LCP Percutaneous Aiming System 3.5 for PHILOS. For less invasive surgery at the proximal humerus.
This description alone does not provide sufficient background for direct use of DePuy Synthes products. Instruction by a surgeon experienced in handling these products is highly recommended.

**Processing, Reprocessing, Care and Maintenance**

For general guidelines, function control and dismantling of multi-part instruments, as well as processing guidelines for implants, please contact your local sales representative or refer to:

http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance

For general information about reprocessing, care and maintenance of Synthes reusable devices, instrument trays and cases, as well as processing of Synthes non-sterile implants, please consult the Important Information leaflet (SE_023827) or refer to:

http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance
# Table of Contents

## Introduction
- LCP Percutaneous Aiming System 3.5 for PHILOS 2
- AO Principles 4

## Surgical Technique
- Patient Positioning and Approach 5
- Implantation 6

## Product Information
- Implants 23
- Instruments 24
- Sets 27

## Bibliography
- Bibliography 28
LCP Percutaneous Aiming System 3.5 for PHILOS. For less invasive surgery at the proximal humerus.

**The Sleeve System**
- Screw holes are accessible by sleeve system for percutaneous screw insertion
- Outer sleeves snap into the aiming arm for quick assembly and removal
- Different drill sleeves for the option of locking and cortex screw insertion
- Color-coding facilitates system orientation

**Introduction**
- Radiolucent aiming arm to enable control view under image intensifier
- Insertion handle can be used independently from aiming arm
- Screw holes are percutaneously accessible by the sleeve system
- Blocked access to screw holes near N. axillaris to protect the nerve

1. Locking Drill Sleeve Ø 2.8 mm
2. Centering Sleeve Ø 1.6 mm for Kirschner wire
3. Drill Sleeve Ø 2.5 mm, neutral position
4. Drill Sleeve Ø 2.5 mm, load position
5. Outer Sleeve
Aiming arm can be used as elongation for insertion handle when turned 180° away from the plate

**Submuscular insertion and percutaneous fixation**
The LCP Percutaneous Aiming System 3.5 for PHILOS facilitates submuscular insertion and percutaneous fixation of PHILOS via the transdeltoid approach. The design of the LCP Percutaneous Aiming System 3.5 for PHILOS is optimized to reduce the risk of interfering with the axillary nerve during screw insertion. To protect the axillary nerve, screw levels C to F are blocked. Screw holes in these sections cannot be accessed through the aiming arm.
In 1958, the AO formulated four basic principles, which have become the guidelines for internal fixation.1,2

**Anatomic reduction**
Fracture reduction and fixation to restore anatomical relationships.

**Early, active mobilization**
Early and safe mobilization and rehabilitation of the injured part and the patient as a whole.

**Stable fixation**
Fracture fixation providing absolute or relative stability, as required by the patient, the injury, and the personality of the fracture.

**Preservation of blood supply**
Preservation of the blood supply to soft tissues and bone by gentle reduction techniques and careful handling.

Patient Positioning and Approach

Note: For information on fixation principles using conventional and locked plating techniques, please refer to the LCP Locking Compression Plate Surgical Technique (DSEM/TRM/0115/0278).

1 Position the patient

Place the patient in the beach chair position on a radiolucent table.

A lateral side table is recommended to place the abducted arm and to relax the deltoid muscle.

Ensure the fluoroscope is positioned in a way that allows visualization of the proximal humerus in two axes (AP and lateral/axial).

Prepare the patient’s arm so that it can be mobilized intraoperatively.

2 Approach

Perform a transdeltoid approach. Begin the incision at the anterolateral tip of the acromion and extend it approximately 4 cm distally over the deltoid muscle.

Split the deltoid to the margin of the acromion.

Precaution: The axillary nerve runs approximately transverse at the level of the surgical neck.

