MEDIN
ORTHOPAEDIC
IMPLANTS

PLATON-NAIL

TITANIUM

→ IMPLANT SYSTEM

MEDIN®

The nail allows insertion using a minimally invasive technique and early postoperative weight bearing, thus avoiding complications related to immobilization.

The conical distal end of the nail facilitates its insertion into the medullary cavity and prevents penetration through the lateral cortex during insertion.

The 4° medial-lateral angle of the nail allows its insertion from the apex of the greater trochanter, thus preventing complications such as secondary femoral fracture.

The nail allows static or dynamic locking in the distal end.

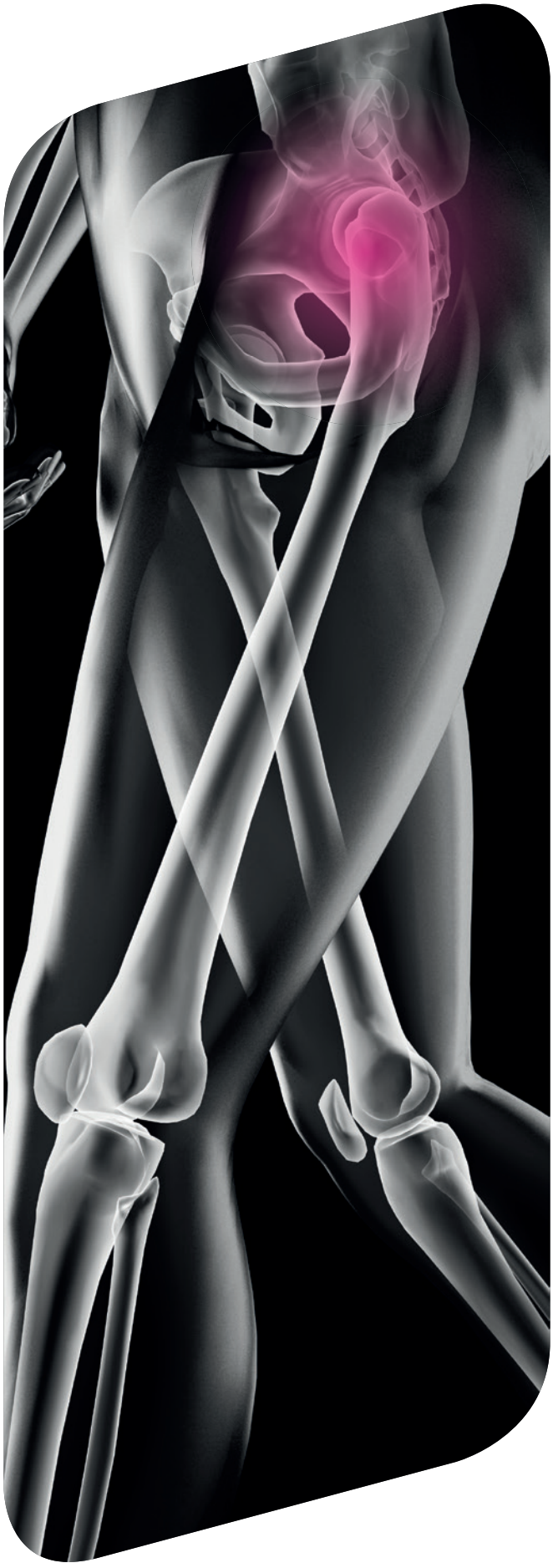
The nail system allows compression between the femoral neck and the trochanteric massif and also between the trochanteric massif and the femoral diaphysis, i.e. in the axis of the femoral diaphysis.

Fixation of the nail in the femoral head is provided by a femoral lag screw, which can be supplemented with an AR-Clip and a set screw. AR-Clip provides rotation control. The set screw prevents rotation of the femoral lag screw around the axis and, when tightened to a greater degree, blocks the sliding of the nail thus providing static proximal locking.

The design of the femoral lag screw allows stable fixation in the subchondral bone of the femoral head while preventing its migration, thus reducing the risk of cut-out effect and the risk of secondary fracture.

The anodized surface improves the biomechanical properties of the implants.

The instruments in the instrumentarium allow easy insertion of the nail and peroperative compression of the femoral head.



MEDIN IMPLANTS
FOR PRECISE CARE

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IMPLANT SYSTEM FEATURES

NAILS

- Material: Titanium alloy (ISO 5832-3)
- Proximal diameter: 17.5 mm
- Distal diameter: 10 mm
- Cannulated
- CCD angle: 125°; 130°
- M/L angle: 4°
- Allows static and dynamic locking
- Variants: Short and Long

SHORT VARIANT

- Length: 190 mm
- Universal shape

LONG VARIANT

- Lengths: 280 - 420 mm (20 mm increments)
- Right and left variant

INDICATIONS

- Inter-, per- and subtrochanteric fractures
- Inter-, per- and subtrochanteric fractures with torsionally unstable proximal fragment
- Combined fractures of the diaphysis and femoral neck
- Pathological fractures in the trochanteric and diaphyseal region of the femur
- Pathological or postoperative axial or angular deviations
- Pseudoarthrosis and instability after delayed femoral bone healing

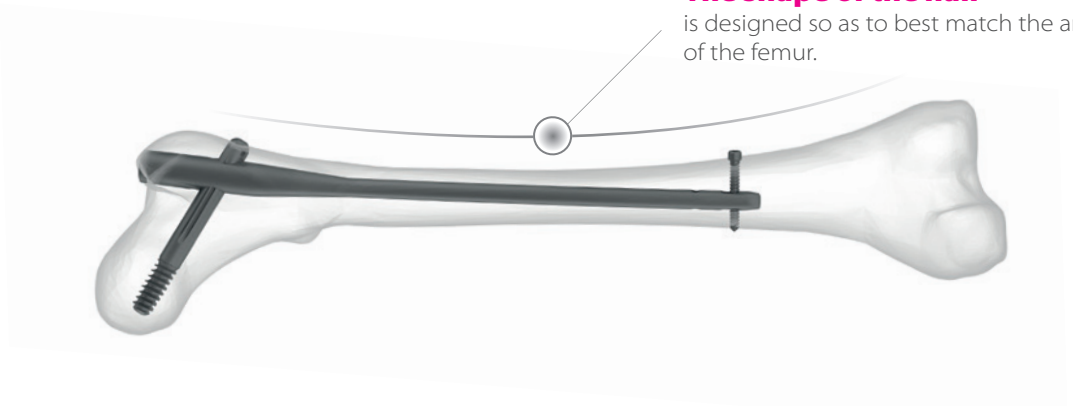
CAUTION!

1. This Surgical Technique Manual does not contain enough information necessary for immediate use of the implant! Always get acquainted with all information on the product label and in the Instructions for Use manual supplied by the manufacturer before using any Medin products.
2. The use of this device is intended exclusively for physicians specialized in traumatology, orthopedy and surgery, who went through the professional training for the device provided by Medin a.s.
3. A list of all accessories and instruments intended for use together with the nail is given in the appropriate section of this surgical technique.
4. Compatibility of respective implants and instruments was tested and certified. Use of the nail in combination with implants or instruments of other manufacturers is not permitted as it may result in damage to the implants or the patient.

   MEDIN, a.s. is not responsible for possible complications resulting from non-compliance with this instruction.
5. Tighten the screws by hand with adequate force. Excessive tightening of the locking screw may cause a diaphyseal cortical fissure or damage the firm anchorage of the screw in the bone, allowing it to migrate.
6. Intraoperative fluoroscopic checking with an X-ray intensifier is required.

   Note:
   Wherever the X-ray radiation symbol ☢ is shown, perform the X-ray check in several projections.
7. Implants are supplied non-sterile and are intended to be sterilized before use. Instructions necessary for the preparation of the implants can be found in the Instructions for Use manual.
8. Before using the drills, always check the number of previous uses, the maximum number of which is set at 30. If this number is exceeded, do not use the drill, dispose of it or send it to the manufacturer for sharpening. Failing that creates a risk of prolonging the surgery or making it impossible to insert the screws.
9. Make sure the surface of the instruments is unimpaired, and that they are correctly set and functional. Do not use instruments that are badly damaged, have illegible markings, show signs of corrosion or have dull blades. Dispose of such instruments. Your MEDIN a.s. sales representative will provide you with further detailed instructions regarding functionality testing. Only the manufacturer is authorized to carry out service maintenance.
10. When taking measurements, make sure that the sleeves fit tightly to the bone. This will make sure the measurements are as accurate as possible.

The shape of the nail
is designed so as to best match the anatomy of the femur.



FUNCTIONAL ELEMENTS OF THE NAILS

→ PLATON-Nail

- Long and short variants of the nail allow treatment of a wide range of proximal femur and diaphyseal fractures
- Allows for immediate post-operative weight bearing
- The conical distal end of the nail prevents perforation of the cortex during insertion and allows easy passage through the medullary cavity

→ Femoral Lag Screw PLATON

- 12 mm diameter, 75–120 mm length, self-tapping thread, cannulated
- Allows compression of the main fragments in the neck axis perpendicular to the fracture line
- The thread design minimizes the risk of migration and cut-out effect

→ AR-Clip PLATON

- 5 sizes to fit the length of the femoral lag screw
- Prevents rotation of femoral head and neck fragments
- Optional implant

