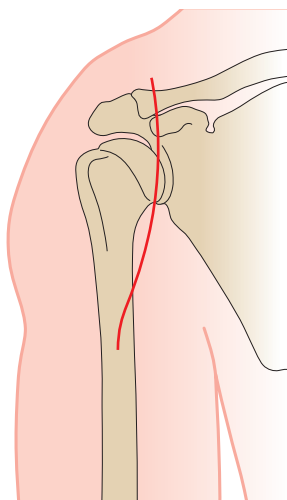
Postoperative, open operation technique

Open Technique

Deltoid Pectoral Incision

For the open technique the delto-pectoral incision is recommended.

Important: Care must be taken to avoid damaging the axillary nerve and blood supply to the bone fragments.



Deltoid pectoral incision delto-pectoral

Insertion of NCB-PH Plate and Fracture Reduction

Due to the anatomical contour, *NCB* plates may act as a lateral guide for fracture reduction.

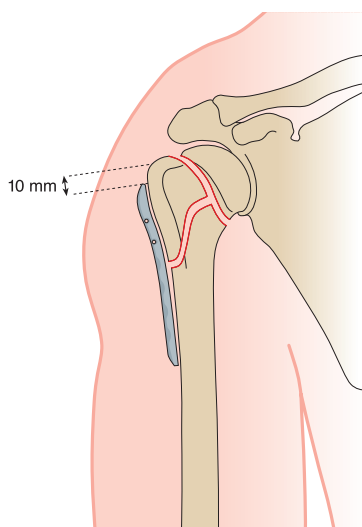
Insert the *NCB-PH* plate (REF 02.02262.10x) before fracture reduction.

Positioning from A-P view

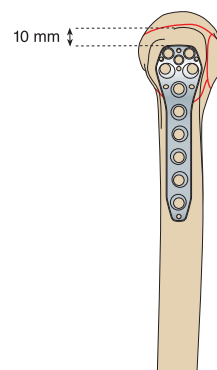
The plate should be placed approx. 10 mm distal to the rotator cuff attachment on the upper edge of the greater tuberosity to avoid postoperative sub-acromial impingement.

Positioning from lateral view

The plate should be centered against the lateral aspect of the greater tuberosity.

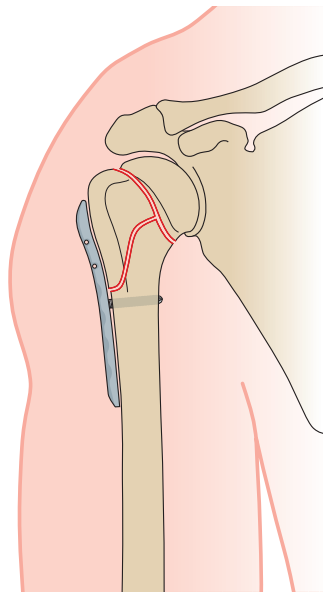


Insert the plate before fracture reduction



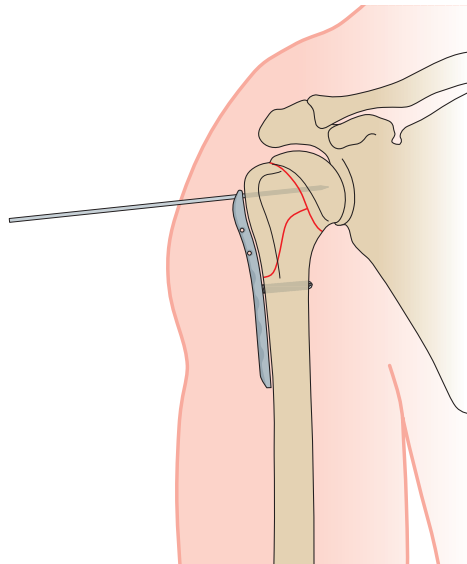
Note: The plate should not be bent, as this might disrupt the function of the locking mechanism.

First place the distal screw closest to the fracture line (see distal screw placement). Tighten this screw and use the plate for fracture reduction.



Insert the distal screw closest to the fracture line

Place a 2 mm K-wire (REF 299.20.150) at the proximal end of the plate and use the plate-K-wire construct to secure the reduction.



Use the plate for fracture reduction

Complete the stabilization of the fracture with the insertion of distal and proximal *NCB* screws once good fracture reduction has been achieved.

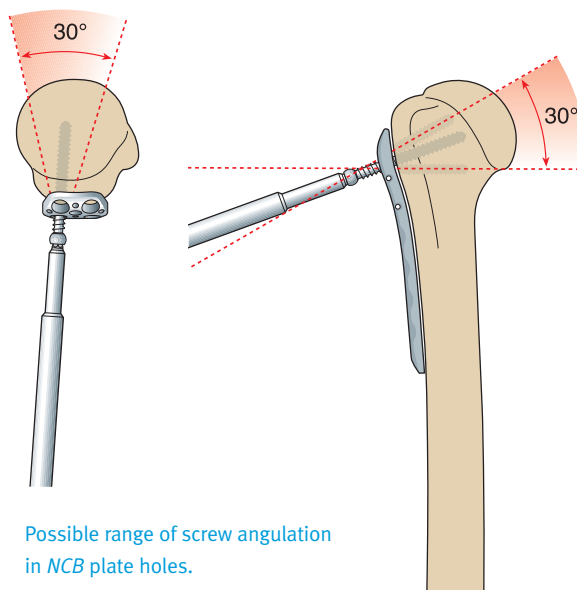
NCB Screw Placement

1. Screw Angulation

30° screw angulation is possible for all the *NCB* holes in the plate.

The placement of *NCB* screws depends on the fracture type and the achieved reduction.







Alternatively, it is possible to use the cannulated *NCB* screws.



Possible range of screw angulation in *NCB* plate holes.

2. Screw and Drill Dimensions

NCB self-tapping screw and drill dimensions

<p>Screw Type Cortical REF 02.0x155.0xx Ø 4.0 mm L 14 – 65 mm</p> 	<p>Screw Type Cancellous REF 02.0x159.0xx Ø 4.5 mm L 30 – 65 mm</p> 
<p>Drill REF 02.00024.118 Ø 3.3 mm</p> 	<p>Drill REF 103.25.180 Ø 2.5 mm</p> 
<p>Drill guide REF 02.00024.111 Ø 3.3 mm</p> 	<p>Drill guide REF 02.00024.010 Ø 2.5 mm</p> 

NCB MotionLoc Screws

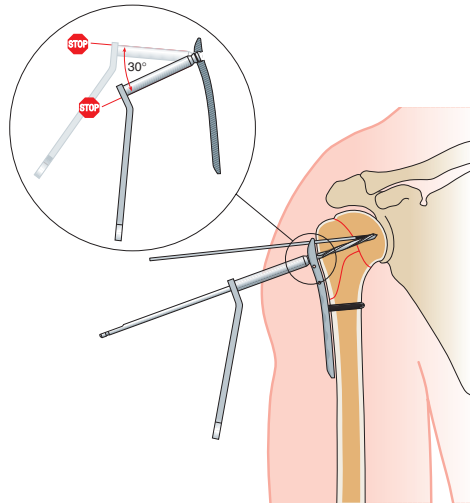
Zimmer MotionLoc Screw for *NCB* Polyaxial Locking Plate System surgical technique (REF 97-3161-002-00 or 97-3161-004-00)* has specific instructions for the *NCB MotionLoc* Screw.

* 97-3161-002-00 is for countries where *NCB MotionLoc* screws are approved to be used with only *NCB* plates and 97-3161-004-00 is for countries where *NCB MotionLoc* screws are approved to be used with both *NCB* as well as *NCB* Periprosthetic plates. See *NCB MotionLoc* package insert for approved plate/*MotionLoc* screw combinations.

a) Proximal screw placement

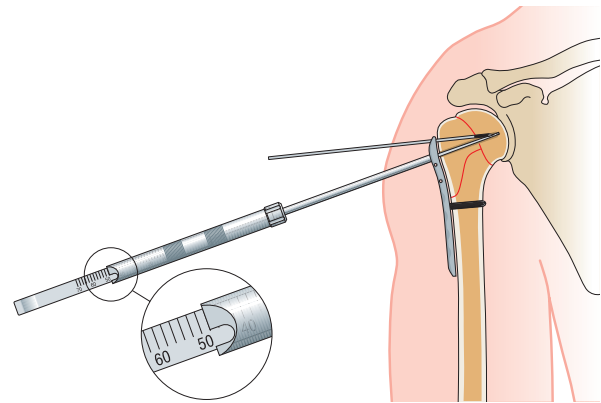
When drilling the proximal screw holes, the use of an image intensifier is recommended. Stop approximately 5 mm before the subchondral bone.

For screw placement use the *NCB* drill guide \varnothing 2.5 mm (REF 02.00024.010) and the two-fluted drill bit \varnothing 2.5 mm (REF 103.25.180). The drill guide allows polyaxial screw placement. A stop is felt at 30 degrees.



Exact screw setting with the drill guide and drill

The screw length is measured with the *NCB* depth gauge (REF 02.00024.214). The appropriate screw length is chosen from the screw rack.

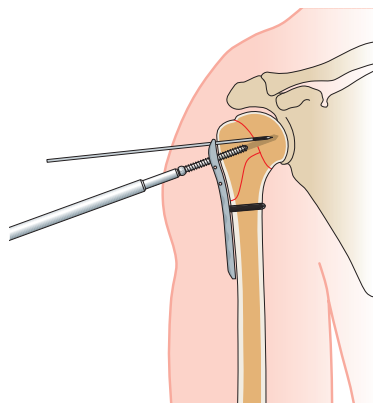


Measuring screw length with the depth gauge

Insert the self-tapping screw with the *NCB* torque screwdriver (REF 02.00024.022). For osteoporotic bone use \varnothing 4.5 mm *NCB* cancellous screws. Repeat this procedure to place all proximal bone screws.

Note: Hand tighten screws – do not use power.