Warning: To avoid damaging the axillary nerve, do not split the deltoid more than 4 cm distal to its origin.
1

Reduce fracture and fix temporarily

Proper reduction of the fracture is crucial for good bone healing and function. In some cases, closed reduction before prepping the patient is beneficial.

Reduce the head fragments and check the reduction using image intensifier control.

Kirschner wires can be used for reduction as joysticks in the fragments and for temporary fixation. Ensure that the Kirschner wires do not interfere with correct plate placement.

Note: The locking screws are not suitable for reduction since they cannot exert compression. The head fragments must be reduced before insertion of locking screws.

Suturing

Provisionally reduce the tubercles using sutures through the insertions of the musculi subscapularis, infra- and supraspinatus. The sutures will help to maintain the stability of the reconstruction when fixing them to the plate later (see p. 20).

Insertion of sutures is especially recommended in weak bone where only short screws can be used due to the risk of penetration through settling.
2

Prepare plate position

**Note:** The LCP Percutaneous Aiming System 3.5 for PHILOS is used with the PHILOS plate. Please consult the surgical technique “Philos and Philos long” (DSEM/TRM/0815/0449) for detailed information on the implant and its indications.

For optimal plate positioning, insert two positioning Kirschner wires 2–4 mm lateral to the bicipital groove and 5–7 mm below the tip of the greater tubercle.

**Precaution:** Placing the plate too high increases the risk of subacromial impingement. Placing the plate too low can prevent the optimal distribution of screws in the humeral head.

2a

Alternative technique

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Description</th>
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<tbody>
<tr>
<td>03.122.006</td>
<td>Insertion Handle for PHILOS – Proximal Humeral Plate 3.5, with Connecting Screw, hexagonal socket</td>
</tr>
<tr>
<td>or</td>
<td>03.122.035</td>
</tr>
</tbody>
</table>

Determine the position of the plate using a Kirschner wire. Insert the Kirschner wire into the proximal guide hole of the insertion handle (analogous to the proximal guide hole of the PHILOS aiming block) below the rotator cuff so that the Kirschner wire aims at the proximal joint surface.
3
Assemble the PHILOS aiming system

Instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>314.550</td>
<td>Screwdriver Shaft, hexagonal, small, Ø 2.5 mm, length 165 mm, for Quick Coupling</td>
</tr>
<tr>
<td>or 03.113.019</td>
<td>Screwdriver Shaft 3.5 Stardrive, T15, long, self-holding, for AO/ASIF Quick Coupling</td>
</tr>
<tr>
<td>03.122.006</td>
<td>Insertion Handle for PHILOS – Proximal Humeral Plate 3.5, with Connecting Screw, hexagonal socket</td>
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<tr>
<td>or 03.122.035</td>
<td>Insertion Handle for PHILOS – Proximal Humeral Plate 3.5, with Connecting Screw, Stardrive T15</td>
</tr>
<tr>
<td>311.431</td>
<td>Handle with Quick Coupling</td>
</tr>
<tr>
<td>03.122.007</td>
<td>Aiming Arm for PHILOS – Proximal Humeral Plate 3.5</td>
</tr>
</tbody>
</table>

Attach the insertion handle to the plate by aligning the stabilization pin of the insertion handle with the connection hole in the PHILOS plate (1).

Use the appropriate screwdriver to tighten the connecting screw of the insertion handle and securely connect the insertion handle to the plate (2).

Note: The aiming arm can be connected to the insertion handle before or after plate insertion, i.e. the proximal screws may be inserted through the aiming arm, or through the insertion handle using the insertion handle as a guide.
The following technique describes insertion of proximal screws through the aiming arm (3).

Precautions:
- Intraoperative bending of the proximal portion of the plate is not recommended for maintaining proper alignment between the aiming device and the plate.
- Do not attempt to use the LCP Percutaneous Aiming System 3.5 for PHILOS with longer PHILOS plates.
4

Insert plate

Slide the plate into the subdeltoid space and along the bone. Always keep the plate in contact with bone.

