

T2[®] Supracondylar Nailing System

Operative technique



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This publication sets forth detailed recommended procedures for using Stryker devices and instruments. It offers guidance that you should heed, but, as with any such technical guide, each surgeon must consider the particular needs of each patient and make appropriate adjustments when and as required. A workshop training is recommended prior to performing your first surgery. All non-sterile devices must be cleaned and sterilized before use.

Follow the instructions provided in our cleaning and sterilization guide (L24002000). Multi-component instruments must be disassembled for cleaning. Please refer to the corresponding assembly/ disassembly instructions.

Please remember that the compatibility of different product systems have not been tested unless specified otherwise in the product labeling.

See package insert (Instruction for Use) (L220105B6 & L22000007) for a complete list of potential adverse effects, contraindications, warnings and precautions. The surgeon must discuss all relevant risks including the finite lifetime of the device with the patient when necessary.

Indications, precautions and contraindications

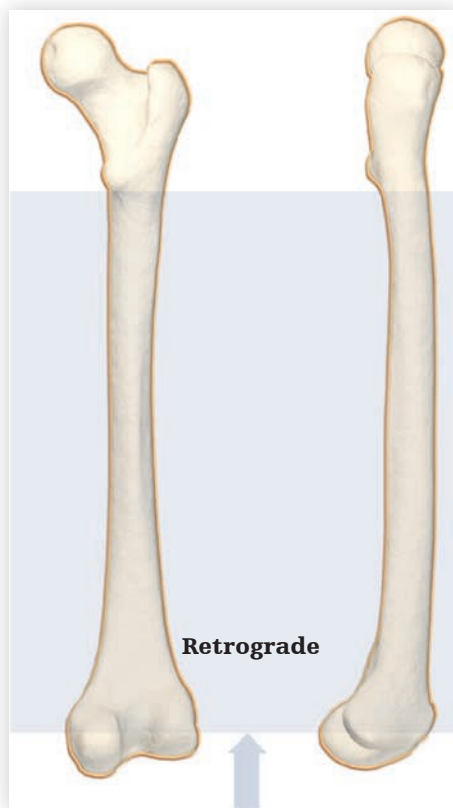


Figure 6

Indications

The T2 SCN System is indicated for:

- Open and closed femoral fractures
- Pseudoarthrosis and correction osteotomy
- Pathologic fractures, impending pathologic fractures, and tumor resections
- Supracondylar fractures, including those with intra-articular extension
- Fractures distal to a total hip prosthesis
- Nonunions and malunions

Precautions

Stryker Systems have not been evaluated for safety and compatibility in magnetic resonance (MR) environment and have not been tested for heating or migration in the MR environment, unless specified otherwise on the product labels.

Contraindications

The physician's education, training and professional judgment must be relied upon to choose the most appropriate device and treatment. Conditions presenting an increased risk of failure include:

- Any active or suspected latent infection or marked local inflammation in or about the affected area.
- Compromised vascularity that would inhibit adequate blood supply to the fracture or the operative site.
- Bone stock compromised by disease, infection or prior implantation that can not provide adequate support and/or fixation of the devices.
- Material sensitivity, documented or suspected.
- Obesity. An overweight or obese patient can produce loads on the implant that can lead to failure of the fixation of the device or to failure of the device itself.
- Patients having inadequate tissue coverage over the operative site.
- Implant utilization that would interfere with anatomical structures or physiological performance.
- Any mental or neuromuscular disorder which would create an unacceptable risk of fixation failure or complications in postoperative care.
- Other medical or surgical conditions which would preclude the potential benefit of surgery.

Introduction



Technical details

Nails

Diameter: 9–14mm
Short version: 170 & 200mm
Long version: 240–440mm

Symbol

■ = Long instruments

Drills

Drills feature a color coded ring:

4.2mm = **Green**

For fully threaded screws 5.0mm

5.0mm = **Black**

For condyle screws

Technical details

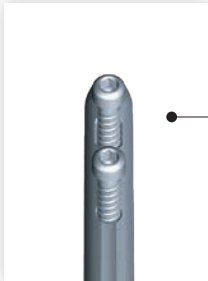


Figure 3

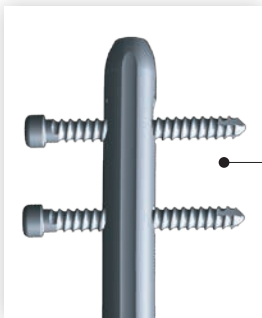
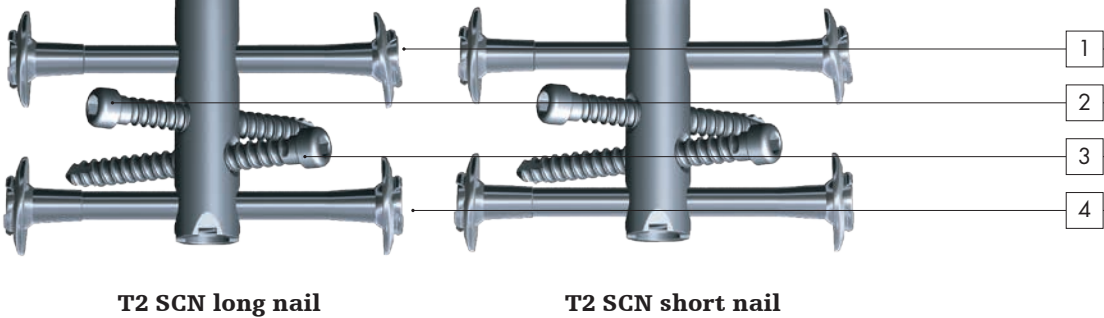


Figure 4



T2 SCN long nail

T2 SCN short nail

Figure 5

Locking options

Proximal locking options T2 SCN long version

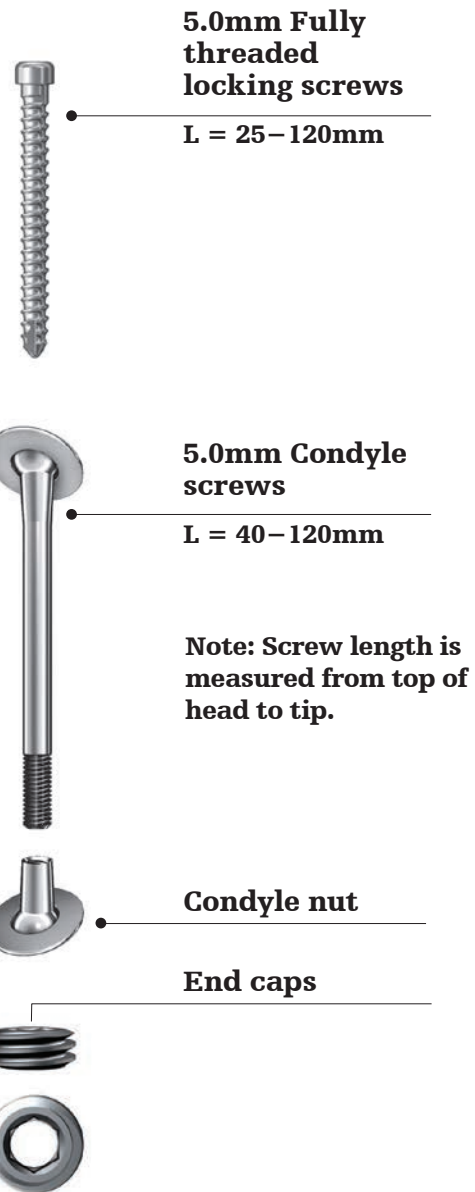
When treating distal fractures, two A/P screws should be used in static position when possible (Fig. 3). Proximal locking may be done in either static or dynamic mode depending on surgeon preference. These holes are targeted freehand.