Important: When determining the proximal screw length, the probability of bone resorption and sintering at the fracture site must be taken into account. Care should be taken to ensure that the screw tip is an adequate distance away from the subchondral zone.



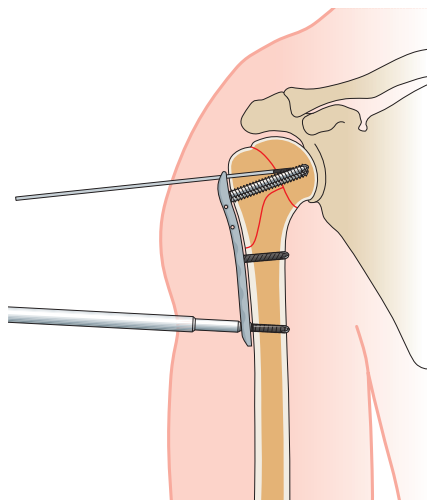
Insert the self-tapping screw

b) Distal screw placement

Same screw placement procedure as proximally.

For screw placement use the *NCB* drill guide Ø 3.3 mm (REF 02.00024.111) and the *NCB* drill bit Ø 3.3 mm (REF 02.00024.118). The drill guide allows polyaxial screw placement. A stop is felt at 30 degrees. Insert the screw using the *NCB* torque screwdriver (REF 02.00024.022).

For optimal fixation, bicortical insertion is recommended. Place at least 3 screws below the fracture.

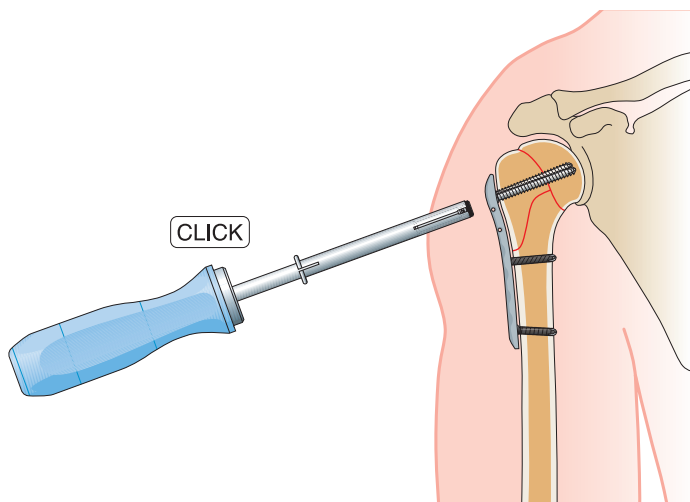


Insert the distal self-tapping screws

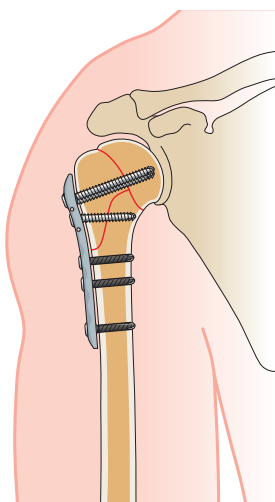
3. Add Locking Caps

To achieve angular stability, insert *NCB* locking caps (REF 02.0x150.300) for all screws with the *NCB* torque screwdriver (REF 02.00024.022) until the wrench declutches (clicking sound).

Note: Always use the *NCB* torque screwdriver to tighten the locking caps and make sure not to tilt the screwdriver during its use. Failure to do so could damage the hex drive of the locking cap and might complicate later removal of the implant. Bone spacers can be removed and replaced with screws.



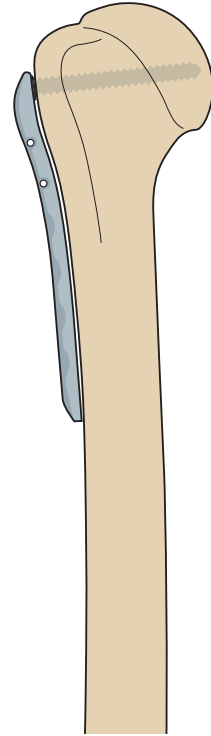
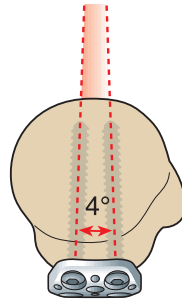
M8 locking cap placement, tighten until wrench declutches (click sound)



Final placement

Proximal Ø 3.5 mm Locking Screw Placement (optional)

Additionally, after reducing the fracture with *NCB* screws, it is possible to place Ø 3.5 mm locking screws (REF xx-2369-0xx-35), which are 4° convergent, in the two proximal holes.



1. Screw and Drill Dimensions

Ø 3.5mm locking screw
and drill dimensions

Screw Type

Cortical

REF xx-2369-0xx-35

Ø 3.5 mm

L 20–50 mm



Drill

REF 103.25.180

Ø 2.5 mm



Drill guide

REF 02.00024.223

Ø 2.5 mm



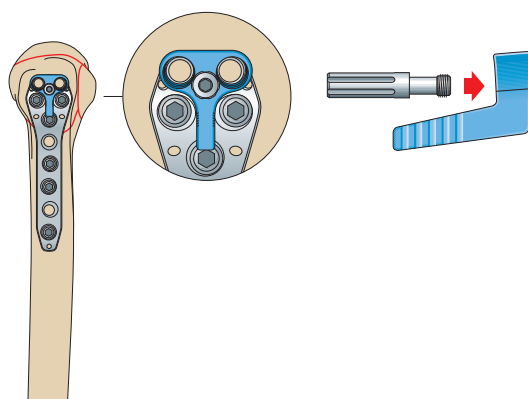
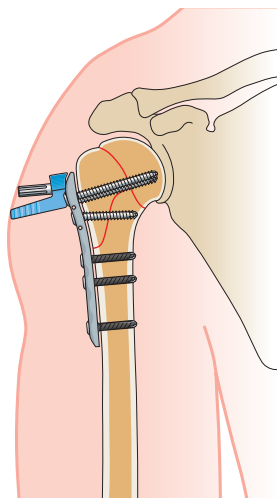
Tissue protection sleeve

REF 02.00024.222

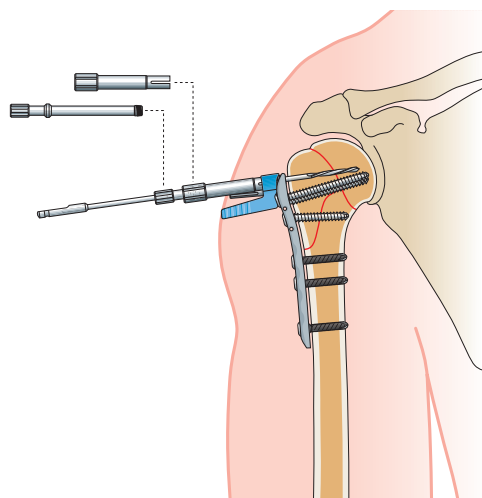


2. Drill Screw Holes

Hold the *NCB-PH* jig (REF 02.00024.220) on the plate and finger tighten or use the small hexagonal screwdriver (REF 109.01.020) to tighten moderately the *NCB-PH* connection screw (REF 02.00024.221).



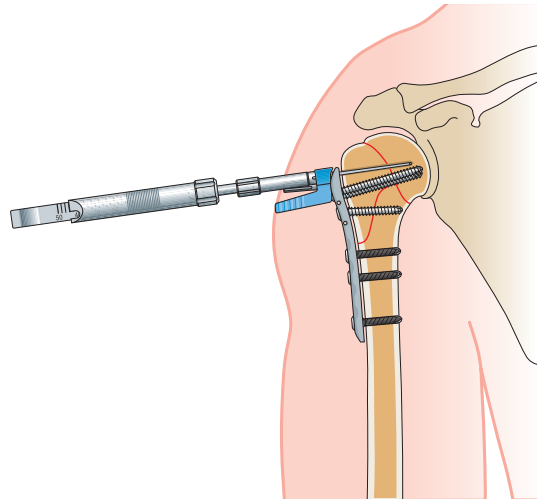
Insert the *NCB-PH* tissue protection sleeve (REF 02.00024.222) and thread the *NCB-PH* drill guide (REF 02.00024.223) into the plate hole. Then use the two-fluted 2.5 mm drill bit (REF 103.25.180) to drill the screw hole.



3. Measure Screw Length

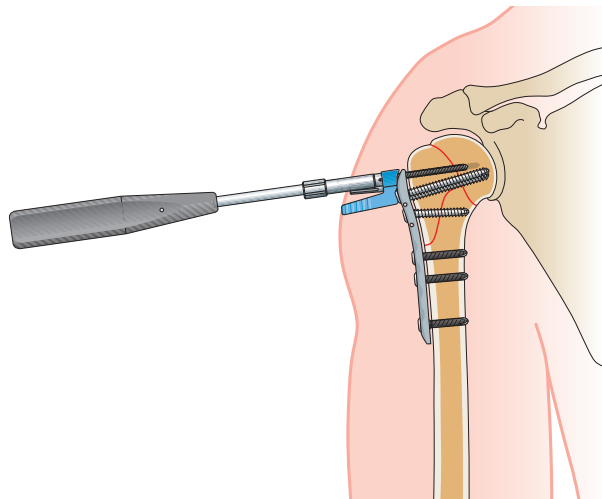
Remove the two-fluted drill bit \varnothing 2.5 mm (REF 103.25.180) and the *NCB*-PH drill guide (REF 02.00024.223) and measure the screw length with the small depth gauge for the 3.5 mm screws (REF 02.00024.216).

Important: When determining the proximal screw length, the probability of bone resorption and sintering at the fracture site must be taken into account. Care should be taken to ensure that the screw tip is an adequate distance away from the subchondral zone.



4. Insert the \varnothing 3.5 mm Locking Screws

Insert the appropriate \varnothing 3.5 mm locking screws (REF xx-2369-0xx-35) using the small hexagonal screwdriver (REF 109.01.020). Once the screw is in place, remove the *NCB*-PH tissue protection sleeve (REF 02.00024.222) and repeat the procedure if the second locking screw is needed. In order to minimize the risk of failure in the screw head hexagonal, it is recommended to tighten these screws by hand only.

