Including LCP DHS and DHS Blade

DHS/DCS System

Surgical Technique

DePuy Synthes

PART OF THE Johnson & Johnson FAMILY OF COMPANIES

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 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

System Overview

The Synthes Dynamic Hip System (DHS) offers a variety of treatment options depending on the fracture site and the patient.

Fixation elements

DHS Screw
- Stainless steel / TiAl6Nb7 (TAN)
- Length 50 –145 mm
- Outer diameter 13 mm
- Coupling: two notches or octagonal

DHS Blade
The DHS Blade reduces the risk of cut-out compared to the standard DHS Screw.
Stainless steel/TAN
Length 65 – 145 mm
Outer diameter 13 mm

DHS Emergency Screw
- Stainless steel
- Length 50 –145 mm
- Outer diameter 14 mm

Plates

DHS plate with DCP holes
Used for more than 25 years.
- Stainless steel / TAN
- Barrel angle 130°–150°
- 2 to 20 holes
- Barrel length: standard and short
- Thickness 5.8 mm
- Fixation with cortex screws ∅ 4.5 mm

LCP DHS plate
Facilitated fixation on the shaft allows for minimally invasive approach.
- LCP combi-holes
- Tapered end
- Undercuts
- Barrel angle 130°–150°
- 1 to 20 holes
- Barrel length: standard and short
- Thickness 5.8 mm
- Fixation with locking screws ∅ 5.0 mm, cortex screws ∅ 4.5 mm or a combination of both

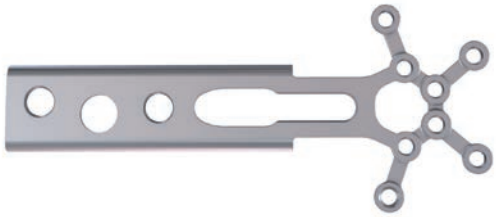
LCP DHS plate with collar
- LCP combi-holes
- Tapered end
- Undercuts
- Barrel angle 135° and 140°
- 3–5 holes
- Barrel length: standard
- Sterile

DHS Trochanter Stabilizing Plate

All DHS Trochanter Stabilizing Plates can be used with the conventional DHS or the LCP DHS plate.

Conventional DHS Trochanter Stabilizing Plate (TSP)
- Lateral support
- Prevents unlimited dynamization
- Allows for the fixation of the upper trochanter with cerclage
- Stainless steel or titanium
- Two lengths: short (138 mm) and long (148 mm)

Locking Trochanter Stabilizing Plate (LTSP)
- Can be adapted to the anatomical condition
- Fixation of the upper trochanter with locking screws
- Lateral support
- Prevents unlimited dynamization
- Stainless steel or titanium
- Length 130 mm



Universal Locking Trochanteric Stabilizing Plate (ULTSP)
- Can be adapted to the anatomical condition
- Fixation of the upper trochanter with locking screws
- Lateral support
- Prevents unlimited dynamization
- Stainless steel
- Length 131 mm

DCS plate

- With DCP holes
- Stainless steel or TAN
- 6 to 22 holes
- Barrel length: short
- Thickness: 5.4 mm
- Width: 16 mm
- Fixation with cortex screws ∅ 4.5 mm

DHS/DCS Compression Screw

Used together with the DHS and DCS plates to compress the femoral fragments on the proximal and distal sides of the fracture.

- Stainless steel or TAN
- Inner hexagon for Hexagonal Screwdriver (314.120 and 314.270)
- Length 36 mm

DHS/DCS Locking Device

Used for locking the sliding mechanism of the DHS Screw or the DHS Blade.

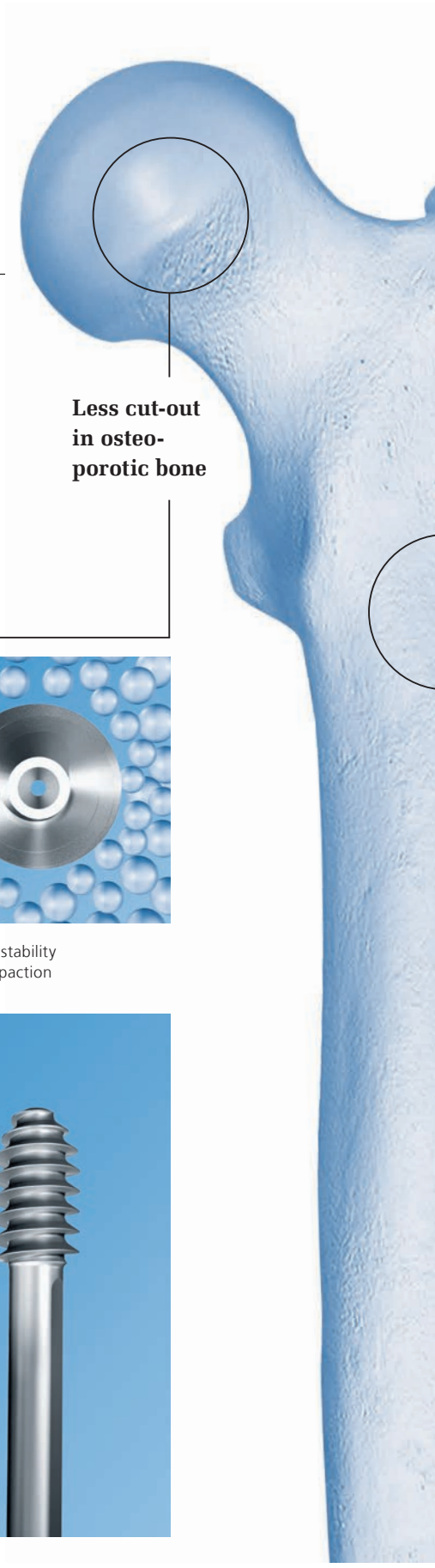
- Stainless steel or TAN
- Inner hexagon for Torque-indicating Screwdriver (338.560)
- Length 35 mm

DHS System. The appropriate solution for proximal femoral fractures.

Modular System

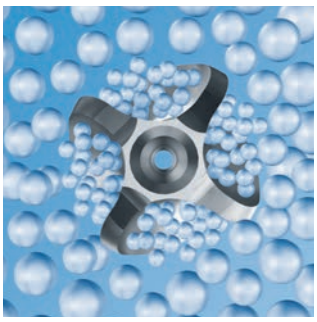
The Dynamic Hip System (DHS) from Synthes consists of the following options:

- DHS Screw or DHS Blade
- Standard plates or LCP plates
- Locking Trochanter Stabilizing Plate (LTSP)



DHS Blade

Increased rotational stability
The shape of the blade leads to improved rotational stability of the femoral head-neck fragment, which is vital for reducing the risk of cut-out, delayed union and varus angulation in unstable trochanteric fractures.[1]



rotational stability
bone compaction

no rotational stability
no bone compaction

Better anchorage in the femoral head
The specially designed tip of the blade allows for compaction of the bone when the blade is inserted. This compaction leads to improved anchorage of the implant in the femoral head, which is beneficial especially in osteoporotic bone.[2]

Increased support surface
The weight-bearing surface of the DHS Blade is greater compared to the surface of the conventional DHS Screw and can therefore take greater loads. A larger surface means less pressure from the implant onto the bone and less risk for cut-out.

DHS Blade

DHS Screw

Locking Trochanter Stabilizing Plate (LTSP)

Fixation of unstable fractures

- Acts as lateral support.
- Reduces excessive secondary fracture impaction and medialization of the femoral shaft.
- Reduces varus angulation and limb shortening.
- Fixates the greater trochanter, restoring the biomechanical function of the gluteus medius.

Minimally invasive approach

LCP DHS plate

Minimally invasive approach

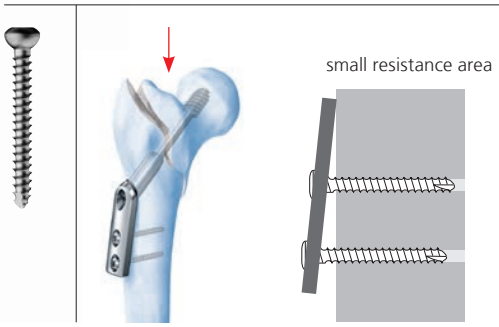
Better fixation on the shaft and lower risk of screw pull out allow for the use of a shorter plate, resulting in:

- Shorter skin incision
- Shorter surgical procedure
- Less blood loss

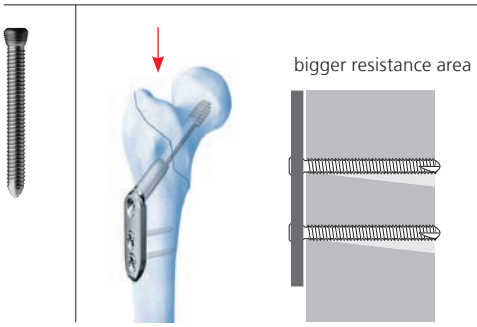
Facilitated fixation on the shaft

- The angular stability prevents the DHS plate from being pulled out.
- Locking screws cannot loosen.