→ Set Screw PLATON

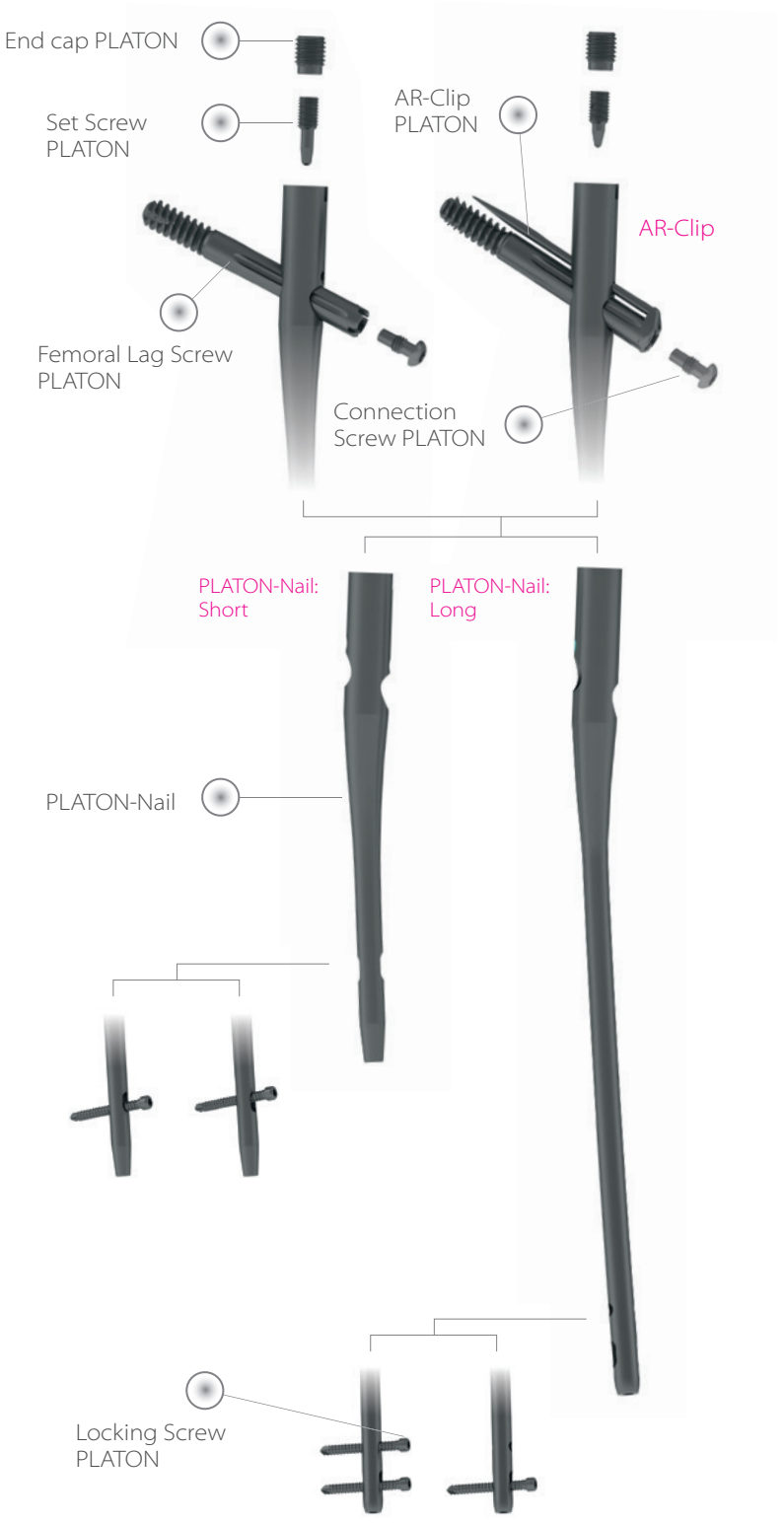
- Allows static locking of the femoral lag screw
- Defines the sliding distance of the femoral lag screw
- Prevents rotation of the femoral lag screw around its axis
- Optional implant

→ AR-Clip Set Screw PLATON

- Allows static locking of the femoral lag screw and AR-Clip
- Defines the sliding distance of the femoral lag screw and AR-Clip
- Optional implant

→ Connection Screw PLATON

- Connects the femoral lag screw and AR-Clip
- Prevents tissue ingrowth into the femoral lag screw
- Optional implant



→ Locking Screw PLATON

- 5 mm diameter, 25 - 95 mm length, self-tapping thread
- Allows static or dynamic distal nail locking (Short and Long nail variants)
- Possibility of secondary distal dynamization (Long nail variant)
- Provides rotational stability of the nail

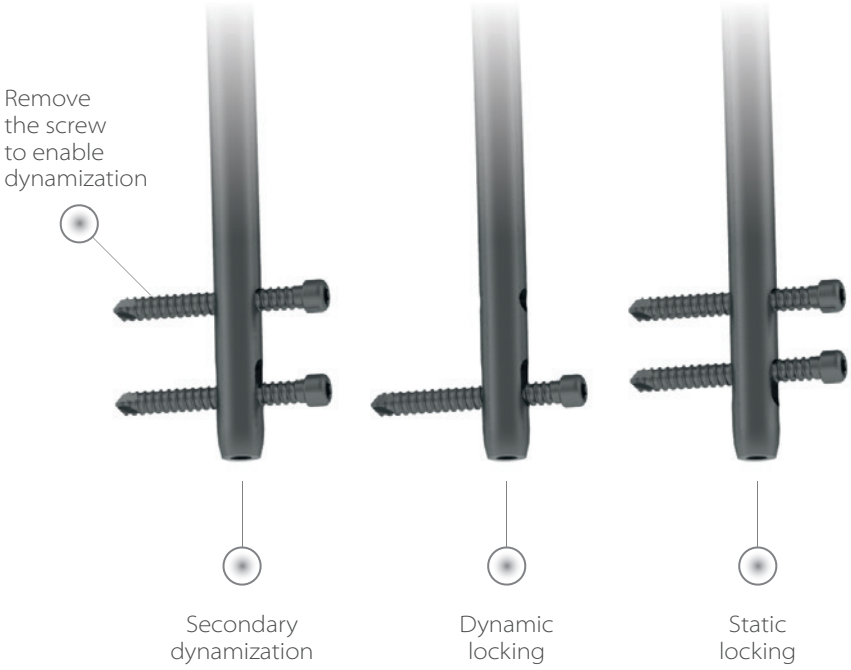
→ End Cap PLATON

- Prevents tissue ingrowth into the proximal end of the nail
- Facilitates the eventual extraction of the nail
- Optional implant

↓ DISTAL LOCKING OPTIONS

PLATON Short Nail

PLATON Long Nail



PLATON AIMING DEVICE

- The proximal aiming system is designed for insertion of the lag screw and AR-Clip of the short and long variant of the nail, and for distal locking of the short variant of the nail.
- Distal locking of the long nail variant is performed using the "free hand" technique.
- The aiming device consists of three main components – the aiming arm, the locking ring and the aiming head.

01
PATIENT POSITIONING

› Place the patient in the supine position on a radiolucent operating table with orthopaedic extension. Position the healthy lower extremity in flexion at the hip and knee, and then position it in abduction into the leg support extension as far as possible to create sufficient room for the X-ray intensifier. Adjust the C-arm to view the proximal femur and the entire fracture area in two mutually perpendicular projections, AP and lateral. It should be possible to view both ends of the nail [fig. 1.1].

02
FRACTURE REDUCTION

› Perform a closed manual reduction of the fracture under fluoroscopic control on the extension table. Reposition the fracture by pulling in line with the femoral axis. Perform an open reduction if the results are not satisfactory.

Caution

Before the insertion of the nail, the fracture must always be reduced. Reduction after the nail insertion is no longer possible.

Note

Precise anatomical reduction and safe immobilization of the patient on the operating table is essential to achieve a good surgical outcome.

03
NAIL SELECTION

› Select the nail based on measurements. Measurements can be taken as part of pre-operative planning. However, it should always be verified in relation to previous reduction.

› First, verify the position of the individual bone fragments under fluoroscopic examination.

› Use a radiopaque X-ray ruler (397 129 69 9190) to determine the length of the nail [Fig. 3.1]. Apply the ruler along the medullary canal, with the tapered end at the level of the piriformis fossa and the planned entry point, up to where the nail should end. Assess the length of the nail.

› It is recommended to have a well-defined image of the pelvis with both hip joints in order to establish the CCD angle. Apply a template or goniometer to the X-ray image in AP projection to estimate the CCD angle. After the reduction, check the CCD angle on the monitor using the template and compare it with the healthy hip image. A 15% magnification should be used.

Note

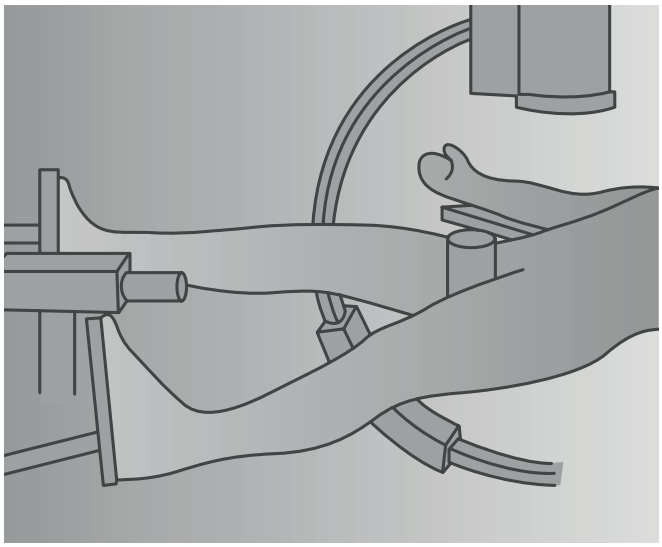
The list of all available nail sizes can be found in section C of this surgical technique.

Note

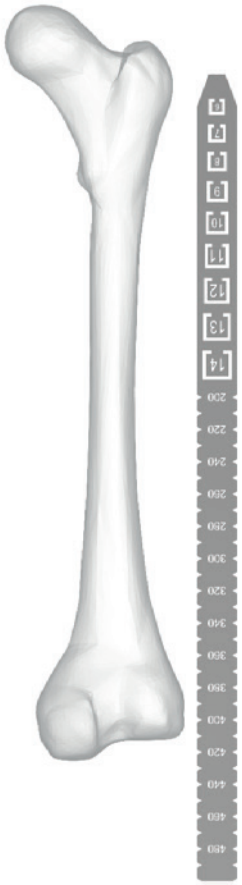
The nail selection must be made with regard to the type of fracture and the diameter of the medullary cavity.

→ INSTRUMENTS

REF	Name
397 129 69 9190	Ruler; 500 mm
208-200	Template for PLATON-Nail



→ Fig. 1.1.



→ Fig. 3.1.

04
SURGICAL APPROACH (ENTRY POINT)

- Before the actual incision, palpate the dorsal edge of the greater trochanter. The entry point is located lateral to the anatomical axis of the femur, at the apex of the greater trochanter, approximately at the border of its anterior and middle thirds in the antero-posterior direction.
- Run the incision longitudinally in line with the axis of the medullary canal, 5 cm proximal to the tip of the greater trochanter, with reference to the patient's anatomy.
- Perform the check fluoroscopically in AP and lateral view. [fig. 4.1]

Note

The length of the incision depends on the patient's habitus and must be correspondingly longer in an obese patient.