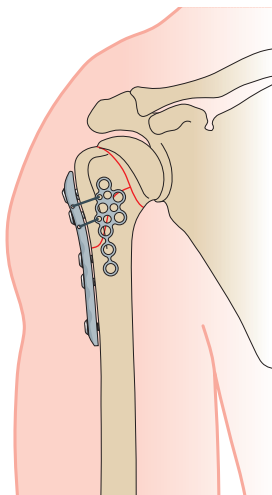


T-Minus Plate (optional)

1. Apply T-Minus Plate

For lesser tuberosity fractures it is possible to apply a small bendable and cuttable plate with 7-holes (REF 02.0x262.101). The plate is fixed to the bone using \varnothing 3.5 mm standard self-tapping cortical screws (REF 02.03131.0xx). The plate is assembled to the *NCB* humerus plate with a pre-bent U-shaped cerclage wire \varnothing 0.8 mm (REF 02.0x362.108) through two holes at the side of the *NCB* plate.

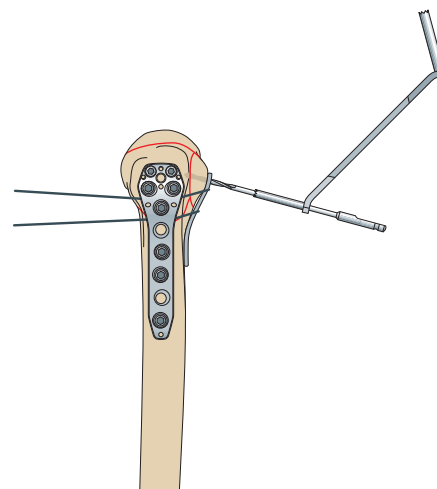
The same plate can be used for the left and right humerus.



Apply T-minus plate to the bone

2. Drill Screw Holes

Use the standard double drill guide for screws \varnothing 2.5/3.5/4.0 (REF 100.40.035) and the two-fluted drill bit \varnothing 2.5 mm, with quick coupling (REF 103.25.180) to drill the holes.

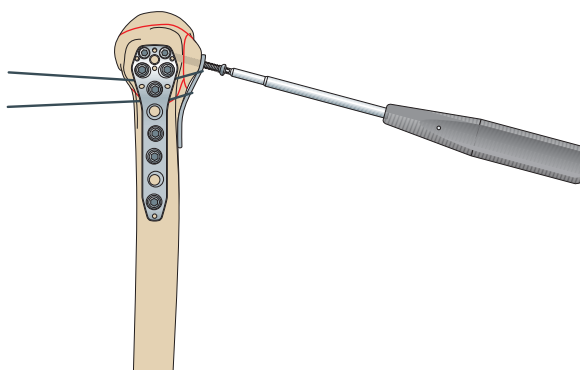


Drilling with a standard double-drill guide

3. Measure Screw Length and Place Screws

Measure the appropriate screw length with the small depth gauge, for screws \varnothing 3.5 mm (REF 02.00024.216).

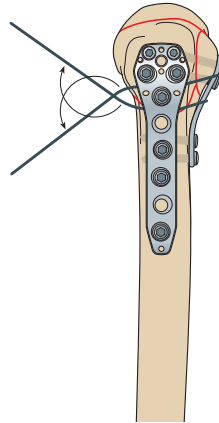
Place the \varnothing 3.5 mm self-tapping cortical screw (REF 02.03131.0xx) with the small hexagonal screwdriver (REF 109.01.020).



T-minus plate screw-placement

4. Twist the Wire

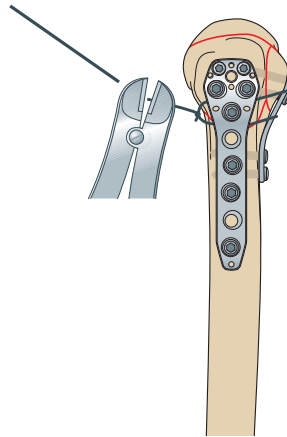
Twist the cerclage wire with wire-bending forceps (REF 100.11.155) and apply some tension to the T-minus plate.



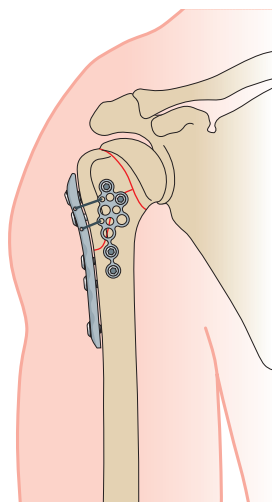
Standard cerclage wire technique is used

5. Cut the Wire

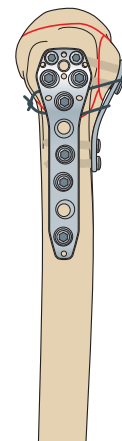
Cut off the remaining cerclage wire with a wire cutter (REF 100.11.115) and bend it along the side of the NCB plate.



Cut off the remaining cerclage wire



Applied T-minus plate and final construct



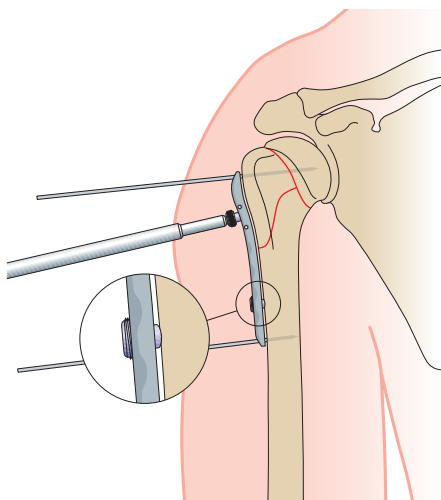
Bone Spacer (optional)

You may temporarily insert bone spacers into the locking holes to avoid periosteal blood flow impairment. Insert bone spacer with a 3.5mm hexagonal screwdriver Three. Lengths from 1 to 3 mm are available.

Note: The spacers are single-use only. They can be removed after locking the screws.

Bone Spacer

REF-No	Color	Length
02.0x150.311	red	1 mm
02.0x150.312	blue	2 mm
02.0x150.313	green	3 mm



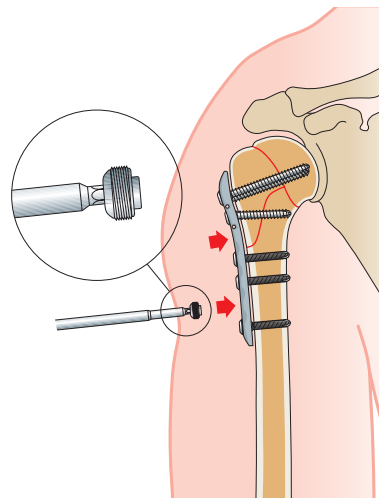
Bone spacer 2 mm (blue) proximally and distally

Blind Screw Inserts and Sutures (optional)

NCB Blind Screw Insertion

To prevent bone ingrowth into empty screw holes it is possible to use NCB blind screw inserts (REF 02.0x150.310). Insert the blind screw inserts using a 3.5 mm hexagonal screwdriver.

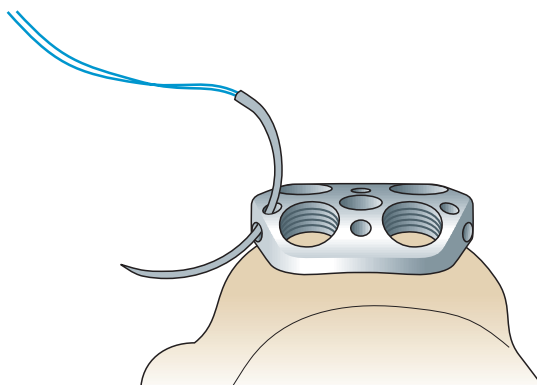
Note: Hand tighten only.



NCB blind screw insertion

Sutures

Oblique holes Ø 2 mm can be used for sutures and reattachment of the rotator cuff after the plate has been fixed to the bone with screws.



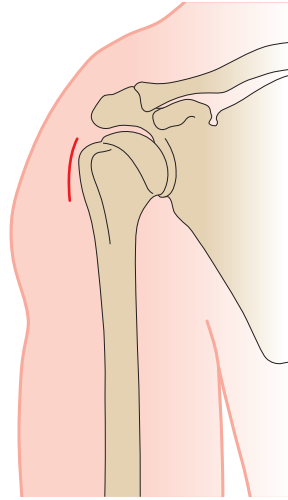
Oblique holes 2 mm for sutures proximally

MIS Technique*

High Anterior/Lateral Deltoid Split Incision

A high anterior/lateral deltoid split incision is recommended.

Important: Care must be taken to avoid damaging the axillary nerve and to keep intact the blood supply of the bone fragments.



Incision for MIS technique

1. Reduce the Fracture

Reduce the fracture and check under image intensification.

The humeral head and tuberosity fragments may be manipulated and temporary fixed with 2 mm Kirschner wires (K-wires) (REF 299.20.150). K-wires should be placed where they will not interfere with the plate application.

Note: If the use of the additional 3.5 mm locking screws is required, insert these screws after the targeting device is removed.



* MIS Minimally Invasive Solutions Technique by Zimmer

Targeting Device

Plate Hole Numbering System

To target the correct plate holes there is a numbering system on the targeting module (REF 02.00024.202).



Assembly of the targeting device

The top side of the targeting module is for the screw holes with numbers: **1-2-4-5-6-7-8-9-10**

Turn the targeting module upside down for the number: **3**



Note: The plate should not be bent since this might compromise the function of the locking mechanism.



NCB screw hole numbering system

Insert the NCB PH Plate

1. Assemble the MIS* radiolucent targeting device

Assemble the radiolucent handle (REF 02.00024.101) to the proximal end of the NCB-PH plate using the NCB-PH connection screw (REF 02.00024.103). Use a 3.5 mm hexagonal screwdriver to tighten the connection screw.

