IMD®

Surgical Technique

DHS- DCS Plate System

INTRODUCTION:

The IMD DHS-DCS Plate System consists of variety of Bone plates & fixed angle Bone Screws. This system is a single use implantable device for long term duration (intended for continuous use for more than 30 days) contacting femur bone and its surrounding tissues.

INDICATIONS:

DHS-DCS Plate System involves Seven Plates and each plates have its own intended uses. Intended uses for all plates are given below:

Wise-Lock DHS plate is intended to treat stable and unstable fractures of the proximal femur:

- Intertrochanteric
- Subtrochanteric
- Pertrochanteric
- Basilar neck fractures

Dynamic Hip Compression Plate is indicated to fix-

- fractures of the proximal femur
- trochanteric, pertrochanteric, intertrochanteric, and basilar neck fracture

95° DCS Plate is indicated to fix following fracturesof the distal femur-

- Intercondylar fractures
- Supracondylar fractures
- Unicondylar fractures

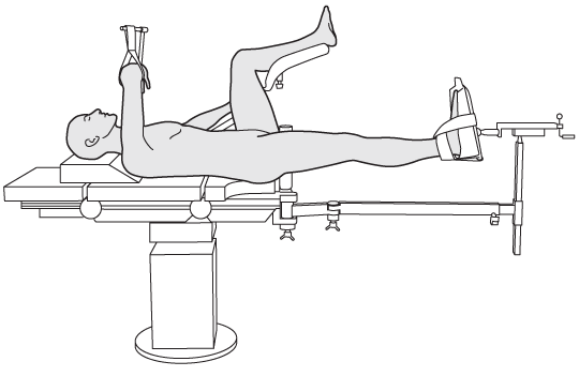
95° Condylar Blade Plate indicated to fix fractures in the distal and proximal areas of femur and intertrochanteric valgisation osteotomy. It is designed to perform reconstructive osteotomies

CONTRAINDICATIONS:

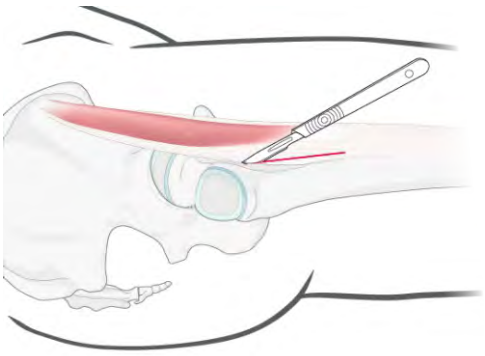
Contraindications include, but are not limited to:

1. Infection, local to the operative site.
2. Signs of local inflammation.
3. Severely comminuted fractures in which bone fragments are too small or numerous to adequately fix or maintain a reduced position
4. Patient susceptibility to allergic reaction to the components of the alloy ,the implant is manufactured from.
5. Mental illness or schizophrenia, which may cause patients to ignore the limitations and precautions of the implanted material, leading to implants fracture and complication.
6. Alcohol or drug addict
7. Severe osteopenia and/or osteoporosis, or in the presence of marked or rapid bone absorption, metabolic bone disease, cancer, or any other tumor-like condition of the bone which may compromise fixation.
   Osteoporosis is a relative contraindication since this condition may limit the degree of obtainable correction, the amount of mechanical fixation.
8. Symptomatic Arthritis
9. Any patient having inadequate tissue coverage over the operative site or where there is inadequate bone stock, bone quality, or anatomical definition.
10. Any time implant utilization would interfere with anatomical structures or expected physiological performance.
11. Any patient unwilling to cooperate with the post-operative instructions.

Patient Positioning: The patient is placed in a supine position on the fracture table. The ipsilateral arm is elevated in a sling and the uninjured leg is placed on the leg holder.



Skin Incision: Lateral approach is used in order to get access to the femur fracture site. The incision is centered over the femoral neck axis line, and slightly posterior to the palpable mid line of the trochanter.



DHS IMPLANTATION

Fracture Reduction: K Wire is positioned and inserted anteriorly along femoral head in order to determine the Femoral neck anteversion. More K wires are inserted in case of unstable fracture to provide temporary stability.

