



Surgical Technique

3.5mm Wise-Lock PHELOS - Proximal Humerus Plate

about us

Auxein Medical is an integrated, research based, orthopaedic Implants & instruments manufacturing company, producing a wide range of quality, affordable generic implants, trusted by healthcare professionals and patients across geographies. It is the Company's constant endeavor to provide a wide basket of generic and our innovator products that exceed the highest expectations of customers in term of quality and safety. The company has world-class manufacturing unit established in india and serves customers in over 75 countries worldwide.

Our Achievements



PHEELOS AND LONG PHEELOS

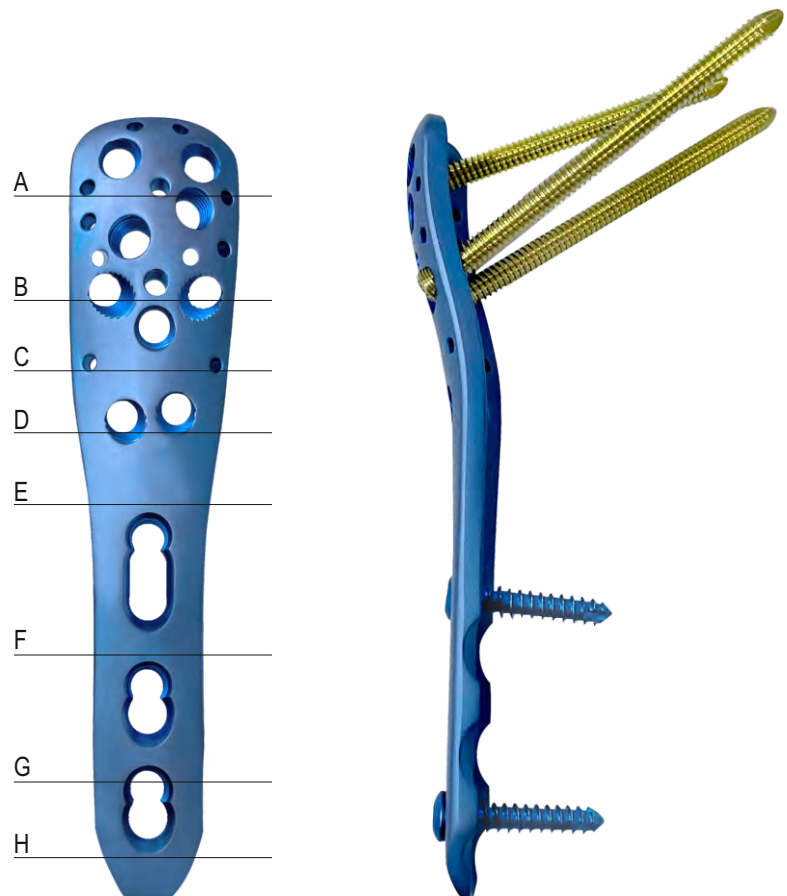
PHEELOS Proximal Humerus Wise-Lock System

PHEELOS

- Proximal screw holes in section A–E for 3.5mm Wise-Lock screws enable an angular stable construct to enhance the grip in osteoporotic bone and multi-fragment fractures
- Carefully apply for osteoporotic bone
- Optimal screw placement
- Proximal holes for suturing to help maintain fracture reduction

PHEELOS Long

- Shaft reinforced to 3.7 mm
- Distal Wise-Lock Capsule holes for maximum adaptability



INDICATIONS

PHEELOS indications

- Dislocated two-, three-, and four-fragment fractures of the proximal humerus, including fractures involving osteopenic bone
- Pseudarthroses in the proximal humerus
- Osteotomies in the proximal humerus

PHEELOS long indications

- As for PHEELOS, but for fractures extending to the shaft or without medial support



PATIENT POSITIONING AND APPROACH

POSITION THE PATIENT

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

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

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



APPROACH

A deltopectoral or transdeltoid approach is recommended.

If the transdeltoid approach is performed, the use of the Wise-Lock Percutaneous Aiming System 3.5 for PHEELOS is recommended.

WARNINGS:

- Do not injure the axillary nerve. The axillary nerve can be palpated at the lower margin of the incision.
- To avoid damaging the axillary nerve, do not split the deltoid more than 4 cm distal to its origin.

IMPLANTATION

REDUCE FRACTURE AND FIX TEMPORARILY

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

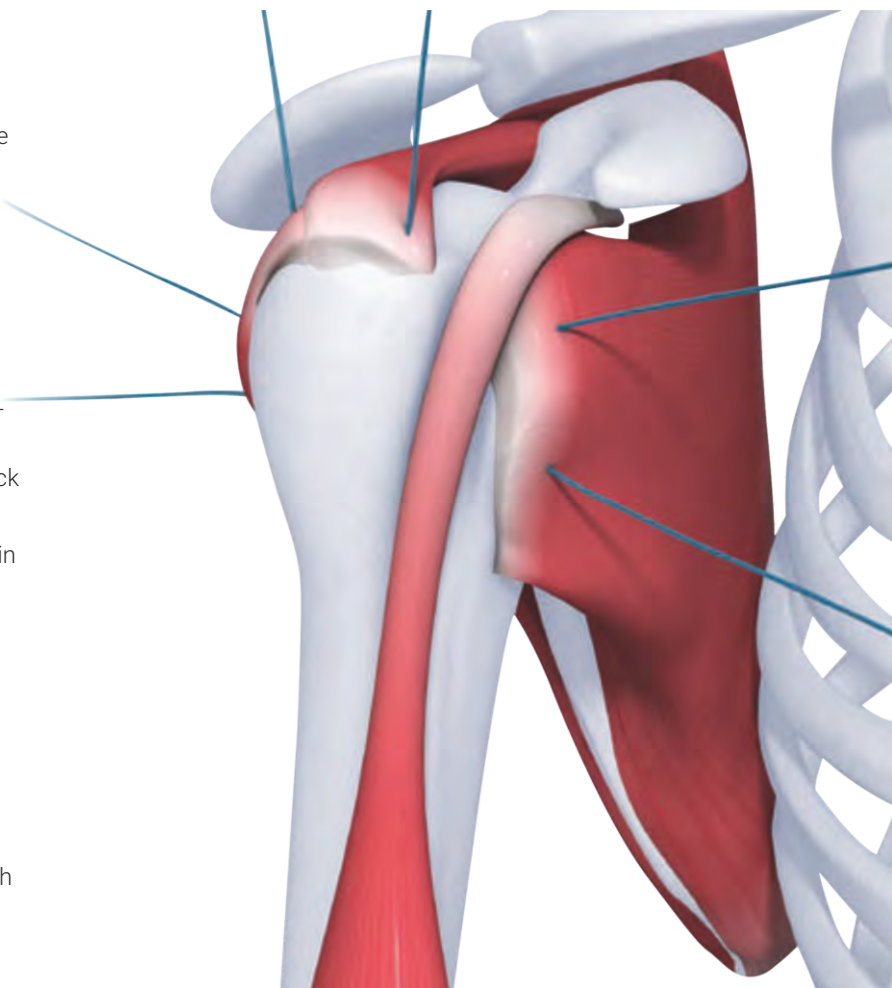
Reduce the head fragments and check the reduction under image intensifier control.