2. Inserting NCB PH Plate

Insert the plate (REF 02.02262.10x) through the high anterior/lateral deltoid split incision subcutaneously along the proximal humerus.

Note: Attempt to get bone contact immediately. Care must be taken to avoid damaging the axillary nerve and the vascularization of the fragments.

3. Position NCB PH Plate to Bone

Positioning from A-P view

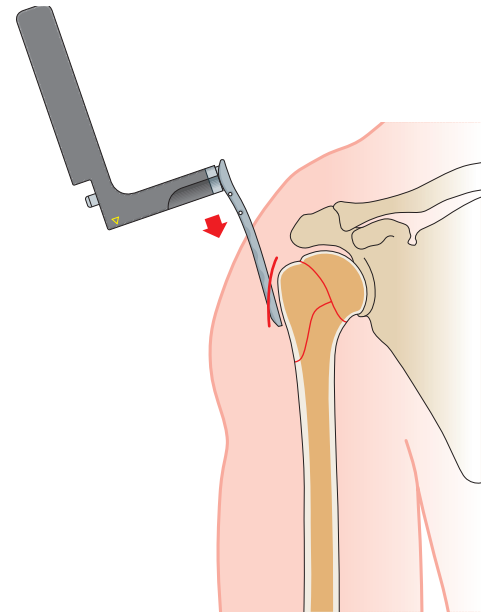
The plate should be placed approx. 10 mm distal to the rotator cuff attachment on the upper edge of the greater tuberosity to avoid postoperative subacromial impingement.

Positioning from lateral view

The plate should be centered against the lateral aspect of the greater tuberosity.

4. Assemble the Targeting Module

Attach the targeting module (REF 02.00024.202) to the handle with the hole numbering 1–2–4–5–6–7–8–9–10 on the lateral side. Fit the yellow arrowhead markings.



Insert the plate

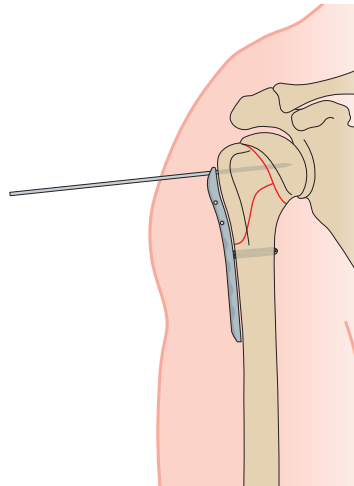
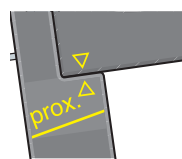
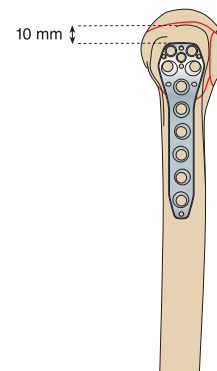
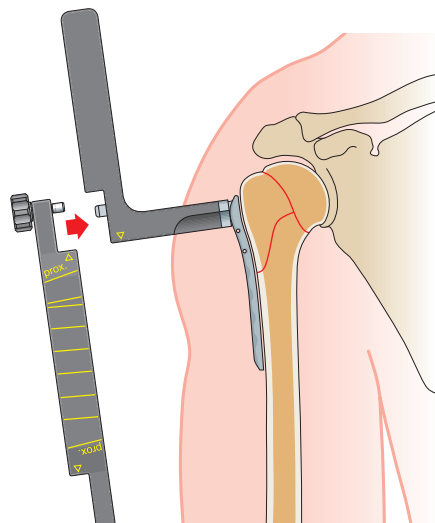


Plate alignment 10 mm distal of edge greater tuberosity and center against the lateral aspect



Yellow arrowhead markings



Assemble the targeting module

NCB Cannulated Screw Placement

1. General Remarks

Placement of the *NCB* screws depends on the fracture type and the reduction achieved.

Two cannulated screw types are offered with the *NCB*-PH System. Cancellous *NCB* screws, preferably for the epiphysis and metaphysis, as well as cortical *NCB* screws which are optimal for placement in the diaphysis. Both screw types are self-drilling and self-tapping. The screws can be precisely placed over the guide wires. A tissue protection sleeve assembly is used for guidance. A cannulated drill bit can be used to predrill hard cortical bone.

Note: Use the cannulated screws only after insertion of \varnothing 1.6 mm, length 190 mm guide wire (REF 02.01362.116).

MIS* Technique NCB Self-Drill Screw and Drill Dimensions

Guide wire

REF 02.01362.116
 \varnothing 1.6 mm
 L 190 mm



Screw Type

Cannulated
 Cortical, self drilling
 REF 02.0x157.0xx
 \varnothing 4.0 mm
 L 14–65 mm



Screw Type

Cannulated
 Cancellous, self drilling
 REF 02.0x160.0xx
 \varnothing 4.5 mm
 L 30–65 mm



Drill

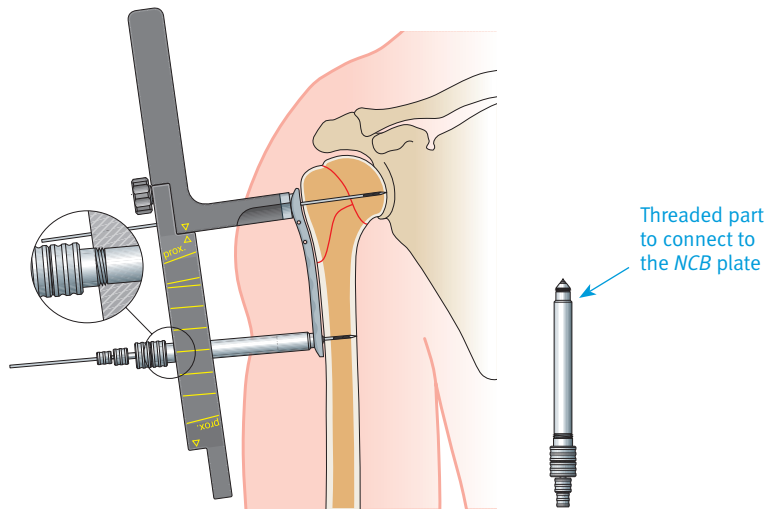
REF 02.00024.117
 \varnothing 3.3 mm



2. Temporary Plate Fixation

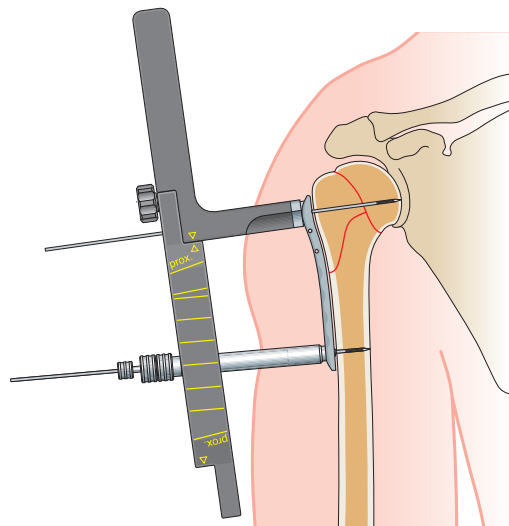
Proximally, the plate can be temporarily fixed to the bone with a 1.6 mm guide wire through the *NCB-PH* connection screw (REF 02.00024.103) of the targeting device.

To fix the plate distally, insert the *NCB* Tissue Protection Sleeve assembly $\varnothing 1.6\text{-}\varnothing 10$ (REF 02.0024.213, 02.0024.114 to 116) through a skin incision and screw the *NCB-PH* drill guide (REF 02.00024.114) into the plate and then the *NCB-PH* soft tissue protection sleeve (REF 02.00024.213) into the targeting device.



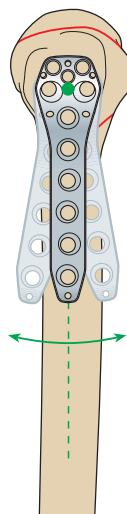
Temporary plate fixation and placement of the tissue protection sleeve

Insert $\varnothing 1.6$ mm guide wire with a length of 190 mm (REF 02.01362.116) and confirm the correct position with an image intensifier.



Insert $\varnothing 1.6$ mm guide wire

Note: The distal center can be found with $\varnothing 1.6$ mm guide wire by finding the anterior and posterior bone cortex and putting the guide wire in the middle of these two reference points.

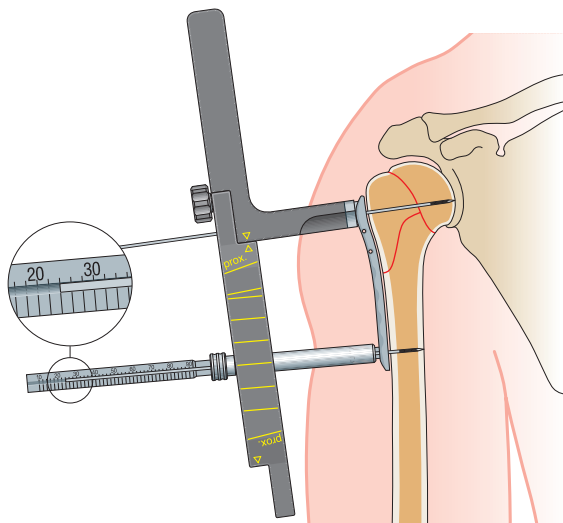


Find the distal center

3. Distal Cannulated Screw Placement

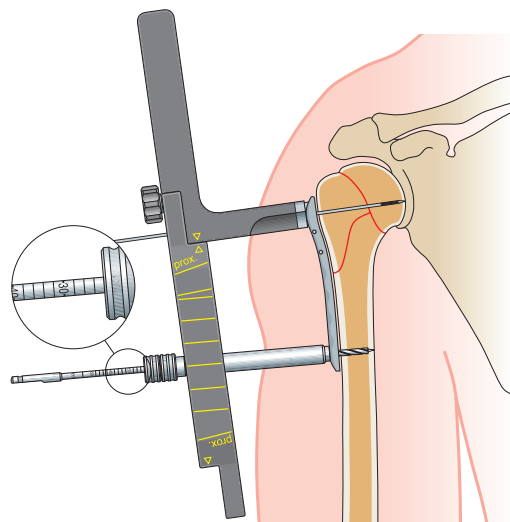
Determine the screw length from the measurement with the *NCB* measuring device gauge (REF 02.00024.219) along the Ø 1.6 mm guide wire (L = 190 mm only).