05
INSERTION OF GUIDE WIRE

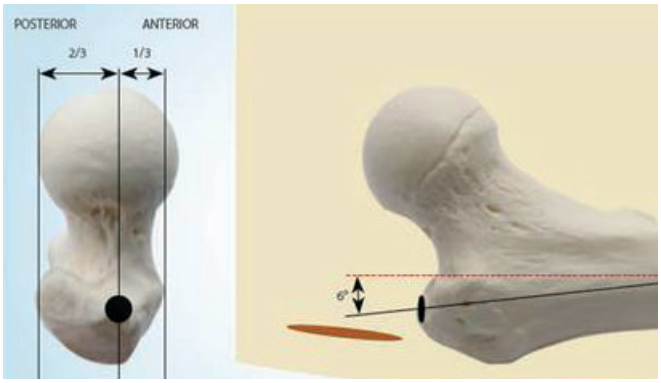
- In order to enter, use the (203-104) drill sleeve inserted into the (202-107) drill sleeve, through which the guide wire (206-100) is inserted to the apex of the greater trochanter and further into the femoral cavity under fluoroscopic control. Perform an axial projection to verify the position of the guide wire. It is imperative that the wire passes through the centre of the diaphysis. [fig. 5.1]
- It is also possible to use the perforator (203-123) to open the medullary cavity before inserting the guide wire.
- Use the cannulated drill (203-110) to enter the medullary cavity. Remove the inner (203-104) drill sleeve and drive the drill over the (206-100) guide wire through the (202-107) drill sleeve. It is sufficient to pre-drill only the area of the trochanteric massif because only the proximal part of the nail is strengthened. The diameter of the entry hole should be extended up to 18 mm [fig. 5.2].
- Check the pre-drilling depth under fluoroscopic control with an X-ray intensifier.
- In the vast majority of cases, distal femoral pre-drilling is not necessary. It is only pre-drilled when the diameter of the cavity prevents a safe insertion of the nail. Reaming of the femoral cavity can only be performed after the reduction has been achieved, as unlike diaphyseal fractures, the insertion of the nail does not result in spontaneous reduction. The cavity is pre-drilled with a reamer 1 mm larger than the diameter of the nail. The nail is then easily inserted into the femoral cavity with gentle rotational movements.
- For pre-drilling, use the medullary cavity reaming system as described in the OP064 surgical technique.

Caution

Medullary cavity reamers for pre-drilling the medullary cavity are not part of the instrumentarium.

→ INSTRUMENTS

REF	Name
203-123	Perforator; D13, 60 mm, cannulated
206-100	Guide Wire; 3.2 x 450 mm
202-107	Drill Sleeve; 21/19 x 140 mm
203-104	Drill Sleeve; 19/3.6 x 172 mm
203-110	Drill; 17.5/3.5 x 269 mm, triangular coupling



→ Fig. 4.1.

→ Fig. 5.1.

→ Fig. 5.2.

06

PREPARATION OF NAIL AND AIMING DEVICE

→ SETTING UP THE AIMING HEAD:

› First, loosen the locking ring [1]. Partially pull out [2] and rotate the aiming head to the desired position so that the colored grooves marked on the aiming head and the aiming arm are opposite each other [3]. Then lock the head by clicking it into the inner hexagon in the aiming arm [4] and tighten the locking ring [5].

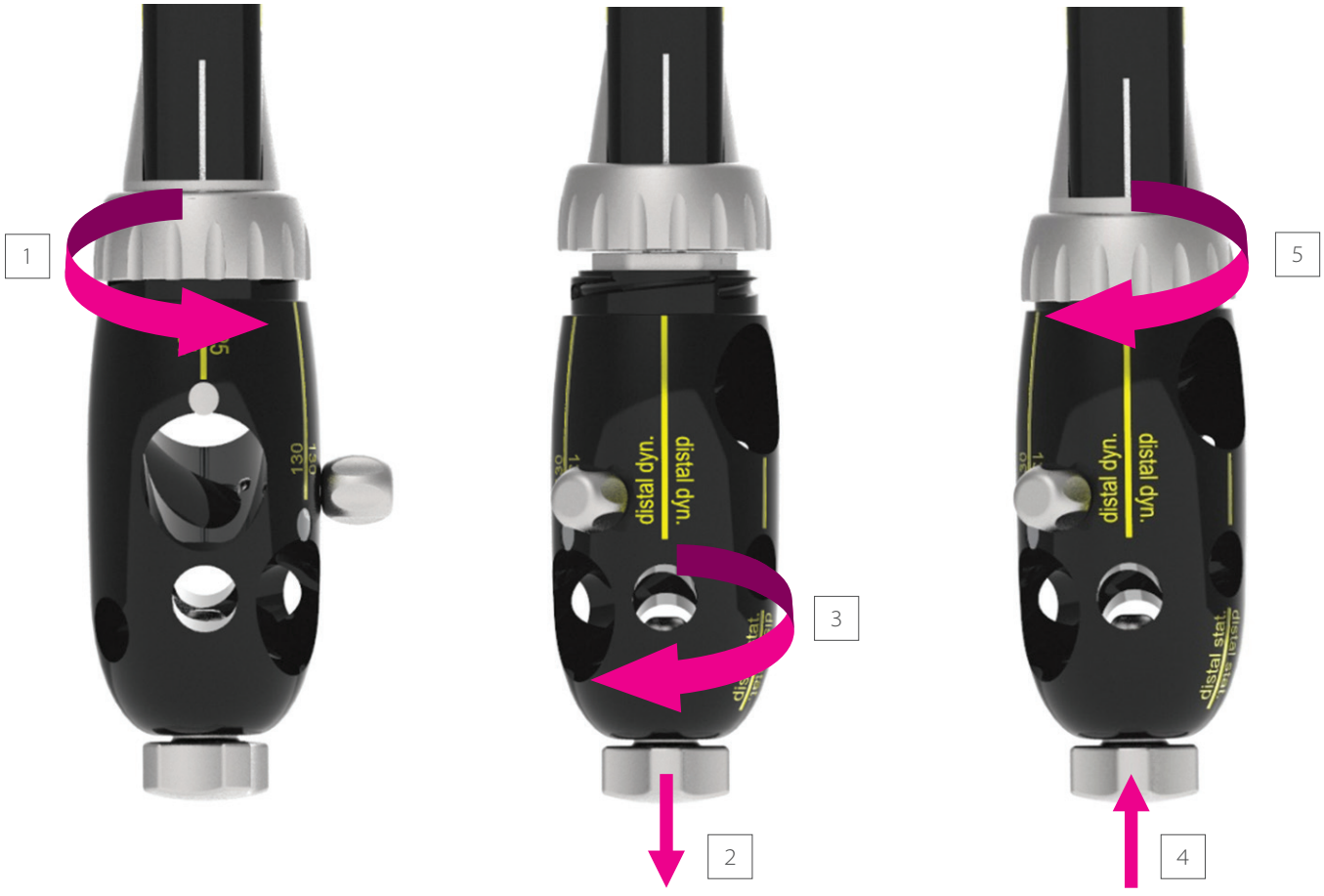
→ SETTING UP THE AIMING HEAD:

› CCD angle 125°

› CCD angle 130°

› Distal dynamic locking (only short PLATON-NAIL)

› Distal static locking (only short PLATON-NAIL)



› Insert the nail onto the aiming arm so that the grooves of the proximal end of the nail and the clamping part of the aiming arm fit exactly together. Using the T wrench (201-110), extender bit (201-115) and M12 screw (204-110), connect the nail to the aiming arm and tighten securely. [Fig. 6.1]

→ INSTRUMENTS

REF	Name
204-106	Aiming device for nail; PLATON
201-110	T wrench; SW 10
201-115	Extender bit; SW 10
204-110	Aiming device screw; M12

→ TESTING FUNCTIONALITY OF AIMING DEVICE

› After securing the nail to the aiming arm, set the CCD angle (125° or 130°) on the aiming head. Test the aiming of the proximal hole in the nail by inserting the guide sleeves (202-135, 202-136) and the drill (203-102). The drill must go easily into the proximal hole in the nail [Fig. 6.2].

→ Fig. 6.2.

› For the PLATON short nail, also test the distal aiming. Check the static and dynamic locking with the sleeves (202-133, 202-134) and the drill (203-146). [Fig. 6.3]

→ Fig. 6.3.

⚠ Caution

If, after following all the instructions for assembling the aiming device and connecting the nail, the holes in the nail do not match the holes in the aiming device, stop the surgery! Improper assembly of the aiming device and its connection to the nail or inaccuracy of the aiming device may cause: inaccurate drilling, insertion of screws outside the nail, damage to the instruments or the patient, instability and subsequent failure of the osteosynthesis!

→ INSTRUMENTS

REF	Name
202-135	Guide Sleeve; 16/14 × 204 mm
202-136	Guide Sleeve; 14/12 × 220 mm
203-102	Drill; 12/3.5 × 427 mm, triangular coupling
202-133	Guide Sleeve; 11/7 × 160 mm
202-134	Drill Sleeve; 7/4.3 × 180 mm
203-146	Drill; 4.3 × 300 mm; AO coupling

→ Fig. 6.1.

07
NAIL INSERTION

› Insert the nail over the guide wire in a slight rotational motion into the medullary cavity. The depth and rotation of the nail should be checked fluoroscopically. Refer to the position of the hole for the lag screw. [fig. 7.1]

Note

The use of a hammer is not recommended because of the risk of iatrogenic femoral fracture. However, its gentle and careful application to the last few millimetres ensures the ideal seating of the long variant of the PLATON nail. Finish the nail insertion by gently tapping the impactor (205-100) with a hammer.

Caution

Do not use a surgical hammer to insert the nail into the medullary cavity. Damage to the aiming device or patient could occur!

› Check the correct position of the nail fluoroscopically under the X-ray intensifier in two projections. The nail must be inserted deep enough so that in the AP projection the lag screw is slightly below the axis of the neck. The ideal position of the lag screw in the AP projection is the lower quadrant of the femoral head. In lateral or axial projection, the screw should pass through the centre. [fig. 7.2][fig. 7.3]

› Alternatively, the position of the nail can be checked by inserting a long wire in the longitudinal axis of the lag screw hole under fluoroscopic control. [Fig. 7.2][Fig. 7.3]

→ Fig. 7.2.

→ Fig. 7.3.

→ INSTRUMENTS

REF	Name
205-100	Impactor; 8 mm

→ Fig. 7.1.

08
LAG SCREW INSERTION

› There are two ways of how to insert the lag screw. The screw can be inserted either without temporary fixation of the proximal fragment against rotation or with fixation of the proximal fragment. Both of these insertion methods are described below.

Note

Sleeves and drills are colour coded for easy identification and easier orientation during the operation.

A. METHOD WITHOUT FIXING THE PROXIMAL FRAGMENT AGAINST ROTATION

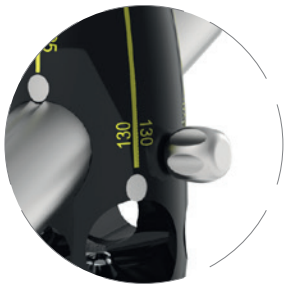
› Remove the guide wire from the medullary cavity.