Proximal locking options T2 SCN short version

When treating distal fractures, two M/L locking screws should be used when possible (Fig. 4). Both screws can be placed directly through the targeting arm proximal, SCN.

Distal locking options T2 SCN short and long version

The different distal screw positions for both T2 SCN versions are (sequence of recommended insertion, Fig. 5):



Transverse screw: condyle screw or fully threaded screw

Oblique screw: fully threaded locking screw

Oblique screw: fully threaded locking screw

Transverse screw: condyle screw or fully threaded screw

Technical details

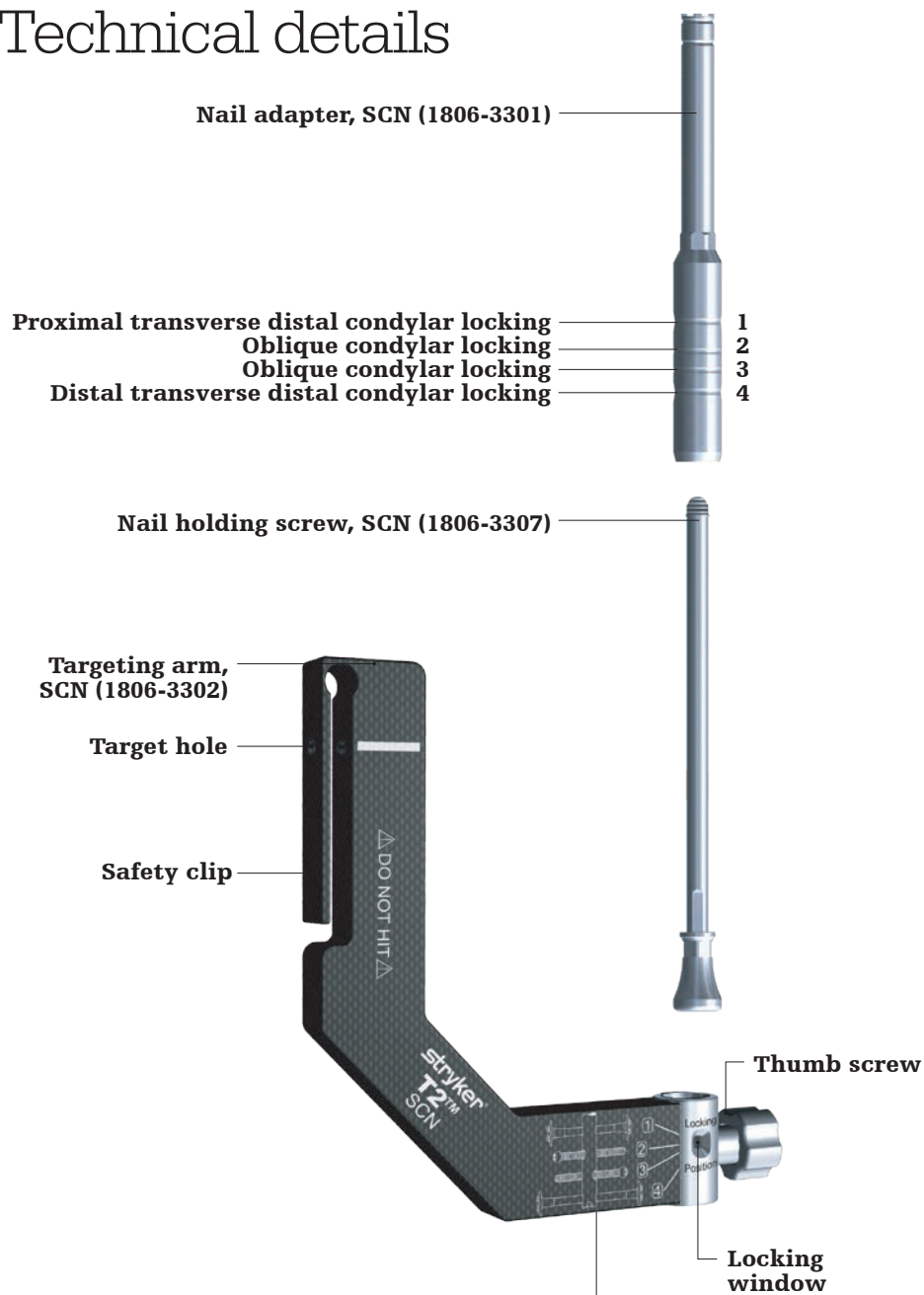


Figure 1

Target device features

(Targeting arm, SCN)

The targeting arm for the T2 SCN is designed with one locking hole for all locking screws to be placed in the distal femur (Fig. 1).

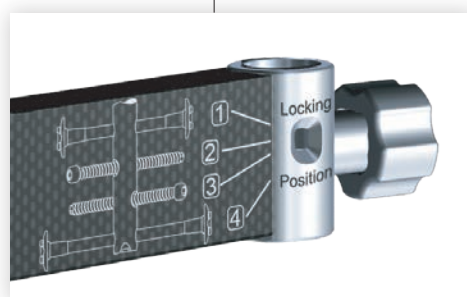
These are the locking holes in the distal femur:

1. Proximal transverse distal condylar locking
2. Oblique condylar locking
3. Oblique condylar locking
4. Distal transverse distal condylar locking

The targeting arm can be rotated and axially moved along the nail adapter. The locking window, together with the corresponding positions on the targeting arm indicates the appropriate locking position.

After the required locking position is reached, the targeting arm is locked by tightening the thumb screw.

Note: To avoid mis-drilling the targeting arm can be locked in the dedicated position only.



Target device features (targeting arm proximal, SCN)

An additional target device for the T2 SCN short version is available for the proximal locking options: The name of this target device is: targeting arm proximal, SCN (Fig. 2).

After the required locking position is reached, the targeting arm is locked by tightening the thumb screw.

The targeting arm proximal, SCN, is designed to provide guided proximal locking for the T2 SCN short version 170 & 200mm.