Note: With this procedure the distance from the plate to the tip of the measuring device wire is measured.



Determine the screw length with the depth gauge

For hard cortical bone it is possible to use the Ø 3.3 mm *NCB* cannulated drill bit (REF 02.00024.117) (only until touching the second cortex, to make sure that the guide wire does not fall out). If the drill bit is used, the screw length can be determined from the scale on the drill bit shaft.

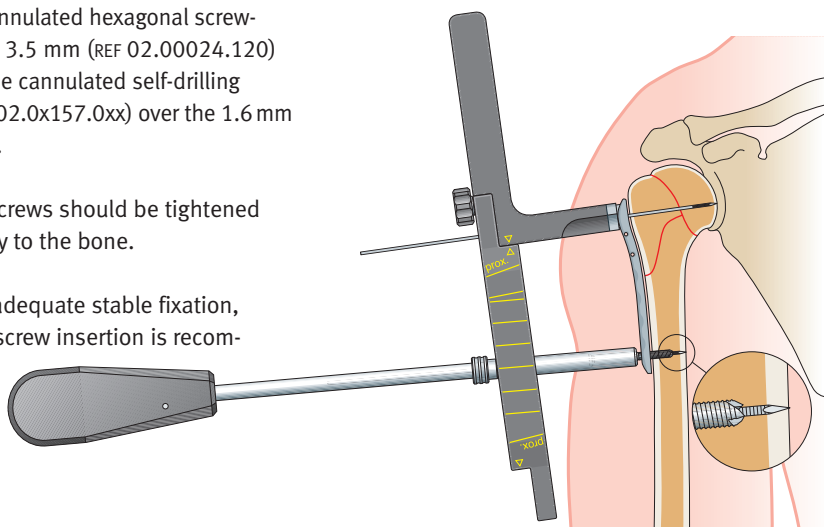


Determine the screw length with the scale on the drill bit shaft

Use the cannulated hexagonal screwdriver, hex 3.5 mm (REF 02.00024.120) to insert the cannulated self-drilling screw (REF 02.0x157.0xx) over the 1.6 mm guide wire.

The *NCB* screws should be tightened moderately to the bone.

Note: For adequate stable fixation, bicortical screw insertion is recommended.



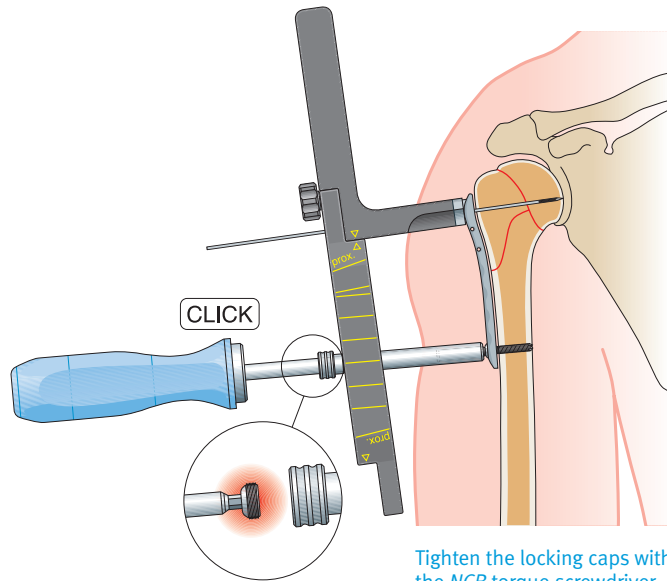
Insert the cannulated self-drilling screw

4. Achieve Angular Stability

To achieve angular stability remove the guide wire and tighten the locking cap (REF 02.0x150.300) with the *NCB* torque screwdriver (REF 02.00024.022) until the wrench declutches (clicking sound).

Note: Always use the *NCB* torque screwdriver to tighten the locking caps and make sure not to tilt the screwdriver during its usage.

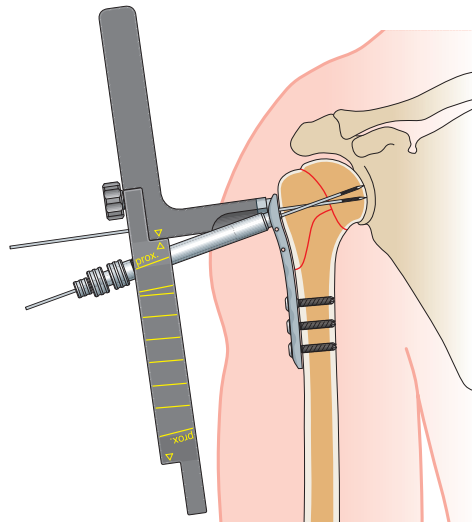
Failure to do so could damage the hex drive of the cap and might complicate later extraction of the implant.



Tighten the locking caps with the *NCB* torque screwdriver

5. Proximal Cannulated Screw Placement

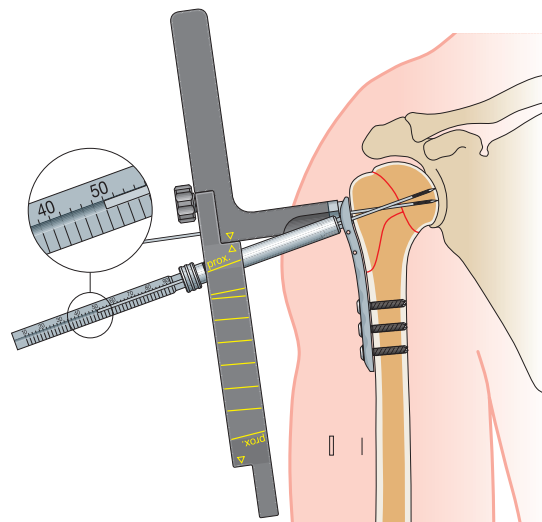
Insert \varnothing 1.6 mm guide wire with a length of 190 mm (REF 02.01362.116) close to the subchondral bone and confirm the correct position under image intensification.



Insert the guide wire

Measure the length with the *NCB* measuring device (REF 02.00024.219) along the \varnothing 1.6 mm guide wire (L = 190 mm only).

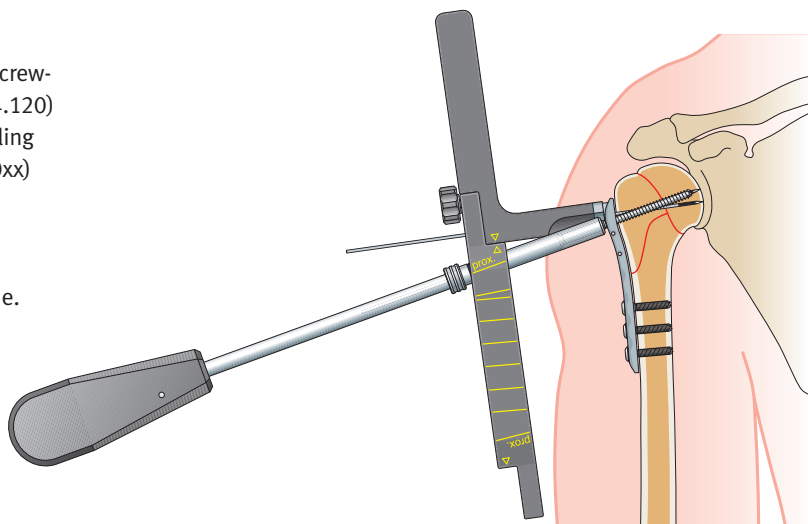
Note: With this procedure the distance from the plate to the tip of the guide wire is measured. Determine the screw length by subtracting a sufficient distance to make sure that the screw is in an adequate distance from the joint.



Measuring screw length

Use the cannulated hexagonal screwdriver, hex 3.5 mm (REF 02.00024.120) to insert the cannulated self-drilling cancellous screw (REF 02.0x160.0xx) over the 1.6 mm guide wire.

The *NCB* screws should only be tightened moderately to the bone.



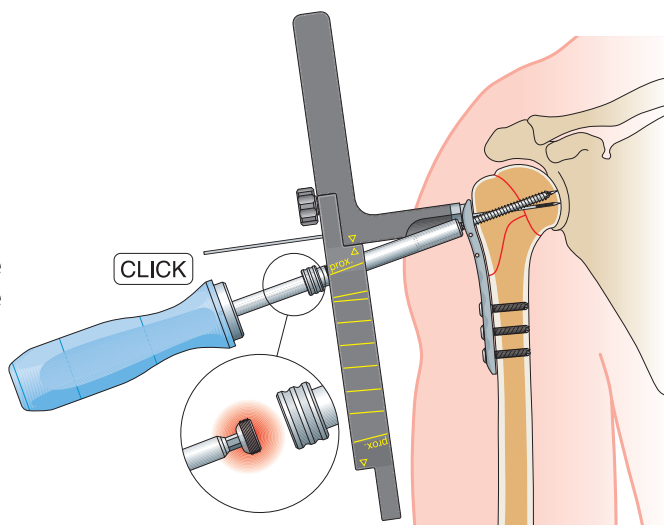
Insert the cannulated self-drilling cancellous screw

6. Achieve Angular Stability

To achieve angular stability, remove the guide wire and tighten the locking cap (REF 02.0x150.300) with the *NCB* torque screwdriver (REF 02.00024.022) until the wrench declutches (clicking sound).

Note: Always use the *NCB* torque screwdriver to tighten the locking caps and make sure not to tilt the screwdriver during its usage.