› Adjust the CCD angle on the aiming head according to the selected nail. Insert the trocar (203-147) into the guide sleeve (202-135) and guide it through the hole in the aiming head all the way to the skin.

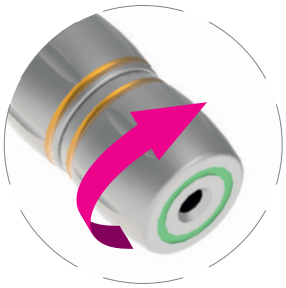
› Make a point incision and bring the trocar and sleeve to the bone. Remove the trocar and push the guide sleeve gently against the bone. Secure the sleeve against sliding by tightening the screw on the side of the aiming head. [Detail 8.1]

› Then insert the guide sleeve (202-136) with the drill sleeve (202-132) into the secured guide sleeve. Fix the two sleeves together by tightening the thread. [fig. 8.1] [Detail 8.2]

→ Fig. 8.1.



Detail 8.1.



Detail 8.2.

→ Fig. 8.2.

Detail 8.3.

› Make sure that the locking ring of the aiming device is tightened sufficiently. Otherwise there is a risk of inaccurate drilling.

› To facilitate the insertion of the guide wire, pre-drill the lateral cortex with the drill (203-146).

› After pre-drilling, replace the drill sleeve (202-132) with the drill sleeve (202-111).

› Using the hand chuck (200-110), insert the guide wire (206-100) through the drill sleeve into the subchondral bone of the femoral head. [Detail 8.3] The end of the wire should be inserted at a distance of 3-5 mm from the contour of the head [Fig. 8.2].

Caution

During subsequent drilling of the hole and insertion of the lag screw, it is necessary to monitor the tip of the guide wire to avoid perforation of the head and acetabulum and injury to the vascular structures of the pelvis!

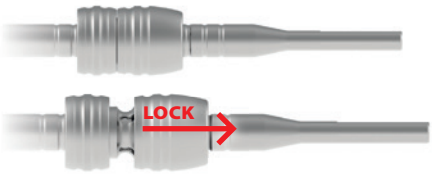
Caution

It is essential that the wire is inserted accurately. Future correction of the lag screw position is not possible!

Note

To avoid incorrect wire insertion, it is recommended to hold the aiming arm in the correct position with a slight upward counter pressure during the drilling process.

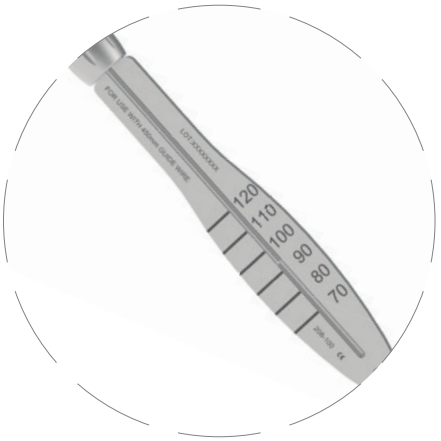
- Estimate the length of the lag screw by applying the gauge (208-100) to the guide wire. The end of the guide wire will show the length of the lag screw on the gauge scale [Detail 8.4].
- The drill (203-102) is equipped with an adjustable stop. Set the desired value of the lag screw length and lock by clicking. The correct setting has been made if the desired value is legibly set on the side facing the tip of the drill. [Detail 8.5]



Detail 8.5.

- Insert the drill (203-102) into the guide sleeve and manually pre-drill the hole for the lag screw using the hand chuck (200-110). Drill until the drill stop stops against the guide sleeve. [fig 8.3]

→ Fig. 8.3.



Detail 8.4.

Note

The lag screw is self-tapping. Using a tap is usually not necessary. If the bone is very hard, manual tapping can be done with a tap (203-103) attached to a T wrench (201-131) to facilitate insertion of the lag screw.

- Attach the lag screw to the T wrench (201-131) and insert it over the guide wire under X-ray control into the pre-drilled hole. Check the insertion depth by referring to the groove on the T wrench. The groove must be in line with the edge of the guide sleeve. [fig 8.4] [Detail 8.6]
- The silicone handle of the T-wrench must be in a position either parallel or at right angles to the aiming arm. This ensures that the set screw is positioned in one of the four grooves in the lag screw. [fig. 8.5]
- If the handle is not adjusted as described above, it must be turned clockwise until this position is achieved.

Caution

The lag screw should not be turned in the opposite direction during insertion as its firm anchorage in the spongiosa may be disturbed.

Note

Provided that the lag screw is firmly anchored in a dislocated proximal fragment, the fracture can be compressed by rotating the nut on the T wrench clockwise. [Detail 8.7]

→ Fig. 8.4.

Detail 8.6.

Detail 8.7.

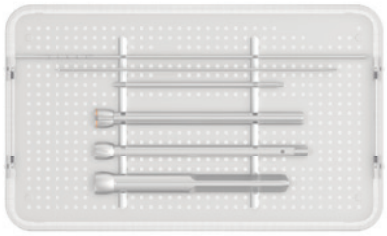
→ Fig. 8.5.

→ INSTRUMENTS

REF	Name
203-147	Trocar; 14 × 235 mm
202-136	Guide Sleeve; 14/12 × 220 mm
202-132	Drill Sleeve; 12/4.3 × 240 mm
203-146	Drill; 4.3 × 300 mm; AO coupling
200-110	Hand Chuck; BT23-116-M8-K68
206-100	Guide Wire; 3.2 × 450 mm
208-100	Gauge; for wire, 3.2 mm
203-102	Drill; 12/3.5 × 427 mm, triangular coupling
203-103	Tap; for femoral lag screw, 12 × 110 mm
201-131	T wrench; for femoral lag screw
202-111	Drill Sleeve; 12/3.2 × 240 mm

B. METHOD WITH FIXING THE PROXIMAL FRAGMENT AGAINST ROTATION

› The instruments for fixing the proximal fragment against rotation and for the insertion of the AR-Clip are in a separate tray [fig. 8.6].



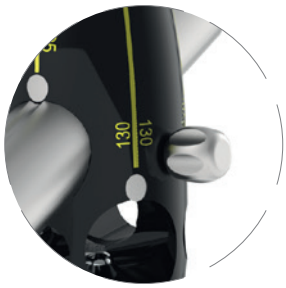
→ Fig. 8.6.

REF	Name
210-126	Instruments fo AR-Clip

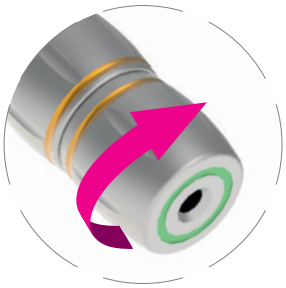
› Adjust the CCD angle on the aiming head according to the selected nail. Insert the trocar (203-107) into the guide sleeve (202-108) and guide it through the hole in the aiming head all the way to the skin.

› Make a point incision and bring the trocar and sleeve to the bone. Remove the trocar and push the guide sleeve gently against the bone. Secure the sleeve against sliding by tightening the screw on the side of the aiming head. [Detail 8.9]

› Then insert the guide sleeve (202-106) with the drill sleeve (202-132) into the secured guide sleeve (202-108). Fix the two sleeves together by tightening the thread. [fig. 8.7] [Detail 8.8]



Detail 8.9.



Detail 8.8.

› Make sure that the locking ring of the aiming device is tightened sufficiently. Otherwise there is a risk of inaccurate drilling.

› Before inserting the guide wire, pre-drill the lateral cortex with the drill (203-146).

› After pre-drilling, replace the drill sleeve (202-132) with the drill sleeve (202-111).

› Using the hand chuck (200-110), insert the guide wire (206-100) through the drill sleeve into the subchondral bone of the femoral head (up to 5 mm). [fig 8.8] [Detail 8.10]

Caution

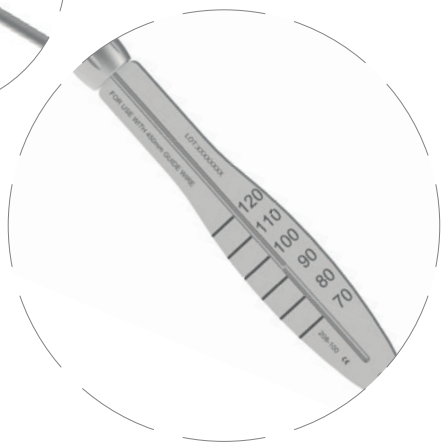
It is essential that the guide wire is inserted accurately. Future correction of the lag screw position is not possible. Check the progress of the insertion fluoroscopically under an X-ray intensifier!

Note

To avoid incorrect wire insertion, it is recommended to hold the aiming arm in the correct position with a slight upward counter pressure during the drilling process.

- Estimate the length of the lag screw by applying the gauge (208-100) to the guide wire. The length of the lag screw corresponds to the penetration depth of the guide wire (i.e. the length of the guide wire protruding from the sleeve).
- On the gauge scale, the end of the guide wire will show a value corresponding to the length of the lag screw. [Detail 8.11]
- To prevent rotation of the proximal fragment during drilling and when tightening the lag screw, you can temporarily fix the proximal fragment with a fixing wire (206-101).
- After removing the drill sleeve (202-111), insert the fixing wire using the adapter (206-102) into the upper hole of the guide sleeve (202-106). Check the insertion depth of the fixing wire via the groove. After insertion, the groove of the fixing wire must be in alignment with the guide sleeve (202-108). [fig. 8.9] [Detail 8.12]

Detail 8.10.

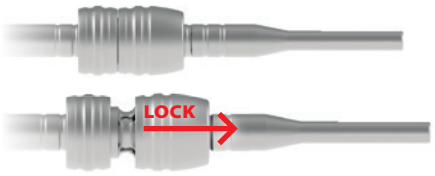


Detail 8.11.

→ Fig. 8.7.

→ Fig. 8.8.

- The drill (203-102) is equipped with an adjustable stop. Set the desired value of the lag screw length and lock by clicking. The correct setting has been made if the desired value is legibly set on the side facing the tip of the drill. [Detail 8.13]



Detail 8.3.

- Insert the drill into the guide sleeve and manually pre-drill the hole for the lag screw using the hand chuck (200-110). Drill clockwise until the drill stop stops against the guide sleeve. [fig. 8.10]

Note

The lag screw is self-tapping. Using a tap is usually not necessary. If the bone is very hard, manual tapping can be done with a tap (203-103) attached to a T wrench (201-131) to facilitate insertion of the lag screw.