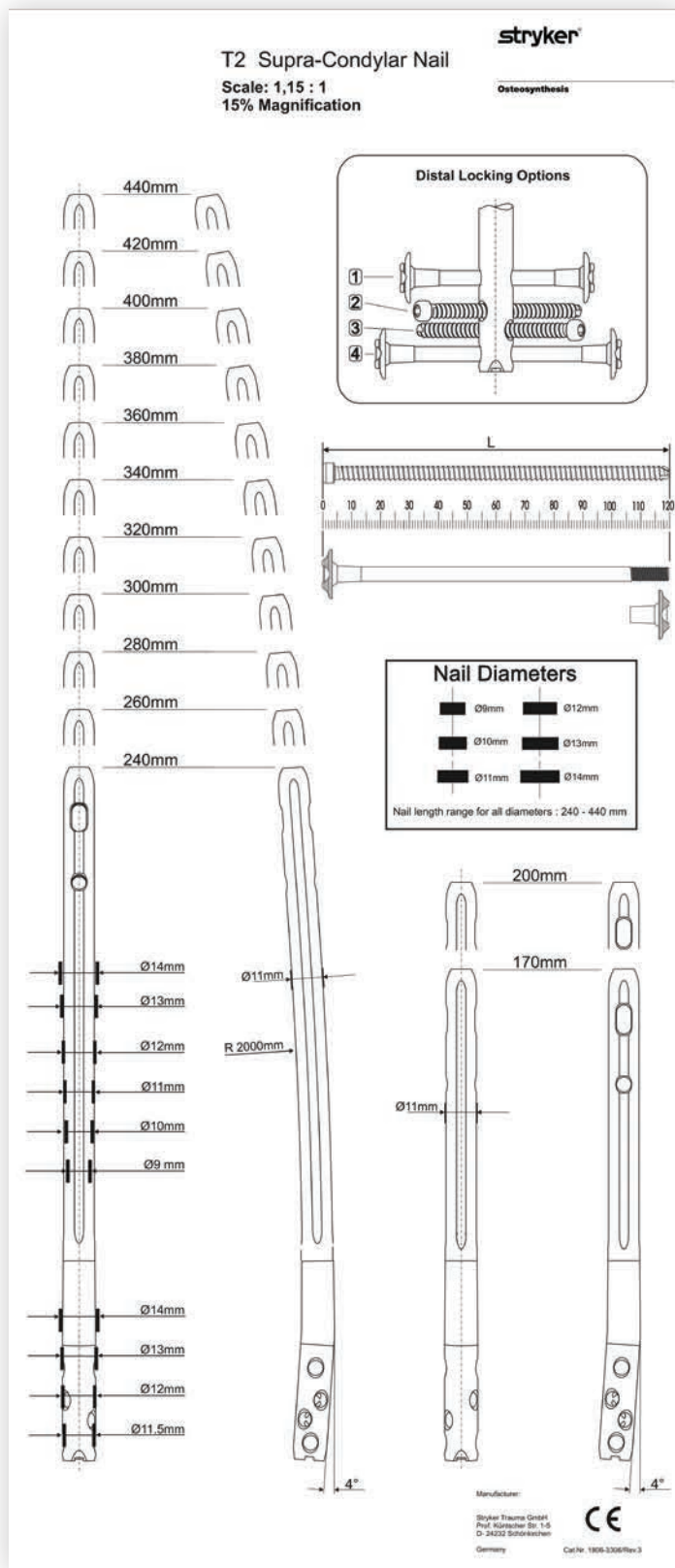


Targeting arm proximal, SCN (1806-3305)



Figure 2

Pre-operative planning



An x-ray template (1806-3306) is available for pre-operative planning (Fig. 7).

Thorough evaluation of pre-operative radiographs of the affected extremity is critical. Careful radiographic examination of the trochanteric region and intercondylar regions can prevent intra-operative complications.

The nail length of the T2 SCN Long version is determined by measuring the distance between a point 5mm – 15mm proximal to the intercondylar notch to a point at/or to the lesser trochanter.

The nail length of the T2 SCN Short version will depend on the fracture site. Available lengths are 170mm and 200mm.

Note: Check with local representative regarding availability of nail sizes.

Figure 7

Operative technique

Patient positioning

Retrograde nail insertion is performed with the patient supine on a radio-lucent table. The affected lower extremity and hip region are freely draped, and the knee is placed over a sterile bolster. This will allow knee flexion. Manual traction through a flexed knee or a distraction device may be used to facilitate reduction for most femoral fractures (Fig. 8).

Incision

A 3cm midline skin incision is made extending from the inferior pole of the patella to the tibial tubercle, followed by a medial parapatellar capsular incision (Fig. 9). This should be sufficient to expose the intercondylar notch for retrograde nail insertion. Occasionally, a larger incision may be needed, especially if the fracture has intra-articular extension and fixation of the condyles is necessary.

Distal femoral fractures are often complicated by intra-articular fracture line extension. These fractures should be anatomically reduced and secured. Titanium AsnisIII cannulated screws should be used with a combination of bone holding clamps to secure the Intracondylar region for nail insertion. The design of the T2 SCN nail allows for further fixation and compression using the T2 condyle screws. Care should be taken with cannulated screws placement not to interfere with the nail insertion. An alternative is to reduce and maintain reduction of the femoral condyles with a pointed reduction forceps and only utilize the cross locking screws for definite fixation.

Figure 8

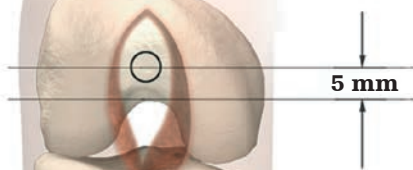


Figure 9

Operative technique

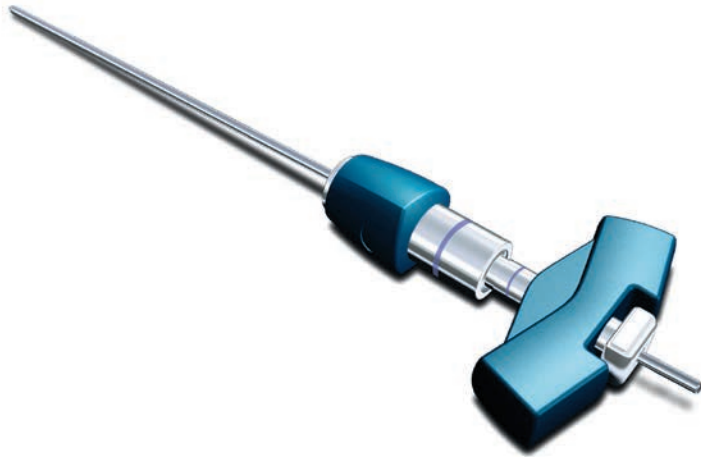


Figure 10

Entry point

Note: Entry point preparation is key to this operation and critical for excellent results.

The 3×285mm K-Wire (1806-0050S)* can be fixed to the guide wire handle (1806-1095 and 1806-1096) (Fig. 10). With fractures of the condyles secured, the entry point for T2 SCN insertion is made by centering the 3×285mm K-Wire through the retrograde protection sleeve (703165) and positioning within the intercondylar notch anterior to Blumensaat's line on the M/L radiograph (Fig. 11a) using the slotted hammer (1806-0170).

This point is found by palpating a distinct ridge just anterior to the posterior cruciate ligament. The K-Wire placement should be verified with A/P and lateral radiographs (Fig. 11a & 11b).

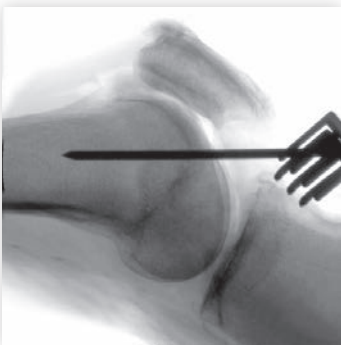


Figure 11a

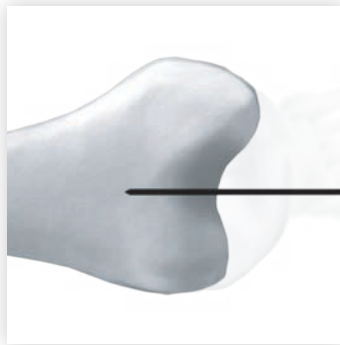


Figure 11b

* Outside of the U.S., product with an "S" may be ordered non-sterile without the "S" at the end of the corresponding Cat. Number.



Figure 12

The K-Wire is advanced 10cm, confirming its placement within the center of the distal femur on an A/P and lateral radiograph.

The retrograde protection sleeve is contoured to fit the profile of the intercondylar notch. It is designed to help reduce the potential for damage during reaming, and also provide an avenue for the reamer debris to exit the knee joint (Fig. 12).

When the inner retrograde K-Wire guide is removed, the distal most 8cm of the femur has to be reamed carefully. The entry portal has to be carefully enlarged using the bixcut reamer set starting from 6.5mm in 0.5 increments through the retrograde protection sleeve (Fig. 13).

Alternatively, when patient anatomy allows, the Ø12mm rigid reamer (1806-2014) is inserted over the 3×285mm K-Wire and through the retrograde protection sleeve.