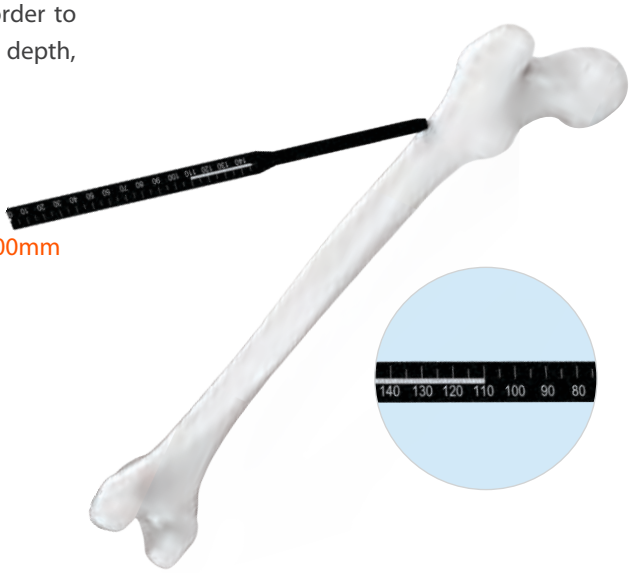
Guide Wire Insertion: The DHS angle guide 130° or 135° depending on type of plate to be used is aligned along the axis of femoral shaft in such a way that guide point towards the center of femoral head. Now, the 2.5mm Threaded Guide wire is inserted into femur through the DHS angle guide in such a way that is aligned parallel to the k wire earlier used for determining anteversion. In case of dense bone, it is recommended to predrill the lateral cortex using 2.0mm drill bit through the DHS angle guide.

Determining DHS/DCS screw length: Direct measuring device is slide over the guide wire to determine guide wire insertion depth. In order to calculate Reaming depth, DHS/DCS screw length and tapping depth, 10mm is subtracted from measured guide wire insertion depth.

For Example, if

Guide wire insertion depth= 110 mm

Reamer depth= DHS/DCS screw length= tapping depth= 110-10= 100mm

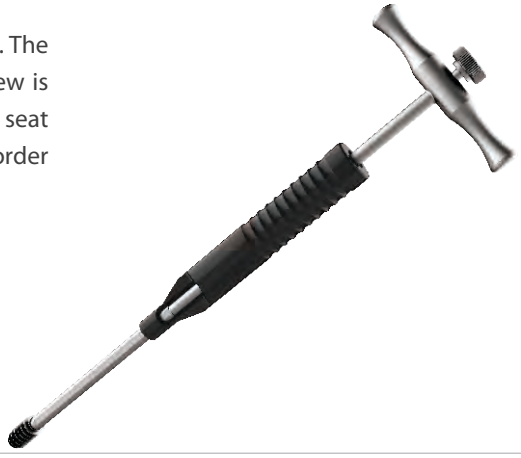


Reaming: Reaming head of the triple reaming head will be slided along the drill bit. The reamer is slided until the non-cutting end of the reamer reaches the predetermined reamer depth on the scale. The reamer head is secured in required position by tightening the locking nut.

Now insert the quick coupling end of DHS triple reamer in T handle**)**. Slide the DHS Triple reamer over guide wire to perform drilling for the DHS/DCS screw. Along with drilling it also performs reaming for plate barrel and countersink for plate/barrel junction.

Tapping (optional): The short centering sleeve will be slided over tap . Insert the quick coupling end of tap into T-handle .
Insert the assembly in the predrilled hole and tap to a predetermined depth by looking at the readings in short centering sleeve.

Insert DHS/DCS screw: The coupling screw is inserted into the Guide shaft . The long centering sleeve is slided over the guide shaft. Now, the DHS/DCS screw is inserted into the assembly in such a way that the tabs of guide shaft should seat into the slots of DHS/DCS screw. And finally the coupling screw is rotated in order to hold the DHS/DCS screw in place.



The assembly is slided over the guide wire and stabilized by seating the long centering sleeve into the reamed hole. Now the handle is turned clockwise in order to insert the DHS/DCS screw.

Remove Guide shaft: It is important to align the guide shaft handle before removing it so that the DHS/DCS screw is aligned in place for insertion of DHS plate. Now, remove the coupling screw, guide shaft and the long centering sleeve .

DHS Plate Insertion: Insert the appropriate DHS plate onto the DHS/DCS screw until it comes in contact with the lateral cortex. Finally remove the 2.5mm threaded guide wire.

Plate Seating:

DHS-DCS impactor is used for proper seating of the plate on bone.