- Remove the drill sleeve (202-111) before inserting the lag screw.

Caution

In the case of nail locking without AR-Clip (see Chapter 08-A), remove the fixing wire (206-101) before inserting the lag screw, as it would prevent compression of the fragments.

- Attach the lag screw to the T wrench (201-131) and guide it over the guidewire into the subchondral bone of the femoral head under fluoroscopic control. Check the insertion depth by referring to the groove on the T wrench. The groove must be in alignment with the edge of the guide sleeve after the screw is inserted. [fig. 8.11] [Detail 8.14]
- The silicone handle of the T wrench must be in a position either parallel or at right angles to the aiming arm. This ensures that the set screw is positioned in one of the four grooves in the lag screw.
- If the handle is not adjusted as described above, it must be turned clockwise until this position is achieved. [fig. 8.12]

Caution

The lag screw should not be loosened again after insertion as this could compromise its firm anchorage in the bone.

Note

Provided that the lag screw is firmly anchored in a dislocated proximal fragment, the fracture can be compressed by rotating the nut on the T wrench clockwise. [Detail 8.15]

Detail 8.12.

→ Fig. 8.9.

→ Fig. 8.10.

→ Fig. 8.11.

Detail 8.14.

Detail 8.15.

→ Fig. 8.12.

→ INSTRUMENTS

REF	Name
210-126	Instruments for AR-Clip
202-108	Guide Sleeve; 24×205 mm
203-107	Trocar; 14×232 mm
202-106	Guide Sleeve; 19.3×220 mm
202-132	Drill Sleeve; 12/4.3×240 mm
203-146	Drill; 4.3 × 300 mm; AO coupling
202-111	Drill Sleeve; 12/3.2×240 mm
200-110	Hand Chuck; BT23-116-M8-K68
206-100	Guide Wire; 3.2×450 mm
208-100	Gauge; for wire, 3.2 mm
206-101	Fixing wire; 4×300 mm
206-102	Adapter for fixing wire; 6×180 mm
203-102	Drill; 12/3.5×427 mm, triangular coupling
203-103	Tap; for femoral lag screw, 12×110 mm
201-131	T wrench; for femoral lag screw

09

SET SCREW AND CONNECTION SCREW INSERTION

› In lateral and medial fractures, rotation of the femoral head and neck fragments can be prevented with an AR-Clip. However, successful osteosynthesis is not conditioned by the use of AR-Clip.

› Use the set screw to secure the lag screw and AR-Clip against rotation. A connection screw is used to connect the lag screw to the AR-Clip. This screw can be used to protect the threaded hole of the lag screw against tissue ingrowth even if the AR-Clip is not inserted.

Caution

The perceived resistance when screwing in the set and connection screws is a common phenomenon and must be overcome. The thread design of both screws is adapted to prevent their spontaneous loosenin!

A. LOCKING WITHOUT AR-CLIP

› Insert the set screw (110-308) through the slot in the aiming device into the thread of the proximal end of the nail using the extender bit (201-120) attached to the T wrench (201-110). [fig. 9.1]

Caution

Before inserting the set screw, make sure that the handle of the T wrench is turned parallel or at a right angle to the aiming arm. This ensures that the set screw is correctly positioned and fits into the groove of the lag screw. [Detail 9.1]

Note

Check the correct position of the set screw by rotating the T wrench. If the set screw is stuck in one of the lag screw grooves, the T wrench cannot be rotated. If otherwise, repeat the procedure.

› Tighten the connection screw firmly to block sliding and achieve static proximal locking.

› Loosen the set screw back ¼ turn to ensure free sliding movement of the lag screw.

Caution

Do not loosen the set screw more than ¼ turn.

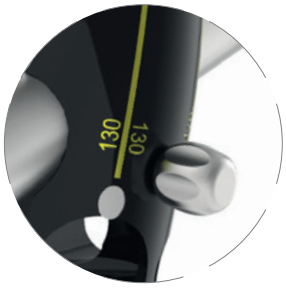
› The lag screw can be closed with a connection screw to prevent tissue ingrowth. Remove the guide sleeve (202-136) from the slot in the aiming device. Insert the connection screw (110-304) using the SW5 screwdriver (201-100) over the guide wire via the guide sleeve (202-135). [fig. 9.2]

› Loosen the side screw of the aiming head and remove the sleeve including the guide wire. [Fig. 9.3] [Detail 9.2]

→ Fig. 9.1.

Detail 9.1.

→ Fig. 9.2.



Detail 9.2.

→ INSTRUMENTS

REF	Name
201-120	Extender bit; SW 4
201-110	T wrench; SW 10
201-100	Screwdriver; A, SW 5
Alternative	
201-102	Screwdriver; T, SW 5

→ Fig. 9.3.

B. LOCKING WITH AR-CLIP

› If the fixing wire (206-101) has not been previously inserted, use the perforator (203-116) to open the lateral cortex. Insert the perforator with the hand chuck (200-110) into the upper part of the guide sleeve (202-106). Open the lateral cortex and with a slight rotational movement, guide the perforator through the opening of the nail to the level of the tip of the lag screw. Check the depth of the perforator insertion fluoroscopically [fig. 9.4]

› Once you reach the level of the tip of the lag screw, remove the perforator and guide sleeve (202-106).

Note

The AR-Clip should always be shorter than the lag screw.

› Insert the AR-Clip using the T wrench (201-131) through the sleeve and over the guide wire up to the lag screw. Then release the T wrench. [fig. 9.5] [Detail 9.3]

Detail 9.3.

→ Fig. 9.4.

→ Fig. 9.5.

› Insert the connection screw (110-304) using the SW5 screwdriver (201-100) over the guide wire via the guide sleeve (202-108). Tighten the screw. [fig 9.6]

→ Fig. 9.6.

› Insert the set screw (110-309) through the aiming device into the proximal end of the nail using the extender bit (201-120) attached to the T wrench (201-110) [fig. 9.7]

› The settings and options for inserting the set screw are described in section 9A.

› Tighten the set screw firmly and then loosen by ¼ turn. This ensures free sliding movement of the lag screw with the AR-Clip.

⚠ Caution

Do not loosen the set screw more than ¼ turn.

→ INSTRUMENTS

REF	Name
203-116	Perforator; 4 x 378 mm
200-110	Hand Chuck; BT23-116-M8-K68
201-131	T wrench; for femoral lag screw
201-120	Extender bit; SW 4
201-110	T wrench; SW 10
201-100	Screwdriver; A, SW 5
Alternative	
201-102	Screwdriver; T, SW 5

→ Fig. 9.7.

10

DISTAL LOCKING

› Distal locking with the aiming device is only done when using the PLATON short nail.

→ DISTAL LOCKING OF PLATON SHORT NAIL

› Set static or dynamic locking on the aiming head of the aiming device. [fig. 10.1]

⚠ Caution

Make sure that the locking ring of the aiming device is tightened firmly. Otherwise, there is a risk of inaccurate drilling, insertion of screws outside the nail, unstable osteosynthesis and its subsequent failure, damage to the instruments or the patient.

› Insert the trocar (203-144) into the guide sleeve (202-133) and secure it by turning it. Then guide the assembly through the slot in the aiming head all the way to the skin. Mark the entry point and perform an incision. Insert the sleeve with the trocar close to the bone. Remove the trocar and push the sleeve to the bone. Then fix the position of the sleeve against unwanted movement with the ring on the aiming head. [fig. 10.2]

› Insert the drill sleeve (202-134). Fix the two sleeves together by tightening the thread.

› Then insert the countersink (203-145) and open the cortex. [Fig. 10.3]

→ Fig. 10.1.

→ Fig. 10.2.

› Use the drill (203-146) guided through the sleeves to pre-drill a hole for the locking screw. Drill bicortically through the distal hole of the nail. The length of the locking screw can be assessed using the scale on the drill, provided that the sleeves are in close contact with the bone. [Fig. 10.4]

› Assess the length of the nail using a depth gauge (208-112) guided through the guide and drill sleeves. Insert the depth gauge into the pre-drilled hole through the sleeve assembly and catch the hook on the opposite cortex. Push the sliding part of the depth gauge tightly against the drill sleeve and assess the length of the screw from the scale. [Fig. 10.5] [Detail 10.1] [Detail 10.2]

Detail 10.1.

Detail 10.2.

› Remove the drill sleeve (202-134) from the guide sleeve (202-133). Insert the locking screw into the pre-drilled hole with a screwdriver SW 3.5 (201-106). Insert the locking screw under fluoroscopic control in two projections. At the same time, you can check the screw insertion using the screwdriver scale. [fig. 10.6]

› After inserting the last locking screw, remove the guide sleeve (202-133) from the aiming device and then remove the aiming device. Disassemble the aiming device using the extender bit (201-115) mounted on the T wrench (201-110).

→ INSTRUMENTS

REF	Name
203-144	Trocar; 7×185 mm
202-133	Guide Sleeve; 11/7×160 mm
202-134	Drill Sleeve; 7/4.3×180 mm
203-145	Countersink; 4.3 mm
203-146	Drill; 4.3×300 mm; AO coupling
201-115	Extender bit; SW 10
201-110	T wrench; SW 10
204-106	Aiming device for nail; PLATON
208-112	Depth gauge, 2.5×90 mm
201-106	Screwdriver; A, SW 3.5
Alternative	
201-105	Screwdriver; T, SW 3.5

→ Fig. 10.3.

→ Fig. 10.4.

→ Fig. 10.5.

→ Fig. 10.6.

→ DISTAL LOCKING OF PLATON LONG NAIL (free hand technique)

› Depending on the type of fracture, choose static, dynamic or subsequent dynamic distal locking.

⚠ Caution

Check the correct position of the fragments and the rotation and length of the femur before inserting distal locking!

› After checking, position the C-arm to the side projection. The C-arm must be positioned relative to the extremity in such a way that the nail hole can be seen in an accurate AP projection, i.e. the hole will be in the shape of a regular circle in the X-ray image.

› It is necessary to center it directly on the hole (the hole is in the center of the monitor) to avoid distortion.

› Under fluoroscopic control, place the tip of the scalpel on the skin over the centre of the hole and make a point incision to the bone. [Detail 10.3]

› Drive the drill (203-146) through the incision. Under fluoroscopic control, place the drill tip over the centre of the hole. [Detail 10.4]

Detail 10.3.