The distal most 8cm of the femur is reamed slowly and carefully.



Figure 13

Caution: Prior to advancing the K-Wire within the distal femur, check the correct guidance through the Ø12mm rigid reamer. Do not use bent K-Wires.

Optionally, the cannulated awl (1806-0045) may be used to open the canal.

Note: During opening the entry portal with the awl, dense cortex may block the tip of the awl. An awl plug (1806-0032) can be inserted through the awl to avoid penetration of bone debris into the cannulation of the awl shaft.



Figure 14



Figure 15

Reamed technique

Note: Fracture reduction should be performed prior to placement of the guide wire.

For the reamed technique, the 3×1000mm ball tip guide wire (1806-0085S)* is inserted through the fracture site and does not require a guide wire exchange. The universal rod with reduction spoon may be used as a fracture reduction tool to facilitate guide wire insertion through the fracture site (Fig. 14).

Note:

- **The ball tip at the end of the guide wire will stop the reamer head and facilitate the removal of a broken reamer head.**
- **It is essential that all bone fragments are reduced prior to reaming.**

Reaming (Fig. 15) of the femur should be performed very carefully and is commenced in 0.5mm increments until chatter or cortical contact is appreciated. Final reaming should be 1mm larger than the diameter of the nail to be inserted.

Note:

- **If any provisional fixation screw used in reducing the fractures are in the line of the reamer they should be repositioned.**
- **Thoroughly irrigate the knee joint to remove any debris.**

* Outside of the U.S., locking screws and other specific products may be ordered non-sterile without the "S" at the end of the corresponding Cat. Number.

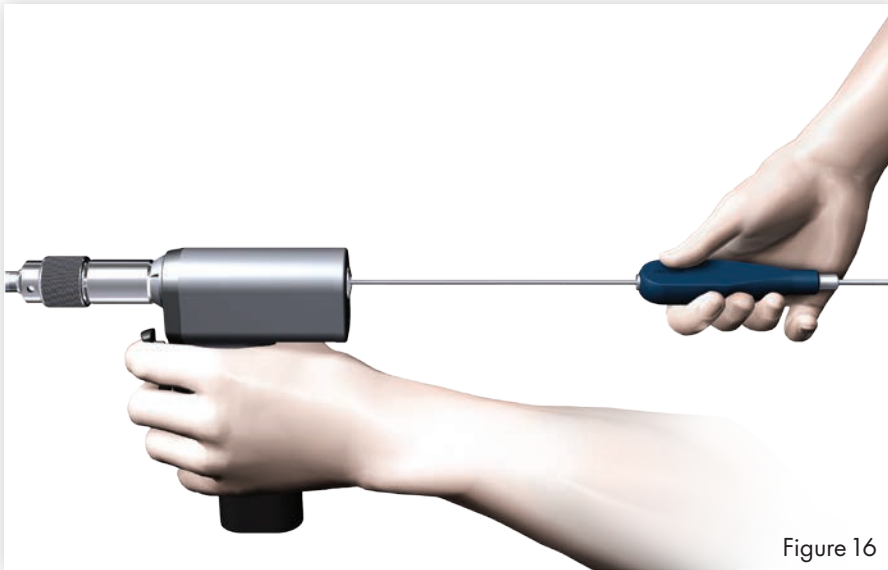


Figure 16

The guide wire pusher can be used to help keep the guide wire in position during reamer shaft extraction. The metal cavity at the end of the handle pushed on the end of the power tool facilitates to hold the guide wire in place when starting to pull the power tool (Fig. 16). When close to the guide wire end place the guide wire pusher with its funnel tip to the end of the power tool cannulation (Fig. 17). While removing the power tool the guide wire pusher will keep the guide wire in place.

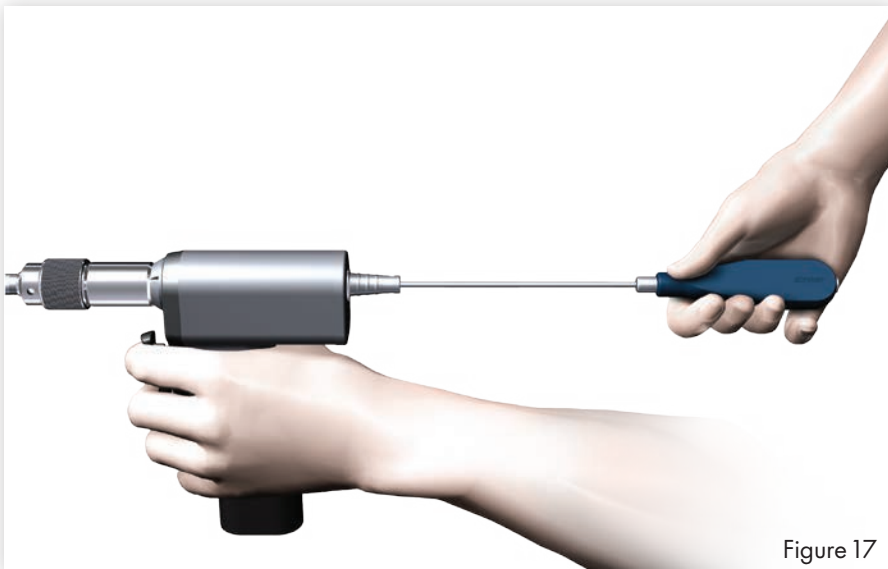
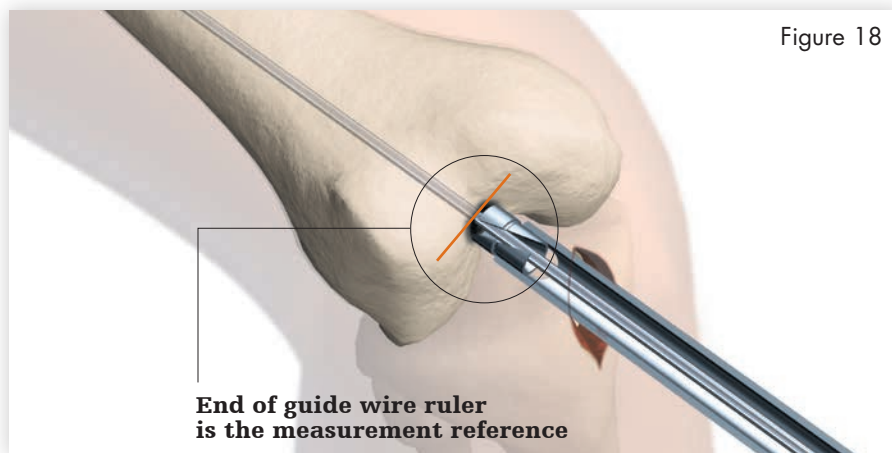


Figure 17

Caution: The diameter of the driving end of the 9mm–11mm diameter nails is 11.5mm. Additional metaphyseal reaming may be required to facilitate nail insertion. Nail sizes 12-14mm have a constant diameter. Thoroughly irrigate the knee joint to remove any debris.