Conventional screws



Locking screws



Indications and Contraindications

DHS

Including all combinations of DHS Screw, DHS Blade, DHS plate with DCP holes, LCP DHS plate and LCP DHS with collar.

Indications DHS

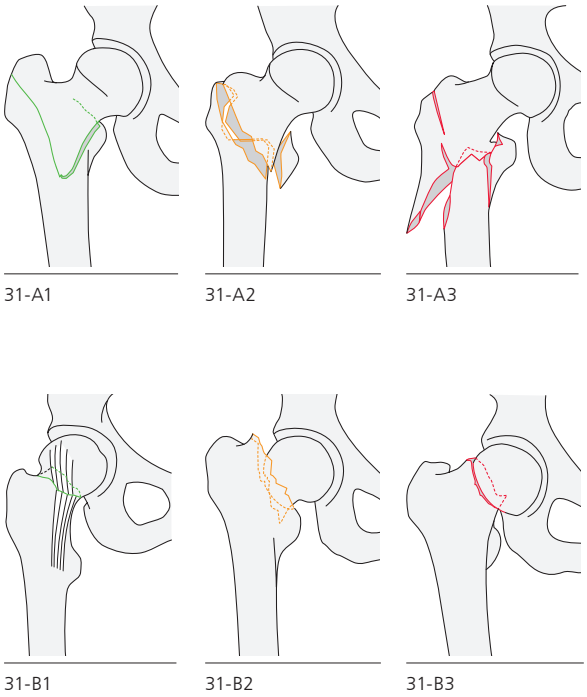
- Pertrochanteric fractures of type 31-A1 and 31-A2
- Intertrochanteric fractures of type 31-A3
- Basilar neck fractures 31-B
  (DHS Screw in conjunction with an antirotation screw)
- Subtrochanteric fractures

Contraindications DHS

- The DHS is not to be used in cases where there is a high incidence of:
  - Sepsis
  - Malignant primary or metastatic tumors
  - Material sensitivity
  - Compromised vascularity

Recommendations DHS

- DHS Blade: for osteoporotic patients
- DHS Screw ∅ 14 mm: for revisions of DHS Screws ∅ 13 mm
- LCP DHS: for the use of shorter plates, especially in the case of femoral neck fractures
- For certain subtrochanteric fractures, a 95° DCS plate is recommended.



Trochanter Stabilizing Plate

Indications LTSP/ULTSP/TSP

- Unstable pertrochanteric fractures of type 31-A2 and 31-A3, especially multifragmentary fractures with a separated or longitudinally split greater trochanter

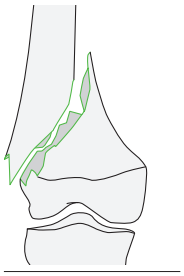
DCS

Indications DCS

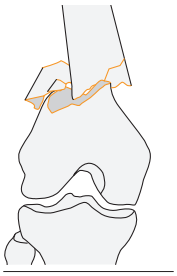
- Proximal femur: Very proximally located, purely subtrochanteric fractures of types 32-A and 32-B
- Distal femur: Fractures of type 33-A (extra-articular, supracondylar) and fractures of type 33-C (fully articular fractures)

Contraindications DCS

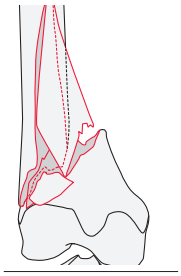
- Pertrochanteric fractures or trochanteric fractures with subtrochanteric expansion (31-A3)



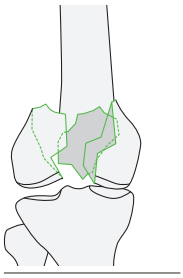
33-A1



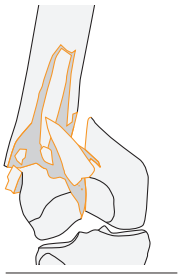
33-A2



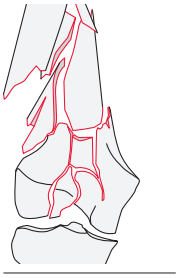
33-A3



33-C1



33-C2



33-C3

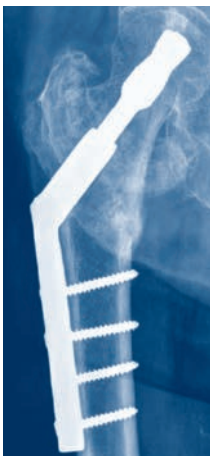
Clinical Cases

Pertrochanteric fractures
Special surgical considerations:

- **Implant of choice**
  Recent metanalysis has shown that the DHS tends to be statistically superior to intramedullary devices for trochanteric fractures.[3,4] Further studies are required to determine whether different types of intramedullary nails produce similar results, or whether intramedullary nails are advantageous for certain fracture types (e.g. subtrochanteric fractures).[4]
- **Prevention of cut-out: correct placement of the screw**
  The correct placement of the DHS Screw or Blade has shown to be one of the main success factors to prevent implant cut-out. The device should ideally be positioned in a center-center position in the femoral head and within 5 mm of subchondral bone.[5,6] See surgical technique page 15.


80 year old female, fracture 31-A2.2, preoperative


postoperative


3 month follow-up

Femoral neck fractures
Special surgical considerations:

- **Implant of choice**
  For unstable basicervical fractures, the DHS seems biomechanically superior to three cannulated screws.[7] Nevertheless, operations of cervical hip fractures with a dynamic hip screw or three parallel screws seem to give similar clinical results.[8]
- **Emergency treatment**
  A femoral neck fracture should be treated surgically within 6 hours of admission whenever possible. Elderly patients who had surgery within 12 hours[9] or even within 24 hours[10] have a significantly lower mortality rate.
- **Antirotation screw for DHS Screw**
  If the DHS Screw is used, an additional antirotation screw should be placed parallel to the DHS Screw. In this case, the DHS Screw needs to be placed more caudally than normal. With the DHS Blade, rotational stability is achieved without an antirotation screw.

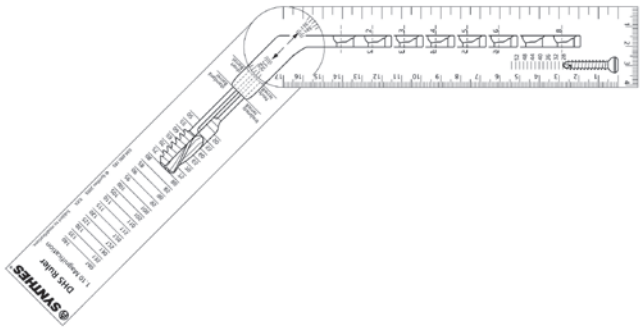

81 year old female, fracture 31-B2.1, preoperative


postoperative


3 month follow-up

1. Preoperative planning

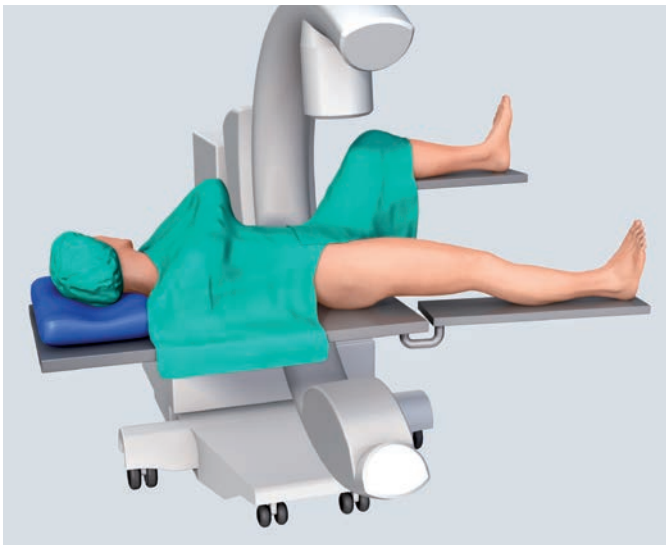
The size and angle of the plate as well as the length of the DHS Blade or Screw can be determined preoperatively by using the DHS Goniometer (Art. No. 034.000.185).