Note: The Wise-Lock screws are not suitable for reduction since they cannot exert compression. The head fragments must be reduced before insertion of wise-lock screws.

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

SUTURING

Provisionally reduce the tubercles using sutures through the insertions of the muscoli subscapularis, infra- and supra-spinatus. The sutures will help to maintain the stability of the reconstruction when fixing them to the plate later.



ATTACH AIMING DEVICE TO PLATE

Insert the stabilization pin of the aiming device in the specially provided hole on the PHEELOS plate. Use the screwdriver to tighten the securing screw of the aiming device.

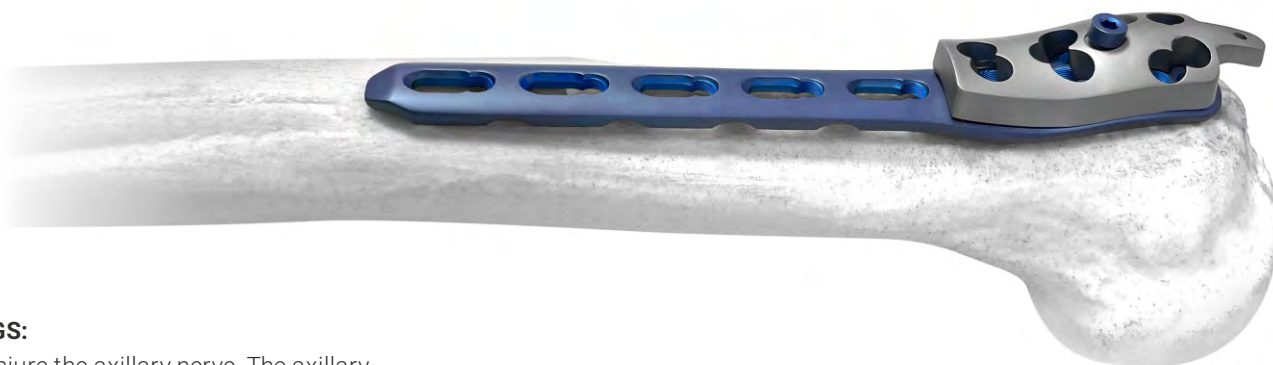
PRECAUTION: Intraoperative bending of the proximal portion of the plate is not recommended for maintaining proper alignment between the aiming device and the plate.



POSITION PLATE

Position the plate 2–4 mm posterior to the bicipital groove and 5–7 mm distal to the top of the greater tubercle. Align the plate properly to the humeral shaft.

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



WARNINGS:

- Do not injure the axillary nerve. The axillary nerve can be palpated at the lower margin of the incision.
- To avoid damaging the axillary nerve, do not split the deltoid more than 4 cm distal to its origin.

ALTERNATIVE TECHNIQUES

Determine the position of the plate using the PHEELOS aiming device with nose. Insert a Kirschner wire into the proximal guide hole below the rotator cuff so that the Kirschner wire aims at the proximal joint surface.



FIX PLATE TEMPORARILY

Fix the plate temporarily with a cortical screw in the elongated combi-hole in the plate shaft.

Use the 2.5 mm drill bit with the 3.5 universal drill guide to drill the bone through both cortices.

Determine the required length of the cortical screw using the depth gauge.

Insert the appropriate 3.5 mm cortical screw using the screwdriver.



OPTION: Temporary fixation with Kirschner wires

If required, use Kirschner wires through the triple sleeve system for temporary fixation of the humeral head.

WARNING: Do not penetrate the joint surface with the Kirschner wires.

