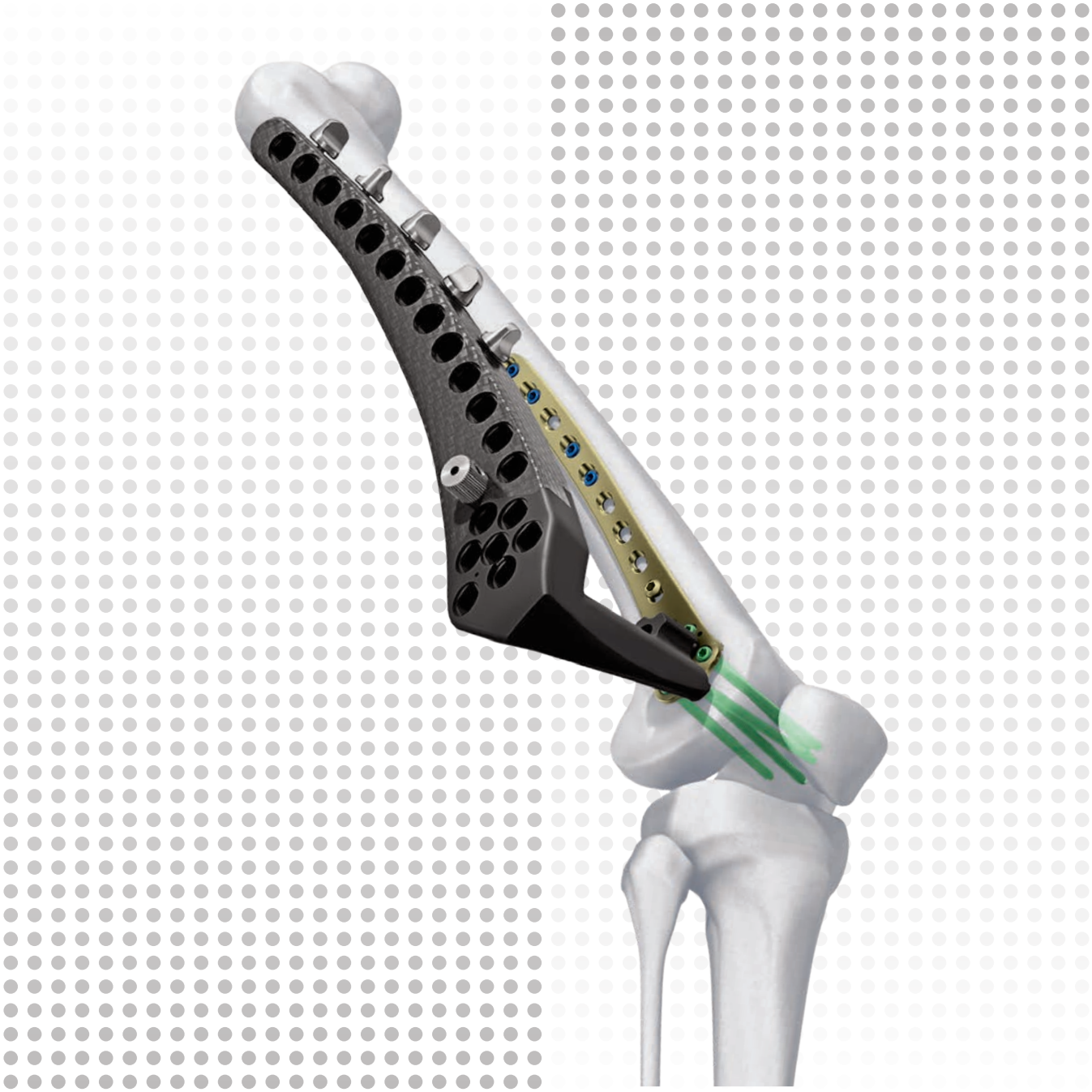
LCP Distal Femur Plates with LISS Instrumentation

Surgical Technique



approved by AO Technical Commission

DePuy Synthes
THE ORTHOPAEDICS COMPANY OF Johnson & Johnson

Image intensifier control

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 DePuy Synthes reusable devices, instrument trays and cases, as well as processing of DePuy Synthes non-sterile implants, please consult the Important Information leaflet (SE_023827) or refer to:
http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance

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■ **Notes**
▲ **Precautions**
▲ **WARNINGS**

LCP Distal Femur Plates with LISS Instrumentation

Anatomically contoured plates

- Available in stainless steel and titanium alloy (TAN)
- LCP DF plates in eight lengths with 5 to 19 holes in the shaft
- Long LCP DF plates (15 to 19 holes) available in sterile only
- LISS DF, plates in TAN in lengths 5, 9 and 13 holes

Available screws

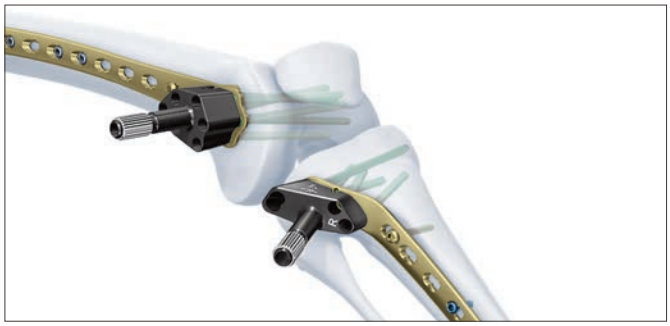
- Self-tapping or self-drilling locking screws
- Periprosthetic locking screws with blunt tip for periprosthetic fractures
- Cortex screws
- Available in stainless steel and titanium

▲ Precaution:

Excessive and repetitive bending is not recommended as it may weaken the plate.

Available guiding tools: guiding block and LISS insertion guide

The guiding block facilitates mounting of the threaded LCP drill sleeves.



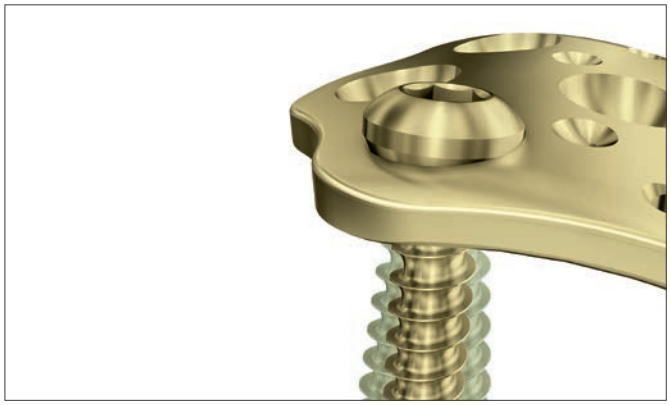
The radiolucent LISS insertion guide allows accurate percutaneous placement of screws and facilitates the insertion of the plate.

Use of cortex screws in the plate head

The threaded holes in the plate head also accept cortex screws to create compression.

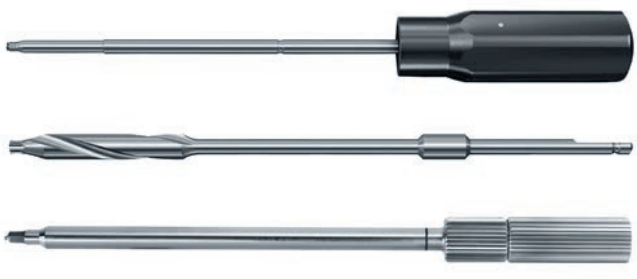
■ Note:

Cortex screws are only recommended in cases when compression through the plate is needed or when an independent cortex screw cannot be placed. This decision depends on patient's history, bone quality, physiological condition and compliance and has to be made individually for each patient.



LISS instrumentation for Stardrive and Hex drive

The torque-limiting screwdriver, the screwdriver shaft and the cleaning instrument are available for screws with Stardrive and Hex drive.



Intended Use, Indications and Contraindications can be found in the corresponding system Instructions for Use.