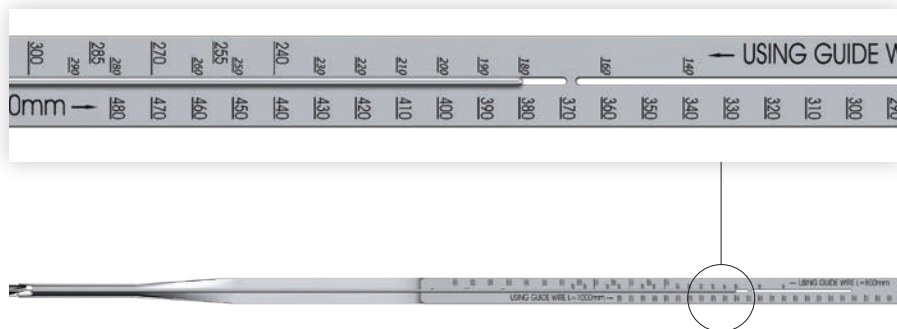
Nail selection

Diameter

The diameter of the selected nail should be 1mm smaller than that of the last reamer used.

Length

Nail length may be determined by measuring the remaining length of the guide wire. The guide wire ruler (1806-0022) may be used by placing it on the guide wire and reading the correct nail length at the end of the guide wire on the guide wire ruler (Fig. 18 & Fig. 19). The calibration is based on the use of either an 800mm or 1000mm guide wire. The guide wire ruler is marked for both options.



The guide wire ruler can be easily folded and unfolded.

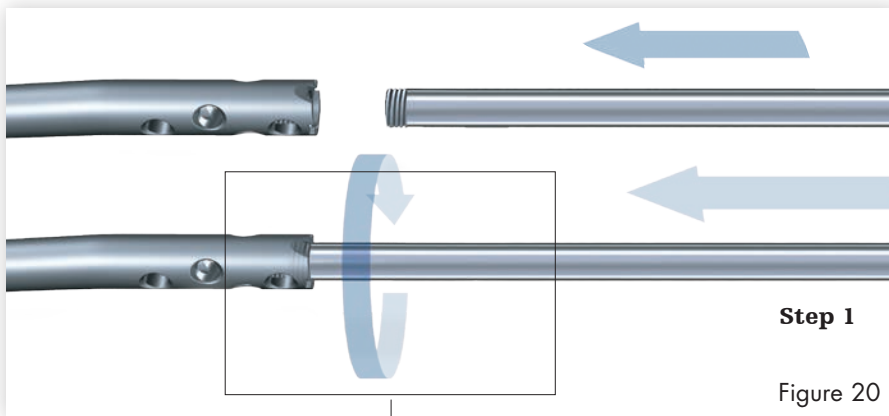


Figure 20

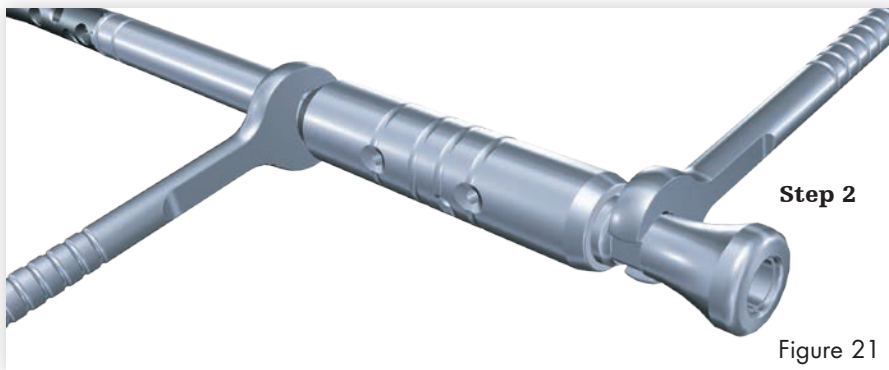
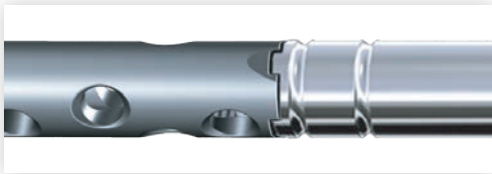


Figure 21

Nail insertion

The selected nail is assembled onto the nail adapter (1806-3301) with the nail holding screw, SCN (1806-3307) (Fig. 20).

Tighten the nail holding screw with the spanner 10mm (1806-0130) and the spanner 12mm (1114-6004) acting as the counter force (Fig. 21).

For assembling the T2 SCN short version follow the same instructions.

Note: Curvature of the nail must match the curvature of the femur.

Caution: Prior to nail insertion please check correct alignment by inserting a drill bit through the assembled tissue protection and drill Sleeve placed in the targeting device and targeting all locking holes of the implant.

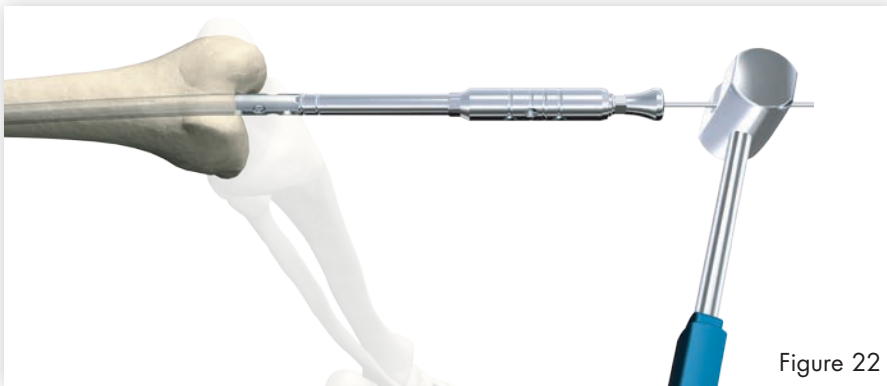


Figure 22

The slotted hammer (1806-0170) can be used on the nail holding screw (Fig. 22) or, if dense bone is encountered, the universal rod (1806-0110) may be attached to the nail holding screw and used in conjunction with the slotted hammer to insert the nail.

Note: Only hit the nail holding screw.

If the nail has been inserted too far it has to be repositioned. For repositioning the nail, the universal rod and the slotted hammer may be attached to the nail holding screw to carefully and smoothly extract the assembly.

Unique to the T2 SCN System, the guide wire ball tip, 3×1000mm (1806-0085S) does not need to be exchanged.

Note: Remove the guide wire prior to drilling and inserting the locking screws.

When inserting the T2 SCN, the nail should be counter-sunk below the Subchondral bone using Blumensaat's line as a reference (Fig. 23). The nail adapter has a marking at 10mm to allow for a reference with fluoroscopy. The nail can never be left proud as this will destroy the patella cartilage. Correct seating is verified with a lateral fluoroscopic image with the condyles superimposed. The distal nail tip should be proximal to the subchondral line.



Figure 23

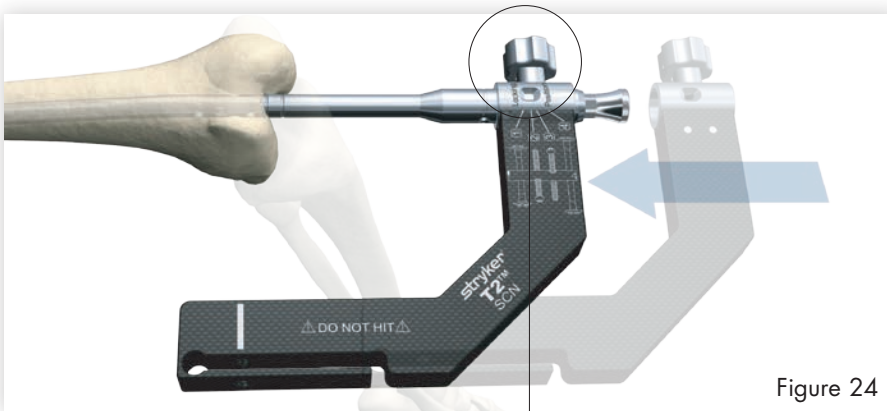


Figure 24



Figure 25

Guided distal locking mode

The targeting arm, SCN (1806-3302) is assembled onto the nail adapter, SCN.