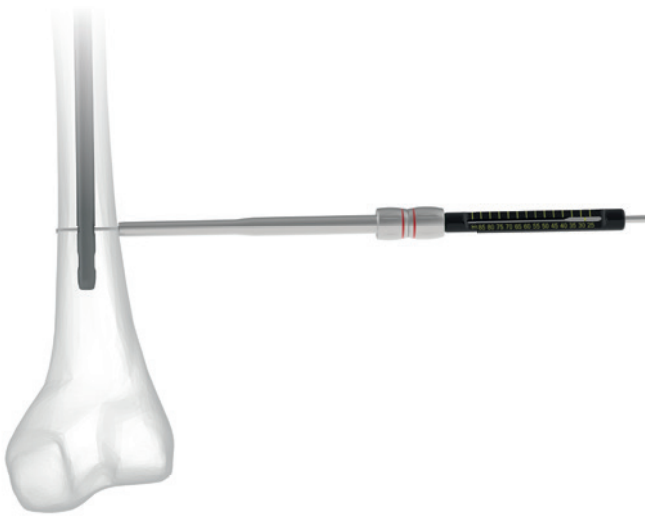
Detail 10.4.

› Position the drill perpendicular to the bone and pre-drill a hole for the locking screw. Drill holes bicortically through the nail hole under fluoroscopic control.

› Assess the length of the nail using the depth gauge (208-112). The depth gauge must be used in combination with the guide (202-133) and drill (202-134) sleeves. Insert the depth gauge into the pre-drilled hole through the sleeve assembly and catch the hook on the opposite cortex. Push the sliding part of the depth gauge tightly against the drill sleeve and assess the length of the screw. [fig. 10.7] [Detail 10.5] [Detail 10.6]

Detail 10.5.

Detail 10.6.



→ Fig. 10.7.

→ Fig. 10.8.

› Remove the drill sleeve (202-134) and the guide sleeve (202-133). Insert the locking screw into the pre-drilled hole with a screwdriver SW 3.5 (201-106) under fluoroscopic control.

→ INSTRUMENTS

REF	Name
203-146	Drill; 4.3 × 300 mm; AO coupling
208-112	Depth gauge, 2.5 × 90 mm
202-133	Guide Sleeve; 11/7 × 160 mm
202-134	Drill Sleeve; 7/4.3 × 180 mm
201-106	Screwdriver; A, SW 3.5
Alternative	
201-105	Screwdriver; T, SW 3.5

11

CLOSING THE NAIL

› After removing the aiming device, insert the end cap (110-301) using the extender bit (201-120) mounted on the T wrench (201-110) and close the nail. [fig. 11.1] [Detail 11.1]

Note

The end cap protects the proximal end of the nail against tissue ingrowth and thus facilitates the eventual extraction of the nail.

→ INSTRUMENTS

REF	Name
201-120	Extender bit; SW 4
201-110	T wrench; SW 10

Detail 11.1.

12
IMPLANT EXTRACTION

Caution

The hammer for nail extraction is not part of the instrumentarium!

REF	Name
397 129 69 5670	Hammer for implants; M12×495 mm, 1000g

- First, create access to the locking screws by incision. It is possible to navigate according to the scars from the prior insertion. Clean the screws thoroughly of any ingrown tissue. Loosen and remove the distal screws using a SW 3.5 screwdriver (201-106).
- Make an incision at the entry point of the nail at the apex of the greater trochanter and insert the extender bit (201-120) mounted on the T wrench (201-110) into the hexagonal hole in the end cap.
- Remove the end cap and set screw (if present).
- Make an incision at the entry point of the lag screw and remove the connection screw (110-304) using a SW 5 screwdriver (201-100).

Note

Inserting a guide wire (206-100) into the lag screw can facilitate the subsequent steps in extracting the connection screw, AR-Clip and lag screw.

- Use the T wrench (201-131) to remove the AR-Clip. Screw the T wrench into the threaded hole in the AR-Clip and remove it by pulling.

Note

Alternatively, holding forceps or similar instrument can be used.

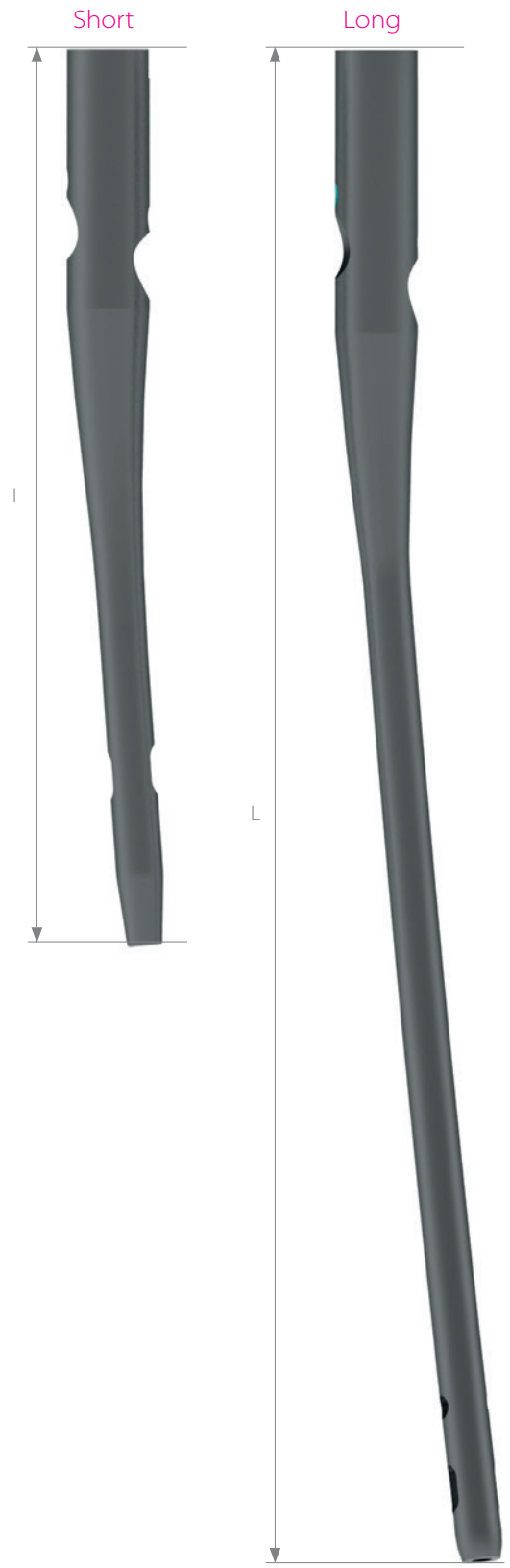
- Remove the lag screw using the T wrench (201-131). We recommend using the hammer for implants (397 129 69 5670) to extract the nail. Screw the hammer into the internal M12 thread in the nail and gradually pull the nail out with light blows. [fig. 12.1]

→ INSTRUMENTS

REF	Name
201-120	Extender bit; SW 4
201-110	T wrench; SW 10
206-100	Guide Wire; 3.2×450 mm
201-131	T wrench; for femoral lag screw
201-100	Screwdriver; A, SW 5
201-106	Screwdriver; A, SW 3.5
Alternative	
201-102	Screwdriver; T, SW 5
201-105	Screwdriver; T, SW 3.5

→ Fig. 12.1.

→ PLATON-NAIL

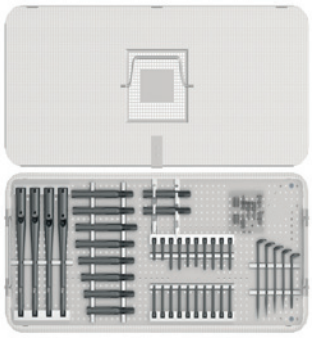


PLATON-Nail; Short

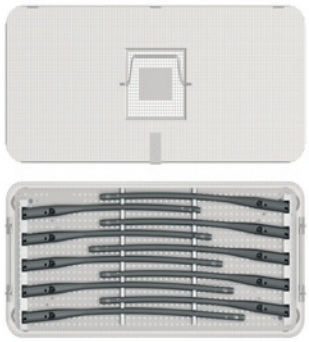
REF	L [mm]	Ø [mm]	CCD	Variant
110 - 400	190 mm	10 mm	125°	Universal
110 - 401	190 mm	10 mm	130°	Universal

PLATON-Nail; Long

REF	L [mm]	Ø [mm]	CCD	Variant
110 - 407	280	10	125°	Right
110 - 408	300	10	125°	Right
110 - 409	320	10	125°	Right
110 - 410	340	10	125°	Right
110 - 411	360	10	125°	Right
110 - 412	380	10	125°	Right
110 - 413	400	10	125°	Right
110 - 414	420	10	125°	Right
110 - 417	280	10	130°	Right
110 - 418	300	10	130°	Right
110 - 419	320	10	130°	Right
110 - 420	340	10	130°	Right
110 - 421	360	10	130°	Right
110 - 422	380	10	130°	Right
110 - 423	400	10	130°	Right
110 - 424	420	10	130°	Right
110 - 427	280	10	125°	Left
110 - 428	300	10	125°	Left
110 - 429	320	10	125°	Left
110 - 430	340	10	125°	Left
110 - 431	360	10	125°	Left
110 - 432	380	10	125°	Left
110 - 433	400	10	125°	Left
110 - 434	420	10	125°	Left
110 - 437	280	10	130°	Left
110 - 438	300	10	130°	Left
110 - 439	320	10	130°	Left
110 - 440	340	10	130°	Left
110 - 441	360	10	130°	Left
110 - 442	380	10	130°	Left
110 - 443	400	10	130°	Left
110 - 444	420	10	130°	Left



	REF	Name	pcs
	209 - 101	Basket for implants PLATON-Nail Short and for accessories	1
		– without implants – for keeping of: PLATON-Nail; Short, (2 × 130°; 2 × 125°) Femoral Lag Screw PLATON; (75 – 120 mm – 5mm increments) Locking Screw PLATON; 5 mm, 2 × (25 – 70 mm – 5 mm increments) AR-Clip PLATON; (XS, S, M, L, XL) Set Screw PLATON (2 pcs); Set Screw PLATON; for AR-Clip (2 pcs) End Cap PLATON (2 pcs) Connection Screw PLATON (2 pcs)	



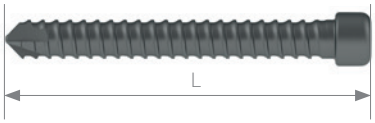
	REF	Name	pcs
	209 - 105	Basket for implants PLATON-Nail Long	1
		– without implants – for keeping of: PLATON-Nail; Long, max 10 pcs (5 × left, 5 × right), length variants are not specified.	