Cortical Screw Insertion:

In order to fix the plate on bone, 4.5mm cortical screws are inserted into plate shaft.

- **Predrilling screw holes:** Universal Drill Guide, 4.5/3.2mm is used to predrill the hole for cortical screw insertion. 3.2mm drill bit is used for 4.5mm cortical screw. If required, 4.5mm bone tap is also available in order to create screw thread pattern in bones for easy screw insertion.

- **Determining screw length:** The Depth gauge is inserted into the predrilled hole in order to measure the depth of the hole and which could further be used to select the screw of appropriate length.

- **Screw Insertion:** A 3.5mm tip Hexagonal screwdriver shaft is assembled into the T-handle. Now, this assembly is used to pick and insert 4.5mm cortical screw of predetermined length into predrilled hole.

Wise-Lock Screw Insertion:

An option for insertion of Lock screws is also available in the DHS locking plate. In these holes, 5.0mm Lock screws are inserted.

- Predrilling screw holes: 5.0mm threaded drill guide is locked into plate in order to predrill the holes for Lock screws. 4.3mm drill bit is used to drill holes.

- **Determining screw length:**The Depth gauge is inserted into the predrilled hole in order to measure the depth of the hole and which could further be used to select the screw of appropriate length.
- **Screw insertion:** A 3.5mm tip Hexagonal screwdriver is used to pick and insert 5.0mm locking screw of predetermined length in predrilled hole.

Compression screw insertion: The compression screw may be inserted into the DHS/DCS screw using a 3.5mm tip Hexagonal screwdriver in order to provide further compression to the trochanteric fracture.
Throughout the procedure, the guide wire remains in place. So if the guide wire is misplaced or unintentionally withdrawn between the whole procedure, it is reinserted using the method discussed below.

Reinsertion of Guide Wire: The DHS/DCS screw is inserted backwards into the short centering sleeve. The assembly is used as guide to insert the guide wire through the cannulated hole in the DHS/DCS screw. The guide wire is gently hammered in order to reinsert it back in place.

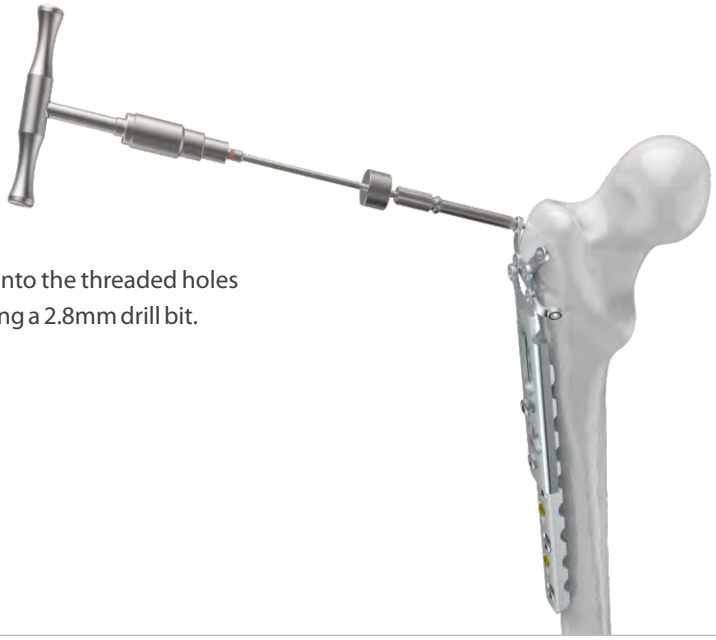
Removal of DHS Plate with Screw: After removal of DHS plate, the coupling screw is inserted into the DHS-DCS wrench . The wrench is attached to the DHS/DCS screw in such a way that the wrench fits exactly on the DHS/DCS screw. The coupling screw is tightened into the DHS/DCS screw. Now, the whole assembly is rotated anti-clockwise in order to take out the DHS/DCS screw from bone.

Trochanter Stabilizing Plate fixation

Bending of the plate:

The bending of plate is required prior to fixation, so that the plate adapts to the anatomy of the bone.

Fixation on DHS plate: The first and the third holes of the DHS pate are kept vacant in order to fix the trochanter plate. The trochanter plate is placed on the DHS plate and the vacant holes of the later are aligned with the holes of trochanter plate. Finally 4.5 mm cortical screws are inserted into the aligned holes to affix the trochanter plate in place using the similar technique as discussed above for the insertion of 4.5mm cortical screw.