Prior to guided locking, please verify that the nail holding screw is securely tightened.

Note: When treating distal fractures, four screws should be used whenever possible. The order of locking is case dependent.

Proximal locking – fully threaded screw

Turn the targeting arm around the nail adapter until it is locked in the M/L plane to gain access to the most proximal of the distal locking holes (Fig. 24).

The position 1 is fixed by tightening the thumb screw.

Note: Check that the position 1 is indicated in the locking window (Fig. 25).

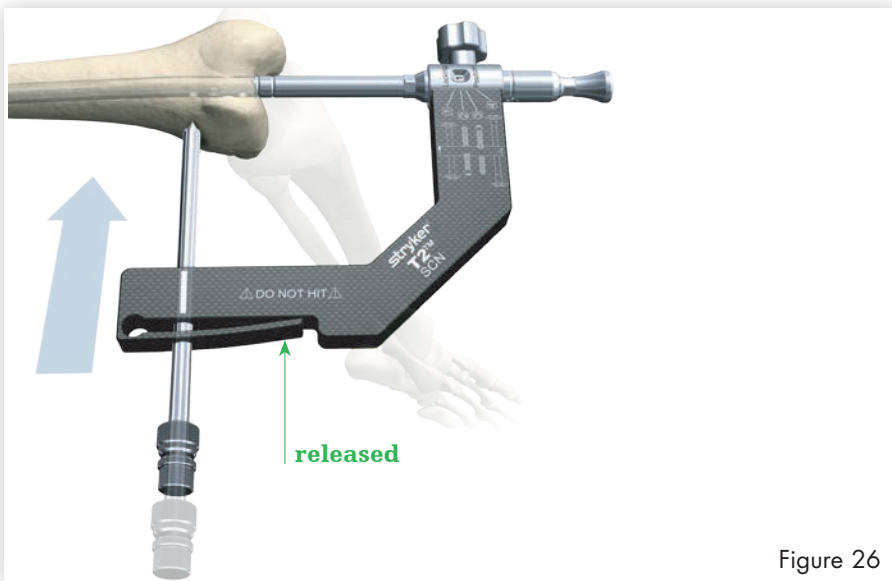


Figure 26

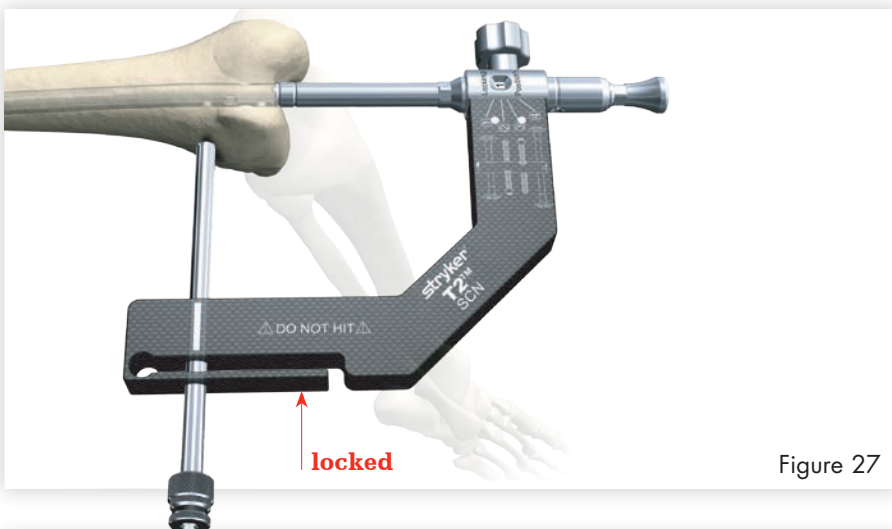


Figure 27

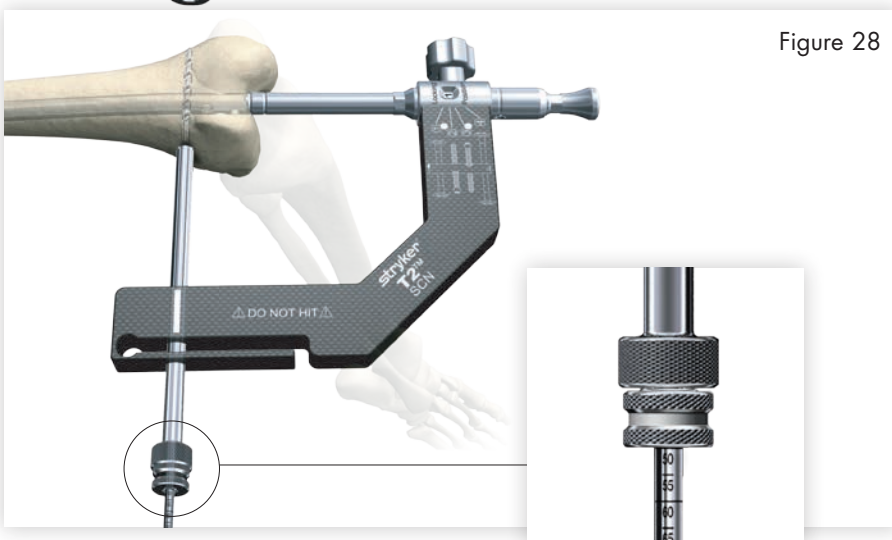


Figure 28

The long tissue protection sleeve (1806-0185) together with the long drill sleeve (1806-0215) and the long trocar (1806-0315) are inserted into the targeting arm by pressing the safety clip (Fig. 26).

The mechanism will keep the sleeve in place and prevent it from falling out. It will also prevent the sleeve from sliding during screw measurement.

To release the tissue protection sleeve, the safety clip must be pressed again.

A small skin incision is made, and the assembly is pushed through until it is in contact with the lateral cortex of the femur (Fig. 26).

The long trocar is removed, with the long tissue protection sleeve and the long drill sleeve remaining in position (Fig. 27).

Depending on the fracture pattern and the bone quality, either a fully threaded screw (see page 17) or a condyle screw (see page 20) can be used for the most proximal locking.

To ensure accurate drilling and determination of the screw length, use the center tipped Ø4.2×340mm calibrated drill (1806-4260S).

After drilling both cortices, the screw length may be read directly off of the calibrated drill at the end of the drill sleeve. If measurement with the long screw gauge (1806-0325) is preferred, first remove the long drill sleeve and read the screw length directly at the end of the long tissue protection sleeve (Fig. 28 & 29).

Caution: Make sure the tissue protection sleeve/drill sleeve assembly is seated on bone prior to selecting final screw length.

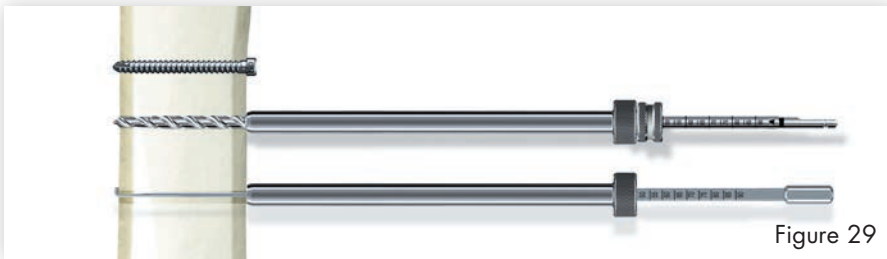


Figure 29

Note:

- The position of the end of the drill as it relates to the far cortex is equal to where the end of the screw will be. Therefore, if the end of the drill is 3mm beyond the far cortex, the end of the screw will also be 3mm beyond.
- The long screw gauge is calibrated so that with the bend at the end pulled back flush with the far cortex, the screw tip will end 3mm beyond the far cortex (Fig. 29).