The AO Principles of Fracture Management

Mission

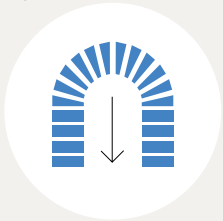
The AO's mission is promoting excellence in patient care and outcomes in trauma and musculoskeletal disorders.

AO Principles[1,2]

1.

Fracture reduction and fixation to restore anatomical relationships.

2.



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

3.

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

4.

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

[1] Müller ME, M Allgöwer, R Schneider, H Willenegger. Manual of Internal Fixation. 3rd ed. Berlin, Heidelberg, New York: Springer. 1991
[2] Buckley RE, Moran CG, Apivatthakakul T. AO Principles of Fracture Management: 3rd ed. Vol. 1: Principles, Vol. 2: Specific fractures. Thieme; 2017.

Preoperative Planning

Complete the preoperative radiographic assessment and prepare the preoperative plan. Determine plate length and instruments to be used.

Preoperative planning of lag screws may be necessary.

▲ Precaution:

Plate bending is not recommended as this may weaken the plate and the plate-screw interface and can compromise the targeting function of an aiming arm, if in use. However, there may be cases in which plate bending is clinically necessary. In such cases, the plate should only be bent to fit proximal femur anatomy and only bend the plate incrementally and between screw holes using the plate bending press (329.300), and never bend back-and-forth. Insert at least one screw distal to the bend.

Preparation

1. Prepare required sets

Instrument sets	
01.120.040	LISS Instruments and Insertion Handle, for DF and PLT Plates, in Vario Case
or	
01.120.041	LISS Instruments Stardrive and Insertion Handle, for DF and PLT Plates, in Vario Case

Optional instrument set	
01.120.457	LCP Large Fragment Instruments and Standard Instruments in Vario Case

Plate sets	
01.120.332	LCP-DF 4.5/5.0 (Stainless Steel), in Modular Tray, Vario Case System
or	
01.120.334	LCP-DF 4.5/5.0 (Titanium Alloy/TAN), in Modular Tray, Vario Case System

■ Note on long plates:

The LCP DF plates with 15 to 19 holes are available in sterile only and not part of a set. Therefore these articles have to be ordered as single items (for article numbers refer to “LCP DF Implants” section).

Screw sets	
68.122.050	Modular Insert, for Modular Screw Rack, for Screws ∅ 5.0 mm, size 1/3, without Contents, Vario Case System
68.122.051	Modular Insert, for Modular Screw Rack, for Screws ∅ 4.5 mm, size 1/3, without Contents, Vario Case System
68.122.052	Modular Insert, for Modular Screw Rack, for Screws ∅ 6.5 mm, size 1/3, without Contents, Vario Case System
68.122.054	Modular Screw Rack, with Drawer Measuring Block and Lid, length 200 mm, height 115 mm, size ½, without Contents, Vario Case System

Power Tools*	
511.701	Compact Air Drive II
511.750	AO/ASIF Quick Coupling, for Compact Air Drive and Power Drive
511.790	Quick Coupling for Kirschner Wires ∅ 0.6 to 3.2 mm, for Compact Air Drive and Power Drive
05.001.201	Battery Handpiece, modular, for Trauma Recon System
05.001.202	Power Module, for Trauma Recon System
05.001.203	Sterile Cover, for Trauma Recon System
05.001.227	Lid for Battery Handpiece No. 05.001.201, for Trauma Recon System
05.001.205	AO/ASIF Quick Coupling, for Trauma Recon System
05.001.212	Quick Coupling for Kirschner Wires ∅ 1.0 to 4.0 mm, for Trauma Recon System
05.001.216	Torque Limiter, 4.0 Nm, or Trauma Recon System

* For further information refer to the instructions for use for the Trauma Recon System or the Compact Air Drive.

■ Note:

The LISS instruments are compatible with both LISS and LCP DF plates. This technique guide shows the technique with LCP plates only. For your reference a picture of the LISS plate is shown on the right.

2. Position the patient

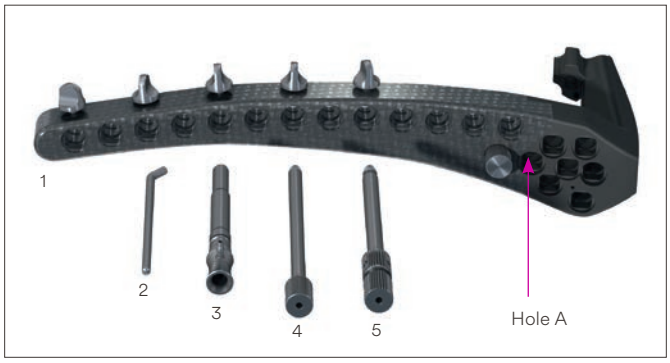
Position the patient supine on a radiolucent table. The leg should be freely movable. The contralateral leg can be placed in an obstetric leg holder. Place the knee joint line slightly distal to the hinged part of the table to allow flexion of the knee during surgery.

Avoid too strong a traction and a fully extended knee, as the forces of the gastrocnemius muscle would draw the distal fragment into recurvatum. This does not only make the reduction of the fracture difficult, but also endangers the popliteal artery and vein.

In very short distal fragments, it is recommended to flex the lower leg to approximately 60°. This also reduces the traction force of the gastrocnemius muscle.

3. Assemble the insertion instruments

Instruments		
324.011	LISS Insertion Guide for Distal Femur, left, radiolucent	
or		
324.012	LISS Insertion Guide for Distal Femur, right, radiolucent	1
321.170	Pin Wrench ∅ 4.5 mm, length 120 mm	2
324.022	Drill Sleeve for LISS Insertion Guide, length 130 mm	3
324.044	Stabilization Bolt for LISS Insertion Guide, length 156 mm	4
324.043	Fixation Bolt for LISS Insertion Guide, length 151 mm	5



■ Note:

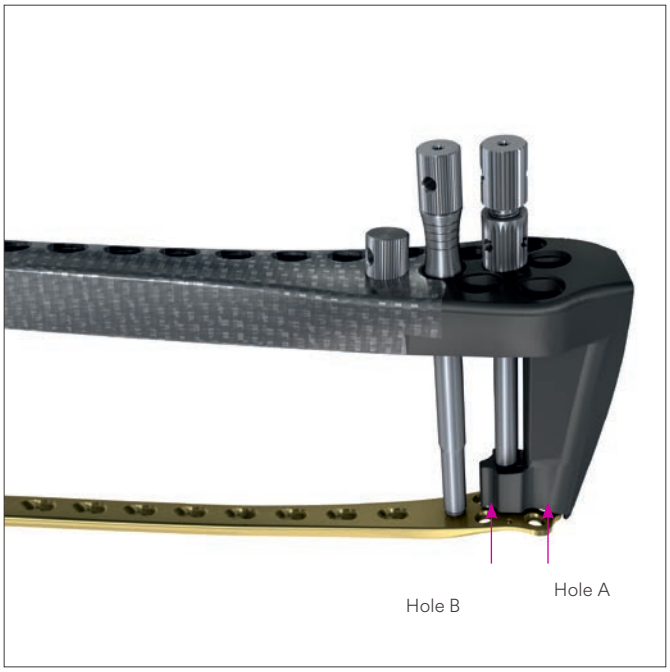
In certain cases (e.g. distal fracture treated with a short plate) it may be advantageous to do the surgery without using the LISS insertion guide and the corresponding LISS instruments. Then, screws can be inserted by applying the technique described in the LCP Instructions for Use.

Insert the fixation bolt in hole A of the insertion guide.

Place the insertion guide on the three-point locking mechanism of the plate.

Thread the fixation bolt into the plate. Thread the nut of the fixation bolt and lightly tighten it with the pin wrench.

For a stable fixation of the plate on the insertion guide during insertion, introduce the stabilization bolt with the drill sleeve in hole B and thread it into the plate.



■ Note:

To potentially prevent tissue ingrowth and facilitate implant removal, the unoccupied screw holes may be filled with screw hole inserts prior to inserting the plate. Use the torque-limiting screwdriver. The optimum torque is reached after one click.