Fixation on Bone: The threaded drill guide, 3.5mm is attached onto the threaded holes of the trochanter plate and a hole is drilled through the bone using a 2.8mm drill bit.

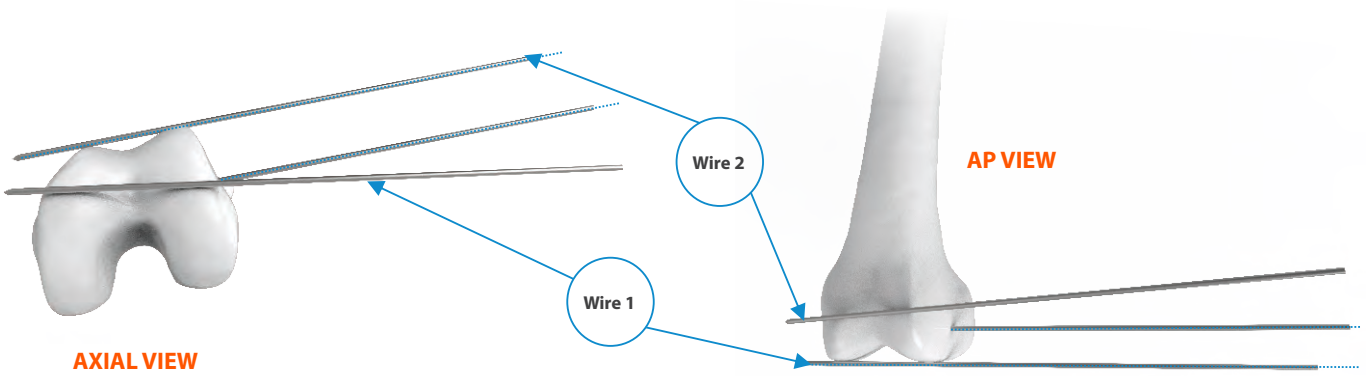
Screw fixation: The hexagonal screwdriver with 2.5mm tip is used to insert the 3.5mm Lock screw through the predrilled hole.

DCS IMPLANTATION

DCS IMPLANTATION

The DCS plate is basically designed to fix the fractures at the Distal end of Femur bone. It can also be at proximal end of Femur for subtrochanteric fracture fixation.

Fracture Reduction: 2.5mm threaded guide wires are inserted into the fractured fragments of the distal Femur in order to provide a temporary fixation.