Note: **If the DHS Blade is from 65 to 75 mm, a DHS plate with short barrel should be used to allow for sufficient dynamization.**

2. Position patient

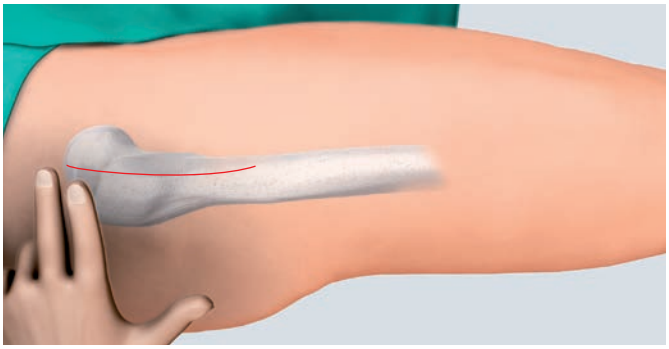
Place the patient in a supine position on the operating table.



3. Reduce fracture

If possible, reduce the fracture under the image intensifier by means of traction, abduction and internal rotation.

4. Access



Make a straight lateral skin incision of approximately 15 cm in length, starting two finger-widths proximal to the tip of the greater trochanter.

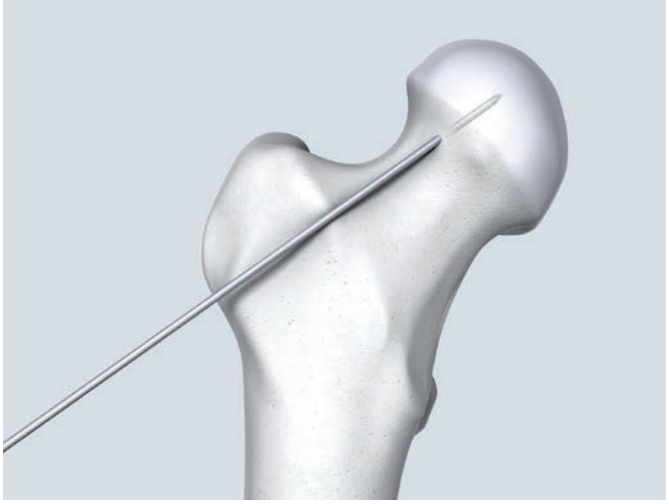
Split the iliotibial tract lengthwise. Detach the m. vastus lateralis dorsally to the intramuscular membrane, retract ventrally and, if necessary, make a slight notch in the muscle in the region of the innominate tubercle. Expose the proximal femoral shaft without retracting the periosteum.

5. Insert anteversion wire

Instrument	
292.200	Kirschner Wire ∅ 2.0 mm with trocar tip, length 150 mm

Determine the femoral neck anteversion by inserting a new Kirschner wire anterior to the femoral neck.

In the case of unstable fractures, insert several Kirschner wires into the femoral head to temporarily stabilize the reduced fragments.

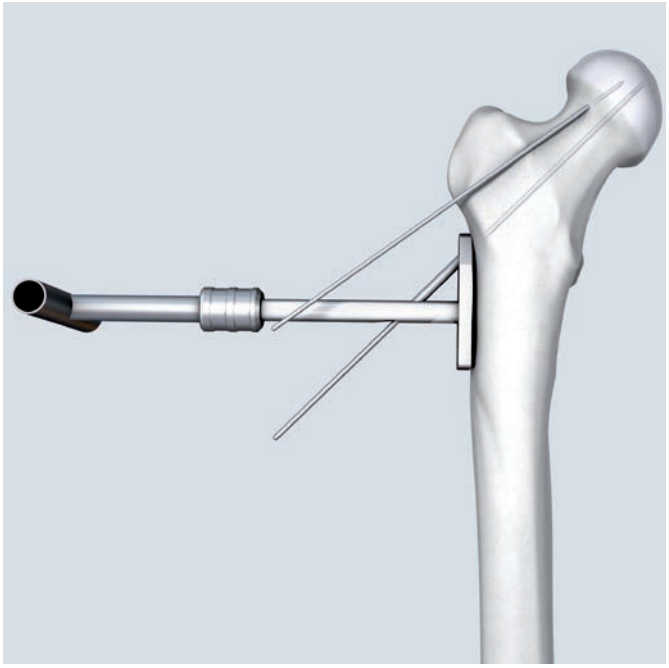


6. Insert guide wire

Instruments	
338.000	DHS/DCS Guide Wire ∅ 2.5 mm
338.005	DHS Angled Guide 130°
338.010	DHS Angled Guide 135°
338.020	DHS Angled Guide 140°
338.030	DHS Angled Guide 145°
338.040	DHS Angled Guide 150°

Insert a new DHS/DCS guide wire at the desired angle with the correct angled guide. The guide wire should be placed in the middle of the femoral head and should extend into the subchondral bone.

- Check the position of the guide wire in both AP and mediolateral positions.



7. Determine length of DHS Screw / DHS Blade

Instrument	
338.050	DHS/DCS Direct Measuring Device

Read the length of the DHS Screw or Blade directly off the guide wire with the measuring device.

If the guide wire is inserted into the subchondral bone remove 10 mm from the measurement.

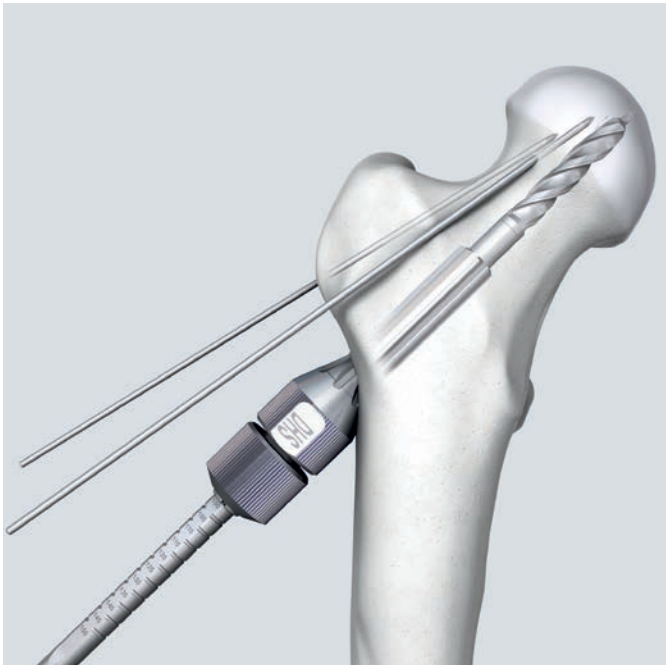
Example: **If you read 110 mm on the direct measuring device, the measured length of the implant is 100 mm.**

8. Ream for insertion of DHS Screw/ DHS Blade

A Instruments for DHS Screw	
338.130	DHS Triple Reamer, complete
Consisting of:	
338.100	Drill Bit ∅ 8.0 mm
338.110	DHS Reamer
338.120	Nut, knurled

Alternative instrument for short barrel plates (for DHS screw/blade ≤ 75 mm)

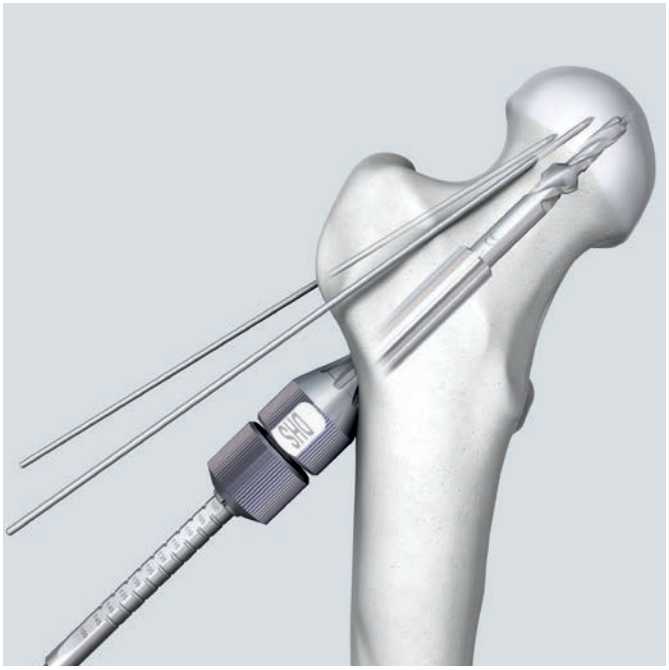
338.440	DHS Reamer



B Instruments for DHS Blade	
03.224.009	Triple Reamer for DHS Blade, complete
Consisting of:	
03.224.003	Drill Bit ∅ 6.0/10.5 mm
338.110	DHS Reamer
338.120	Nut, knurled

Alternative instrument for short barrel plates (for DHS screw/blade ≤ 75 mm)

338.440	DHS Reamer



Assemble the triple reamer. Slide the reamer over the drill bit until it clicks into place.

Set the triple reamer at the length of the implant selected (100 mm in the example).

Secure the reamer by tightening the knurled nut.