Failure to do so could damage the hex driver of the locking cap and might complicate later extraction of the implant.



Tighten the locking caps with the torque screwdriver

7. Last Proximal Screw Placement (No. 3)

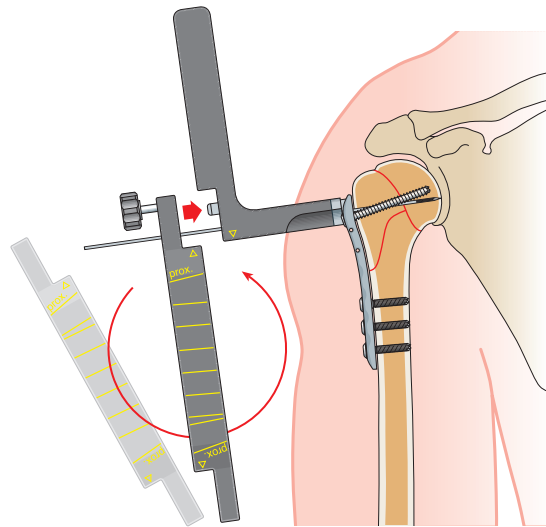
To place the last proximal screw, turn the targeting module over and use hole number 3. Fit the two yellow arrowhead markings together. Then follow the same screw placement procedure as described in step 5–6.

Proximal \varnothing 3.5 mm locking screw placement

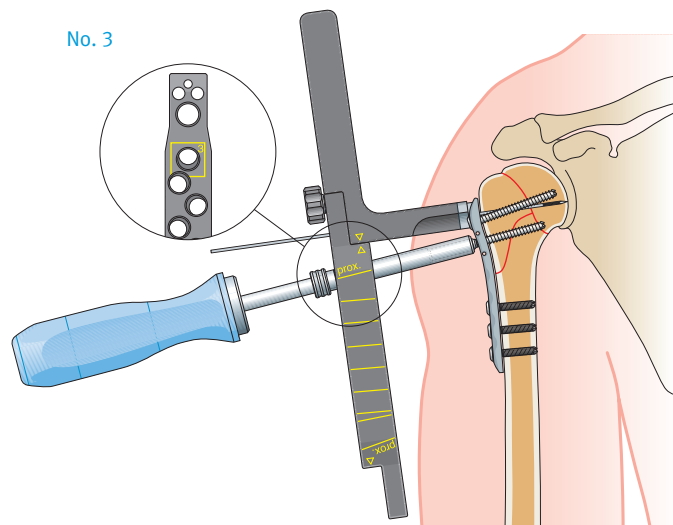
If the additional stabilization with 3.5 mm locking screws is required, remove the targeting device and repeat the sequence described on page 15.

Use of solid screws

If fixation with solid screws is preferred, use the *NCB-PH MIS* drill bit (REF 02.00024.215) and the *NCB-PH* depth gauge (REF 02.00024.214) to drill and measure the screw length.



Turn the targeting module upside down and use the yellow top marking with hole no. 3



Position of the targeting module to place screw no. 3

Implant Removal

To remove the *NCB-PH* humerus plate, first remove the \varnothing 3.5 mm locking screws; if they were used. Then remove all locking caps (REF 02.0x150.300) from the plate. Loosen all bone screws and then remove all bone screws completely. This prevents simultaneous rotation of the plate when removing the last bone screw.

NCB Proximal Humerus – Information Implants



Sterile packed

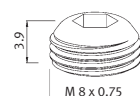
STERILE R

NCB®-PH plate

Holes	L mm	Quantity*	REF (Sterile)
4	80	1	02.02262.104
5	93	1	02.02262.105
7	117	1	02.02262.107**



NCB® Locking cap



Ø mm	○ mm	Quantity*	REF (Non Sterile)	REF (Sterile)
8	3.5	10	02.03150.300	02.02150.300

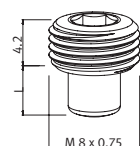


NCB® Blind screw

Quantity*	REF (Non Sterile)	REF (Sterile)
2	02.03150.310	02.02150.310



NCB® Spacer
(red, blue, green)



L mm	Ø mm	Quantity*	REF (Non Sterile)	REF (Sterile)
1	3.5	–	02.03150.311	02.02150.311
2	3.5	2	02.03150.312	02.02150.312
3	3.5	–	02.03150.313	02.02150.313

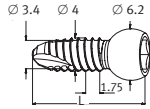
Materials: The NCB plates and screws are made of Ti6Al4V, ISO 5832-3, ASTM F136.

*Indicates the quantity of non sterile items in the standard graphic case.

** Not available in all countries.



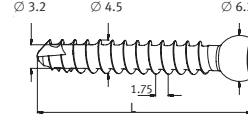
NCB® screw, self-tapping



L mm	∅ mm	∅ mm	Quantity*	REF (Non Sterile)	REF (Sterile)
14	4	3.5	–	02.03155.014	02.02155.014
16	4	3.5	–	02.03155.016	02.02155.016
18	4	3.5	–	02.03155.018	02.02155.018
20	4	3.5	2	02.03155.020	02.02155.020
22	4	3.5	2	02.03155.022	02.02155.022
24	4	3.5	2	02.03155.024	02.02155.024
26	4	3.5	2	02.03155.026	02.02155.026
28	4	3.5	2	02.03155.028	02.02155.028
30	4	3.5	2	02.03155.030	02.02155.030
32	4	3.5	2	02.03155.032	02.02155.032
34	4	3.5	2	02.03155.034	02.02155.034
36	4	3.5	2	02.03155.036	02.02155.036
38	4	3.5	2	02.03155.038	02.02155.038
40	4	3.5	2	02.03155.040	02.02155.040
42	4	3.5	2	02.03155.042	02.02155.042
44	4	3.5	2	02.03155.044	02.02155.044
46	4	3.5	2	02.03155.046	02.02155.046
48	4	3.5	2	02.03155.048	02.02155.048
50	4	3.5	2	02.03155.050	02.02155.050
55	4	3.5	–	02.03155.055	02.02155.055
60	4	3.5	–	02.03155.060	02.02155.060
65	4	3.5	–	02.03155.065	02.02155.065



NCB® cancellous screw, self-tapping



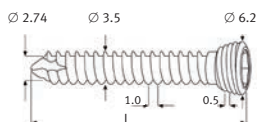
L mm	∅ mm	∅ mm	Quantity*	REF (Non Sterile)	REF (Sterile)
30	4.5	3.5	–	02.03159.030	02.02159.030
32	4.5	3.5	–	02.03159.032	02.02159.032
34	4.5	3.5	–	02.03159.034	02.02159.034
36	4.5	3.5	–	02.03159.036	02.02159.036
38	4.5	3.5	–	02.03159.038	02.02159.038
40	4.5	3.5	–	02.03159.040	02.02159.040
42	4.5	3.5	–	02.03159.042	02.02159.042
44	4.5	3.5	–	02.03159.044	02.02159.044
46	4.5	3.5	2	02.03159.046	02.02159.046
48	4.5	3.5	2	02.03159.048	02.02159.048
50	4.5	3.5	2	02.03159.050	02.02159.050
55	4.5	3.5	–	02.03159.055	02.02159.055
60	4.5	3.5	–	02.03159.060	02.02159.060
65	4.5	3.5	–	02.03159.065	02.02159.065

Materials: The NCB screws are made of Ti6Al4V, ISO 5832-3, ASTM F136.

* Indicates the quantity of **Non Sterile** implants in the standard graphic case.



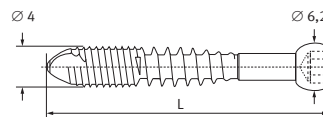
Ø 3.5 mm locking screws
(Non Sterile screws are included in the set **ZS02.00024.796**)



L mm	Ø mm	Ø mm	Quantity***	REF (Non Sterile)	REF (Sterile)
20	3.5	2.5	2	00-2369-020-35	47-2369-020-35
22	3.5	2.5	2	00-2369-022-35	47-2369-022-35
24	3.5	2.5	2	00-2369-024-35	47-2369-024-35
26	3.5	2.5	2	00-2369-026-35	47-2369-026-35
28	3.5	2.5	2	00-2369-028-35	47-2369-028-35
30	3.5	2.5	2	00-2369-030-35	47-2369-030-35
32	3.5	2.5	2	00-2369-032-35	47-2369-032-35
34	3.5	2.5	2	00-2369-034-35	47-2369-034-35
36	3.5	2.5	2	00-2369-036-35	47-2369-036-35
38	3.5	2.5	2	00-2369-038-35	47-2369-038-35
40	3.5	2.5	2	00-2369-040-35	47-2369-040-35
42	3.5	2.5	2	00-2369-042-35	47-2369-042-35
44	3.5	2.5	2	00-2369-044-35	47-2369-044-35
46	3.5	2.5	2	00-2369-046-35	47-2369-046-35
48	3.5	2.5	2	00-2369-048-35	47-2369-048-35
50	3.5	2.5	2	00-2369-050-35	47-2369-050-35



NCB® MotionLoc® Screws (optional) Ø 4.0 mm Cortical, Self Tapping. See surgical technique (REF 97-3161-002-00 or 97-3161-004-00)* for more specific instructions.