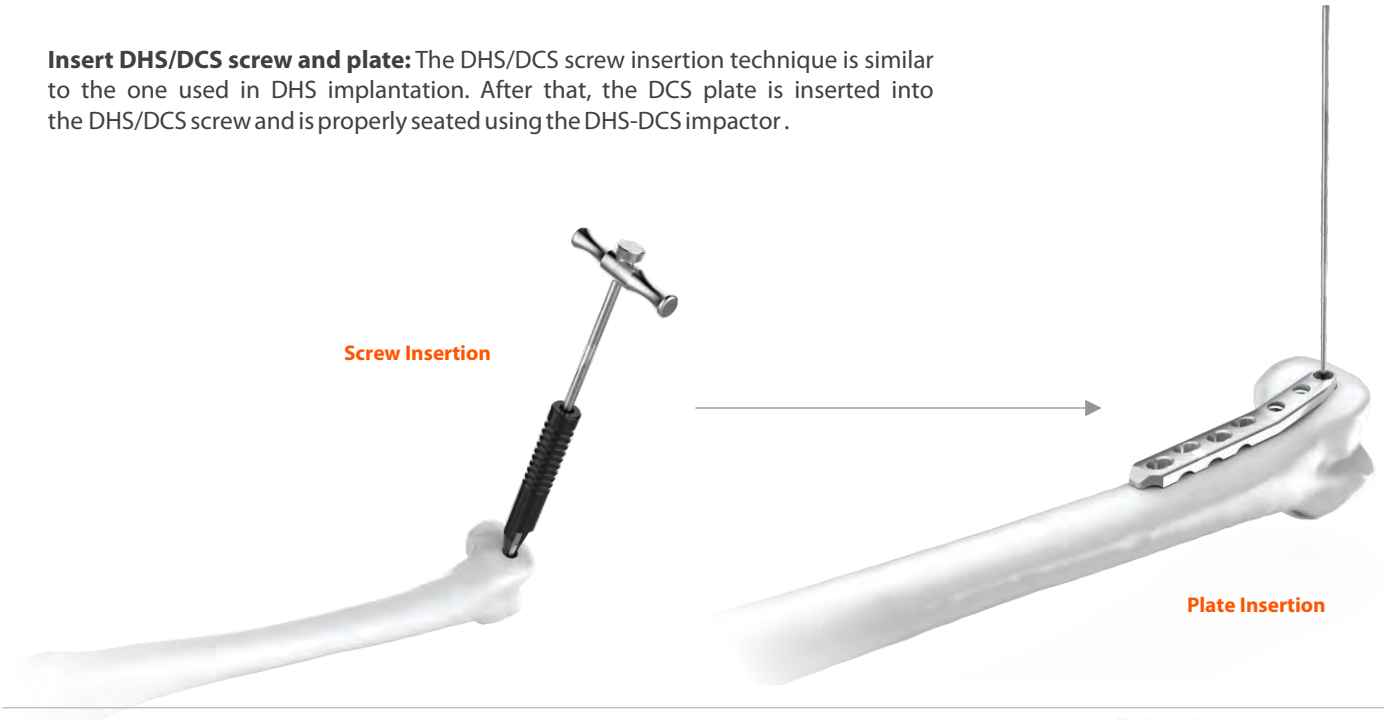


Guide Wire insertion: First of all, the direction of the insertion of central guide wire is needed to be determined. For that, a k wire (wire1) is placed distally over condyles and the second k wire(wire2) is placed anteriorly over condyles. Now the guide wire is inserted parallel to wire 1 in AP view and parallel to wire 2 in axial view using the DCS angle guide . The guide wire placement is finalized under the image intensifier.

Determining guide wire length: Direct measuring device is slided over the guide wire and insertion depth is measured from scale on the measuring device.

Reaming: In order to calculate Reaming depth, DHS/DCS screw length and tapping depth, 10mm is subtracted from measured guide wire insertion depth. DCS triple reamer is set to a predetermined depth and then locked in place by tightening the locking nut. After assembling it to the quick coupling T handle , the reaming is performed.

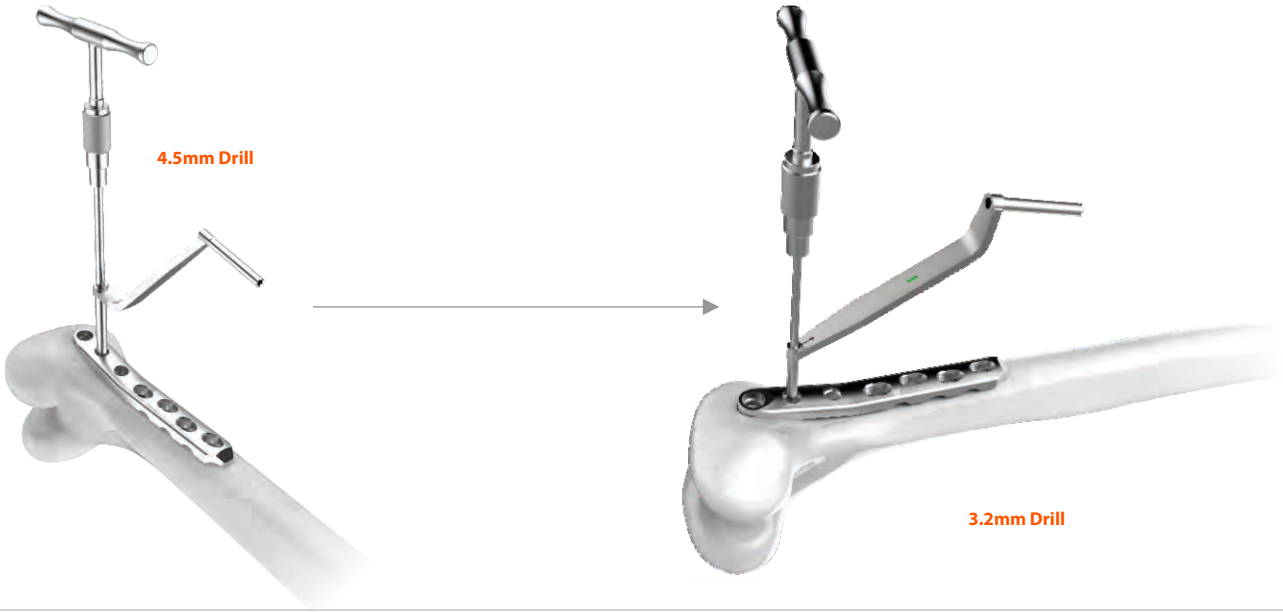
Insert DHS/DCS screw and plate: The DHS/DCS screw insertion technique is similar to the one used in DHS implantation. After that, the DCS plate is inserted into the DHS/DCS screw and is properly seated using the DHS-DCS impactor .