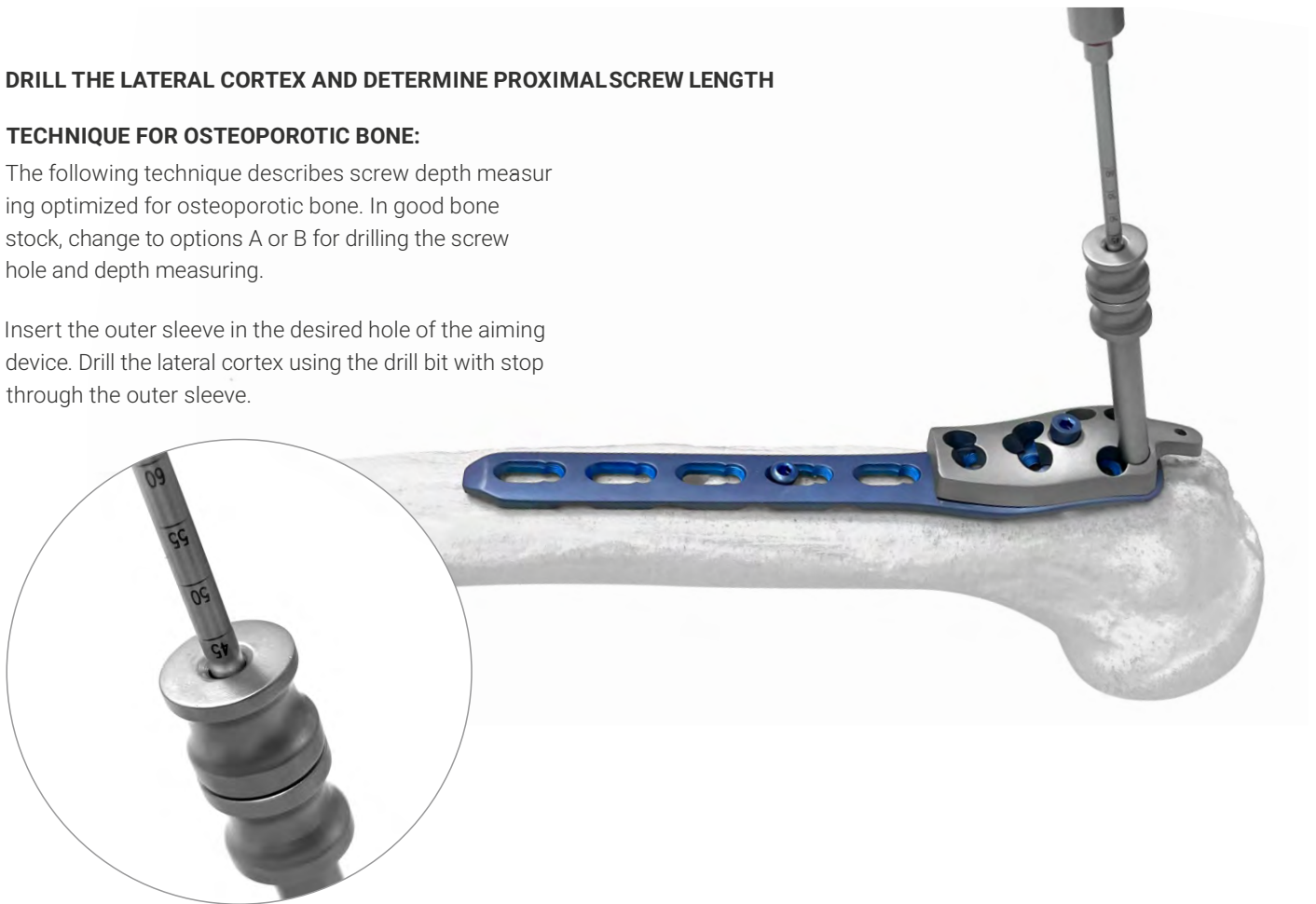


DRILL THE LATERAL CORTEX AND DETERMINE PROXIMAL SCREW LENGTH

TECHNIQUE FOR OSTEOPOROTIC BONE:

The following technique describes screw depth measuring optimized for osteoporotic bone. In good bone stock, change to options A or B for drilling the screw hole and depth measuring.

Insert the outer sleeve in the desired hole of the aiming device. Drill the lateral cortex using the drill bit with stop through the outer sleeve.



WARNING: In porotic bone, only drill the lateral cortex.

ALTERNATIVE INSTRUMENT

Use the drill sleeve with thread independently from the aiming device.

WARNINGS:

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

ALTERNATIVE TECHNIQUES FOR GOOD BONE STOCK

If the bone stock is good, choose one of the following

OPTION A: Use a 2.8 mm drill bit through the drill sleeve and drill 5–8 mm below the joint surface. Read the required screw length from the drill bit.

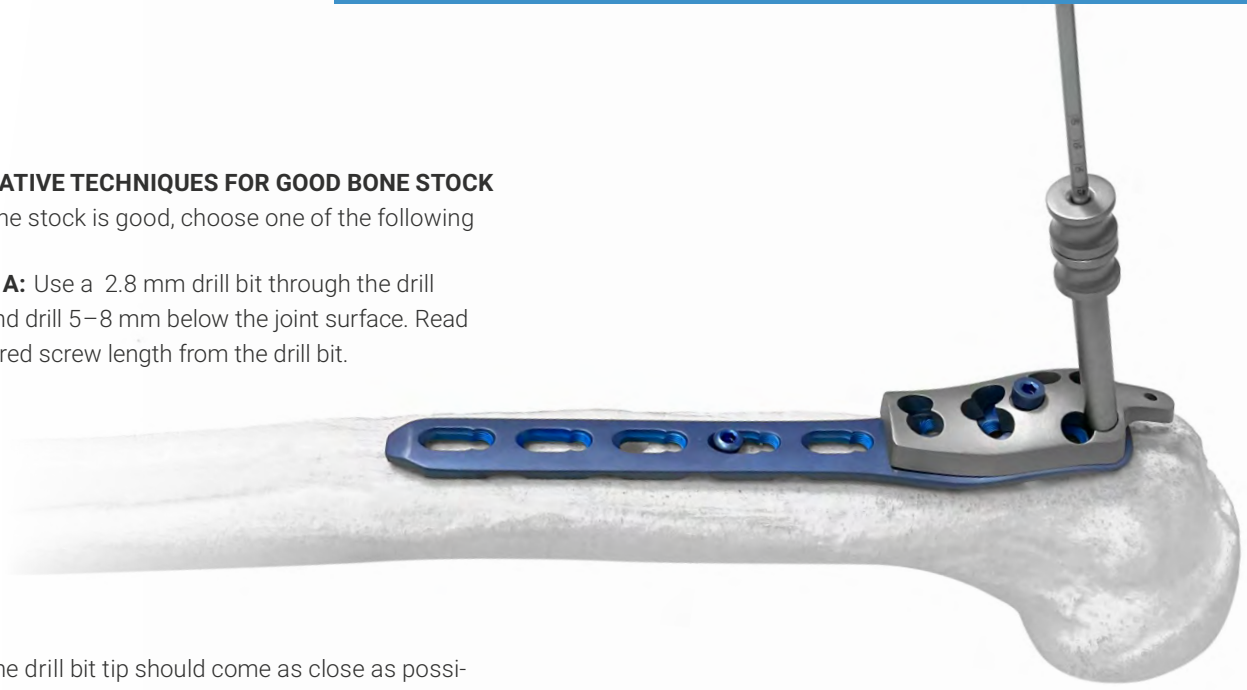
NOTE: The drill bit tip should come as close as possible to the subchondral bone, approximately 5–8mm from the joint surface. Since it may not always be possible to feel the resistance from the subchondral bone, and the drill bit represents the final position of the wise-lock screw, the use of image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

WARNING: Do not push the drill bit through the joint surface.

OPTION B: Check the subsequent position of the screws using Kirschner wires. Attach the triple sleeve system, consisting of a outer sleeve, a drill sleeve, and a centering sleeve for the Kirschner wire onto the aiming device and insert a Kirschner wire 1.6 mm.

Check the position of the Kirschner wire. The tip of the Kirschner wire should be located in the subchondral bone (5–8 mm below the joint surface).

Slide the PHEELOS direct measuring device for Kirschner wire 1.6 mm over the Kirschner wire and determine the length of the required screw.