L mm	Ø mm	REF (Non Sterile)	REF (Sterile)
24	4.0	02.03162.024	02.02162.024
26	4.0	02.03162.026	02.02162.026
28	4.0	02.03162.028	02.02162.028
30	4.0	02.03162.030	02.02162.030
32	4.0	02.03162.032	02.02162.032
34	4.0	02.03162.034	02.02162.034
36	4.0	02.03162.036	02.02162.036
38	4.0	02.03162.038	02.02162.038
40	4.0	02.03162.040	02.02162.040
42	4.0	02.03162.042	02.02162.042
44	4.0	02.03162.044	02.02162.044
46	4.0	02.03162.046	02.02162.046

Compatible Zimmer Products with the NCB Proximal Humerus System

REF Sterile	Description
47-2232-060-00**	NCB Polyaxial Locking Plate Cable Button, Gold, 2.5mm Hex Drive, Material: Ti6Al4V
47-2232-060-01	NCB Polyaxial Locking Plate Cable Button, Blue, 2.5mm Hex Drive, Material: Ti6Al4V
00-2232-002-35	Hex Buttons, 3.5mm Hex, Drive Material: C.P. Titanium
00-2232-002-28	Cable-Ready Cable Assembly Cerclage, Ø 1.8mm, L. 914mm, Material: CoCr
00-2232-004-18	Cable-Ready Cable Assembly Cerclage, Ø 1.8mm, L. 635mm, Material: CoCr

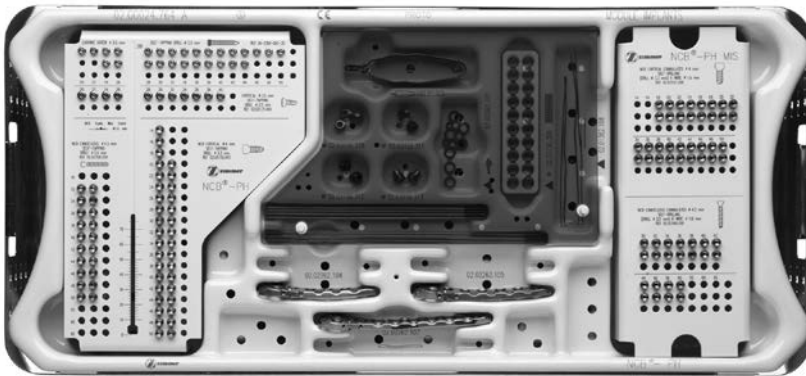
Materials: The 3.5 mm locking screws and NCB MotionLoc screws are made of Ti6Al4V, ISO 5832-3, ASTM F136.

* 97-3161-002-00 is for countries where NCB MotionLoc screws are approved to be used with only NCB plates and 97-3161-004-00 is for countries where NCB MotionLoc screws are approved to be used with both NCB as well as NCB Periprosthetic plates. See NCB MotionLoc package insert for approved plate/MotionLoc screw combinations.

** Not available in Europe, Middle East and Africa.

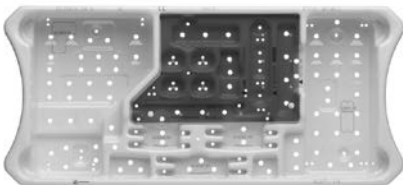
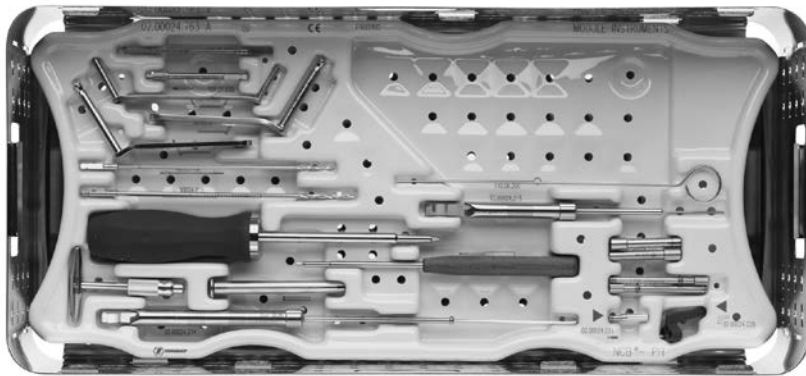
*** Indicates the quantities of Non Sterile implants in the Ti 3.5 mm locking screw set **ZS02.00024.796**

Graphic Case for Open Technique



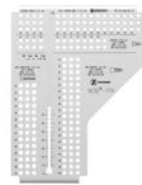
NCB®-PH standard graphic case for open technique (with standard instruments)

Unit	REF
1	ZS02.00024.760



NCB®-PH graphic case module instruments

Quantity*	REF
1	02.00024.763

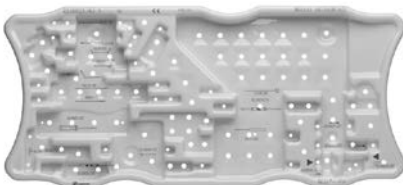


NCB®-PH graphic case module screw rack standard

Quantity*	REF
1	02.00024.765

NCB®-PH graphic case cover

Quantity*	REF
1	02.00024.701



NCB®-PH graphic case module implants

Quantity*	REF
1	02.00024.764

NCB®-PH graphic case insert¹⁾ (empty)

Quantity*	REF
–	02.00024.766

NCB®-PH graphic case base (Inox)

Quantity*	REF
1	02.00024.702

*Indicates the quantity in the standard graphic case.

¹⁾ Optional insert if ordered without MIS instruments.

Standard Instruments



NCB® drill guide

∅ mm	Quantity*	REF
2.5	1	02.00024.010
3.3	1	02.00024.111



Small depth gauge for 3.5 mm screws

Quantity*	REF
1	02.00024.216



Small hexagonal screwdriver

L mm	∅ mm	Quantity*	REF
245	2.5	1	109.01.020



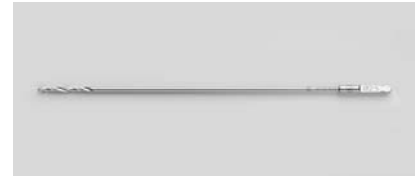
NCB®-PH torque screwdriver

L mm	∅ mm	Quantity*	REF
245	3.5	1	02.00024.022



NCB®-PH jig for 3.5 mm locking screws

Quantity*	REF
1	02.00024.220



Two-fluted drill bit ∅ 2.5 mm

L mm	Quantity*	REF
180	2	103.25.180



NCB® drill bit, with quick coupling

L mm	∅ mm	Quantity*	REF
195	3.3	2	02.00024.118



NCB®-PH conn. screw for 02.00024.220

Quantity*	REF
2	02.00024.221



Self-holding screw forceps

Quantity*	REF
1	100.90.005



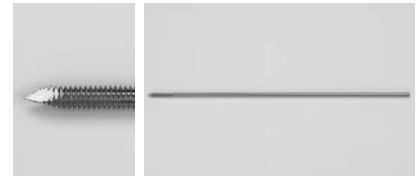
NCB® locking screw holder for 3.5 mm hexagonal screwdriver

L mm	Quantity*	REF
95	1	02.00024.121



NCB®-PH tissue protection sleeve for 02.00024.220

Quantity*	REF
2	02.00024.222



Kirschner wire, with threaded tip

L mm	∅ mm	Quantity*	REF
150	2.0	4	299.20.150



NCB®-PH depth gauge

Quantity*	REF
1	02.00024.214



NCB®-PH drill guide ∅ for 02.00024.220

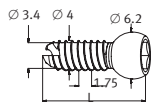
∅ mm	Quantity*	REF
2.5	2	02.00024.223

*Indicates the quantity in the standard graphic case.

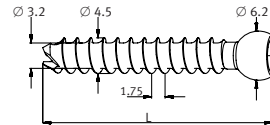
Implants for MIS* Surgical Technique



NCB® cannulated screw
Ø 4, self-drill



NCB® cannulated cancellous
screw Ø 4.5, self-drill



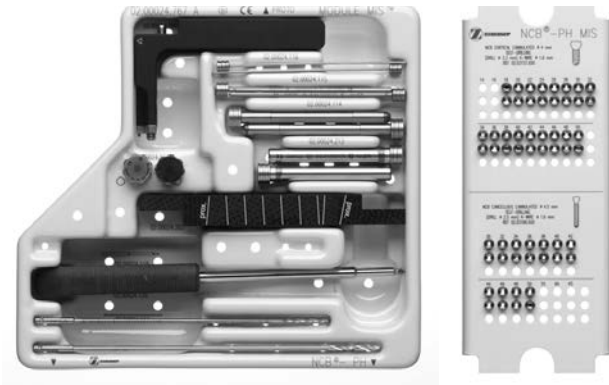
L mm	Ø mm	Quantity**	REF (Non Sterile)	REF (Sterile)	L mm	Ø mm	Quantity**	REF (Non Sterile)	REF (Sterile)
14	4	–	02.03157.014	02.02157.014	30	4.5	–	02.03160.030	02.02160.030
16	4	–	02.03157.016	02.02157.016	32	4.5	–	02.03160.032	02.02160.032
18	4	–	02.03157.018	02.02157.018	34	4.5	–	02.03160.034	02.02160.034
20	4	2	02.03157.020	02.02157.020	36	4.5	–	02.03160.036	02.02160.036
22	4	2	02.03157.022	02.02157.022	38	4.5	–	02.03160.038	02.02160.038
24	4	2	02.03157.024	02.02157.024	40	4.5	–	02.03160.040	02.02160.040
26	4	2	02.03157.026	02.02157.026	42	4.5	–	02.03160.042	02.02160.042
28	4	2	02.03157.028	02.02157.028	44	4.5	–	02.03160.044	02.02160.044
30	4	2	02.03157.030	02.02157.030	46	4.5	2	02.03160.046	02.02160.046
32	4	2	02.03157.032	02.02157.032	48	4.5	2	02.03160.048	02.02160.048
34	4	2	02.03157.034	02.02157.034	50	4.5	2	02.03160.050	02.02160.050
36	4	2	02.03157.036	02.02157.036	55	4.5	–	02.03160.055	02.02160.055
38	4	2	02.03157.038	02.02157.038	60	4.5	–	02.03160.060	02.02160.060
40	4	2	02.03157.040	02.02157.040	65	4.5	–	02.03160.065	02.02160.065
42	4	2	02.03157.042	02.02157.042					
44	4	2	02.03157.044	02.02157.044					
46	4	2	02.03157.046	02.02157.046					
48	4	2	02.03157.048	02.02157.048					
50	4	2	02.03157.050	02.02157.050					
55	4	–	02.03157.055	02.02157.055					
60	4	–	02.03157.060	02.02157.060					
65	4	–	02.03157.065	02.02157.065					

Materials: The NCB screws are made of Ti6Al4V, ISO 5832-3, ASTM F136.