DCS Plate xation: 6.5mm cancellous screws can be used at the fracture site in order to provide compression and increase contact between the fracture fragments using Lag screw insertion technique. Final fixation of the plate is performed by inserting the 4.5mm cortical screw or combination of both 4.5mm cortical screw and 5.0 mm Lock screws depending on whether the DHS plate is locking or non-locking type using the technique showed in the DHS implantation procedure.

Cancellous screw insertion: As mentioned above, 6.5mm cancellous screws are inserted in the proximal holes of the DCS Plate. Following steps shows the procedure to insert a cancellous screw.

- **Predrilling screw holes:** Universal Drill Guide, 4.5/3.2mm is used to predrill the hole in the near cortex using 4.5mm drill bit . Now align the Universal Drill Guide, 4.5/3.2mm with the predrill hole and drill across the far cortex through the guide using 3.2mm Drill bit .



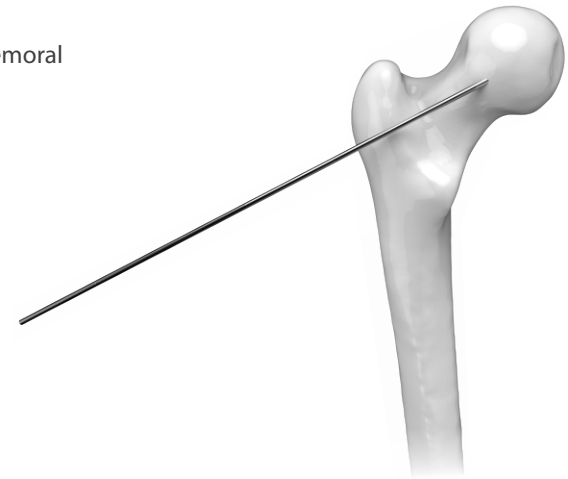
- **Determining screw length:** The Depth gauge is inserted into the predrilled hole in order to measure the depth of the hole and which could further be used to select the screw of appropriate length.

- **Screw insertion:** A 3.5mm tip Hexagonal screwdriver is used to pick and insert 6.5mm cancellous screw of predetermined length in predrilled hole.

- **Compression screw insertion:** The compression screw may be inserted into the DHS/DCS screw using a 3.5mm tip Hexagonal screwdriver in order to provide further compression to the fracture.

DCS Implantation for Subtrochanteric Fractures

Fracture Reduction: K Wire is positioned and inserted anteriorly along femoral head in order to determine the Femoral neck anteversion.



Guide Wire insertion: The Guide wire is inserted at proximal end of femur using DCS angle guide. Final position of the wire is confirmed under the image intensifier in both AP and mediolateral positions.

Determining guide wire length: Direct measuring device is slided over the guide wire and insertion depth is measured from scale on the measuring device.