4. Reduce the fracture

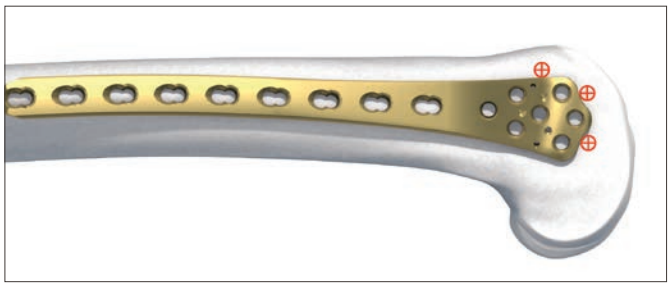
In an intra-articular fracture, first reconstruct and stabilize the entire joint. The figure shows the possible positioning sites for lag screws in the condyles (in red).

■ Note:

Make sure that these lag screws will not collide with the screws inserted through the insertion guide.

The fracture can be aligned manually by traction using a temporary knee-bridging external fixator or a distractor. Intraoperative x-ray or image-intensifier control is recommended to check the reduction.

The anteromedial insertion of a Schanz screw can be useful in distal fragment manipulation.

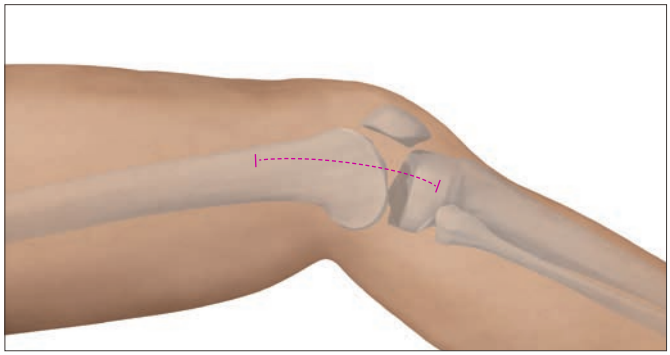


Possible positioning sites for lag screws (in red)

5. Surgical approaches

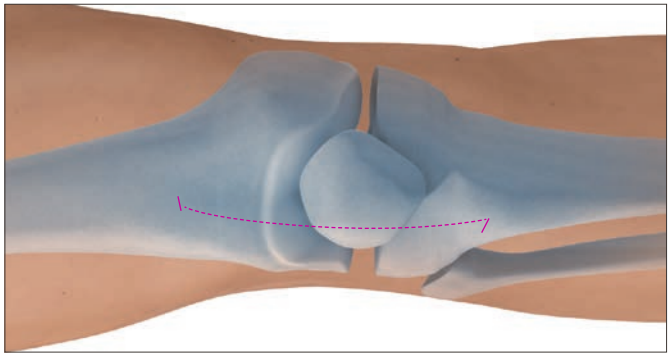
Extra-articular fractures

Perform a skin incision from Gerdy's tubercle about 80 mm in a proximal direction. Split the iliotibial tract in the direction of the fibres. Open the space between the lateral vastus and the periost. Distally, the lateral vastus muscle inserts mainly on the femoral ridge. There are no muscle insertions on the lateral periost or bone. The plate can be inserted into the space between the periost and the muscle.



Intra-articular fractures

In intra-articular fractures, an anterolateral arthrotomy providing good control of the reduction is recommended. This arthrotomy also allows a subsequent insertion of the plate and can be used to insert lag screws from medially.



▲ Precaution:

The incision can be extended if necessary to improve visualization of the articular surface or lateral metaphysis and diaphysis. It may not always be appropriate to use limited incisions and closed reduction techniques.

Plate Insertion

1. Insert LISS

Instruments

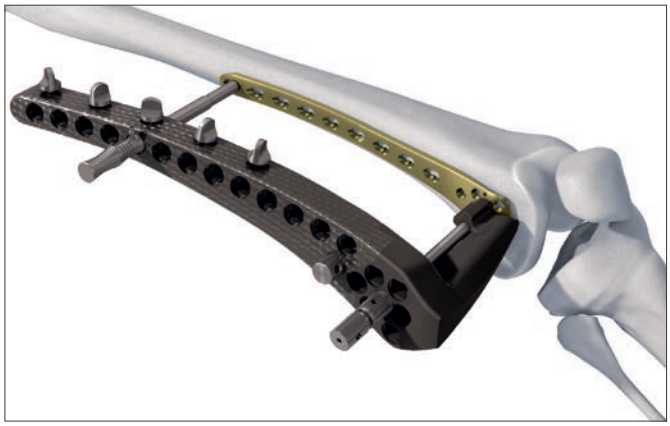
Assembled Insertion Guide

324.027	Trocar, length 162 mm, for No. 324.022

Use the assembled insertion guide to insert the plate between the lateral vastus muscle and the periost. Slide the plate proximally and ensure that its proximal end remains in constant contact with the bone. Position the distal end of the plate against the lateral condyle. To find the correct position, move the plate proximally and then back distally until the plate fits the condyle. Should the proximal end of the handle and the soft tissues impair the insertion of the plate, it is possible to remove the radiolucent proximal part of the handle for insertion.

Due to its weight, the insertion guide tends to tilt dorsally. If the insertion guide points parallel to the floor with the patient in a supine position, the plate is externally rotated and no longer lies flat up against the lateral condyle. The fixation bolt must be oriented parallel to the patello-femoral joint. Consequently, the insertion guide shows an internal rotation of about 10°. This occurrence is also visible in the AP view of an image intensifier. The plate must lie flat up against the condyle to ensure an optimal fit on the bone.

Once the plate is properly aligned with the bone, remove the drill sleeve and stabilization bolt from hole B. Insert the trocar through the drill sleeve in the most proximal hole of the plate. Perform a stab incision and push the drill sleeve and the trocar down to the plate. Check the correct position of the proximal part of the plate, either with the image intensifier or by direct palpation.



Secure the position of the drill sleeve with the lateral screw on the insertion guide. Replace the trocar with a stabilization bolt. To close the frame, thread the stabilization bolt into the plate.

■ Note:

Due to soft tissues around the stabilization bolt, it will be difficult to change the position of the plate/handle assembly once the bolt has been inserted.

Option: Check plate position with a Kirschner Wire

Instrument	
292.699	Kirschner Wire ∅ 2.0 mm with threaded tip, length 280 mm, Stainless Steel

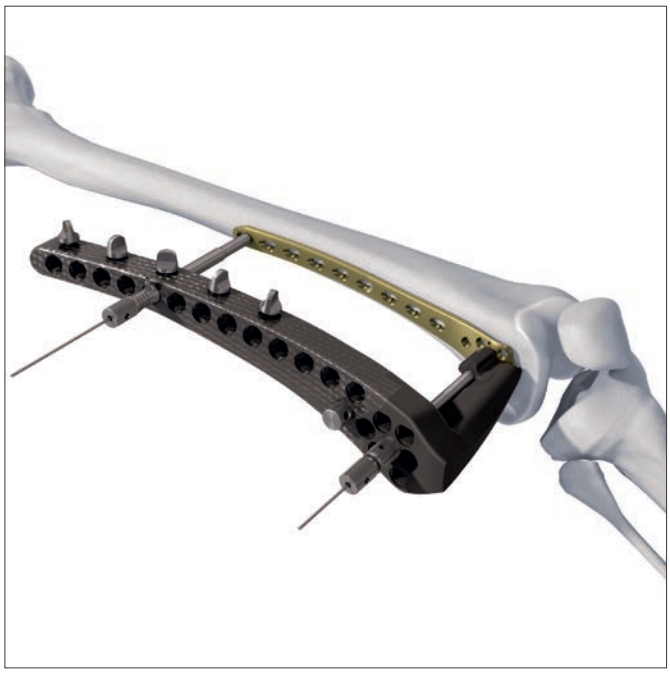
Use a Kirschner wire to check the correct position of the proximal part of the plate on the bone.