Warning: Do not injure the axillary nerve. The axillary nerve can be palpated at the lower margin of the incision.

Precaution: Do not use the insertion handle and the plate for soft tissue retraction or for release or dissection of the deltid insertion.
5

Position and align plate

Instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.113.009</td>
<td>Outer Sleeve for percutaneous LCP Aiming Instruments 3.5</td>
</tr>
<tr>
<td>03.113.022</td>
<td>Centering Sleeve, percutaneous, for Kirschner Wire Ø 1.6 mm</td>
</tr>
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Implants

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>02.113.001</td>
<td>Kirschner Wire Ø 1.6 mm, with drill tip, length 200 mm</td>
</tr>
</tbody>
</table>

Position the plate between the positioning Kirschner wires described in step 2.

Ensure the plate shaft is aligned with the bone.

The plate can be provisionally fixed to the bone using the Kirschner wire holes in the aiming device (or a centering sleeve). Insert the Kirschner wires monocortically to ensure they do not constrain subsequent movement.
6 Determine proximal screw lengths

**Instruments**

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<tr>
<td>323.060</td>
<td>PHILOS Direct Measuring Device for Kirschner Wire Ø 1.6 mm</td>
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**Implants**

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</tr>
</tbody>
</table>

**Warnings:**

- Do not drill through the joint surface.
- Do not insert overly long screws in order to prevent primary or secondary screw penetration.

**Note:** The drill bit tip should come as close as possible to the subchondral bone, approximately 5–8 mm from the joint surface. Since it may not always be possible to feel the resistance from the subchondral bone, and the drill bit represents the final position of the locking screw, the use of image intensification is recommended.

Insert the outer sleeve into one of the proximal holes of the aiming arm (sections A and B in the plate; see page 3). The arrows on the sleeve should point in the same direction as the arrow next to the hole in the aiming arm.

Add the centering sleeve (aqua mark) and insert the Kirschner wire.

**Warning:** Do not penetrate the joint surface with the Kirschner wires.
Check the position of the Kirschner wire using image intensifier control in several planes. Ensure it does not perforate the articular surface.

**Note:** The tip of the Kirschner wire should be located in the subchondral bone (approximately 8 mm below the joint surface).

---

Slide the Philos direct measuring device over the Kirschner wire and determine the length of the required screw.

**Precaution:** Always use a 1.6 mm Kirschner wire, 200 mm long, with the sleeves of the aiming system.

Alternatively, read off the required screw length from the drill bit.
7
Insert proximal screws

**Instruments**

<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>03.113.020</td>
<td>Locking Drill Sleeve $\odot$ 2.8 mm, percutaneous</td>
</tr>
<tr>
<td>03.113.024</td>
<td>Drill Bit $\odot$ 2.8 mm with Stop, calibrated, length 250/225 mm, for Quick Coupling</td>
</tr>
<tr>
<td>314.550</td>
<td>Screwdriver Shaft, hexagonal, small, $\odot$ 2.5 mm, length 165 mm, for Quick Coupling</td>
</tr>
<tr>
<td>or 03.113.019</td>
<td>Screwdriver Shaft 3.5 Stardrive T15, long, self-holding, for AO/ASIF Quick Coupling</td>
</tr>
<tr>
<td>511.770/</td>
<td>Torque Limiter, 1.5Nm, for Compact Air Drive and Power Drive / Torque Limiter, 1.5Nm, for AO/ASIF Quick Coupling</td>
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<td>511.773</td>
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<td>397.705/</td>
<td>Handle for Torque Limiter Nos. 511.770 and 511.771 / Handle with Quick Coupling</td>
</tr>
<tr>
<td>311.431</td>
<td></td>
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</table>

Remove the direct measuring device, Kirschner wire, and centering sleeve. Insert the locking drill sleeve (black mark) and drill the screw hole using the 2.8 mm drill bit (black mark).

**Warning:** Do not push the drill bit through the joint surface.

Remove the drill bit and drill sleeve.