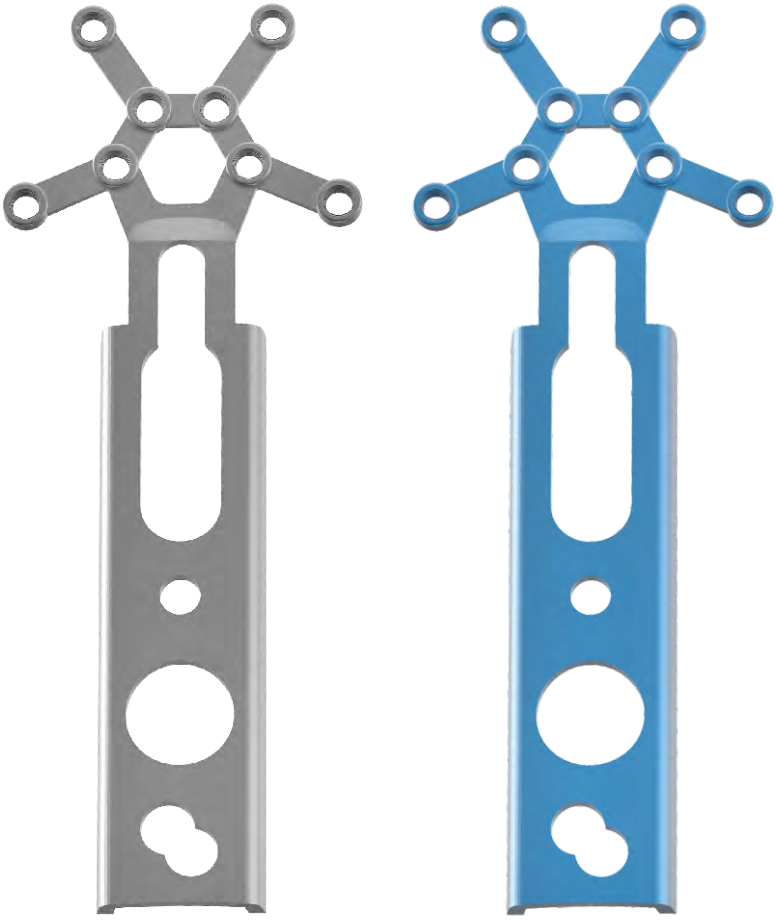
Reaming: In order to calculate Reaming depth, DHS/DCS screw length and tapping depth, 10mm is subtracted from measured guide wire insertion depth. DCS triple reamer is set to a predetermined depth and then locked in place by tightening the locking nut. After assembling it to the quick coupling T handle, the reaming is performed.

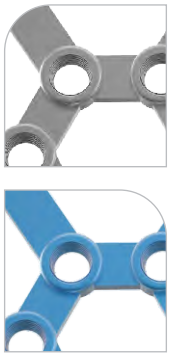
Insert DHS/DCS screw and plate: The DHS/DCS screw insertion technique is similar to the one used in DHS implantation. After that, the DCS plate is inserted into the DHS/DCS screw and is properly seated using the DHS-DCS impactor .

DCS Plate xation: The 6.5mm cancellous screws is inserted in the proximal holes of the DCS Plate. Final fixation of the plate is performed by inserting the 4.5mm cortical screw or combination of both 4.5mm cortical screw and 5.0 mm Lock screws depending on whether the DCS plate is locking or non-locking type using the technique showed in the DHS implantation procedure.

Compression screw insertion: The compression screw may be inserted into the DHS/DCS screw using a 3.5mm tip Hexagonal screwdriver in order to provide further compression to the fracture.

4.5/5.0mm Lock Trochanter Stabilizing Plate For DHS - Adjustable





Round
Locking Hole

Length		Titanium
137		**3056400135**

135° Dynamic Hip Compression Plate

Holes	Titanium
2	**3041402135**
3	**3041403135**
4	**3041404135**
5	**3041405135**
6	**3041406135**
7	**3041407135**
8	**3041408135**
9	**3041409135**
10	**3041410135**
12	**3041412135**

95° DCS Plate

Holes	Titanium
4	**3057404095**
5	**3057405095**
6	**3057406095**
8	**3057408095**
10	**3057410095**
12	**3057412095**

DHS/DCS Compression Screw

		Titanium
Code		**1030400000**

DHS/DCS Screw

Length	Titanium
70mm	**1015400070**
75mm	**1015400075**
80mm	**1015400080**
85mm	**1015400085**
90mm	**1015400090**
95mm	**1015400095**
100mm	**1015400100**
105mm	**1015400105**
110mm	**1015400110**
115mm	**1015400115**
120mm	**1015400120**
125mm	**1015400125**

4.5mm Cortical Screw

Length (mm)	Titanium
20	**1032451020**
22	**1032451022**
24	**1032451024**
26	**1032451026**
28	**1032451028**
30	**1032451030**
32	**1032451032**
34	**1032451034**
36	**1032451036**
38	**1032451038**
40	**1032451040**
42	**1032451042**
44	**1032451044**
46	**1032451046**
48	**1032451048**
50	**1032451050**
55	**1032451055**
60	**1032451060**
65	**1032451065**
70	**1032451070**
75	**1032451075**
80	**1032451080**
85	**1032451085**
90	**1032451090**
95	**1032451095**