2. Fixate LISS temporarily with Kirschner wires

Instrument	
292.699	Kirschner Wire ∅ 2.0 mm with threaded tip, length 280 mm, Stainless Steel

For preliminary fixation of the plate, use 2.0 mm Kirschner wires through the fixation and stabilization bolts.

Carefully check the position of the plate and the length of the reduced injured limb. Once the reduction has been successfully completed and the plate has been positioned correctly, the locking screws can be inserted.



Alternative technique

Instruments	
324.048	Aiming Device for Kirschner Wires, for LISS Insertion Guide
324.034	Centering Sleeve for Kirschner Wire, length 184 mm, for No. 324.048
292.699	Kirschner Wire ∅ 2.0 mm with threaded tip, length 280 mm, Stainless Steel

If necessary, it is possible to use 2.0 mm Kirschner wires for the preliminary fixation along the full length of the plate. Use the aiming device for Kirschner wires to insert the wires on the ventral and dorsal side of the plate. Note that the distance between bone and plate should be kept as short as possible when inserting the wires, as they are arranged in a convergent way. After the insertion of the Kirschner wires, the distance between plate and bone can no longer be reduced.

After removing the Kirschner wire sleeves and the aiming device, proximal/distal displacement and adjustment of the position of the plate can be carried out. At the same time, the lateral Kirschner wires prevent the plate from migrating into the sagittal plane. Once the correct position is determined, the plate can be locked temporarily with a Kirschner wire through the fixation bolt.

■ Note:

The aiming device can be used from hole 3 to hole 13.

Option A: Insertion of Self-Drilling, Monocortical Locking Screws

Screw placement depends on the type of fracture. The position of the screws should be chosen in accordance with established biomechanical principles for internal fixation. The screws should be inserted close to and remote from the fracture gap in the main fragments. Use at least four screws per fracture side.

Once the initial screw has been inserted in each main fragment, length and rotation are defined. Ante- and recurvatum deformities can still be manipulated relatively well, whereas there are only limited correction possibilities for varus/valgus deformities. Therefore, it is recommended to insert the first screw in the distal fragment. The distal screws should be placed parallel to the knee joint. Then insert a screw in the proximal fragment.

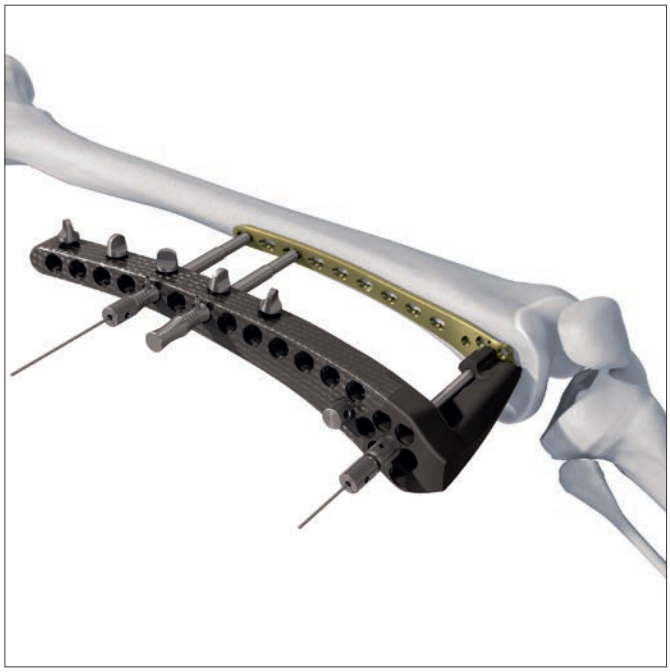
■ Note:

If a screw has to be removed and reinserted, use the torque-limiting screwdriver and not the power tool.

1. Make stab incision

Instruments	
324.022	Drill Sleeve for LISS Insertion Guide, length 130 mm
324.027	Trocar, length 162 mm, for No. 324.022

Make a stab incision and insert the trocar through the drill sleeve.



2. Determine screw length with Kirschner wire

The length of the condylar screws can be determined with Kirschner wire.

Instruments

324.055	Centering Sleeve for Kirschner Wire, length 161 mm, for No. 324.022
324.037	LISS Measuring Device for Kirschner Wires ∅ 2.0 mm, length 121 mm, for No. 292.699
292.699	Kirschner Wire ∅ 2.0 mm with threaded tip, length 280 mm, Stainless Steel

It is possible to use the measuring device with a 2.0 mm Kirschner wire, placed through the centering sleeve.

Using image intensification, insert the Kirschner wire to the desired depth leaving at least 5 mm between the tip of the Kirschner wire and the medial cortex. Measure the screw length over the Kirschner wire using the measuring device for Kirschner wires, leaving the centering sleeve in place, and round down to the nearest screw length. This will ensure that the tip of the screw will not protrude through the medial cortex.

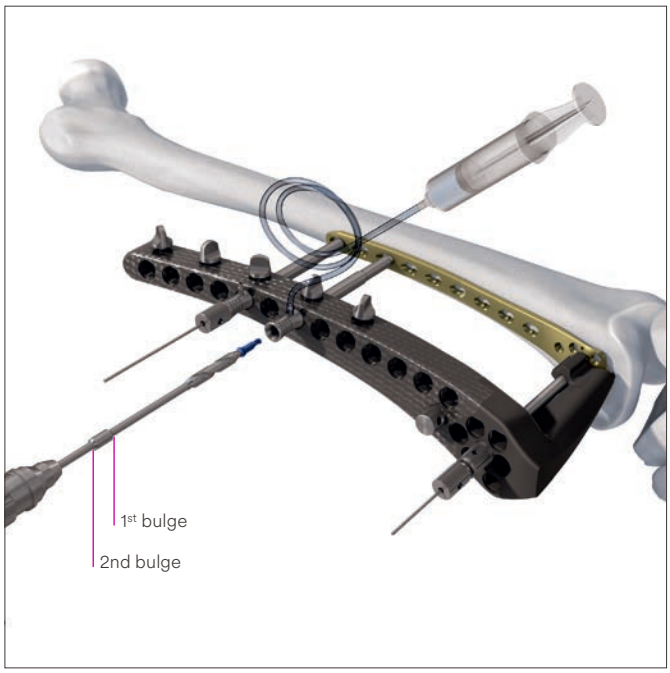
Use screws of 26 mm length in the diaphyseal region.

Options:

- In case of very thick cortex, pre-drill by using the pulling device (324.033) or the drill bit ∅ 4.3 mm (310.423).
- The insertion of the initial screw tends to push the bone medially, especially in case of dense one and/or unstable reductions. See Option: Pulling Device (“Whirly Bird”) section for details on how to use the pulling device for these situations.

3. Insert self-drilling locking screws

Instruments	
511.771	Torque Limiter, 4 Nm, for Compact Air Drive and Power Drive
324.050	Screwdriver Shaft 3.5, hexagonal, length 180 mm
or	
324.250	Screwdriver Shaft Stardrive, T25, length 180 mm
324.052	Torque-limiting Screwdriver 3.5, self-holding, for Locking Screws ∅ 5.0 mm
or	
314.163	Torque-limiting Screwdriver Stardrive, T25, self-holding, for Locking Screws ∅ 5.0 mm
324.019	Stopper for LISS Insertion Guide



To insert the locking screw using a power tool, fit a torque limiter to the power tool and insert the screwdriver shaft into the torque limiter.

Insert the locking screw into the plate hole through the drill sleeve for LISS insertion guide. To insert the screw, start the power tool slowly, increase the speed and then reduce it again before the screw is fully tightened. Advance the screws into the bone until the second bulge of the screwdriver disappears in the drill sleeve.

Tighten the screw manually with the torque-limiting screwdriver. After one click, the optimum torque is reached.

Insert a stopper into the LISS insertion guide after screw insertion.