Ream down to the stop. When reaming in dense bone, use of continuous irrigation is recommended to prevent thermal necrosis.

- Control guide wire migration during reaming. Remove triple reamer.
- Check reaming depth under fluoroscopy during reaming.

Precaution: **It is recommended that the femoral head is temporarily fixated to prevent any inadvertent rotation.**

Reinsertion of the guide wire
If the guide wire is removed accidentally it should be reinserted. To reinsert the wire push the centering sleeve into the reamed hole and slide an inverted DHS Screw or DHS Blade into the sleeve. The guide wire can now be replaced in its original position.

9a. Tap for DHS Screw

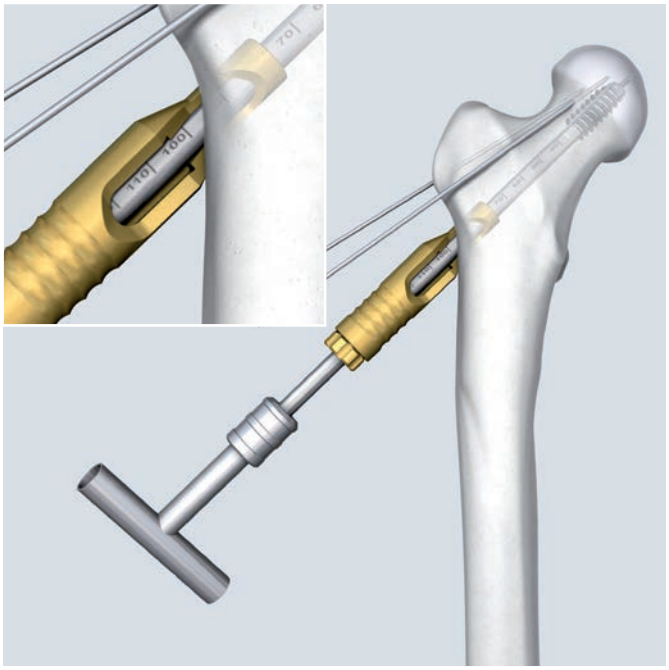
Instruments	
338.320	DHS/DCS Centering Sleeve
338.170	DHS/DCS Tap

Mount the centering sleeve from the side onto the tap and lock it into place by turning the inner sleeve clockwise against the outer sleeve.

Tap to the measured length. Check insertion depth.

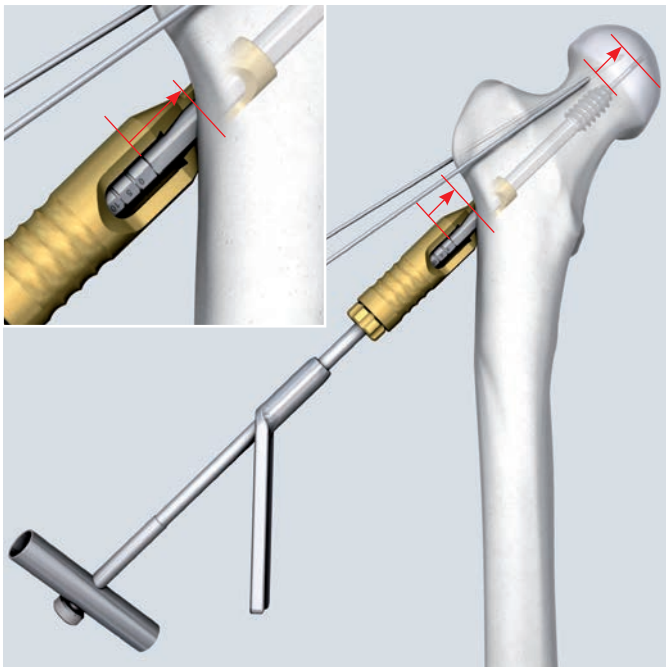
Warning: **Tap only dense, hard femoral bone. Do not tap osteoporotic bone.**

Note: **For the standard insertion technique, consult the quick step technique guide 035.000.080 (9a–11).**



10a. Screw in DHS Screw

Instruments	
338.310	Connecting Screw
338.300	DHS/DCS Wrench for One-Step Insertion Technique (for conventional DHS Screws)
or	
338.302	DHS/DCS Wrench for One-Step Insertion with octagonal coupling
338.320	DHS/DCS Centering Sleeve



Insert the connecting screw into the wrench, slide an appropriate DHS plate onto it and connect the DHS Screw to the wrench. For DHS screws shorter than or equal to 75 mm, take a DHS plate with short barrel. Mount the centering sleeve onto the wrench.

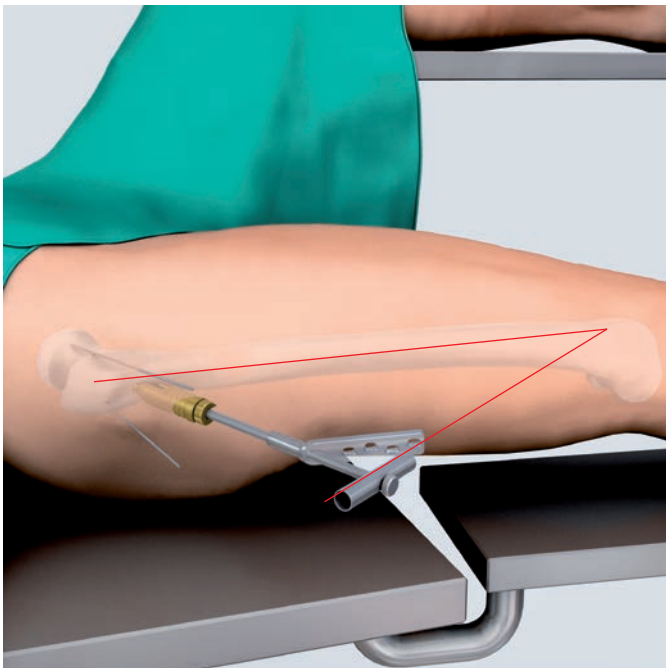
Warning: **To avoid damaging the instruments and the implant, tighten the connecting screw securely.**

Slide the assembled instrument over the guide wire and push the centering sleeve into the pre-drilled hole.

Insert the screw to the desired depth.

Turn the handle of the wrench until it lies in the same plane as the femoral shaft. Only in this position can the plate be slid over the laterally flattened shank of the DHS Screw.

Check insertion depth.



Insertion – DHS Blade

9b. Hammer in the DHS Blade

Instruments	
03.224.001	Insertion Instrument for DHS Blade
03.224.007	Connecting Screw for Insertion of DHS Blade
338.320	DHS/DCS Centering Sleeve

Insert the connecting screw into the insertion instrument and thread it into the DHS blade. Fully tighten the assembly.
Slide the appropriate DHS plate onto the insertion instrument and connect the DHS Blade to the insertion instrument. For DHS blades shorter than or equal to 75 mm, take a DHS plate with short barrel.

Warning: **Be sure that the DHS Blade is unlocked before you insert it.**

Mount the centering sleeve onto the insertion instrument and insert the DHS Blade with slight hammering.

Check insertion depth.

Warning: **The insertion instrument should not be used for the extraction of the DHS Blade.**

10b. Orient the DHS plate on the femoral shaft

Once the DHS Blade has been inserted to the correct position, the centering sleeve can be removed. The plate can then be slid over the shaft of the DHS Blade.

Due to the free rotation of the blade part relative to the shaft part, the DHS plate can be easily aligned to the femoral shaft.

11 Impact DHS plate onto the bone

Instruments

338.280	DHS/DCS Impactor, for One-Step Insertion Technique
or	
338.140	DHS/DCS Impactor

The plate can be impacted onto the bone with one of the two impactors.

12. Fix the DHS plate onto the shaft

Remove all the insertion instruments and the guide wire. Discard the guide wire. Then fix the plate to the femoral shaft.

A Cortex screws for the conventional DHS plate

Instruments	
323.460	Universal Drill Guide 4.5/3.2
310.310	Drill Bit ∅ 3.2 mm
319.010	Depth Gauge
314.150	Screwdriver Shaft, hexagonal

Use the drill guide and the drill bit to drill holes in a neutral position through the plate holes. Insert self-tapping 4.5 mm cortex screws of appropriate length.

B Locking screws for the LCP DHS plate

Instruments	
323.042	LCP Drill Sleeve 5.0, for Drill Bits ∅ 4.3 mm
310.430	LCP Drill Bit ∅ 4.3 mm with Stop
511.771 or 511.774	Torque Limiter, 4.0 Nm
314.119	Screwdriver Shaft Stardrive 4.5/5.0, SD25, self-holding
or	
314.152	Screwdriver Shaft 3.5, hexagonal, self-holding
397.705	Handle for Torque Limiter

Carefully screw the LCP drill sleeve into the desired LCP hole until it is gripped completely by the thread.