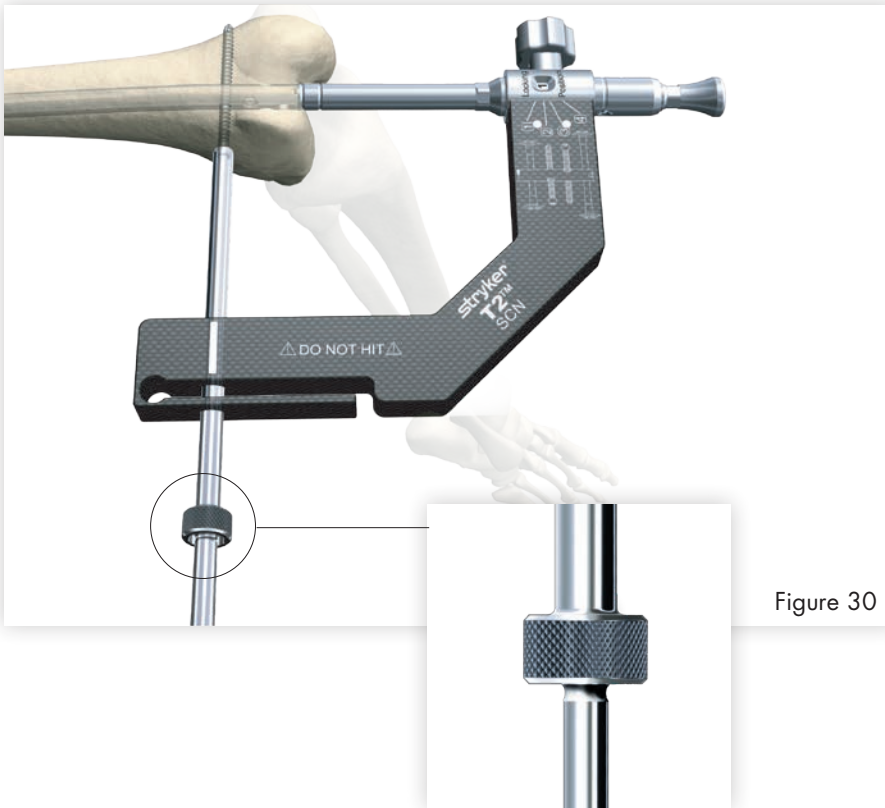


Figure 30

When the long drill sleeve is removed, the correct locking screw is inserted through the long tissue protection sleeve using the long screwdriver shaft (1806-0227) with teardrop handle (702429). The screw is advanced through both cortices (Fig. 30).

The screw design allows for full thread purchase to compensate for self tapping feature of the screws.

The screw is near its proper seating position when the groove around the shaft of the screwdriver is approaching the end of the long tissue protection sleeve (Fig. 31).

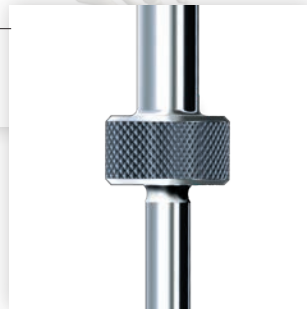


Figure 31

Caution: The coupling of elastosil handles contains a mechanism with one or multiple ball bearings. In case of applied axial stress on the elastosil handle, those components are pressed into the surrounding cylinder resulting in a complete blockage of the device and possible bending.

To avoid intra-operative complications and secure long-term functionality, we mandate that elastosil handles be used only for their intended use. DO NOT HIT on them.

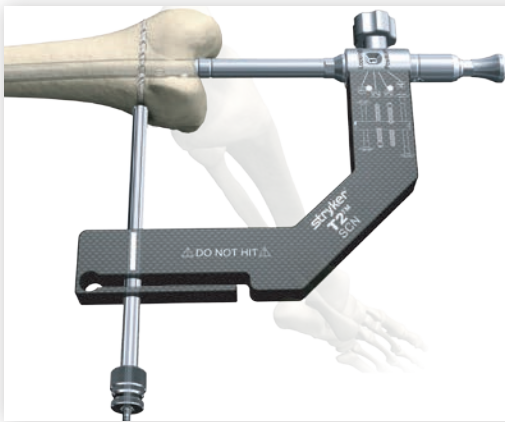


Figure 32

Distal locking (or most proximal of the distal locking screws)

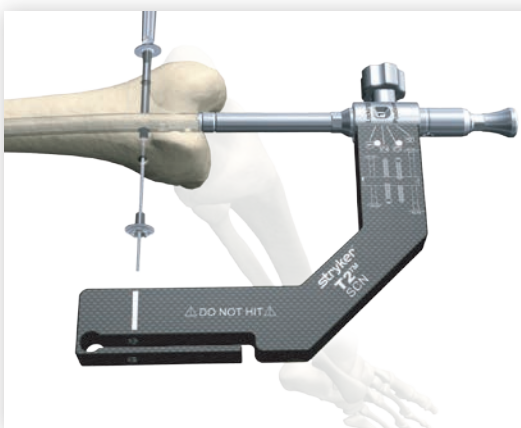
If a condyle screw is to be inserted, both cortices are drilled with the Ø5×340mm drill (1806-5020S) (Fig. 32).

After drilling both cortices, the screw length may be read directly off of the calibrated drill at the end of the long drill sleeve (Fig. 32a).

Note: The measurement equals condyle screw fixation length (from top of the condyle screw head to the top of condyle nut head, as shown in Fig. 32a). The condyle screw length is defined with the condyle screw tip flush to the condyle nut head. The possible fixation length ranges from 2mm longer than the condyle screw length to 5mm shorter. Ensure that the condyle nut is tightened a minimum of 5 turns on the condyle screw!



Figure 32a



**Condyle screw—
introduced M–L**

Figure 33

The condyle screw K-Wire (0152-0218S) is inserted from the lateral side through the long tissue protection sleeve to the medial side (Fig. 33). At the medial point of the perforation, a skin incision is made for the condyle screw.

From the medial side, the condyle screw is now brought forward over the condyle screw K-Wire (0152-0218S) and inserted using the condyle screw screwdriver (1806-0255).

To insert the condyle nut, the long tissue protection sleeve and the long drill sleeve are removed, and the K-Wire is withdrawn to the medial side. This allows the nut to be positioned between the targeting adapter and the level of the skin and onto the condyle screw K-Wire (Fig. 33).