■ Notes:

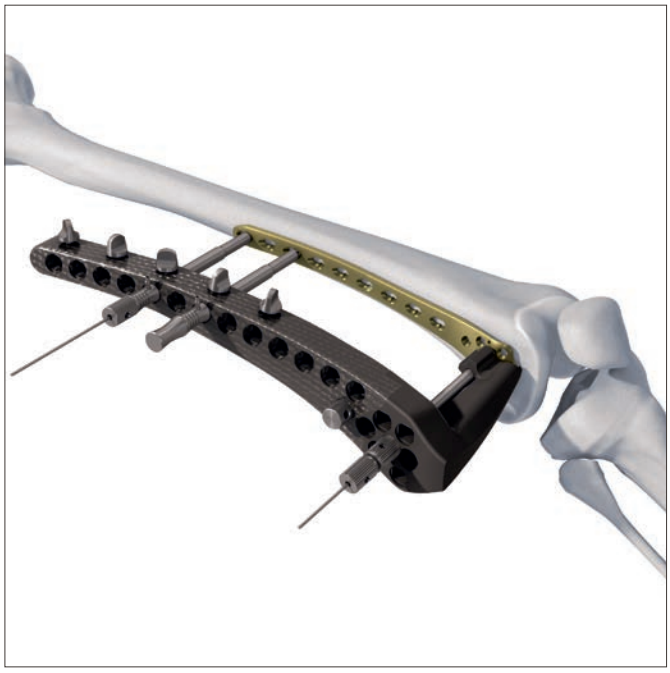
- To reduce the risk of stripping the screw head do not lock the screws at full speed. This can make it difficult to remove the implant.
- In order to achieve an adequate interface between screw and bone, use the power tool without high axial forces (3 to 5 kg).
- To prevent heat necrosis, it is important to cool the screw with saline solution during the drilling procedure through the drill sleeve.
- If the screw is difficult to insert or stops advancing prior to locking to the plate, remove the screw and clean the cutting flutes using a Kirschner wire. The screw can be re-used if the socket has not been damaged.
- Should the screwdriver be difficult to remove after insertion, disconnect it from the power tool and remove the drill sleeve. After reconnecting the screwdriver to the power tool, withdraw the screwdriver from the screw.

Option B: Insertion of Self-Tapping, Bicortical Locking Screws

1. Make stab incision

Instruments	
324.022	Drill Sleeve for LISS Insertion Guide, length 130 mm
324.027	Trocar, length 162 mm, for No. 324.022

Make a stab incision and insert the trocar through the drill sleeve for LISS insertion guide.



2. Predrill screw hole

Instruments	
324.007	Drill Sleeve 7.2/4.3, length 130 mm, for LISS
310.423	Drill Bit ∅ 4.3 mm, length 280 mm, for No. 324.007

Remove the trocar and thread the drill sleeve 7.2/4.3 into the plate hole through the drill sleeve for LISS insertion guide.

Carefully drill the screw hole using the 4.3 mm drill bit.

3. Determine screw length

The length of the condylar screws can be determined with Kirschner wire. See section “Option A: Insertion of Self-Drilling, Monocortical Locking Screws”.

For screws in the diaphyseal region

Slide the stop ring down to the drill sleeve to make reading easier.

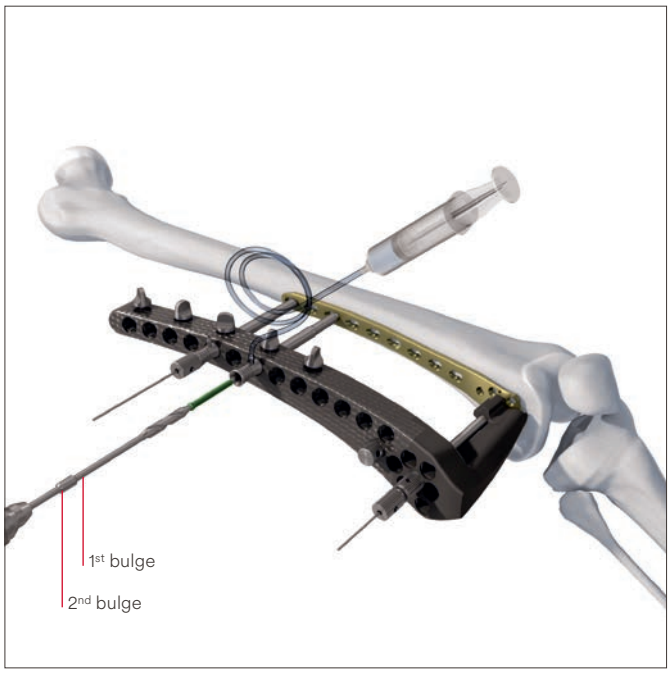
Read the drilled depth directly from the laser mark on the drill bit. Remove both drill bit and drill sleeve 7.2/4.3.

Option:

The insertion of the initial screw tends to push the bone medially. See Option: Pulling Device (“Whirly Bird”) section for details on how to use the pulling device for these situations.

4. Insert self-tapping locking screws

Instruments	
511.771	Torque Limiter, 4 Nm, for Compact Air Drive and Power Drive
324.050	Screwdriver Shaft 3.5, hexagonal, length 180 mm
or	
324.250	Screwdriver Shaft Stardrive, T25, length 180 mm
324.052	Torque-limiting Screwdriver 3.5, self-holding, for Locking Screws ∅ 5.0 mm
or	
314.163	Torque-limiting Screwdriver Stardrive, T25, self-holding, for Locking Screws ∅ 5.0 mm
324.019	Stopper for LISS Insertion Guide



Choose a self-tapping locking screw according to the measured length. To insert the locking screw using a power tool, fit a torque limiter to the power tool and insert the screwdriver shaft into the torque limiter.

Insert the locking screw into the plate hole through the drill sleeve for LISS insertion guide. To insert the screw, start the power tool slowly, increase the speed and then reduce it again before the screw is fully tightened. Advance the screws into the bone until the second bulge of the screwdriver disappears in the drill sleeve.

▲ WARNING:

If the torque limiter is unavailable, do not tighten the screws to the plate under power. Perform final tightening by hand.

Tighten the screw manually with the torque-limiting screwdriver. The optimum torque is reached after one click.

Insert a stopper into the LISS insertion guide after screw insertion.

▲ Precautions:

- To reduce the risk of stripping the screw head do not lock the screws at full speed. This can make it difficult to remove the implant.
- For long screws and thick cortical bone, ensure cooling during insertion.

Option: Manual insertion

Instruments	
324.052	Torque-limiting Screwdriver 3.5, self-holding, for Locking Screws ∅ 5.0 mm
or	
314.163	Torque-limiting Screwdriver Stardrive, T25, self-holding, for Locking Screws ∅ 5.0 mm
324.019	Stopper for LISS Insertion Guide

Insert and lock the screw with the torque-limiting screwdriver through the drill sleeve for LISS insertion guide.

Insert a stopper into the LISS insertion guide after screw insertion.

Option C: Insertion of Self-Tapping Locking Screws for Periprosthetic Fractures

The screws for periprosthetic fractures are available for cases in which an intramedullary nail or a prosthesis could impair the placement of screws.

These periprosthetic screws are self-tapping with a flattened, very short tip. They are available in five lengths of 8, 10, 12, 14 and 18 mm and allow the thread to engage in the near cortex.

1. Make stab incision

Instruments	
324.022	Drill Sleeve for LISS Insertion Guide, length 130 mm
324.027	Trocar, length 162 mm, for No. 324.022

Make a stab incision for plate holes requiring a periprosthetic screw and insert the drill sleeve for LISS insertion guide and the trocar.

2. Predrill screw hole

Instruments	
324.007	Drill Sleeve 7.2/4.3, length 130 mm, for LISS
310.423	Drill Bit ∅ 4.3 mm, length 280 mm, for No. 324.007

Remove the trocar and thread the drill sleeve 7.2/4.3 into the plate hole through the drill sleeve for LISS insertion guide.

Use the drill bit to pre-drill the bone under image intensifier control. Drill as close to the prosthesis or intramedullary implant as possible to allow for the placement of the longest periprosthetic screw possible.