Drill the screw hole using the drill bit.

Read the screw length directly from the laser mark on the drill bit.

Insert the 5.0 mm self-tapping locking screws with a 4 Nm torque limiter.

In case a trochanter stabilizing plate is used
- Use a plate with 4 or more holes.
- Leave the first and the third stem hole of the plate empty.

13. Only for DHS Blade: lock the implant

Instruments	
03.224.004	Screwdriver Shaft Stardrive, SD15
511.770	Torque Limiter, 1.5 Nm
397.705	Handle for Torque Limiter

The DHS Blade must be locked to be made rotationally stable.

Assemble the screwdriver shaft, torque limiter and the handle for torque limiter.

Insert the assembled instrument through the cannulation of the DHS Blade and tighten to a torque of 1.5 Nm. Turn the screwdriver clockwise to lock the blade. The DHS Blade is now rotationally stable.

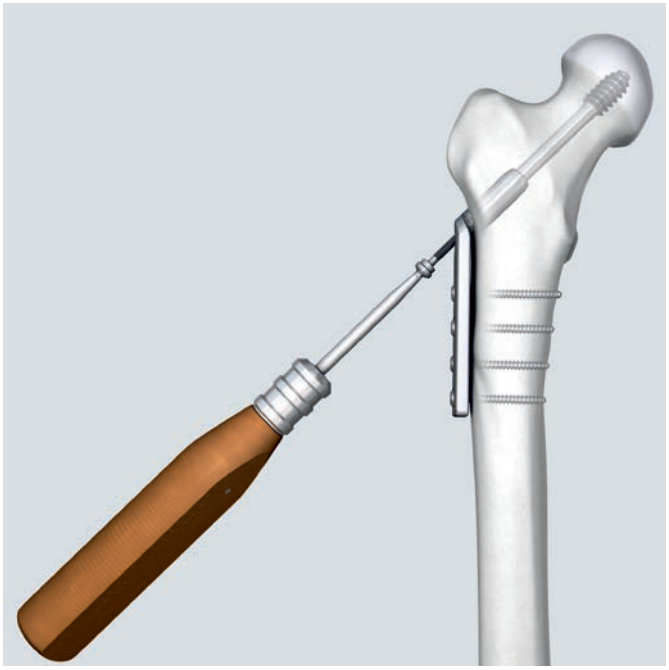
14. Option for DHS Screw: DHS/DCS compression screw

Instruments	
X80.990	DHS/DCS Compression Screw
314.150	Screwdriver Shaft, hexagonal

X=2: stainless steel
X=4: TAN

Fragment compression may also be achieved using DHS/DCS compression screws.

Warning: **It is not recommended that compression should be applied in osteoporotic bone.**



15. Option for young patients: block the dynamization

Instruments	
X80.960	DHS Locking Device
511.774	Torque Limiter, 4 Nm
314.150	Screwdriver Shaft, hexagonal
397.706	Handle for Torque Limiter

X=2: stainless steel
X=4: TAN

The DHS locking device can be used in young patients to prevent the dynamization of the DHS Screw. This avoids any shortening of the leg.

Warning: **The locking device also fits into the DHS Blade but must not be used in osteoporotic patients, due to the increased risk of cut out.**

The DHS Screw chosen must be 10 mm shorter than the length of the reamed hole.

Example
- Measurement: 110 mm
- Reaming setting: 100 mm
- Screw length: 90 mm

The DHS Screw must then be advanced 10 mm deeper. Insert the locking device with a 4 Nm torque limiting screwdriver. The device only works properly if it is completely inserted into the DHS plate barrel.

DHS Removal

A. Removal of DHS with DHS Screw

Instruments	
338.060	DHS/DCS Wrench
338.220	Connecting Screw, long

After removing the DHS plate, attach the wrench to the end of the DHS Screw using the connecting screw.

Warning: **Never use the insertion instruments for implant removal.**

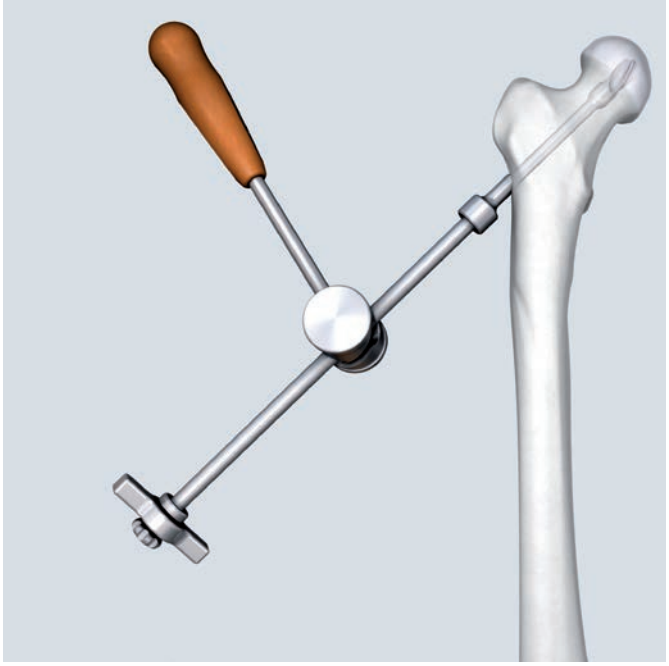
The wrench and connecting screw must fit the DHS Screw exactly. The connecting screw must be tightened securely.

B. Removal of DHS with DHS Blade

Instruments	
03.224.005	Extraction Instrument for DHS Blade
03.224.008	Connecting Screw for Extraction of DHS Blade
03.010.124	Combined Hammer 500 g

After removing the DHS plate, place the connecting screw through the cannulation of the extraction instrument and fix it to the DHS Blade. The blade is then removed with soft backward slide hammering on the extraction instrument.

Warning: **Never use the insertion instruments for implant removal.**



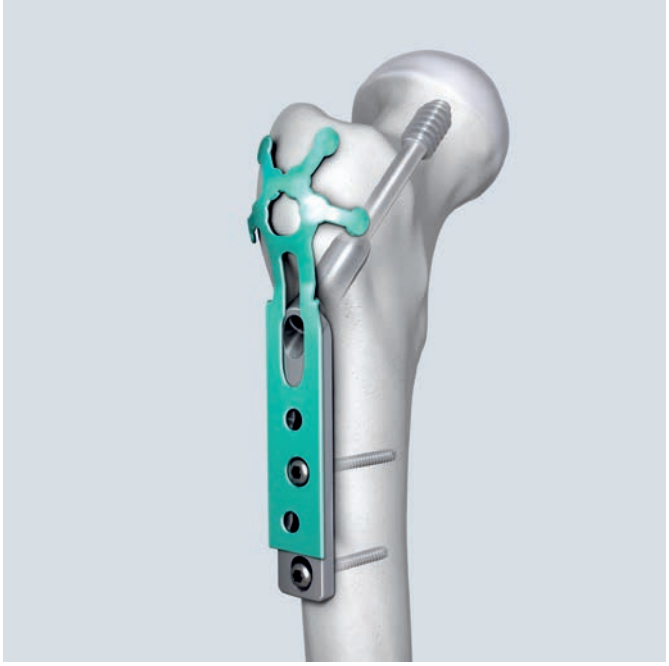
Bone growth around the shaft

Instrument	
03.224.006	Reamer for Extraction of DHS Blade

If removal of blade is difficult due to bone growth around the shaft, use the reamer for extraction to drill over the shaft of the DHS Blade.

LTSP and ULTSP Implantation

The Locking Trochanter Stabilizing Plate (LTSP) and the Universal Trochanteric Stabilizing Plate (ULTSP) can only be used in combination with the DHS / LCP DHS plate.



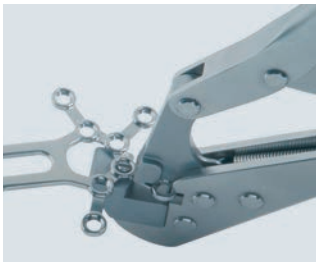
1. Adjust the LTSP/ULTSP

Instruments	
329.151	Cutting Pliers with Positioning Pin ∅ 3.0 mm
329.513	Bending Template
329.050	Bending Iron for Plates 2.4 to 3.5

Before fixing the LTSP/ULTSP over the DHS plate, use the appropriate instruments to cut and bend the plate to adapt it to the specific anatomical configurations. Temporarily position the bending template over the greater trochanter to verify both length and contour of the plate.

Cutting: To avoid sharp edges, use the cutting pliers with positioning pin. Place the plate into the jaws of the cutter as shown.

Bending: The area around the hole for the antirotation screw is bent best with bending irons. Use the bending template to preshape the LTSP/ULTSP.