5.0mm Lock Screw

Length (mm)	Titanium
20	**1017451020**
22	**1017451022**
24	**1017451024**
26	**1017451026**
28	**1017451028**
30	**1017451030**
32	**1017451032**
34	**1017451034**
36	**1017451036**
38	**1017451038**
40	**1017451040**
42	**1017451042**
44	**1017451044**
46	**1017451046**
48	**1017451048**
50	**1017451050**
55	**1017451055**
60	**1017451060**
65	**1017451065**
70	**1017451070**
75	**1017451075**
80	**1017451080**
85	**1017451085**
90	**1017451090**
95	**1017451095**

6.5mm Cancellous Screws, Full Thread

Length (mm)	Titanium
30	**1018466030**
35	**1018466035**
40	**1018466040**
45	**1018466045**
50	**1018466050**
55	**1018466055**
60	**1018466060**
65	**1018466065**
70	**1018466070**
75	**1018466075**
80	**1018466080**
85	**1018466085**
90	**1018466090**
95	**1018466095**
100	**1018466100**
105	**1018466105**
110	**1018466110**
115	**1018466115**
120	**1018466120**

3.5mm Lock Screw

Length (mm)	Titanium
16	**1017435016**
20	**1017435020**
24	**1017435024**

5939532147
3 qty

Spiral drill quick-connecting 3.2x147mm

5939545147
2 qty

Spiral drill quick-connecting 4.5x147mm

5939528147
2 qty

Spiral drill quick-connecting 2.8x147mm

5939545145

Bone Tap Ø4.5mm Cortical Screws

5939545165

Bone Tap Ø6.5mm Cancellous Screw

5280122910

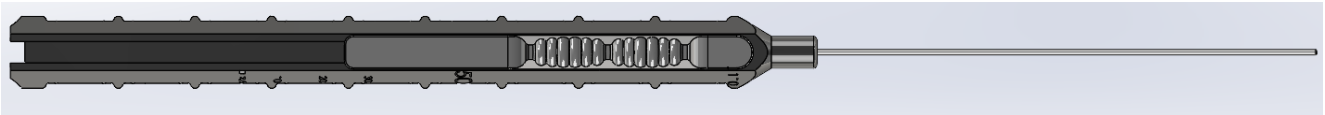
Double Drill Guide, 4.5/3.2mm

5275214902

Double Drill Guide, 6.5/3.2mm

5280122912

Depth gauge for 5mm Screw 10-120mm



5920131001

Small Screwdriver Quickhandle

5222900095 DCS Angle Guide 95°

5222900135 DHS Angle Guide 135°

5222900004 Stepped Reamer DHS 95°

5222900003 Stepped Reamer DCS 95°

5222900001 DHS-DCS Centering Sleeve, Short

5222900002 DHS-DCS Centering Sleeve, Long

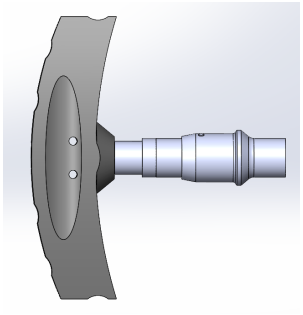
5222900007 DHS-DCS Tap Drill

5222900011 DHS-DCS Impactor Type-I

5222900006 Cannulated Coupling Screw Long for Inserting DHS-DCS Screw

5222900005 Guide Shaft for Coupling Screw- Long, for DHS-DCS

5222900008 T-Handle DHS



5931225250
3 qty Threaded Kirschner Wire 2,5x250x12

5265452908 Length gauge (10-150 mm)

5210720015 Screwdriver Shaft - T15

5210720025 Screwdriver Shaft - T25

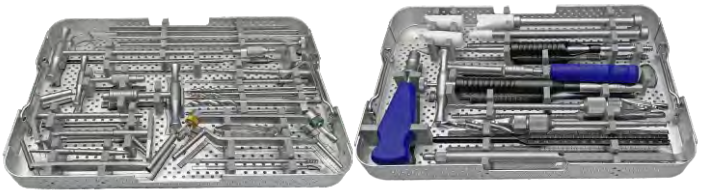
5222900130 DHS Angle Guide 130°

5275211125 Stylet, Ø2.5mm

5937925250
3 qty Kirschner Wire 2,5x250

5920131001 Small Screwdriver Quickhandle

5222800000 DHS-DCS SET



5222801000 Implant Tray for DHS-DCS System