INSERT PROXIMAL SCREWS

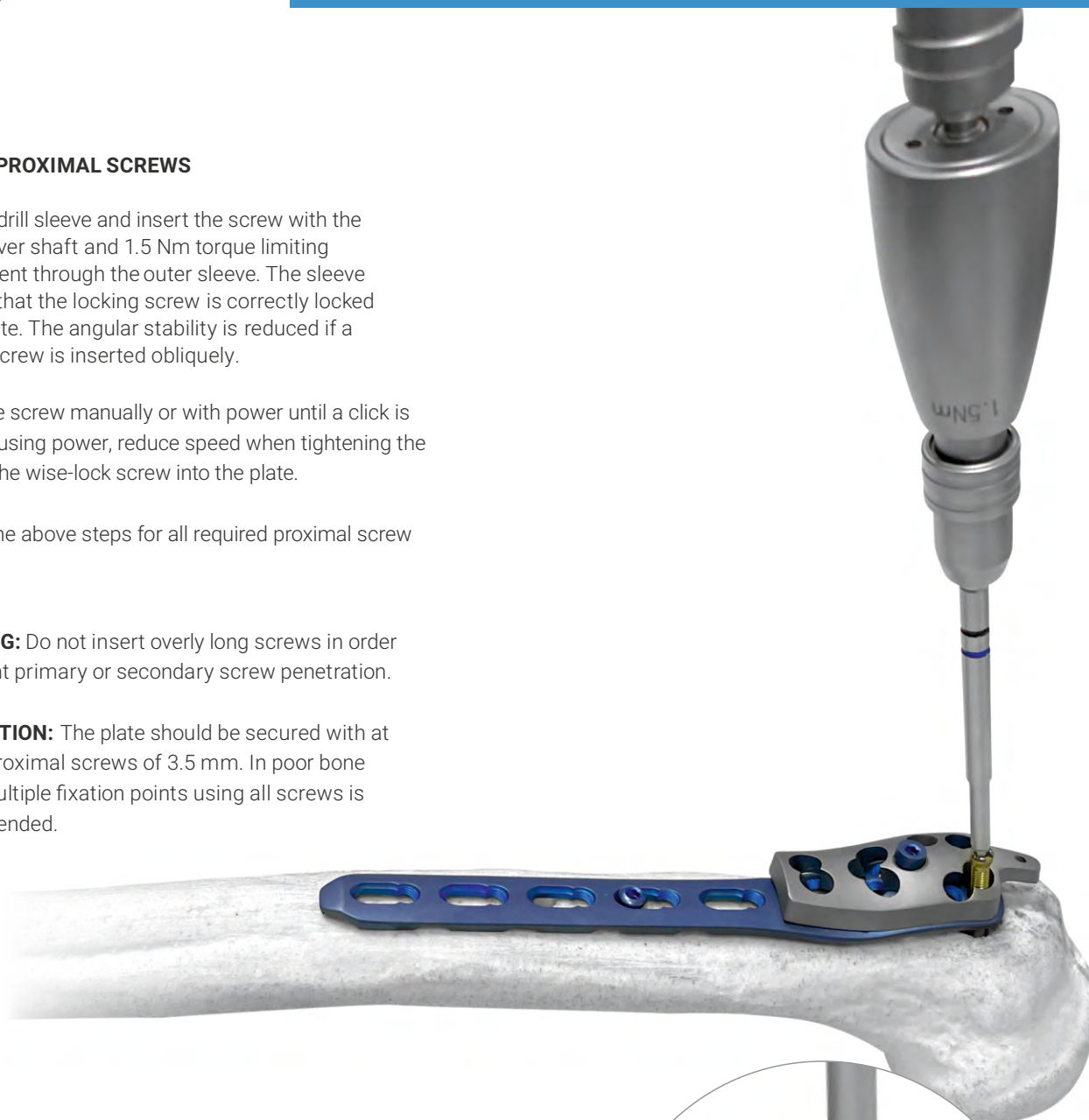
Remove drill sleeve and insert the screw with the screwdriver shaft and 1.5 Nm torque limiting attachment through the outer sleeve. The sleeve ensures that the locking screw is correctly locked in the plate. The angular stability is reduced if a locking screw is inserted obliquely.

Insert the screw manually or with power until a click is heard. If using power, reduce speed when tightening the head of the wise-lock screw into the plate.

Repeat the above steps for all required proximal screw holes.

WARNING: Do not insert overly long screws in order to prevent primary or secondary screw penetration.

PRECAUTION: The plate should be secured with at least 4 proximal screws of 3.5 mm. In poor bone stock, multiple fixation points using all screws is recommended.



INSERT SHAFT SCREWS

After inserting the proximal screws, determine where wise-lock or cortical screws will be used in the shaft.

NOTE: If a combination of cortical and wise-lock screws is used, cortical screws must be inserted first to pull the plate to the bone.



FIXATION WITH 3.5 MM CORTICAL SCREWS

Use the 2.5 mm drill bit with the 3.5 universal drill guide to drill the bone through both cortices.

To set screws in a neutral position, press the drill guide down in the non-threaded hole. To obtain compression, place the drill guide at the end of the non-threaded hole away from the fracture, avoiding downward pressure on the spring-loaded tip.

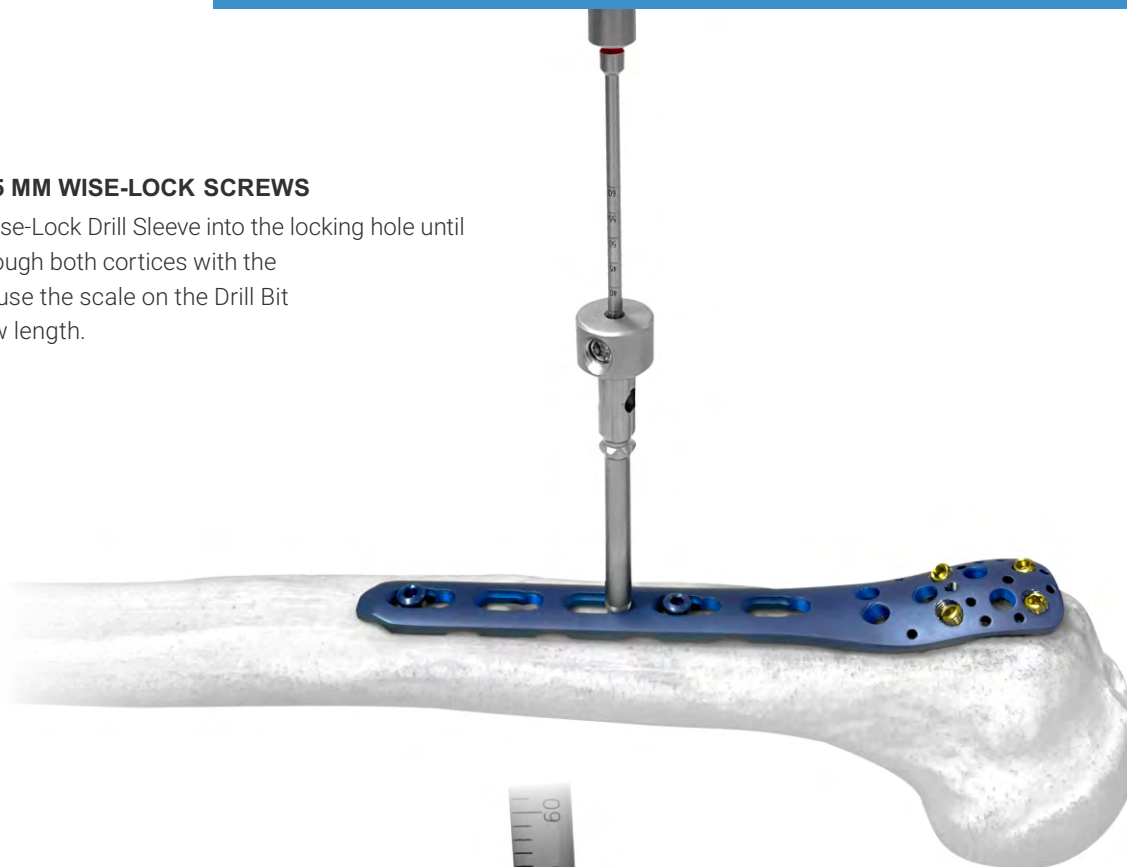
Determine the required length of the cortical screw using the depth gauge.