Cutting

Bending

2. Fix the LTSP/ULTSP onto the DHS plate

Instruments	
323.460	Universal Drill Guide 4.5/3.2
310.310	Drill Bit ∅ 3.2 mm
319.010	Depth Gauge

When fixing the DHS plate with cortex screws, do not occupy the first and the third proximal hole so that the LTSP/ULTSP can be secured through these two holes.

Insert self-tapping 4.5 mm cortex screws through the two remaining open holes of the DHS plate to fix the LTSP/ULTSP.

Note regarding LCP DHS plate: **Use conventional 4.5 mm cortex screws to fix the LTSP/ULTSP onto the LCP DHS plate**

3. For DHS Screw only: place the antirotation screw

Instruments and implants	
338.750	DHS Parallel Drill Guide
X80.990	DHS/DCS Compression Screw

for 6.5 mm Cancellous Bone Screw	
310.310	Drill Bit ∅ 3.2 mm

for 6.5 mm Cannulated Screw	
338.731	Drill Sleeve 4.5/2.8
338.740	Drill Sleeve 6.0/4.5
310.630	Drill Bit ∅ 5.0 mm, cannulated
292.680	Guide Wire ∅ 2.8 mm with threaded tip with trocar

Use the parallel drill guide and the required drill sleeves to place the antirotation screw cranially and parallel to the DHS Screw.

Notes

- **Alternate between tightening the antirotation screw and – if used – the DHS/DCS compression screw to ensure an even compression of the fracture.**
- **If a DHS Blade is used, the use of an antirotation screw is not necessary.**

4. Final adjustment

Instruments	
329.916	Bending Pin for LCP Plates 3.5, with thread
323.027	LCP Drill Sleeve 3.5, for Drill Bits ∅ 2.8 mm

Fine bending may be achieved in situ with the bending pin or with the threaded LCP drill sleeve. Apply small incremental force to achieve the required bending.

5. Fix the locking screws

Instruments	
323.027	LCP Drill Sleeve 3.5, for Drill Bits ∅ 2.8 mm
310.284	LCP Drill Bit ∅ 2.8 mm with Stop
397.705	Handle for Torque Limiter
511.770	Torque Limiter, 1.5 Nm
314.116	Screwdriver Shaft Stardrive 3.5, SD15
314.030	Screwdriver Shaft, hexagonal

To fix the trochanter fragments with 3.5 mm locking screws, thread the LCP drill sleeve into the threaded plate hole until seated.

Use the drill bit through the threaded drill sleeve to drill through the cortex. As the screws are used monocortically, a screw length between 20 and 25 mm is sufficient. Use a 1.5 Nm torque limiter to insert the screws.

The locking screws should not be too long to avoid any impaired dynamization of the DHS Screw or Blade.

Notes:

- **Highly comminuted trochanteric fractures should be fixed as a functional entity rather than attempting a reduction of every single fragment.**
- **The objective of the cranial and oblique locking screws is:**
  - **to counteract the tension forces of the gluteus medius.**
  - **to gather and impact the various fragments of the trochanteric fracture into one another.**

LTSP and ULTSP Removal

Remove the implants in the following sequence:
- All fixation elements (screws, wire, cable, suture) attached to the LTSP/ULTSP
- Antirotation screw (if used)
- Trochanter Stabilizing Plate (LTSP or ULTSP)
- Compression screw or locking device
- LCP DHS plate or conventional DHS plate
- DHS Screw or DHS Blade

Note: **The technique for the conventional TSP is similar to the LTSP and ULTSP. Bending is achieved with bending irons. Instead of locking screws, conventional cortex screws are inserted in the plate head.**

DCS Implantation

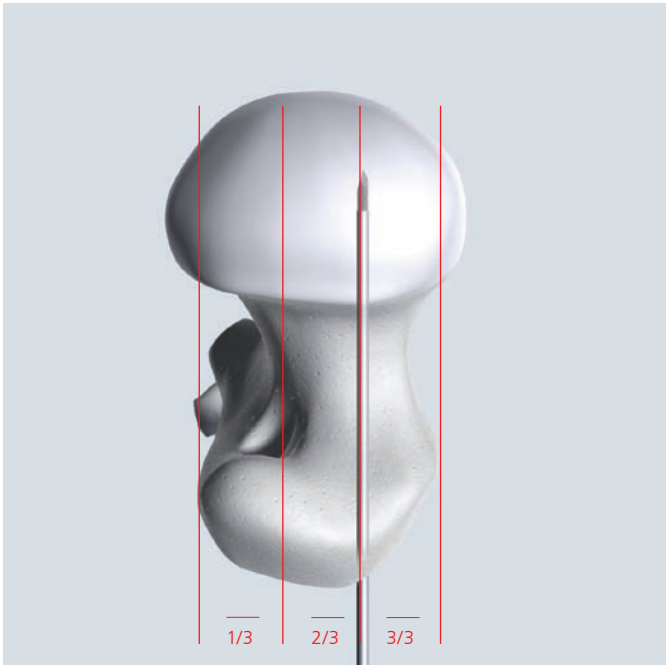
The DCS initially designed for fractures of the lower femur can also be used in certain fractures of the proximal femur. It is a non-gliding implant and the mechanical principle is that of an external tension band.

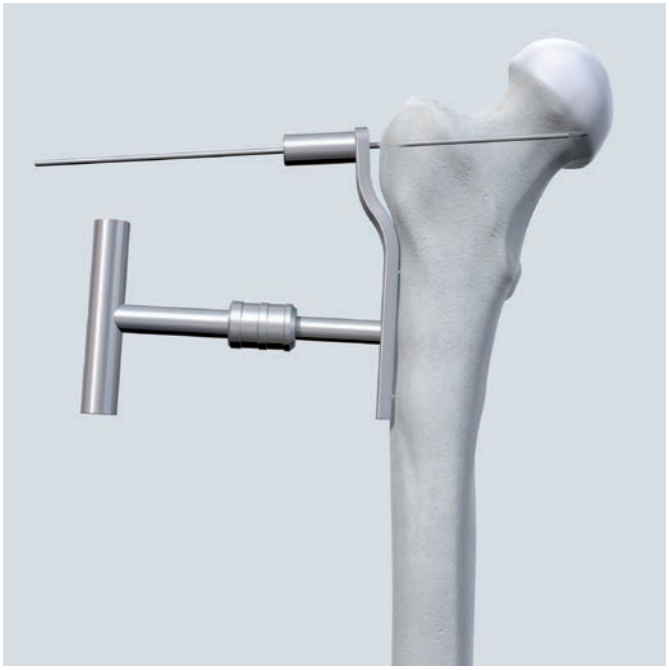
1. Insert guide wire

Instruments	
338.000	DHS/DCS Guide Wire ∅ 2.5 mm
338.420	DCS Angled Guide
338.080	DHS/DCS T-Handle with Quick Coupling

Determine entry point in the proximal femur: Select the entry point at the union one third ventral and two thirds caudal from the greater trochanter.

Insert the DHS/DCS guide wire at the correct angle with the DCS angled guide. Check the position of the guide wire in both AP and mediolateral positions.

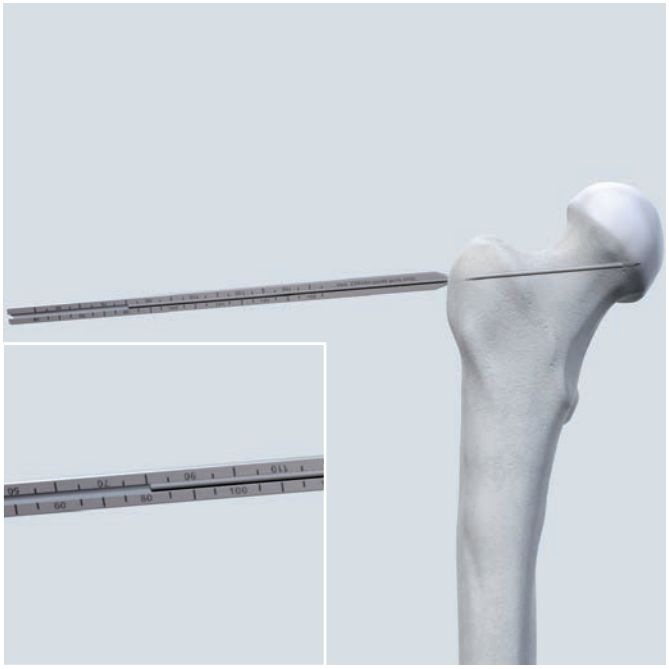




2. Measure the length of the guide wire

Instrument	
338.050	DHS/DCS Direct Measuring Device

Slide the direct measuring device over the guide wire and determine the length (in this example 80 mm).