* MIS *Minimally Invasive Solutions* Technique by Zimmer

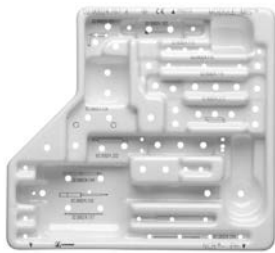
** Indicates the quantity of **Non Sterile** implants in the MIS graphic case module.

Graphic Case for MIS Technique



NCB®-PH graphic case module
MIS instruments and screw rack
(with content)

Quantity**	REF
—	ZS02.00024.780



NCB®-PH graphic case
module MIS instruments

Quantity**	REF
1	02.00024.767



NCB®-PH graphic case
module MIS screw rack

Quantity**	REF
1	02.00024.768

**Indicates the quantity in the MIS graphic case module.

MIS Instruments



NCB®-PH handle for targeting device

Quantity**	REF
1	02.00024.101



NCB® cannulated drill bit with quick coupling

L mm	Ø mm	Quantity**	REF
195	3.3	1	02.00024.117



NCB®-PH/PT measuring device for cannulated screws

Quantity**	REF
1	02.00024.219



NCB®-PH targeting module for targeting device

Quantity**	REF
1	02.00024.202



NCB®-PH Hexagonal screwdriver cannulated short hex

L mm	Ø mm	Quantity**	REF
245	3.5	1	02.00024.120



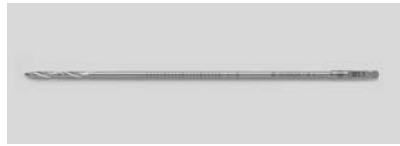
Cleaning wire Ø 1.6 mm

Quantity*	REF
1	110.06.200



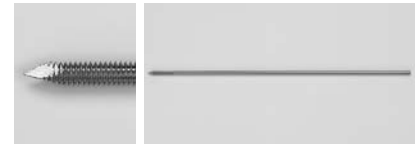
NCB®-PH connection screw for targeting device

Quantity**	REF
1	02.00024.103



NCB®-PH MIS drill bit

L mm	Ø mm	Quantity**	REF
230	3.3	1	02.00024.215



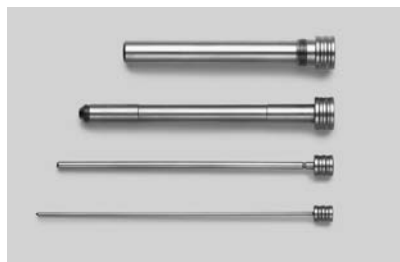
NCB® PH guide wire with threaded tip

L mm	Ø mm	Quantity**	REF
190	1.6	10	02.01362.116



NCB®-PH fixation screw for targeting device

Quantity**	REF
2	02.00024.104



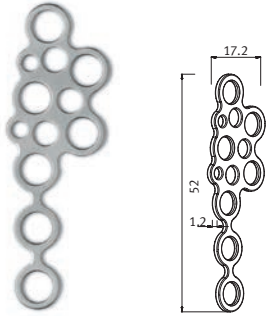
NCB®-PH tissue protection sleeves

Ø	Quantity**	REF
10/8.0	2	02.00024.213
8/3.3	2	02.00024.114
3.3/1.6	2	02.00024.115
1.6	2	02.00024.116

**Indicates the quantity in the MIS graphic case module.

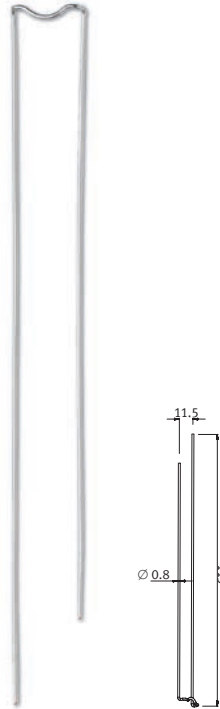
T-Minus Module (optional)

Implants and instrument set (REF **ZS02.00024.790**)



NCB® T-minus plate, 7 holes

Holes	Quantity***	REF (Non Sterile)	REF (Sterile)
7	1	02.03262.101	02.02262.101

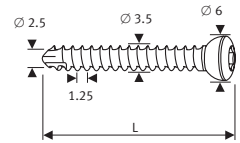


NCB® Cerclage wire for T-minus plate Stainless Steel

L mm	∅ mm	Quantity***	REF (Non Sterile)	REF (Sterile)
115	0.8	2	02.01362.108	02.00362.108



Cortical screw, self-tapping



L mm	∅ mm	∅ mm	Quantity***	REF (Non Sterile)
20	3.5	2.5	2	02.03131.020
22	3.5	2.5	2	02.03131.022
24	3.5	2.5	2	02.03131.024
26	3.5	2.5	2	02.03131.026
28	3.5	2.5	2	02.03131.028
30	3.5	2.5	2	02.03131.030
32	3.5	2.5	2	02.03131.032
34	3.5	2.5	2	02.03131.034
36	3.5	2.5	2	02.03131.036
38	3.5	2.5	2	02.03131.038
40	3.5	2.5	2	02.03131.040

Material: The self tapping cortical screw is made of Ti6Al7Nb, ISO 5832-11, ASTM F1295.
The tuberculum minus plate is made of C.P. titanium, ISO 5832-2, ASTM F67.

*** Indicates the quantity of **Non Sterile** implants in the T-minus module.

T-Minus Instruments (optional)



Wire cutter, for wire max. \varnothing 1.7 mm

L mm	Quantity***	REF
165	1	100.11.115



Wire bending forceps

L mm	Quantity***	REF
140	1	100.11.155



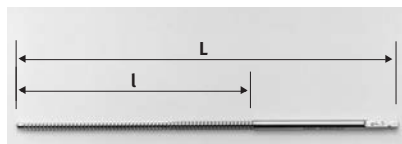
Double drill guides \varnothing 2.5 / 3.5 / 4.0

Quantity***	REF
1	100.40.035



T-handle, with quick coupling for taps

Quantity***	REF
1	100.90.210



Tap for quick coupling

L mm	l mm	\varnothing mm	Quantity***	REF
110	50	3.5	1	106.35.110

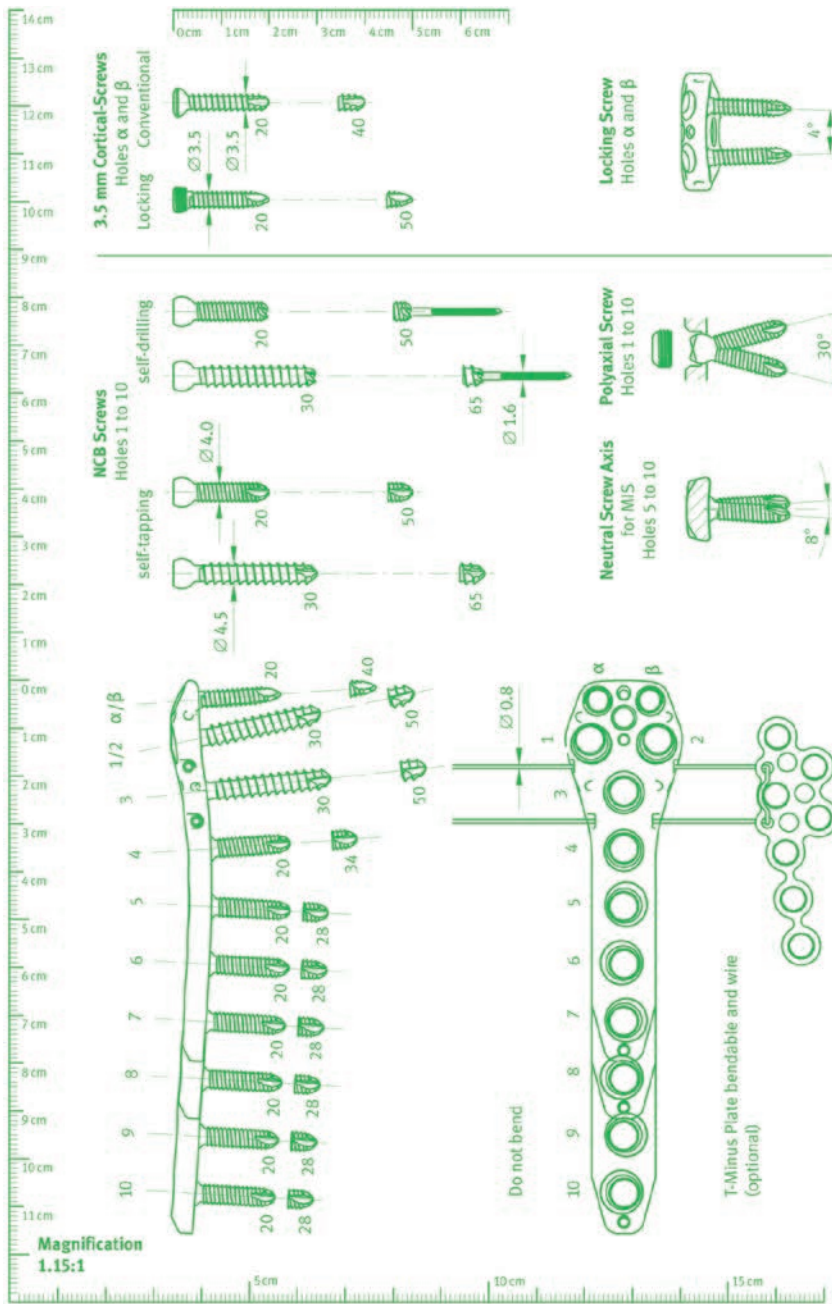


Countersink, for quick coupling
 \varnothing 3.5 and 4.0 mm

Quantity***	REF
1	108.01.035

*** Indicates the quantity in the T-minus module.

Planning Aid



NCB®-PH Proximal Humeral Osteosynthesis Plate with Polyaxial Locking Screws

HK No. 26.01511.000 – Cr. 1 | 2007 Wk



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