Insert the appropriate 3.5 mm cortical screw using the hexagonal screwdriver.

Plate holes in the plate shaft are Wise-Lock combi-holes. A Wise-Lock combi-hole can be fixed with a cortical screw to generate interfragmentary compression.

FIXATION WITH 3.5 MM WISE-LOCK SCREWS

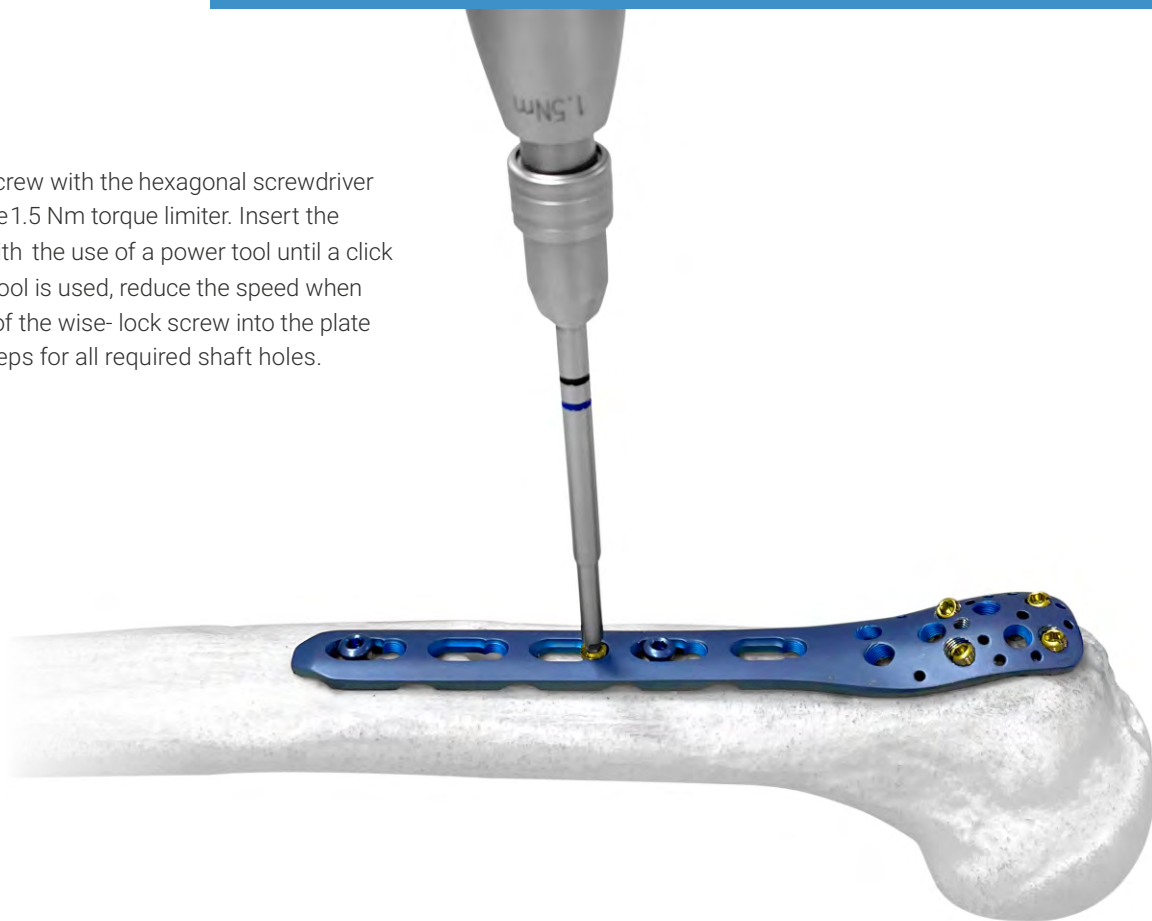
Insert the 3.5mm Wise-Lock Drill Sleeve into the locking hole until fully seated. Drill through both cortices with the 2.8 mm drill bit and use the scale on the Drill Bit to read-off the screw length.



ALTERNATIVE TECHNIQUE: Remove the drill sleeve. Use the depth gauge to determine the screw length.



Insert the wis-lock screw with the hexagonal screwdriver shaft mounted on the 1.5 Nm torque limiter. Insert the screw manually or with the use of a power tool until a click is heard. If a power tool is used, reduce the speed when tightening the head of the wise- lock screw into the plate Repeat the above steps for all required shaft holes.

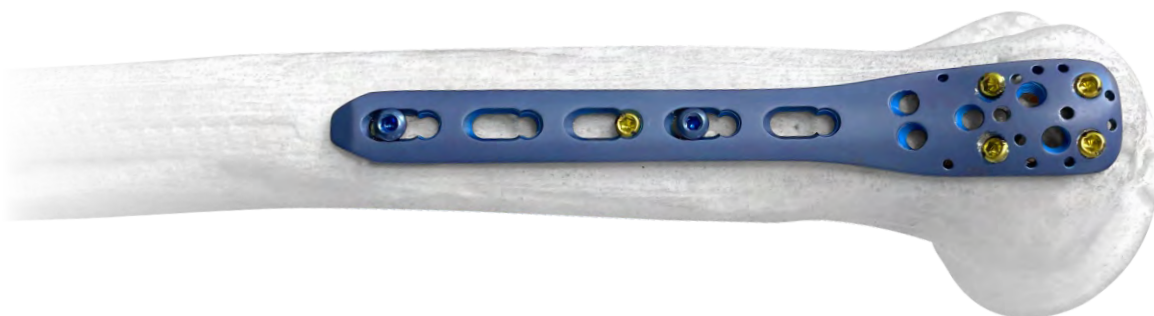


CHECK POSITION OF SCREW TIPS

Check the screw lengths under image intensifier control in the full range of gleno-humeral-motion and ensure that they do not penetrate the articular surface.