3. Reaming

Instruments	
338.170	DHS/DCS Tap
338.320	DHS/DCS Centering Sleeve
338.460	DCS Triple Reamer, complete
Consisting of:	
338.100	Drill Bit ∅ 8.0 mm
338.120	Nut, knurled
338.470	DCS Reamer

Adjust the reaming depth on the triple reamer. The appropriate reaming depth is 10 mm shorter than the measured length of the guide wire (i.e. 80 mm – 10 mm = 70 mm).

Assemble the triple reamer: Slide the reamer over the drill bit until it clicks into place at the selected mark (in this example at 70 mm).

Secure the reamer by tightening the knurled nut.

Ream down to the stop.

Control guide wire migration during reaming.

Remove the DCS triple reamer.

Note: **Check that "DCS" is marked on the reamer to avoid any mix-up with the DHS triple reamer.**

Option: **If the bone is hard, tap the thread using the tap and the centering sleeve. Tap the thread until the selected depth in the small window of the centering sleeve reaches the lateral cortex (in this example 70 mm).**

Warning: **The tap may not be used in osteoporotic bone.**

4. Insert DHS/DCS screw and plate

Once the screw has been inserted and the plate impacted, fix it to the epiphysis with a screw resting against the internal cortex of the neck by means of a gliding hole.

Reduce the subtrochanteric fracture applying the plate on the femoral diaphysis.

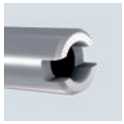
Contact at the fracture site can be improved by inserting one or two lag screws. Perform the final fixation of the plate on the femur using self-tapping 4.5 mm cortex screws.

DCS Removal

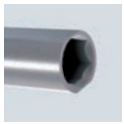
Remove the implants in the following sequence:
- DCS plate
- DHS/DCS Screw

Please also refer to DHS implant removal, page 26.

DHS/DCS Screw



Standard recess



Octagonal recess

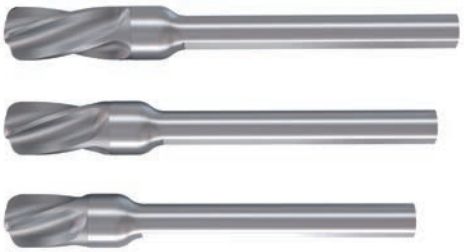
	Standard recess	Octagonal recess		Standard recess
	D = 13 mm	D = 13 mm		D = 14 mm
Length (mm)	Stainless steel	Stainless Steel	TAN	Stainless Steel
50	280.501	280.251	480.500	280.454
55	280.550	280.255	480.550	280.455
60	280.600	280.260	480.600	280.460
65	280.650	280.265	480.650	280.465
70	280.700	280.270	480.700	280.470
75	280.750	280.275	480.750	280.475
80	280.800	280.280	480.800	280.480
85	280.850	280.285	480.850	280.485
90	280.900	280.290	480.900	280.490
95	280.950	280.295	480.950	280.495
100	280.000	280.301	480.000	280.504
105	280.050	280.305	480.050	280.505
110	280.100	280.310	480.100	280.510
115	280.150	280.315	480.150	280.515
120	280.200	280.320	480.200	280.520
125	280.250	280.325	480.250	280.525
130	280.300	280.330	480.300	280.530
135	280.350	280.335	480.350	280.535
140	280.400	280.340	480.400	280.540
145	280.451	280.345	480.450	280.545

Note: **DHS screws from 50 –75 mm must be used with a DHS plate with short barrel.**

All DHS/DCS Screws are available nonsterile and sterile packed.
For sterile implants add suffix S to article number.

DHS Blade ∅ 12.5 mm

Art. No.	Length (mm)
0X.224.065S	65
0X.224.070S	70
0X.224.075S	75
0X.224.080S	80
0X.224.085S	85
0X.224.090S	90
0X.224.095S	95
0X.224.100S	100
0X.224.105S	105
0X.224.110S	110
0X.224.115S	115
0X.224.120S	120
0X.224.125S	125
0X.224.130S	130
0X.224.135S	135
0X.224.140S	140
0X.224.145S	145



X = 2: stainless steel
X = 4: TAN

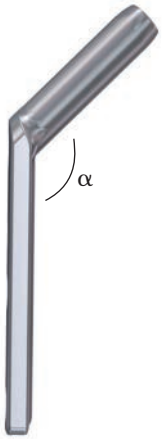
The DHS Blade is only available sterile packed.

Note: DHS Blades from 65 to 75 mm must be used with the DHS plate with short barrel.

DHS plates with DCP holes

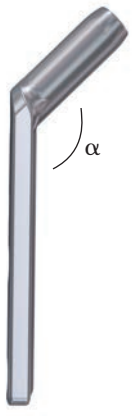
with standard barrel

Holes	α = 130°	α = 135°	α = 140°	α = 145°	α = 150°
2	281.021*	281.102*	X81.220	X81.320	281.402*
2	–	481.120	–	–	481.420
3	281.031*	281.131*	X81.230	X81.330	X81.430
4	X81.040	X81.140	X81.240	X81.340	X81.440
5	281.050*	X81.150	X81.250	X81.350	X81.450
6	X81.060	X81.160	X81.260	X81.360	X81.460
8	281.081*	X81.180	281.280*	281.308*	X81.480
10	281.010*	X81.100	281.200*	281.310*	X81.400
12	281.012*	281.110*	281.212*	281.312*	281.410*
14	281.014*	281.130*	281.214*	281.314*	281.414*
16	–	281.170*	281.216*	281.316*	281.416*
18	–	281.190*	–	–	281.418*
20	–	281.020*	–	–	281.421*



with short barrel

Holes	α = 130°	α = 135°	α = 140°	α = 145°	α = 150°
2	281.502*	281.520*	281.620*	281.720*	281.820*
3	281.503*	281.530*	281.630*	281.730*	281.830*
4	281.504*	X81.540	281.640*	281.740*	281.840*
5	281.505*	X81.550	281.650*	281.750*	281.850*
6	281.506*	X81.560	281.660*	281.760*	281.860*



* Only available in stainless steel

X=2: stainless steel
X=4: TAN

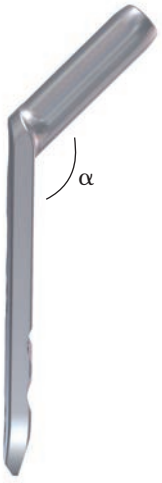
Note: **Use short barrel DHS plates only with DHS screws/blades shorter or equal 75 mm.**

All plates are available nonsterile and sterile packed.
For sterile implants add suffix S to article number.

LCP DHS plates

with standard barrel

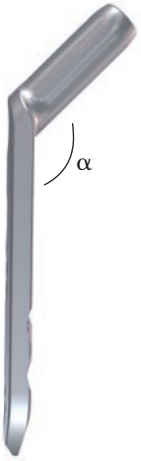
Holes	α = 130°	α = 135°	α = 140°	α = 145°	α = 150°
2	0X.224.202	0X.224.222	0X.224.242	0X.224.262	0X.224.282
3	0X.224.203	0X.224.223	0X.224.243	0X.224.263	0X.224.283
4	0X.224.204	0X.224.224	0X.224.244	0X.224.264	0X.224.284
5	0X.224.205	0X.224.225	0X.224.245	0X.224.265	0X.224.285
6	0X.224.206	0X.224.226	02.224.246*	02.224.266*	0X.224.286
8	02.224.208*	0X.224.228	02.224.248*	02.224.268*	0X.224.288
10	02.224.210*	02.224.230*	02.224.250*	02.224.270*	02.224.290*
12	02.224.212*	02.224.232*	02.224.252*	02.224.272*	02.224.292*
14	02.224.214*	02.224.234*	02.224.254*	02.224.274*	02.224.294*
16	–	02.224.236*	02.224.256*	02.224.276*	02.224.296*
18	–	02.224.238*	–	–	02.224.298*
20	–	02.224.240*	–	–	02.224.299*



* Only available in stainless steel

with short barrel

Holes	α = 130°	α = 135°	α = 140°	α = 145°	α = 150°
2	0X.224.302	0X.224.322	0X.224.342	0X.224.362	0X.224.382
4	0X.224.304	0X.224.324	0X.224.344	0X.224.364	0X.224.384
5	–	0X.224.325	–	–	–
6	–	0X.224.326	–	–	–



X=2: stainless steel
X=4: TAN

Note: **Use short barrel LCP DHS plates only with DHS screws/blades shorter or equal 75 mm.**

All plates are available nonsterile and sterile packed.
For sterile implants add suffix S to article number.

