Surgical Technique
NCB Proximal Humerus System

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*MIS Minimally Invasive Solutions™ Technique by Zimmer*
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.

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 into 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

* 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

---

**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

**4.5 mm NCB cannulated cancellous screw**
- Cannulation for 1.6 mm Guide Wire
- 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 Ø 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 Ø 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 and Patient Positioning

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.

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

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- Lack of bone substance or poor bone quality which makes stable seating of the implant impossible.
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Positioning of the Patient
The patient is placed on the operating table in the beachchair position.

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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.

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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.

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.

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- Lack of bone substance or poor bone quality which makes stable seating of the implant impossible.
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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.
Sample Cases

Preoperative

Preoperative

Postoperative, MIS* operation technique

Postoperative, open operation technique

*MIS Minimally Invasive Solutions™ Technique by Zimmer
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.

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.

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.

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.

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.

2. Screw and Drill Dimensions

NCB self-tapping screw and drill dimensions

<table>
<thead>
<tr>
<th>Screw Type</th>
<th>Screw Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cortical</td>
<td>Cancellous</td>
</tr>
<tr>
<td>REF 02.0x155.0xx</td>
<td>REF 02.0x159.0xx</td>
</tr>
<tr>
<td>☞ 4.0 mm</td>
<td>☞ 4.5 mm</td>
</tr>
<tr>
<td>L 14 – 65 mm</td>
<td>L 30 – 65 mm</td>
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</table>

<table>
<thead>
<tr>
<th>Drill</th>
<th>Drill</th>
</tr>
</thead>
<tbody>
<tr>
<td>REF 02.00024.118</td>
<td>REF 103.25.180</td>
</tr>
<tr>
<td>☞ 3.3 mm</td>
<td>☞ 2.5 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drill guide</th>
<th>Drill guide</th>
</tr>
</thead>
<tbody>
<tr>
<td>REF 02.00024.111</td>
<td>REF 02.00024.010</td>
</tr>
<tr>
<td>☞ 3.3 mm</td>
<td>☞ 2.5 mm</td>
</tr>
</tbody>
</table>

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

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

Insert the self-tapping screw with the NCB torque screwdriver (REF 02.00024.022). For osteoporotic bone use Ø 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.
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.

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.
Proximal 3.5 mm Locking Screw Placement (optional)

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

1. Screw and Drill Dimensions

3.5 mm locking screw and drill dimensions

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**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 Ø 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 Ø 3.5 mm Locking Screws

Insert the appropriate Ø 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 \( \phi 3.5 \) 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 \( \phi 0.8 \) 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.

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

3. Measure Screw Length and Place Screws
Measure the appropriate screw length with the small depth gauge, for screws \( \phi 3.5 \) mm (REF 02.00024.216).

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

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.
**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 Spacers**

<table>
<thead>
<tr>
<th>REF-No</th>
<th>Color</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>02.0x150.311</td>
<td>red</td>
<td>1 mm</td>
</tr>
<tr>
<td>02.0x150.312</td>
<td>blue</td>
<td>2 mm</td>
</tr>
<tr>
<td>02.0x150.313</td>
<td>green</td>
<td>3 mm</td>
</tr>
</tbody>
</table>

**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.

**Sutures**

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

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).

The top side of the targeting module is for the screw holes with numbers: \(1 \rightarrow 2 \rightarrow 4 \rightarrow 5 \rightarrow 6 \rightarrow 7 \rightarrow 8 \rightarrow 9 \rightarrow 10\)

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.
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 subacrominal 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.

*MIS Minimally Invasive Solutions™ Technique by Zimmer
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  1.6 mm, length 190 mm guide wire (REF 02.01362.116).

MIS* Technique
NCB Self-Drill Screw and Drill Dimensions

<table>
<thead>
<tr>
<th>Guide wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>REF 02.01362.116</td>
</tr>
<tr>
<td>Ø 1.6 mm</td>
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<tr>
<td>L 190 mm</td>
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</table>

<table>
<thead>
<tr>
<th>Screw Type</th>
<th>Screw Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannulated</td>
<td>Cannulated</td>
</tr>
<tr>
<td>Cortical, self drilling</td>
<td>Cancellous, self drilling</td>
</tr>
<tr>
<td>REF 02.0x157.0xx</td>
<td>REF 02.0x160.0xx</td>
</tr>
<tr>
<td>Ø 4.0 mm</td>
<td>Ø 4.5 mm</td>
</tr>
<tr>
<td>L 14–65 mm</td>
<td>L 30–65 mm</td>
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<table>
<thead>
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<th>Drill</th>
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<tbody>
<tr>
<td>REF 02.00024.117</td>
</tr>
<tr>
<td>Ø 3.3 mm</td>
</tr>
</tbody>
</table>
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 Ø1.6-Ø10 (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.

Insert Ø 1.6 mm guide wire with a length of 190 mm (ref 02.01362.116) and confirm the correct position with an image intensifier.