→ FEMORAL LAG SCREW PLATON

Technical data	Size [mm]
Screw thread	12

REF	L [mm]
110 - 198	75
110 - 199	80
110 - 200	85
110 - 201	90
110 - 202	95
110 - 203	100
110 - 204	105
110 - 205	110
110 - 206	115
110 - 207	120

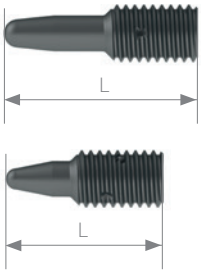
→ LOCKING SCREW PLATON



Technical data	Size [mm]
Screw thread	5
Screw core	4,3
Screw head	6,9
Drill for thread	4,3
Screwdriver	6HR 3,5

REF	L [mm]
101 - 140	25
101 - 141	30
101 - 142	35
101 - 143	40
101 - 144	45
101 - 145	50
101 - 146	60
101 - 147	65
101 - 149	70
101 - 150	75
101 - 151	80
101 - 152	95
101 - 153	90
101 - 154	95

→ SET SCREW PLATON



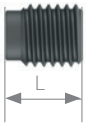
Set screw PLATON

REF	L [mm]	Ø [mm]
110 - 308	27	M8

Set screw PLATON; for AR-Clip

REF	L [mm]	Ø [mm]
110 - 309	22	M8

→ END CAP PLATON

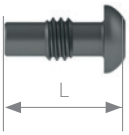


REF	L [mm]	Ø [mm]
110 - 301	14	M12

→ AR-CLIP PLATON

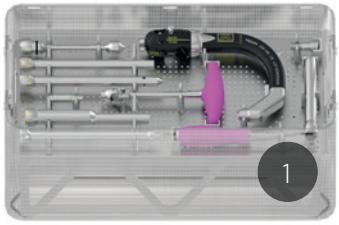
REF	Size	L [mm]
110 - 299	XS	72
110 - 303	S	82
110 - 305	M	92
110 - 307	L	102
110 - 311	XL	112

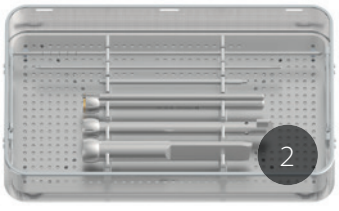
→ CONNECTION SCREW PLATON



REF	Ø [mm]
110 - 304	M8

→ SET OF INSTRUMENTS FOR PLATON-NAIL AND AR-CLIP

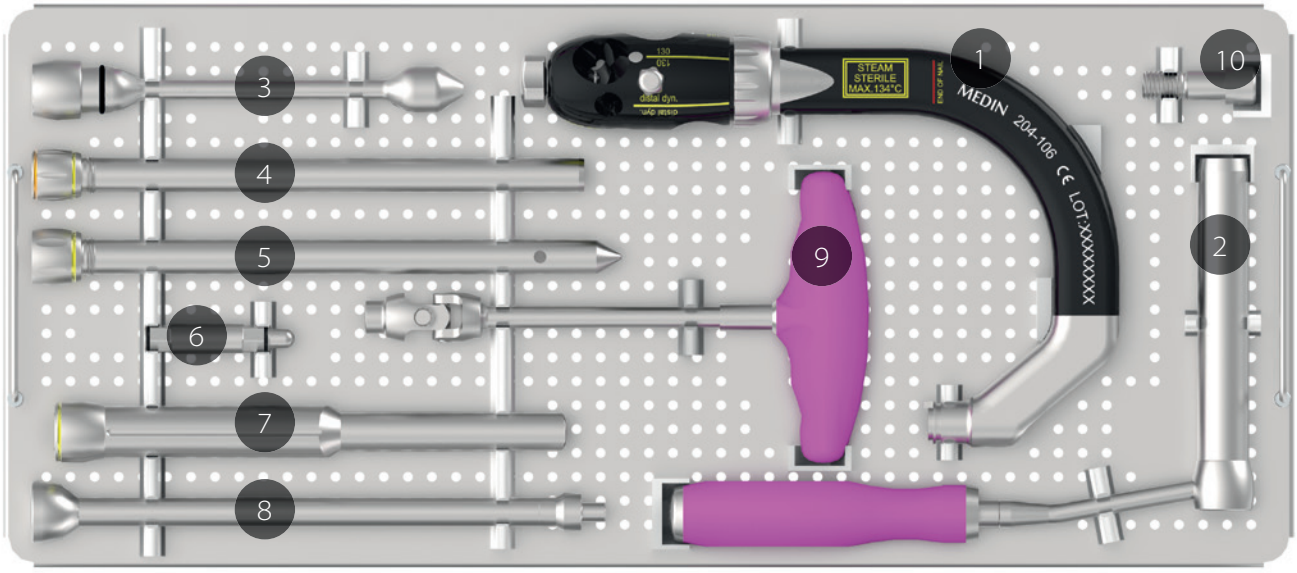




No.	REF	Name	pcs
	210 - 124	Set of instruments for PLATON-Nail and AR-Clip	1
1	210-125	Instruments for PLATON-Nail	1
2	210-126	Instruments for AR-Clip	1
	208-200	Template for PLATON-Nail	

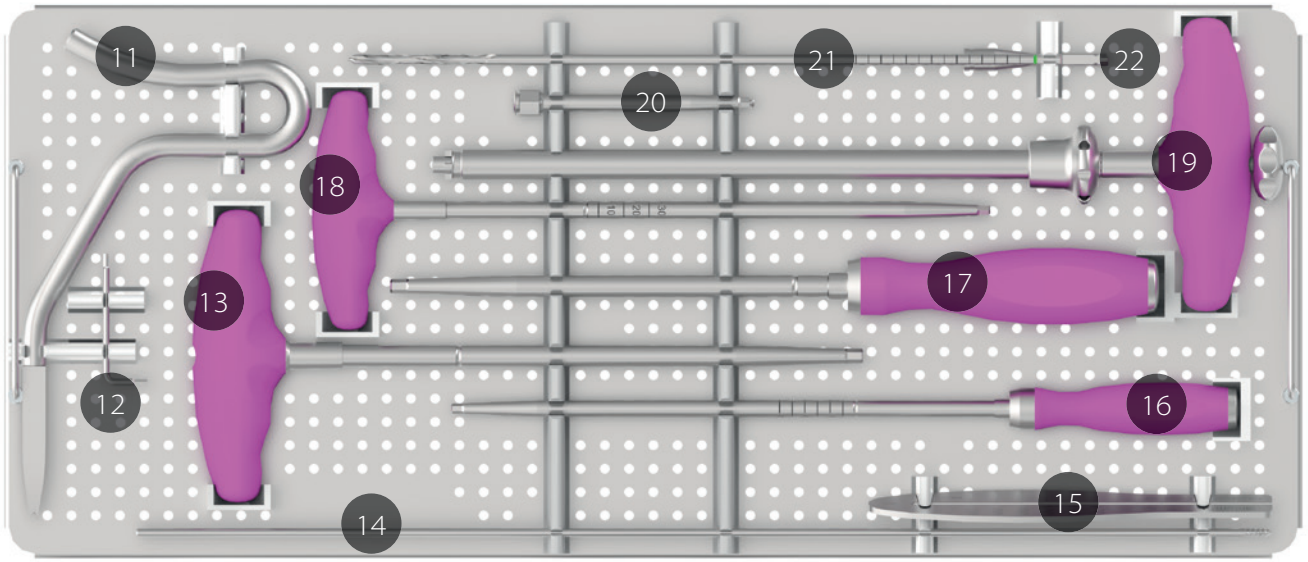
→ INSTRUMENTS FOR PLATON-NAIL

› UPPER PLATE



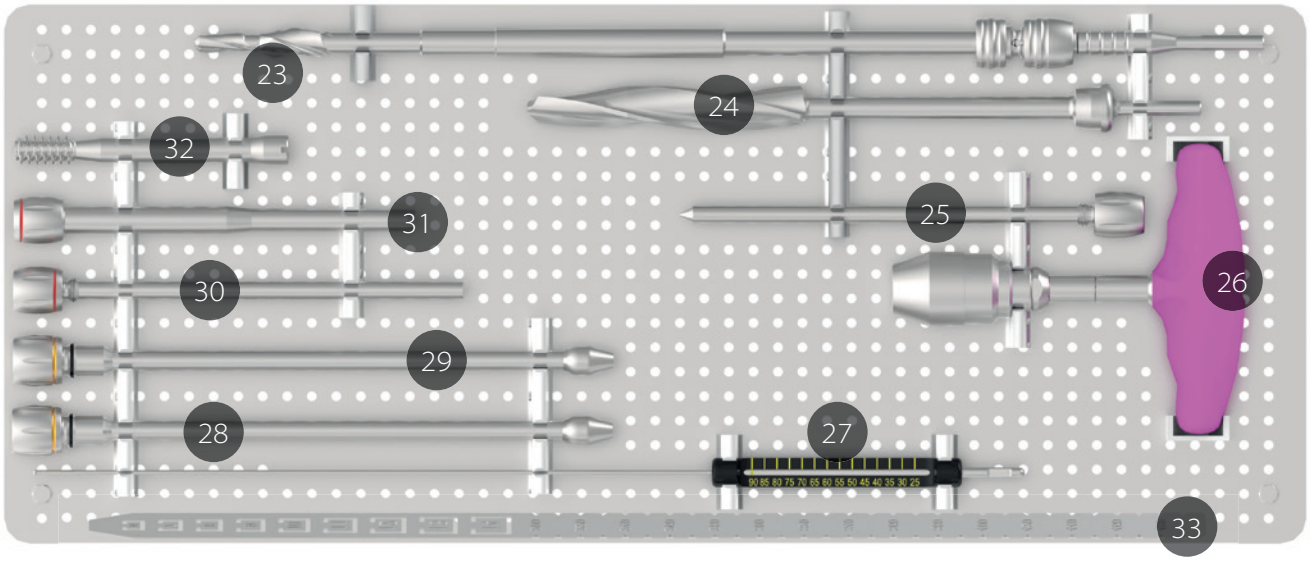
No.	REF	Name	pcs
	210 - 125	Instruments for PLATON-Nail	1
	Upper plate		
1	204-106	Aiming device for nail; PLATON	1
2	202-107	Drill Sleeve; 21/19×140 mm	1
3	203-104	Drill Sleeve; 19/3.6×172 mm	1
4	202-136	Guide Sleeve; 14/12×220 mm	1
5	203-147	Trocar; 14×235 mm	1
6	201-115	Extender bit; SW 10	1
7	202-135	Guide Sleeve; 16/14×204 mm	1
8	205-100	Impactor; 8 mm	1
9	201-110	T wrench; SW 10	1
10	204-110	Aiming device screw; M12	1