**Warning:** In porotic bone, only drill the lateral cortex.
Insert the locking screw with the appropriate screwdriver shaft (hexagonal or Stardrive recess) and 1.5 Nm torque limiting attachment. Insert the screw manually or with power until a click is heard. If using power, reduce speed when tightening the head of the locking screw into the plate.

Repeat the above steps for all required proximal screw holes.

Precaution: The plate should be secured with all 4 proximal screws.
8

Insert shaft screws

Instruments

<table>
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<tr>
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<tbody>
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</tr>
<tr>
<td>03.113.020</td>
<td>Locking Drill Sleeve ( \varnothing ) 2.8 mm, percutaneous</td>
</tr>
<tr>
<td>03.113.024</td>
<td>Drill Bit ( \varnothing ) 2.8 mm with Stop, calibrated, length 250/225 mm, for Quick Coupling</td>
</tr>
<tr>
<td>314.550</td>
<td>Screwdriver Shaft, hexagonal, small, ( \varnothing ) 2.5 mm, length 165 mm, for Quick Coupling</td>
</tr>
<tr>
<td>or 03.113.019</td>
<td>Screwdriver Shaft 3.5 Stardrive, T15, long, self-holding, for AO/ASIF Quick Coupling</td>
</tr>
<tr>
<td>511.770/ 511.773</td>
<td>Torque Limiter, 1.5 Nm, for Compact Air Drive and Power Drive / Torque Limiter, 1.5 Nm, for AO/ASIF Quick Coupling</td>
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<tr>
<td>397.705/ 311.431</td>
<td>Handle for Torque Limiter Nos. 511.770 and 511.771 / Handle with Quick Coupling</td>
</tr>
<tr>
<td>03.113.010</td>
<td>Trocar with handle ( \varnothing ) 6.0 mm</td>
</tr>
</tbody>
</table>

Attach the aiming arm to the insertion handle if you have not already done so.

**Note:** To protect the axillary nerve, the plate holes in section C to F (see page 3) cannot be accessed percutaneously through the aiming arm.
Insert the outer sleeve through the aiming arm.

**Precautions:**
- If a cortex screw will be used, ensure the arrows on the sleeve correspond to the arrow under the etched “CORTEX” on the aiming arm.
- If a locking screw will be used, ensure the arrows on the sleeve correspond to the arrow under the etched “LOCKING” on the aiming arm.
Precaution: To ensure plate-device alignment, the aiming arm must be locked to the plate on both ends during screw insertion. An outer sleeve and a threaded sleeve must be threaded into one of the most distal locking holes in order to create a stable box (1).

Make a small skin incision, and use the outer sleeve with the trocar to stab down to the plate (2).

Note: Mark the incision point on the skin with a marker and remove the aiming arm to obtain good access and view during blunt dissection.
8a

**Insert cortex screws**

Insert an outer sleeve into the desired shaft hole and add the neutral drill guide (yellow mark, neutral).

Use the 2.5 mm drill bit (yellow mark) to drill toward the far cortex. Read the calibration just before penetrating the far cortex. Add the thickness of the far cortex (approximately 4 mm) and select the appropriate screw. Remove the drill bit and drill sleeve. Insert the screw.

**Note:** If a combination of cortex and locking screws is used, cortex screws must be inserted first to pull the plate to the bone.

**Option:** If interfragmentary compression is required, use the compression drill guide (yellow mark, load) for drilling the hole. This technique of using the compression drill guide is analogous to the technique for standard LC-DCP plates using the LC-DCP drill guide.
**8b Insert locking screws**

Screw the threaded drill guide (black mark) through the outer sleeve into the threaded section of the desired combi-hole until it is gripped completely by the thread.

Use the 2.8 mm drill bit (black mark) to drill toward the far cortex. Read the calibration just before penetrating the far cortex. Add the thickness of the far cortex (approximately 4 mm) and select the appropriate screw.