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

Check the stability of the suture fixation. The sutures must not rupture during motion.

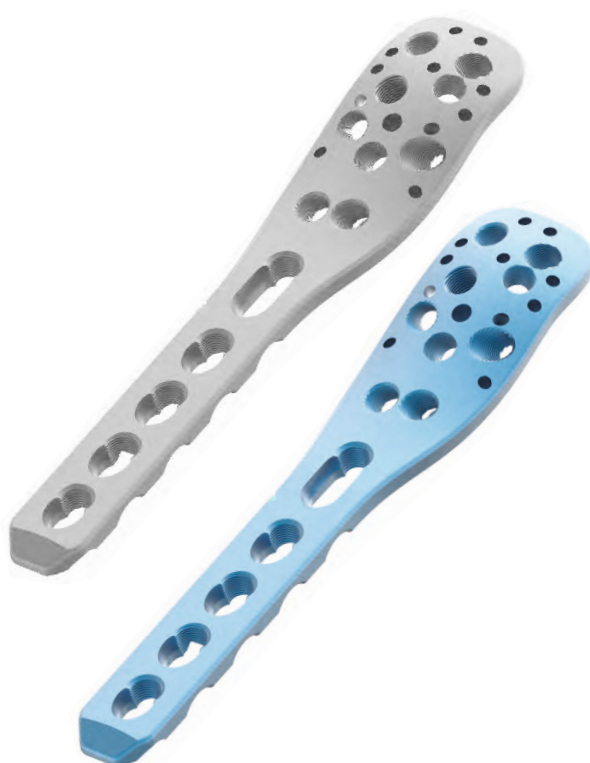


IMPLANT REMOVAL

Unlock all screws from the plate, then remove the screws completely from the bone. This prevents simultaneous rotation of the plate when unlocking the last wise-lock screw. If a screw cannot be removed with the screw driver (e.g. if the hexagonal recess of the Wise-Lock screw is damaged or if the screw is stuck in the plate), use the T-Handle with Quick Coupling to insert the Extraction Screw into the screw head, and unscrew the screw in a counter-clock direction.



PHEELOS - 3.5mm Wise-Lock Proximal Humerus Plate, Short



Round
Locking Hole



Compression and
Locking Hole

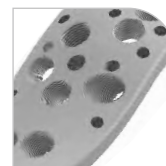


| Holes | Stainless Steel | Titanium |
|-------|-----------------|-------------------|
| 3 | 745.503 | TI-745.503 |
| 4 | 745.504 | TI-745.504 |
| 5 | 745.505 | TI-745.505 |

PHEELOS - 3.5mm Wise-Lock Proximal Humerus Plate, Long



Round
Locking Hole



Compression and
Locking Hole



| Holes | Stainless Steel | Titanium |
|-------|-----------------|-------------------|
| 5 | 745.605 | TI-745.605 |
| 6 | 745.606 | TI-745.606 |
| 8 | 745.608 | TI-745.608 |
| 10 | 745.610 | TI-745.610 |
| 12 | 745.612 | TI-745.612 |



3300-01 Pheelos Aiming Device



3300-02 Centering Sleeve, For Pheelos Aiming Device



3300-03 Drill Sleeve, For Pheelos Aiming Device



3300-04 Centering Sleeve, For Kirschner Wire Ø 1.6mm



3300-05 Pheelos Direct Measuring Device

451-1.6-150 Kirschner Wire with Trocar Tip Both End Ø1.6mm x Length 150mm



2301-000 PHEELOS Instrument Set

| Codes | Set consisting of: | Units |
|--------------------|---|-------|
| 3300-01 | Pheelos Aiming Device | 1 |
| 3300-02 | Centering Sleeve, For Pheelos Aiming Device | 1 |
| 3300-03 | Drill Sleeve, For Pheelos Aiming Device | 1 |
| 3300-04 | Centering Sleeve, For Kirschner Wire Ø 1.6mm | 1 |
| 3300-05 | Pheelos Direct Measuring Device | 1 |
| 451-1.6-150 | Kirschner Wire with Trocar Tip Both End Ø1.6mm x Length 150mm | 5 |

3.5mm Wise-Lock Screw, Self-Tapping (Hex Head)

| Length (mm) | Stainless Steel | Titanium |
|-------------|-----------------|-------------------|
| 10 | 117.010 | TI-117.010 |
| 12 | 117.012 | TI-117.012 |
| 14 | 117.014 | TI-117.014 |
| 16 | 117.016 | TI-117.016 |
| 18 | 117.018 | TI-117.018 |
| 20 | 117.020 | TI-117.020 |
| 22 | 117.022 | TI-117.022 |
| 24 | 117.024 | TI-117.024 |
| 26 | 117.026 | TI-117.026 |
| 28 | 117.028 | TI-117.028 |
| 30 | 117.030 | TI-117.030 |
| * 32 | 117.032 | TI-117.032 |
| * 34 | 117.034 | TI-117.034 |
| 35 | 117.035 | TI-117.035 |
| * 36 | 117.036 | TI-117.036 |
| * 38 | 117.038 | TI-117.038 |
| 40 | 117.040 | TI-117.040 |
| * 42 | 117.042 | TI-117.042 |
| * 44 | 117.044 | TI-117.044 |
| 45 | 117.045 | TI-117.045 |
| * 46 | 117.046 | TI-117.046 |
| * 48 | 117.048 | TI-117.048 |
| 50 | 117.050 | TI-117.050 |
| * 52 | 117.052 | TI-117.052 |
| * 54 | 117.054 | TI-117.054 |
| 55 | 117.055 | TI-117.055 |
| * 56 | 117.056 | TI-117.056 |
| * 58 | 117.058 | TI-117.058 |
| 60 | 117.060 | TI-117.060 |
| 65 | 117.065 | TI-117.065 |
| 70 | 117.070 | TI-117.070 |
| 75 | 117.075 | TI-117.075 |
| 80 | 117.080 | TI-117.080 |