MIDDLE PLATE



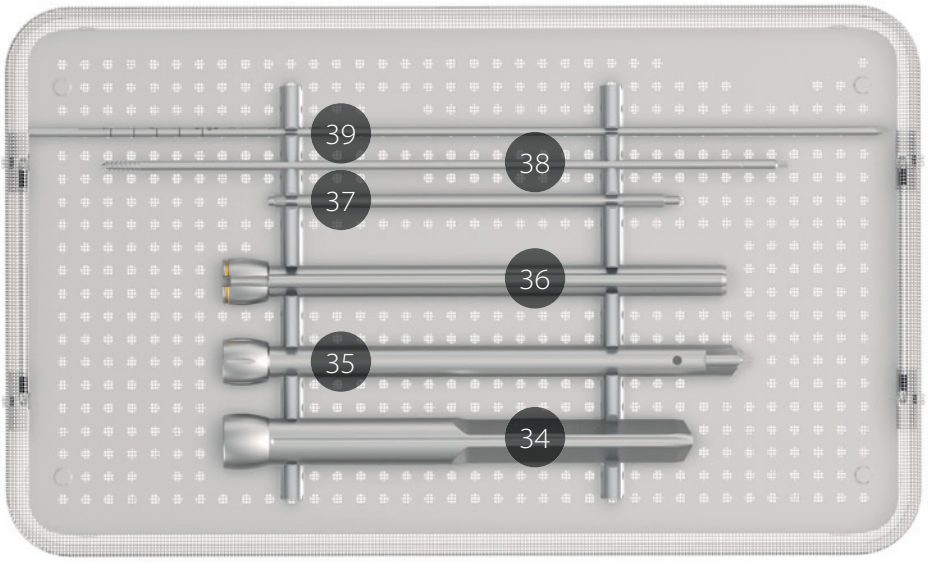
No.	REF	Name	pcs
	210 - 125	Instruments for PLATON-Nail	1
	Middle plate		
11	203-123	Perforator; D13, 60 mm, cannulated	1
12	201-130L	Hex key; SW 2	1
13	201-102	Screwdriver; T, SW 5	1
14	206-100	Guide Wire; 3.2 × 450 mm	2
15	208-100	Gauge; for wire, 3.2 mm	1
16	201-106	Screwdriver; A, SW 3.5	1
17	201-100	Screwdriver; A, SW 5	1
18	201-105	Screwdriver; T, SW 3.5	1
19	201-131	T wrench; for femoral lag screw	1
20	201-120	Extender bit; SW 4	1
21	203-146	Drill; 4.3 × 300 mm; AO coupling	1
22	203-145	Countersink; 4.3 mm	1

LOWER PLATE

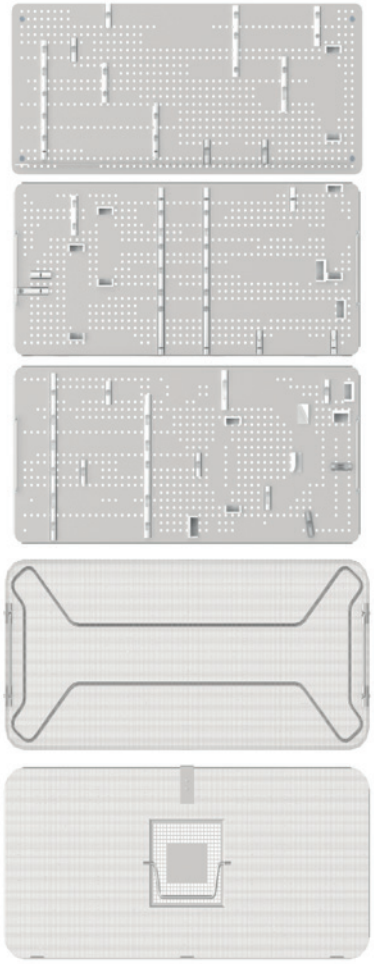


No.	REF	Name	pcs
	210 - 125	Instruments for PLATON-Nail	1
	Lower plate		
23	203-102	Drill; 12/3.5 × 427 mm, triangular coupling	1
24	203-110	Drill; 17.5/3.5 × 269 mm, triangular coupling	1
25	203-144	Trocar; 7 × 185 mm	1
26	200-110	Hand Chuck; BT23-116-M8-K68	1
27	208-112	Depth gauge, 2.5 × 90 mm	1
28	202-132	Drill Sleeve; 12/4.3 × 240 mm	1
29	202-111	Drill Sleeve; 12/3.2 × 240 mm	1
30	202-134	Drill Sleeve; 7/4.3 × 180 mm	1
31	202-133	Guide Sleeve; 11/7 × 160 mm	1
32	203-103	Tap; for femoral lag screw, 12 × 110 mm	1
33	397 129 69 9190	Ruler; 500 mm	1

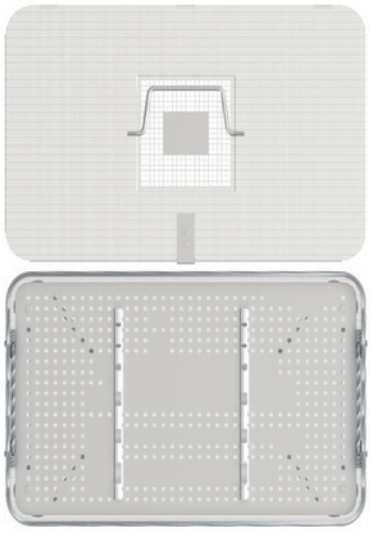
→ INSTRUMENTS FOR AR-CLIP



No.	REF	Name	pcs
≔	210 - 126	Instruments for AR-Clip	1
34	202-108	Guide Sleeve; 24×205 mm	1
35	203-107	Trocar; 14×232 mm	1
36	202-106	Guide Sleeve; 19.3×220 mm	1
37	206-102	Adapter for fixing wire; 6×180 mm	1
38	206-101	Fixing wire; 4×300 mm	1
39	203-116	Perforator; 4×378 mm	1



	REF	Name	pcs
	209-125	Basket for PLATON-Nail instruments	1
		without instruments 540×240×180 mm	



	REF	Name	pcs
	209-126	Basket for AR-Clip Instruments	1
		without instruments 397×237×45 mm	

PLATON-Nail

REF	UDI-DI	Variant
110 – 400	08591712365843	Short, 10×190 mm, 125°
110 – 401	08591712365850	Short, 10×190 mm, 130°
110 – 407	08591712365867	Long, 10×280 mm, 125°, right
110 – 408	08591712365874	Long, 10×300 mm, 125°, right
110 – 409	08591712365881	Long, 10×320 mm, 125°, right
110 – 410	08591712365898	Long, 10×340 mm, 125°, right
110 – 411	08591712365904	Long, 10×360 mm, 125°, right
110 – 412	08591712365911	Long, 10×380 mm, 125°, right
110 – 413	08591712365928	Long, 10×400 mm, 125°, right
110 – 414	08591712365935	Long, 10×420 mm, 125°, right
110 – 417	08591712365942	Long, 10×280 mm, 130°, right
110 – 418	08591712365959	Long, 10×300 mm, 130°, right
110 – 419	08591712365966	Long, 10×320 mm, 130°, right
110 – 420	08591712365973	Long, 10×340 mm, 130°, right
110 – 421	08591712365980	Long, 10×360 mm, 130°, right
110 – 422	08591712365997	Long, 10×380 mm, 130°, right
110 – 423	08591712366000	Long, 10×400 mm, 130°, right
110 – 424	08591712366017	Long, 10×420 mm, 130°, right
110 – 427	08591712366024	Long, 10×280 mm, 125°, left
110 – 428	08591712366031	Long, 10×300 mm, 125°, left
110 – 429	08591712366048	Long, 10×320 mm, 125°, left
110 – 430	08591712366055	Long, 10×340 mm, 125°, left
110 – 431	08591712366062	Long, 10×360 mm, 125°, left
110 – 432	08591712366079	Long, 10×380 mm, 125°, left
110 – 433	08591712366086	Long, 10×400 mm, 125°, left
110 – 434	08591712366093	Long, 10×420 mm, 125°, left
110 – 437	08591712366109	Long, 10×280 mm, 130°, left
110 – 438	08591712366116	Long, 10×300 mm, 130°, left
110 – 439	08591712366123	Long, 10×320 mm, 130°, left
110 – 440	08591712366130	Long, 10×340 mm, 130°, left
110 – 441	08591712366147	Long, 10×360 mm, 130°, left
110 – 442	08591712366154	Long, 10×380 mm, 130°, left
110 – 443	08591712366161	Long, 10×400 mm, 130°, left
110 – 444	08591712366178	Long, 10×420 mm, 130°, left

Femoral Lag Screw PLATON

REF	UDI-DI	Variant
110 – 198	08591712365652	12×75 mm
110 – 199	08591712365669	12×80 mm
110 – 200	08591712365676	12×85 mm
110 – 201	08591712365683	12×90 mm
110 – 202	08591712365690	12×95 mm
110 – 203	08591712365706	12×100 mm
110 – 204	08591712365713	12×105 mm
110 – 205	08591712365720	12×110 mm
110 – 206	08591712365737	12×115 mm
110 – 207	08591712365744	12×120 mm

Locking Screw PLATON

REF	UDI-DI	Variant
101 – 140	08591712365508	5x25 mm
101 – 141	08591712365515	5x30 mm
101 – 142	08591712365522	5x35 mm
101 – 143	08591712365539	5x40 mm
101 – 144	08591712365546	5x45 mm
101 – 145	08591712365553	5x50 mm
101 – 146	08591712365560	5x55 mm
101 – 147	08591712365577	5x60 mm
101 – 148	08591712365584	5x65 mm
101 – 149	08591712365591	5x70 mm
101 – 150	08591712365607	5x75 mm
101 – 151	08591712365614	5x80 mm
101 – 152	08591712365662	5x85 mm
101 – 153	08591712365638	5x90 mm
101 – 154	08591712365645	5x95 mm

Set Screw PLATON

REF	UDI-DI	Variant
110 – 308	08591712365812	M8, L27 mm
110 – 309	08591712365829	pro AR Clip, M8, L22 mm

End Cap PLATON

REF	UDI-DI	Variant
110 – 301	08591712365768	M12, L15

AR-Clip PLATON

REF	UDI-DI	Variant
110 – 299	08591712365751	XS
110 – 303	08591712365775	S
110 – 305	08591712365799	M
110 – 307	08591712365805	L
110 – 311	08591712365836	XL

Connection Screw PLATON

REF	UDI-DI	Variant
110 – 304	08591712365782	M8, L20


240
(mm)
230
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0


240
(mm)
230
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
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