**Note:** The distal center can be found with Ø 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.
3. Distal Cannulated Screw Placement

Determine the screw length from the measurement with the NCB measuring device gauge (REF 02.00024.219) along the 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.

For hard cortical bone it is possible to use the 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.

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.
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.

5. Proximal Cannulated Screw Placement
Insert Ø 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.

Measure the length with the NCB measuring device (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 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.
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.

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.
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 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.

Implant Removal
To remove the NCB-PH humerus plate, first remove the 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

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

* Indicates the quantity of Non Sterile implants in the standard graphic case.
NCB® Proximal Humerus – Surgical Technique

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

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

Compatible Zimmer Products with the NCB Proximal Humerus System

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

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

The NCB®-PH standard graphic case for open technique (with standard instruments) includes the following components:

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Quantity</th>
<th>Reference</th>
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</thead>
<tbody>
<tr>
<td>NCB®-PH standard graphic case</td>
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<td>ZS02.00024.760</td>
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## NCB®-PH Graphic Case Module Implants

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<tr>
<th>Item Description</th>
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<th>Reference</th>
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</thead>
<tbody>
<tr>
<td>NCB®-PH graphic case module implants</td>
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</tbody>
</table>

## NCB®-PH Graphic Case Module Instruments

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<tr>
<th>Item Description</th>
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</tr>
</thead>
<tbody>
<tr>
<td>NCB®-PH graphic case module instruments</td>
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## NCB®-PH Graphic Case Module Screws

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<th>Item Description</th>
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<tbody>
<tr>
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## NCB®-PH Graphic Case Insert

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## NCB®-PH Graphic Case Cover

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<td>NCB®-PH graphic case cover</td>
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## NCB®-PH Graphic Case Base (Inox)

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<tbody>
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*Indicates the quantity in the standard graphic case.
1) Optional insert if ordered without MIS instruments.
# Standard Instruments

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<tr>
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<td></td>
<td>3.3 mm</td>
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<td>02.00024.111</td>
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<tr>
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<td>L mm: 245, ø mm: 3.5</td>
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<tr>
<td>NCB® drill bit, with quick coupling</td>
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<td>02.00024.118</td>
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<tr>
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<td>NCB® PH jig for 3.5 mm locking screws</td>
<td>Quantity*</td>
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<td>NCB®-PH tissue protection sleeve</td>
<td>for 02.00024.220</td>
<td>Quantity*</td>
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<td>NCB®-PH depth gauge</td>
<td>Quantity*</td>
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*Indicates the quantity in the standard graphic case.
# Implants for MIS* Surgical Technique

**NCB® cannulated screw**

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<tr>
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**NCB® cannulated cancellous screw**

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<th>L mm</th>
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<th>Quantity**</th>
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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

**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**
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**
Quantity** REF
245 3.5 1 02.00024.120

**NCB®-PH connection screw for targeting device**
Quantity** REF
1 02.00024.103

**NCB®-PH MIS drill bit**
Quantity** REF
230 3.3 1 02.00024.215

**NCB®-PH Hexagonal screwdriver with threaded tip**
Quantity** REF
190 1.6 10 02.01362.116

**NCB®-PH tissue protection sleeves**
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**

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<th>Holes</th>
<th>Quantity***</th>
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**NCB® Cerclage wire for T-minus plate**

Stainless Steel

<table>
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<th>L mm</th>
<th>Ø mm</th>
<th>Quantity***</th>
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<th>REF (Sterile)</th>
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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)

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<tr>
<th>Item Description</th>
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<th>Quantity</th>
<th>REF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire cutter, for wire max. Φ 1.7 mm</td>
<td>165</td>
<td>1</td>
<td>100.11.115</td>
</tr>
<tr>
<td>Wire bending forceps</td>
<td>140</td>
<td>1</td>
<td>100.11.155</td>
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<tr>
<td>Double drill guides Φ 2.5 / 3.5 / 4.0</td>
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<td></td>
<td>100.40.035</td>
</tr>
<tr>
<td>T-handle, with quick coupling for taps</td>
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<td></td>
<td>100.90.210</td>
</tr>
<tr>
<td>Tap for quick coupling</td>
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<td>106.35.110</td>
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<tr>
<td>Countersink, for quick coupling Φ 3.5 and 4.0 mm</td>
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</table>

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

NCB® Proximal Humerus System – Surgical Technique

X ray template  REF 06.01511.000
Notes
Disclaimer

This documentation is intended exclusively for physicians and is not intended for laypersons. Information on the products and procedures contained in this document is of a general nature and does not represent and does not constitute medical advice or recommendations. Because this information does not purport to constitute any diagnostic or therapeutic statement with regard to any individual medical case, each patient must be examined and advised individually, and this document does not replace the need for such examination and/or advice in whole or in part.

Please refer to the package inserts for important product information, including, but not limited to, indications, contraindications, warnings, precautions, and adverse effects.