* Sizes not available in Screw Caddy



3.5mm Cortical Screw, Self-Tapping, (Hex Head)

| Length (mm) | Stainless Steel | Titanium |
|-------------|-----------------|------------|
| 10 | 104.210 | TI-104.210 |
| 12 | 104.212 | TI-104.212 |
| 14 | 104.214 | TI-104.214 |
| 16 | 104.216 | TI-104.216 |
| 18 | 104.218 | TI-104.218 |
| 20 | 104.220 | TI-104.220 |
| 22 | 104.222 | TI-104.222 |
| 24 | 104.224 | TI-104.224 |
| 26 | 104.226 | TI-104.226 |
| 28 | 104.228 | TI-104.228 |
| 30 | 104.230 | TI-104.230 |
| 32 | 104.232 | TI-104.232 |
| 34 | 104.234 | TI-104.234 |
| 36 | 104.236 | TI-104.236 |
| 38 | 104.238 | TI-104.238 |
| 40 | 104.240 | TI-104.240 |
| 42 | 104.242 | TI-104.242 |
| 44 | 104.244 | TI-104.244 |
| 46 | 104.246 | TI-104.246 |
| 48 | 104.248 | TI-104.248 |
| 50 | 104.250 | TI-104.250 |
| * 55 | 104.255 | TI-104.255 |
| * 60 | 104.260 | TI-104.260 |
| * 65 | 104.265 | TI-104.265 |
| * 70 | 104.270 | TI-104.270 |
| * 75 | 104.275 | TI-104.275 |
| * 80 | 104.280 | TI-104.280 |
| * 85 | 104.285 | TI-104.285 |
| * 90 | 104.290 | TI-104.290 |



*

* Sizes not available in Screw Caddy

3443-37

Depth Gauge, measuring range upto 60mm



3445-2.5

Screw Driver, Hex 2.5mm, Self-Retaining (for Screw Removal)



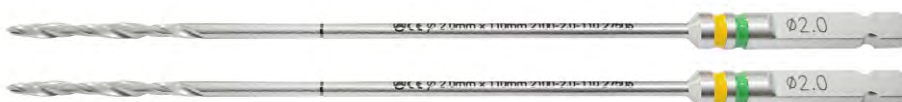
3992-035

Allen Key for Drill Bit Stopper Ø3.0mm



2100-2.0-110

Drill Bit with Quick Coupling, Ø2.0mm x Length 110mm



2100-2.5-112

Drill Bit with Quick Coupling, Ø2.5mm x Length 112mm



2100-3.5-112

Drill Bit with Quick Coupling, Ø3.5mm x Length 112mm



2103-2.8-165

Drill Bit with Quick Coupling with Stopper, Ø2.8mm x Length 165mm



2104-27

Bone Tap Quick Coupling for Wise Lock Screws, Ø2.7mm



2104-02

Bone Tap Quick Coupling for Cortical Screws, Ø3.5mm



2104-04

Bone Tap, Quick Coupling for Cancellous Screws, Ø4.0mm



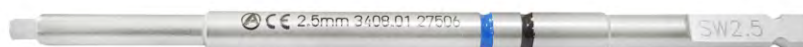
3400-01

Countersink for Ø3.5/4.0mm Screws, Quick Coupling

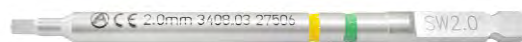


3408-01

Hexagonal Screw Driver Shaft - 2.5mm Tip, Quick Coupling



3408-03 Hexagonal Screw Driver Shaft - 2.0mm Tip, Quick Coupling



2186-2.5 HSS Drill Bit, Ø2.5, Metal



2106-1.2 Guide Sleeve for Ø1.2mm K. Wires



3443-05 Depth Gauge, measuring range upto 50mm, for Ø2.4mm/2.7mm Screws



3443-39 Trephine



BT-SF-06 Bending Template, Small



BT-SF-08

Bending Template, Medium



BT-SF-10

Bending Template, Large



3402-000

T-Handle with Quick Coupling



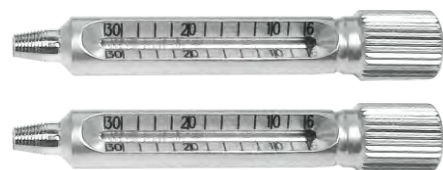
1472-054

Quick Coupling Shaft



TDG-2.7

Threaded Drill Guide, Ø2.7mm (For Drill Bit 2.0mm)



3441-18

Threaded Drill Guide, Ø3.5mm (For Drill Bit 2.8mm)