3. Determine screw length

Slide the stop ring down to the drill sleeve to make reading easier.

Read the drilled depth directly from the laser mark on the drill bit. Remove both drill bit and drill sleeve 7.2/4.3.

4. Insert self-tapping locking screws for periprosthetic fractures

Instruments

324.052	Torque-limiting Screwdriver 3.5, self-holding, for Locking Screws ∅ 5.0 mm
or	
314.163	Torque-limiting Screwdriver Stardrive, T25, self-holding, for Locking Screws ∅ 5.0 mm
324.019	Stopper for LISS Insertion Guide

Choose a periprosthetic screw according to the measured length. Insert and lock the screw with the torque-limiting screwdriver through the drill sleeve for LISS insertion guide.

Insert a stopper into the LISS insertion guide after screw insertion.

■ Note:

If the measured drill depth is shorter than 8 mm, do not use periprosthetic screws.

▲ Precaution:

Never place a screw which is longer than the measured length, as this will result in stripping of the thread in the bone and loss of screw anchoring.

Option: Pulling Device (“Whirly Bird”)

Instrument

324.033	Pulling Device, length 240 mm, for LISS
324.022	Drill Sleeve for LISS Insertion Guide, length 130 mm

The insertion of the initial screw tends to push the bone medially.

Insert the pulling device without the knurled nut through the drill sleeve into the neighbouring hole of the first permanent screw.

Stop the power tool before the entire screw length of the pulling device is inserted.

Remove the power tool and the drill sleeve.

Screwing the knurled nut onto the pulling device allows the bone to pull towards the plate. Since the tip of this instrument has a diameter of 4.0 mm, replacing it with a 5.0 mm locking screw still ensures good purchase in the bone.

▲ Precaution:

It is important to monitor the advance of the screw tip carefully when inserting the pulling device. Stop the power tool before the pulling device is seated on the plate. Failure to do so may result in stripping the thread in the bone.

Option: Guiding Blocks

Using LCP instrumentation

See technique guide LCP Locking Compression Plate.

Using LISS instrumentation

Use instruments as described in section plate insertion.

Using the guiding blocks for LCP DF

The guiding block facilitates mounting of the threaded LCP drill sleeves in the head of the plate.

Instruments	
312.946/947	Guiding Block for LCP DF, right/left
323.042	LCP Drill Sleeve 5.0, for Drill Bits ∅ 4.3 mm
310.430	LCP Drill Bit ∅ 4.3 mm with Stop, length 221 mm, 2-flute, for Quick Coupling

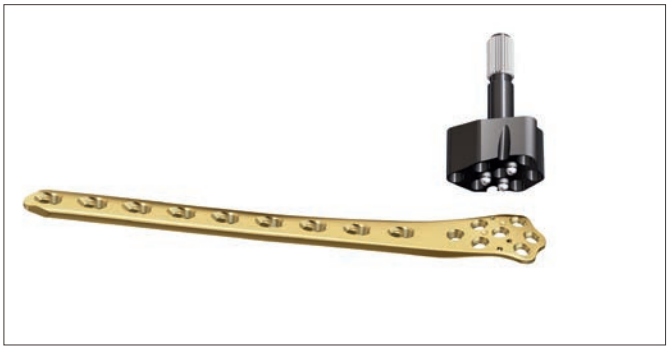
■ Note:

If cortex screws are used they have to be inserted before mounting the guiding block and before inserting locking screws.

Instrument assembly

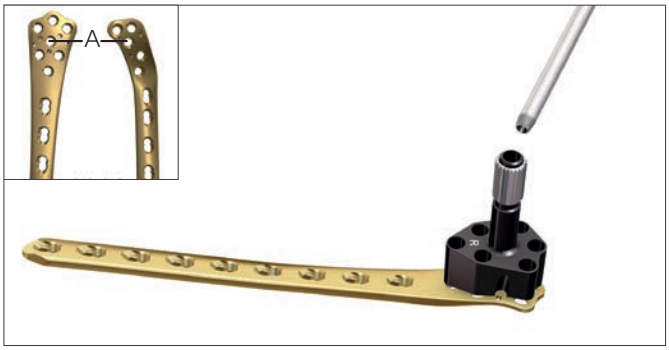
1.

Choose the matching guiding block and place it onto the plate head. Make sure that the three-point locking mechanism is positioned on the contoured reference points of the plate.



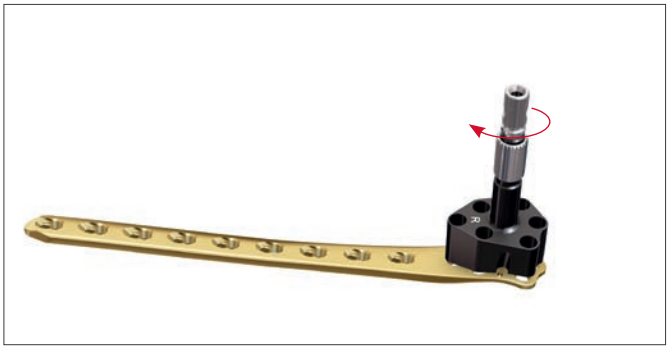
2.

Insert a first LCP drill sleeve through the guiding block into the central hole (A) of the plate and tighten it.



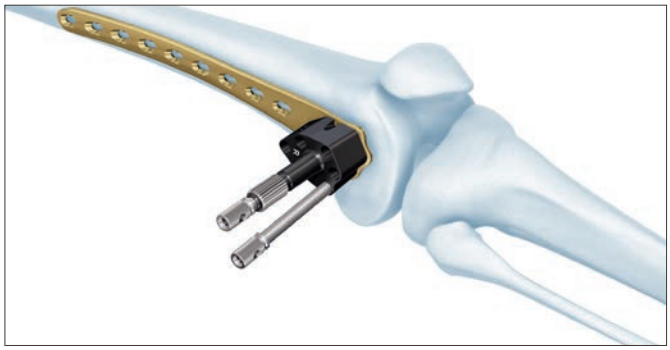
3.

To lock the LCP drill sleeve tighten the locking nut of the guiding block by turning it clockwise.



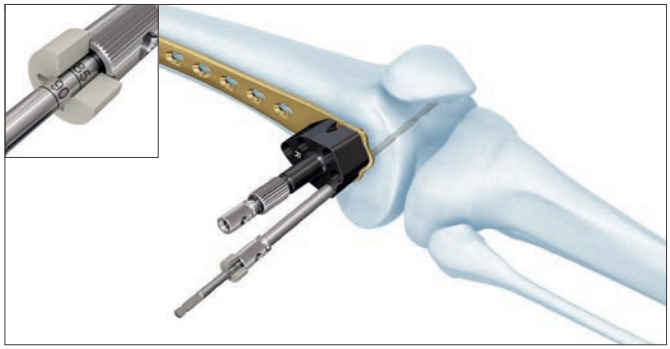
4.

For preparing additional holes in the plate head insert LCP drill sleeves in the surrounding holes.



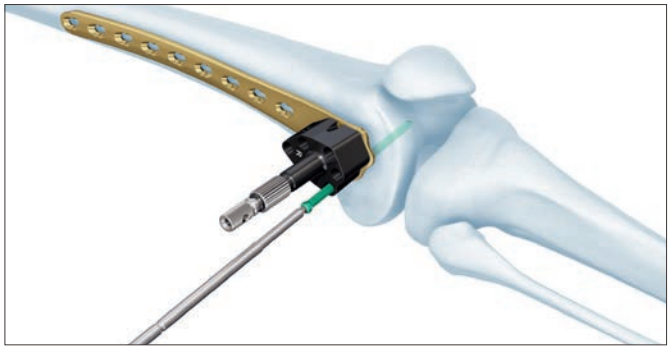
Predrilling and screw measurement

Pre-drill with the LCP drill bit ∅ 4.3 mm. Measure screw length by reading the drilled depth directly from the laser mark on the drill bit. To make reading easier shove the stop ring down to the drill sleeve.