LCP DHS plates with collar

Holes	α = 135°	α = 140°
3	04.120.203S	04.120.303S
4	04.120.204S	04.120.304S
5	0X.120.205S	04.120.305S

DHS Trochanter Stabilizing Plates

Conventional DHS Trochanter Stabilizing Plates

X81.869	length 138 mm
X81.870	length 147 mm

Locking Trochanter Stabilizing Plate: X81.871

X=2: stainless steel
X=4: titanium

Universal Locking Trochanteric Stabilizing Plate: 02.102.001

3.5 mm Locking Screws, self-tapping

Length (mm)	Hex	Stardrive
16	X13.016	X12.104
20	X13.020	X12.106
24	X13.024	X12.108

X=2: stainless steel
X=4: TAN

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

5.0 mm Locking Screws, self-tapping (⬢ X12.201 – X12.227 / ⬢ X13.314 – X13.390)

X=2: stainless steel
X=4: TAN

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

4.5 mm Cortex Screws, self-tapping (X14. 814 – X14. 940)

X=2: stainless steel
X=4: TAN

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

6.5 mm Cancellous Bone Screws

16 mm	X16.030–120
32 mm	X17.045–150
Full thread	X18.020–110

X=2: stainless steel
X=4: TAN

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

6.5 mm Cannulated Screws, self-drilling

16 mm	X08.401–425
32 mm	X08.431–452
Full thread	X08.460–482

X=2: stainless steel
X=4: TAN

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

DCS plate 95°

Holes	Stainless steel	TAN
6	281.960	481.960
8	281.980	481.980
10	281.900	481.900
12	281.925	
14	281.930	
16	281.940	
18	281.950	
20	281.970	
22	281.990	

DHS/DCS Compression Screw
280.990: stainless steel
480.990: TAN

DHS/DCS Locking Device
280.960: stainless steel
480.960: TAN

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

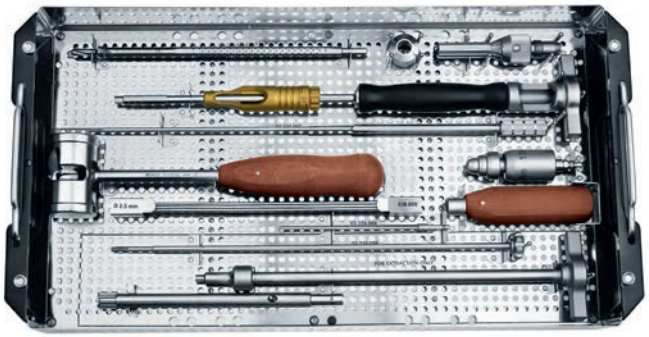
Sets

DHS Blade

Implant Set for DHS Blades, in suitcase for sterile implants

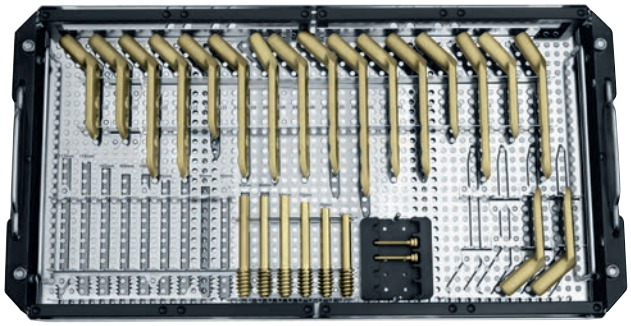
01.224.802	stainless steel
01.224.804	titanium alloy / TAN
DEM.000.305	Suitcase for DHS Blades

01.224.800	Instrument Set for DHS Blades in Vario Case
68.224.000	Vario Case for DHS Blade

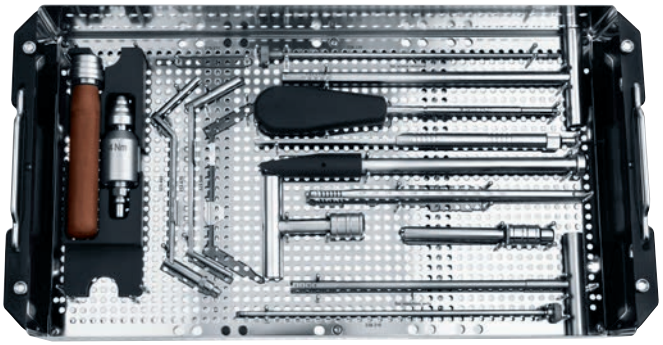


LCP DHS

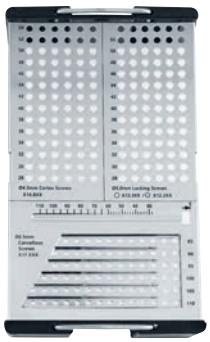
LCP DHS Implant Set in Vario Case

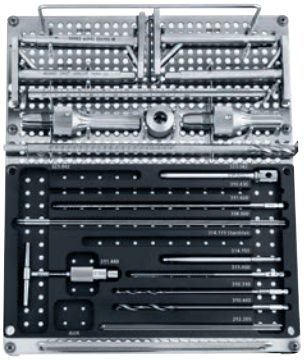


01.120.012	stainless steel
01.120.014	titanium alloy / TAN

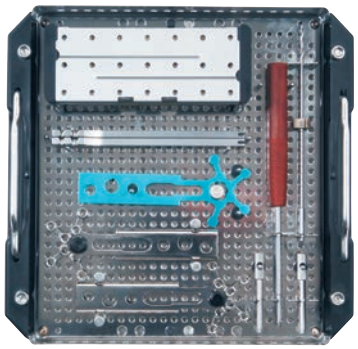


01.120.010	LCP DHS Basic Instrument Set in Vario Case
01.120.011	LCP DHS Basic Instrument Set for One-step Insertion Technique in Vario Case





Locking Trochanter Stabilizing Plates



01.102.802	Instruments for locking Trochanter Stabilizing Plate, for DHS, Stainless Steel
01.102.804	Instruments for locking Trochanter Stabilizing Plate, for DHS, Pure Titanium
01.102.812	Instruments for locking Trochanter Stabilizing Plate, for DHS, Stardrive, Stainless Steel
01.102.814	Instruments for locking Trochanter Stabilizing Plate, for DHS, Stardrive, Pure Titanium

DHS

181.360	DHS Implant Set in Vario Case
681.360	Vario Case for DHS Implants

DCS

181.365	DCS Implant Set in Vario Case
681.365	Vario Case for DCS Implants

Bibliography

1
A. Lustenberger et al. (1995) Rotational instability of trochanteric fractures fixed with the dynamic hip screw. A roentgenographic analysis. Unfallchirurg 95:514 – 517.

2
M. B. Sommers et al. (2004) A laboratory model to evaluate cutout resistance of implants for pertrochanteric fracture fixation. JOT 18:361–368.

3
H. W. Jones (2006) Are short femoral nails superior to the sliding hip screw? A meta-analysis of 24 studies involving 3279 fractures. Int Orthop. 30(2):69–78.

4
M. J. Parker et al. (2006) Gamma and other cephalocondylic intramedullary nails versus extramedullary implants for extracapsular hip fractures in adults (Cochrane Review). The Cochrane Database of Systematic Reviews, Issue 4.

5
Baumgartner et al. (1995) The value of the tip-apex distance in predicting failure of fixation of pertrochanteric fractures of the hip. Journal of Bone & Joint Surgery Am. 77:1058–64.

6
D. Lorich et al. (2004) Osteoporotic pertrochanteric hip fractures – management and current controversies. Journal of bone & Joint Surgery 2.

7
B. Blair et al (1994) Basicervial fractures of the proximal femur: a biomechanical study of 3 internal fixation techniques. Clinical Orthopedics and related research 306:256–263.

8
M. J. Parker al. (1998) Choice of implant for internal fixation of femoral neck fractures. Meta-analysis of 25 randomised trials including 4925 patients. Acta Orthop Scand. 69(2):138–43.

9
C. Bredahl, et al. (1992) Mortality after hip fracture: results of operation within 12 h of admission. Injury 23 (2):83–6.

10
W. P. Hamlet et al. (1997) Influence of health status and the timing of surgery on mortality in hip fracture patients. J Orthop 26 (9):621–7.

MRI Information

Torque, Displacement and Image Artifacts according to ASTM F 2213-06, ASTM F 2052-14 and ASTM F 2119-07

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 F 2182-11a

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.**

DePuy Synthes
PART OF THE Johnson&Johnson FAMILY OF COMPANIES

Synthes GmbH
Eimattstrasse 3
4436 Oberdorf
Switzerland
Tel: +41 61 965 61 11
Fax: +41 61 965 66 00
www.depuysynthes.com

Not all products are currently available in all markets.

This publication is not intended for distribution in the USA.

All surgical techniques are available as PDF files at
www.depuysynthes.com/ifu

CE
0123

 036.000.255 DSEM/TRM/1114/0221(5) 02/17