3420-01

Drill Sleeve Insert, Ø3.5/2.5mm



1472-036

Drill Guide 2.0mm



1472-044

Double Drill Guide, Ø2.0/2.7mm



1472-046

Self Centering Double Drill Guide, Ø2.5/3.5mm



3441-16

Drill Guide for Neutral and Loaded Position, Ø3.5mm



1472-066

Hohmann Retractor, 6.5mm



1472-068

Hohmann Retractor, 8.5mm



2146-018

Hohmann Retractor, 15.5mm



2149-1012

Periosteal Elevator, Straight, 12mm



3406-02

Hexagonal Screw Driver-2.0mm Tip



3406-02S

Screw Holding sleeve for 2.0mm Tip Screwdriver



3406-03

Hexagonal Screw Driver-2.5mm Tip



3406-03S Screw Holding sleeve for 2.5mm Tip Screwdriver



3409-01L Small Bending Iron, Left



3409-01R Small Bending Iron, Right



2107-1180 Reduction Forcep, Pointed, Ratchet Lock, 180mm



2106-1160 Reduction Forcep, Serrated Jaws, Speed Lock, 160mm



2106-190 Self Centering Bone Holding Forcep, Speed Lock, 190mm



2150-1006S

Periosteal Elevator with Silicon Handle, Curved, 6mm



TQ-2.0

Torque Limiting Attachment, 0.8Nm



TQ-2.5

Torque Limiting Attachment, 1.5Nm



1472-064

Toque Screw Driver Handle



GW-1.2-230

Guide Wire with Threaded Trocar Tip, Ø1.2mm x Thread Length 10mm x Length 230mm



3415-000

Screw Holding Forcep For 3.5mm Wise-Lock Small Fragment System



ST-007NW

Screw Caddy For 3.5mm Wise-Lock Small Fragment System



7-050-03

Instrument Trays For 3.5mm Wise-Lock Small Fragment Instrument Set

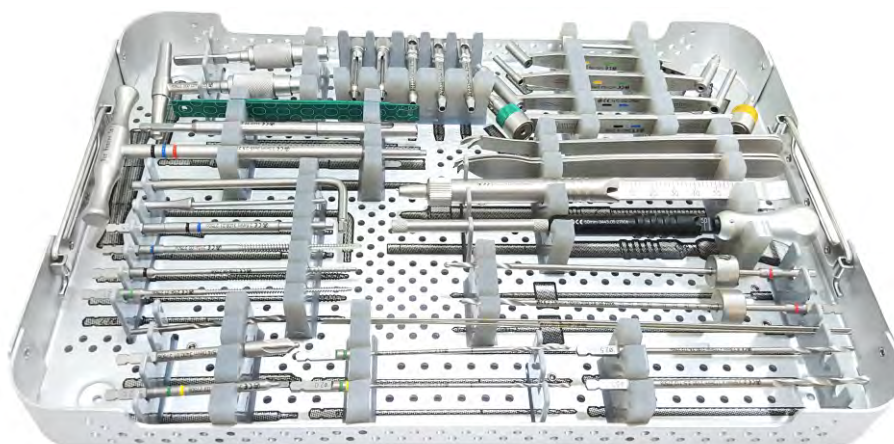
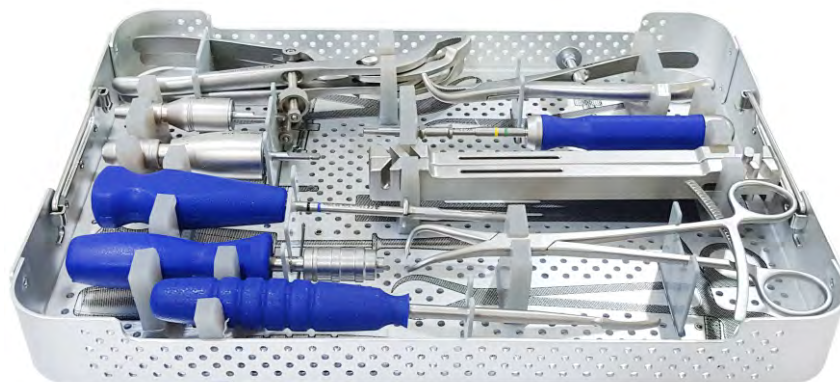


IC-2310-WL

Container for 3.5mm Wise-Lock Small Fragment Instrument Set



2302-000 Small Fragment Wise-Lock Instrument Set



2302-000 Small Fragment Wise-Lock Instrument Set

| Codes | Set Consisting of: | Units |
|---------------------|---|-------|
| 3443-37 | Depth Gauge, measuring range upto 60mm | 1 |
| 3445-2.5 | Screw Driver, Hex 2.5mm, Self-Retaining (for Screw Removal) | 1 |
| 3992-035 | Allen Key for Dill Bit Stopper Ø3.0mm | 1 |
| 2100-2.0-110 | Drill Bit with Quick Coupling, Ø2.0mm x Length 110mm | 2 |
| 2100-2.5-112 | Drill Bit with Quick Coupling, Ø2.5mm x Length 112mm | 1 |
| 2100-3.5-112 | Drill Bit with Quick Coupling, Ø3.5mm x Length 112mm | 1 |
| 2103-2.8-165 | Drill Bit with Quick Coupling with Stopper, Ø2.8mm x Length 165mm | 2 |
| 2104-27 | Bone Tap Quick Coupling for Wise Lock Screws, Ø2.7mm | 1 |
| 2104-02 | Bone Tap Quick Coupling for Cortical Screws, Ø3.5mm | 1 |
| 2104-04 | Bone Tap, Quick Coupling for Cancellous Screws, Ø4.0mm | 1 |
| 3400-01 | Countersink for Ø3.5/4.0mm Screws, Quick Coupling | 1 |
| 3408-01 | Hexagonal Screw Driver Shaft - 2.5mm Tip, Quick Coupling | 1 |
| 3408-03 | Hexagonal Screw Driver Shaft - 2.0mm Tip, Quick Coupling | 1 |
| 2186-2.5 | HSS Drill Bit, Ø2.5, Metal | 1 |
| 2106-1.2 | Guide Sleeve for Ø1.2mm K. Wires | 1 |
| 3443-05 | Depth Gauge, measuring range upto 50mm, for Ø2.4mm/2.7mm Screws | 1 |
| 3443-39 | Trephine | 1 |
| BT-SF-06 | Bending Template, Small | 1 |
| BT-SF-08 | Bending Template, Medium | 1 |
| BT-SF-10 | Bending Template, Large | 1 |
| 3402-000 | T-Handle with Quick Coupling | 1 |
| 1472-054 | Quick Coupling Shaft | 1 |
| TDG-2.7 | Threaded Drill Guide, Ø2.7mm (For Drill Bit 2.0mm) | 2 |
| 3441-18 | Threaded Drill Guide, Ø3.5mm (For Drill Bit 2.8mm) | 3 |
| 3420-01 | Drill Sleeve Insert, Ø3.5/2.5mm | 1 |
| 1472-036 | Drill Guide 2.0mm | 1 |
| 1472-044 | Double Drill Guide, Ø2.0/2.7mm | 1 |
| 1472-046 | Self Centering Double Drill Guide, Ø2.5/3.5mm | 1 |
| 3441-16 | Drill Guide for Neutral and Loaded Position, Ø3.5mm | 1 |
| 1472-066 | Hohmann Retractor, 6.5mm | 1 |
| 1472-068 | Hohmann Retractor, 8.5mm | 1 |
| 2146-018 | Hohmann Retractor, 15.5mm | 2 |
| 2149-1012 | Periosteal Elevator, Straight, 12mm | 1 |
| 3406-02 | Hexagonal Screw Driver-2.0mm Tip | 1 |
| 3406-02S | Screw Holding sleeve for 2.0mm Tip Screwdriver | 1 |
| 3406-03 | Hexagonal Screw Driver-2.5mm Tip | 1 |
| 3406-03S | Screw Holding sleeve for 2.5mm Tip screwdriver | 1 |
| 3409-01L | Small Bending Iron, Left | 1 |
| 3409-01R | Small Bending Iron, Right | 1 |
| 2107-1180 | Reduction Forcep, Pointed, Ratchet Lock, 180mm | 1 |
| 2106-1160 | Reduction Forcep, Serrated Jaws, Speed Lock, 160mm | 1 |

| Codes | Set Consisting of: | Units |
|-------------------|---|-------|
| 2106-190 | Self Centering Bone Holding Forcep, Speed Lock, 190mm | 2 |
| 2150-1006S | Periosteal Elevator with Silicon Handle, Curved, 6mm | 1 |
| TQ-2.0 | Torque Limiting Attachment, 0.8Nm | 1 |
| TQ-2.5 | Torque Limiting Attachment, 1.5Nm | 1 |
| 1472-064 | Toque Screw Driver Handle | 1 |
| GW-1.2-230 | Guide Wire with Threaded Trocar Tip, Ø1.2mm x Thread Length 10mm x Length 230mm | 3 |
| 3415-000 | Screw Holding Forcep For 3.5mm Wise-Lock Small Fragment System | 1 |
| ST-007NW | Screw Caddy For 3.5mm Wise-Lock Small Fragment System | 1 |
| 7-050-03 | Instrument Trays For 3.5mm Wise-Lock Small Fragment Instrument Set | 2 |
| IC-2310-WL | Container for 3.5mm Wise-Lock Small Fragment Instrument Set | 1 |



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