Screw insertion

Remove the LCP drill sleeve. Insert the locking screw through the guiding block.



Implant Removal

Instruments	
324.011	LISS Insertion Guide for Distal Femur, left, radiolucent
or	
324.012	LISS Insertion Guide for Distal Femur, right, radiolucent
324.043	Fixation Bolt for LISS Insertion Guide, length 151 mm
324.022	Drill Sleeve for LISS Insertion Guide, length 130 mm
324.044	Stabilization Bolt for LISS Insertion Guide, length 156 mm
324.027	Trocar, length 162 mm, for No. 324.022
324.050	Screwdriver Shaft 3.5, hexagonal, length 180 mm
or	
324.250	Screwdriver Shaft Stardrive, T25, length 180 mm
324.052	Torque-limiting Screwdriver 3.5, self-holding, for Locking Screws ∅ 5.0 mm
or	
314.163	Torque-limiting Screwdriver Stardrive, T25, self-holding, for Locking Screws ∅ 5.0 mm

Remove the implant only after complete consolidation of the fracture. Remove it in reverse order to the implantation.

First, make the incision for the insertion guide in the path of the old scar, and mount the insertion guide (see step 1).

Make stab incisions and use the torque-limiting screwdriver to unlock all screws manually. In a second step, completely remove all screws with a power tool.

Option: Clean screw heads with cleaning instruments

Instruments	
324.053	Cleaning Instrument for LISS Screw Head, length 202 mm
or	
324.253	Cleaning Instrument for Screw Head Stardrive, T25, length 202 mm

The cleaning instrument helps to clean the recess of the screw heads. After placing the drill sleeve, insert the cleaning instrument carefully. Insert the stiletto with threaded tip and turn clockwise. Remove the cleaning instrument. Unlock all screws manually with the torque-limiting screwdriver. In a second step, completely remove all screws with a power tool.

If the screws cannot be removed with the screwdriver, please consult the separate DePuy Synthes publication “Screw Extraction Set. Instruments for removing DePuy Synthes screws.”, which explains in detail how screws with a damaged recess as well as how broken and jammed screws can be removed.

After removal of all screws, remove the plate. Should the plate remain stuck when all screws have been removed, take the insertion guide away and use the fixation bolt to loosen the plate.

Additional Information

If the reduction of the fracture causes difficulties, insert a Schanz screw antero-medially in the distal fragment, and use the screw as a joystick. The insertion of a Schanz screw or pulling device into the proximal fragment can also be useful. Should it still be impossible to perform a correct reduction, improve the access by enlarging the soft-tissue opening.

▲ Precaution:

Bending and twisting of the plate is not recommended as it may result in a misalignment between the holes of the insertion guide and the corresponding plate holes.

Should the plate lie too ventral or too dorsal, the screws cannot be centred in the medullary canal. This position may compromise screw purchase (see illustration).

Both screwdriver shaft and torque-limiting screwdriver are equipped with a self-holding mechanism. Apply slight pressure on pick-up to ensure that the screwdriver shaft penetrates the recess of the screw head.

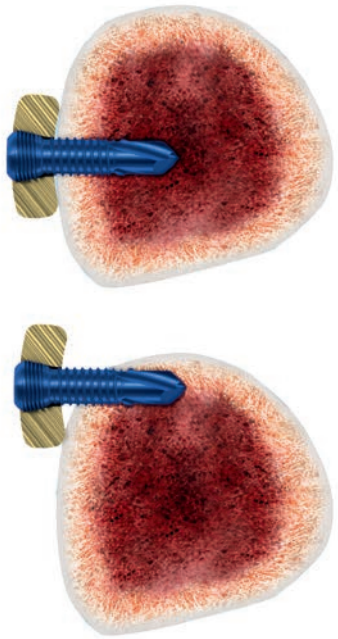
Should the screwdriver be difficult to remove after insertion, disconnect it from the power tool and remove the drill sleeve. After reconnecting the screwdriver to the power tool, withdraw the screwdriver from the screw.

Standard 4.5 mm cortex screws can be used through the insertion guide if required. Note that cortex screws cannot be inserted through the drill sleeve for LISS insertion guide.

Hole A serves to lock the insertion guide to the implant. This hole cannot be used for the insertion of a screw as long as the fixation bolt is attached. If a screw has to be inserted in hole A, remove the fixation bolt – with the stabilization bolt still in place – and attach it in an adjacent hole. Place the drill sleeve in hole A (pre-drill if necessary) and insert the appropriate screw. If all holes are occupied by a screw, the screw in hole A can be inserted by free-hand technique. Use the direction given by the fixation bolt prior to removal of the insertion guide to determine the correct direction for insertion.

To ensure stability of the construct, the most proximal screw should be inserted last, just before removing the insertion guide. Remove the stabilization bolt and insert the screw through the drill sleeve.

If hole A is unoccupied, it must be closed with a Screw Hole Insert (422.390) to facilitate the application of the insertion guide for removing the implant.



Correct placement

Compromised screw purchase

Instruments for Minimally Invasive Osteosynthesis

Hohmann Retractor Holder

The Hohmann retractor holder enables the percutaneous insertion of plates. It can be used in combination with implant systems such as LCP and LISS.

For additional information see the separate DePuy Synthes publication on the Hohmann retractor holder.

Soft Tissue Retractor

The offset blade facilitates preparation of the epiperiosteal cavity for percutaneous plate insertion.

- Adjustable blade for insertion angle and blade length
- Available in two sizes: for small and large fragment plates

For additional information see the separate DePuy Synthes publication on the Soft tissue retractor.

Implants

LCP Distal Femur (LCP DF)

Stainless steel	Titanium alloy	Holes	Length (mm)	
222.250	422.250	5	156	right
222.251	422.251	5	156	left
222.252	422.252	7	196	right
222.253	422.253	7	196	left
222.254	422.254	9	236	right
222.255	422.255	9	236	left
222.256	422.256	11	276	right
222.257	422.257	11	276	left
222.258	422.258	13	316	right
222.259	422.259	13	316	left
02.124.030S	04.124.030S	15	356	right
02.124.031S	04.124.031S	15	356	left
02.124.034S	04.124.034S	17	396	right
02.124.035S	04.124.035S	17	396	left
02.124.038S	04.124.038S	19	436	right
02.124.039S	04.124.039S	19	436	left

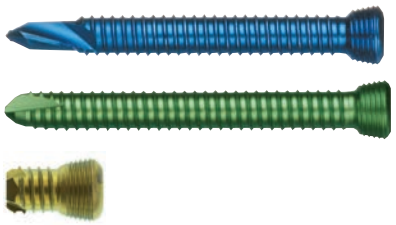
■ Note:

Long LCP DF plates from 15–19 holes are available in sterile only.

Add suffix "S" to article number to order sterile product.

Locking Screws ∅ 5.0 mm

Hex	Stardrive	
X13.414–	X12.251–	self-drilling,
X13.490	X12.267	length 14–90 mm
X13.314–	X12.201 –	self-tapping,
X13.390	X12.227	length 14–90 mm
0X.221.458	0X.221.508	for periprosthetic
0X.221.460	0X.221.510	fractures,
0X.221.462	0X.221.512	self-tapping,
X22.402	0X.221.514	length 8–18 mm
X22.404	0X.221.518	



422.390	Screw Hole Insert ∅ 5.0 mm, Titanium Alloy (TAN)

X = 2: stainless steel
X = 4: TAN

All screws are available nonsterile and sterile packed.
For sterile implants add suffix “S” to the article number.