Remove the drill bit and the drill sleeve. Insert the locking screw with the appropriate screwdriver shaft (hexagonal or Stardrive recess) and 1.5 mm torque limiting attachment. Insert the screw manually or with power until a click is heard.

If using power, reduce speed when tightening the head of the locking screw into the plate.
9
Remove aiming arm

Remove the sleeves and aiming arm assembly from the plate.

10
Attach sutures

Knot the sutures through the designated holes in the plate. This construct functions as a tension band and transmits the forces of the rotor cuff over the plate and into the shaft, while preventing fragment displacement during the early rehabilitation period.
11

Final check

Before closing the wound, check the screw lengths and the stability of the suture fixation. Check the screws using image intensifier control in the full range of gleno-humeral-motion and ensure that they do not penetrate the articular surface. The sutures must not rupture during motion.

**Precaution:** It is important to check the screw lengths in all planes as their angulation and direction may be difficult to visualize.
**Implants**

**PHILOS – Proximal Humeral Plate 3.5**

<table>
<thead>
<tr>
<th>Stainless steel</th>
<th>Titanium</th>
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<th>Length (mm)</th>
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<td>90</td>
</tr>
<tr>
<td>241.903</td>
<td>441.903</td>
<td>5</td>
<td>114</td>
</tr>
</tbody>
</table>

**Precaution:** Do not attempt to use the LCP Percutaneous Aiming System 3.5 for PHILOS with PHILOS long plates.

All plates are available nonsterile or sterile packed. Add suffix “S” to article number to order sterile product.

**Kirschner Wires**

02.113.001 Kirschner Wire $\phi$ 1.6 mm, with drill tip, length 200 mm

**Screws**

- X12.102 – 124 Locking Screw Stardrive $\phi$ 3.5 mm, length 12–60 mm, self-tapping
- X13.012 – 060 Locking Screw $\phi$ 3.5 mm, length 12–60 mm, self-tapping
- *X04.812 – 860 Cortex Screw $\phi$ 3.5 mm, length 12–60 mm, self-tapping

*Stardrive
Hexagonal

X=2: Stainless steel
X=4: TAN
*X=4: TiCP

All screws are available nonsterile or sterile packed. Add suffix “S” to article number to order sterile product.
### PHILOS Sizing Templates

<table>
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<tr>
<th>Code</th>
<th>Description</th>
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<tbody>
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<td>03.122.003</td>
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<td>03.122.004</td>
<td>Shaft holes 5</td>
</tr>
<tr>
<td>03.122.005</td>
<td>Shaft holes long</td>
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### Instruments

- **03.122.007**  
  Aiming Arm for PHILOS – Proximal Humeral Plate 3.5

- **03.122.006 / 03.122.035**  
  Insertion Handle for PHILOS – Proximal Humeral Plate 3.5, with Connecting Screw, hexagonal socket / Stardrive T15

- **03.113.009**  
  Outer Sleeve for percutaneous LCP Aiming Instruments 3.5

- **03.113.010**  
  Trocar with Handle Ø 6.0 mm

- **03.113.012**  
  Drill Sleeve Ø 2.5 mm for neutral position, percutaneous
03.113.013  Drill Sleeve Ø 2.5 mm, for compression position, percutaneous

03.113.020  Locking Drill Sleeve Ø 2.8 mm, percutaneous

03.113.022  Centering Sleeve, percutaneous, for Kirschner Wire Ø 1.6 mm

03.113.023  Drill Bit Ø 2.5 mm with Stop, calibrated, length 250/225 mm, for Quick Coupling

03.122.008  Stop for Drill Bits Ø 2.5 mm
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<td>PHILOS Direct Measuring Device for Kirschner Wire Ø 1.6 mm</td>
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<td>01.122.040</td>
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<td>01.122.042</td>
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### Optional sets

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<td>Small Fragment Reduction Instruments, in Modular Tray, Vario Case System</td>
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<tr>
<td>01.122.015</td>
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Bibliography