Instruments

324.011	LISS Insertion Guide for Distal Femur, left, radiolucent	
324.012	LISS Insertion Guide for Distal Femur, right, radiolucent	
324.043	Fixation Bolt for LISS Insertion Guide, length 151 mm	
321.170	Pin Wrench ∅ 4.5 mm, length 120 mm	
324.022	Drill Sleeve for LISS Insertion Guide, length 130 mm	
324.044	Stabilization Bolt for LISS Insertion Guide, length 156 mm	
324.027	Trocar, length 162 mm, for No. 324.022	
324.033	Pulling Device, length 240 mm, for LISS	
310.423	Drill Bit ∅ 4.3 mm, length 280 mm, for No. 324.007	

324.052	Torque-limiting Screwdriver 3.5, self-holding, for Locking Screws ∅ 5.0 mm	
314.163	Torque-limiting Screwdriver Stardrive, T25, self-holding, for Locking Screws ∅ 5.0 mm	
324.050	Screwdriver Shaft 3.5, hexagonal, length 180 mm	
324.250	Screwdriver Shaft Stardrive, T25, length 180 mm	
324.055	Centering Sleeve for Kirschner Wire, length 161 mm, for No. 324.022	
324.019	Stopper for LISS Insertion Guide	
324.056	X-ray Calibrator, length 50 mm	
324.053	Cleaning Instrument for LISS Screw Head, length 202 mm	
324.253	Cleaning Instrument for Screw Head Stardrive, T25, length 202 mm	
312.946	Guiding Block for LCP-DF 4.5/5.0, right	
312.947	Guiding Block for LCP-DF 4.5/5.0, left	
312.940	Guiding Block for LCP-PLT 4.5/5.0, right	
312.941	Guiding Block for LCP-PLT 4.5/5.0, left	

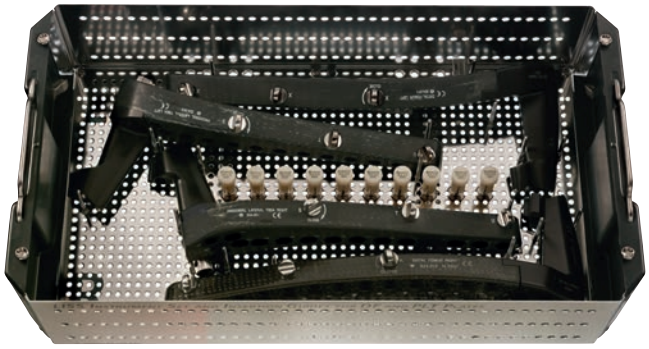
Optional instruments

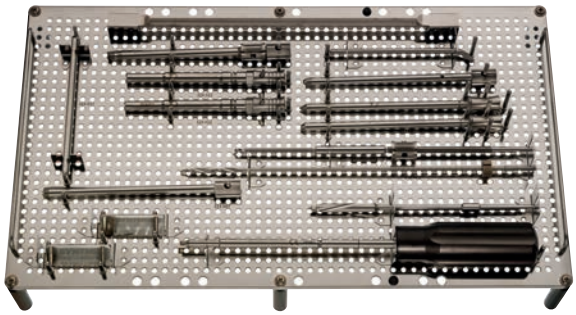
324.048	Aiming Device for Kirschner Wires, for LISS Insertion Guide	
324.034	Centering Sleeve for Kirschner Wire, length 184 mm, for No. 324.048	
292.699	Kirschner Wire ∅ 2.0 mm with threaded tip, length 280 mm, Stainless Steel	
324.037	LISS Measuring Device for Kirschner Wires ∅ 2.0 mm, length 121 mm, for No. 292.699	
324.007	Drill Sleeve 7.2/4.3, length 130 mm, for LISS	

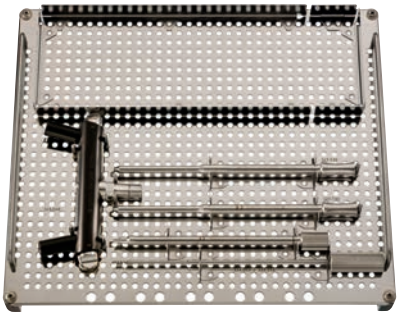
Sets

LISS Instruments and Insertion Handle, for DF and PLT Plates, in Vario Case

01.120.040	Hex
01.120.041	Stardrive
68.120.040	Vario Case

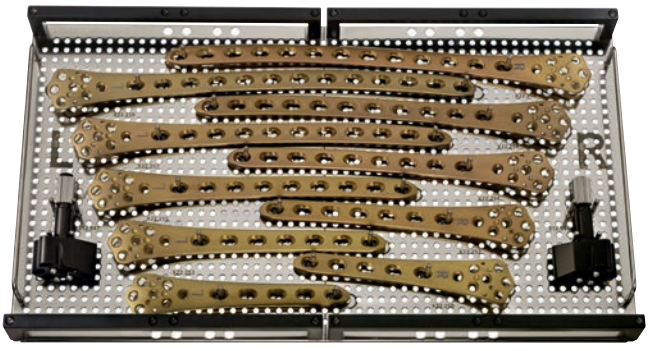






LCP DF 4.5/5.0 in Vario Case

01.120.332	Stainless Steel
01.120.334	Titanium Alloy/TAN
68.120.330	Insert



■ Note on long plates:

The LCP DF plates with 15 to 19 holes are available in sterile only and not part of a set. Therefore these articles have to be ordered as single items.

Modular Large Fragment Screw Rack

68.122.050	Modular Insert, for Modular Screw Rack, for Screws ∅ 5.0 mm, size ⅓, without Contents, Vario Case System
68.122.051	Modular Insert, for Modular Screw Rack, for Screws ∅ 4.5 mm, size ⅓, without Contents, Vario Case System
68.122.052	Modular Insert, for Modular Screw Rack, for Screws ∅ 6.5 mm, size ⅓, without Contents, Vario Case System
68.122.054	Modular Screw Rack, with Drawer, Measuring Block and Lid, length 200 mm, height 115 mm, size ½, without Contents, Vario Case System
68.122.056	Auxiliary Modular Insert, for Modular Screw Rack, size ⅓, without Contents, Vario Case System
68.000.128	Auxiliary Module, size ⅓, height 14 mm, for Screw Rack, size ½
68.000.129	Auxiliary Module, size ⅓, height 28 mm, for Screw Rack, size ½

Discontinued Implant

LISS Distal Femur (LISS DF)

TAN	Holes	Length (mm)	
422.340	5	156	Right
422.341	5	156	Left
422.344	9	236	Right
422.345	9	236	Left
422.348	13	316	Right
422.349	13	316	Left

Add suffix "S" to article number to order sterile product.

MRI Information

Torque, Displacement and Image Artifacts according to ASTM F 2213-06, ASTM F 2052-14 and ASTM F2119-07

Non-clinical testing of worst case scenario in a 3 T MRI system did not reveal any relevant torque or displacement of the construct for an experimentally measured local spatial gradient of the magnetic field of 3.69 T/m. The largest image artifact extended approximately 169 mm from the construct when scanned using the Gradient Echo (GE). Testing was conducted on a 3 T MRI system.

Radio-Frequency-(RF-)induced heating according to ASTM F2182-11a

Non-clinical electromagnetic and thermal testing of worst case scenario lead to peak temperature rise of 9.5 °C with an average temperature rise of 6.6 °C (1.5 T) and a peak temperature rise of 5.9 °C (3 T) under MRI Conditions using RF Coils (whole body averaged specific absorption rate [SAR] of 2 W/kg for 6 minutes [1.5 T] and for 15 minutes [3 T]).

▲ Precautions:

The above mentioned test relies on non-clinical testing. The actual temperature rise in the patient will depend on a variety of factors beyond the SAR and time of RF application. Thus, it is recommended to pay particular attention to the following points:

- It is recommended to thoroughly monitor patients undergoing MR scanning for perceived temperature and/or pain sensations.
- Patients with impaired thermoregulation or temperature sensation should be excluded from MR scanning procedures.
- Generally, it is recommended to use a MR system with low field strength in the presence of conductive implants. The employed specific absorption rate (SAR) should be reduced as far as possible.
- Using the ventilation system may further contribute to reduce temperature increase in the body.

Not all products are currently available in all markets.
This publication is not intended for distribution in the USA.
Intended use, Indications and Contraindications can be found in the corresponding system Instructions for Use.
All Surgical Techniques are available as PDF files at www.depuysynthes.com/ifu

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