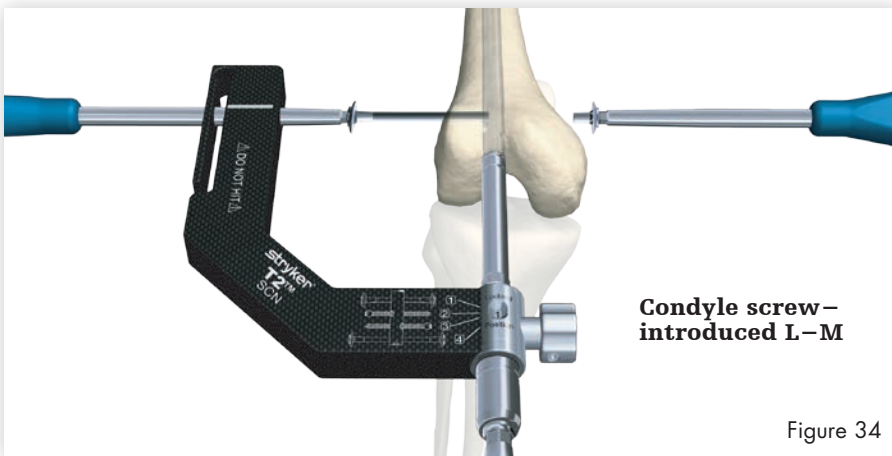


Figure 34

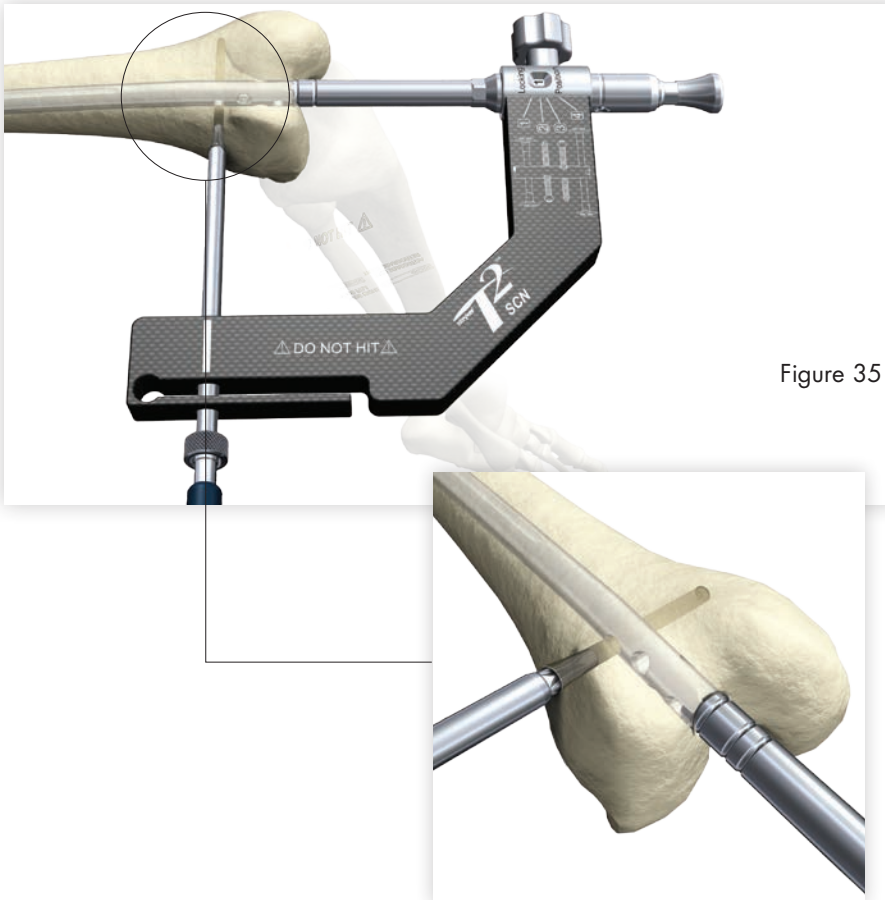


Figure 35

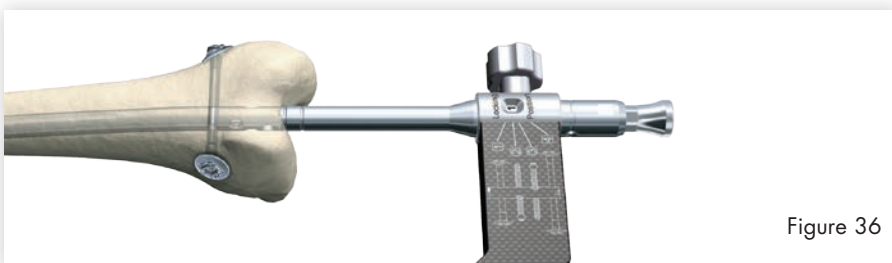


Figure 36

Alternatively, if patient anatomy allows, the condyle screw may be introduced from lateral to medial in a similar manner as described above (Fig. 34).

If necessary, contour the bone geometry with the countersink for condyle screw prior to insert the condyle screw and nut to optimize the seating of the washer (Fig. 35).

The lateral cortex can be contoured through the tissue protection sleeve, the medial cortex in a freehand technique, guided by the 1.8mm K-Wire.

Using both condyle screw screwdrivers, the condyle nut and the condyle screw are tightened. Once tightened, the K-Wire is removed (Fig. 34).

Note:

- In cases where the chosen condyle screw is too long it may be easier to extract the screw with the Revision condyle screwdriver Bit (1806-0257) placed on top of the condyle screwdriver.
- Do not use the revision condyle screwdriver bit for screw insertion and/or compression.

The adjustable screw washer of the condyle screw and the condyle nut adapt to the surface of the bone and may eliminate the need to countersink both (Fig. 36).

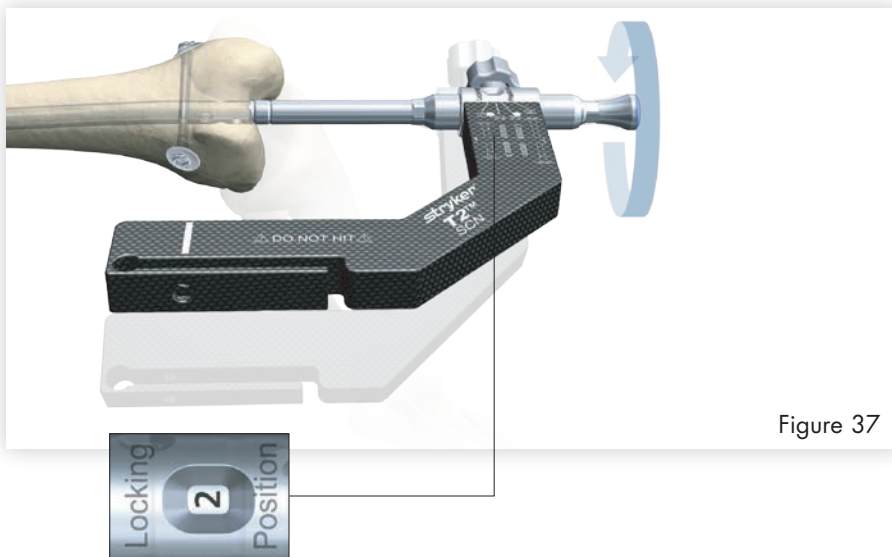


Figure 37

Oblique locking – fully threaded screw

Turn and pull back the targeting arm around the nail adapter until the system is locked in the oblique plane to gain access to the most proximal oblique locking hole. The position is fixed by tightening the thumb screw.

Note: Check that position 2 is indicated in the locking window (Fig. 37).

The long tissue protection sleeve (together with the long drill sleeve and the long trocar) is inserted into the targeting arm by pressing the safety clip. To release the tissue protection sleeve, the safety clip must be pressed again.

A small skin incision is made, and the assembly is pushed through until it is in contact with the cortex of the femur. The long trocar is removed, with the long tissue protection sleeve and the long drill sleeve remaining in position.



Figure 38

To ensure accurate drilling and easy determination of the screw length, use the center tipped $\text{Ø}4.2 \times 340\text{mm}$ calibrated drill (1806-4260S). The centered drill is forwarded through the drill sleeve and pushed onto the cortex (Fig. 38). After drilling both cortices, the screw length may be read directly off of the calibrated drill at the end of the drill sleeve. If measurement with the long screw gauge (1806-0325) is preferred, first remove the long drill sleeve and read the screw length directly at the end of the long tissue protection sleeve (Fig. 29, page 19).

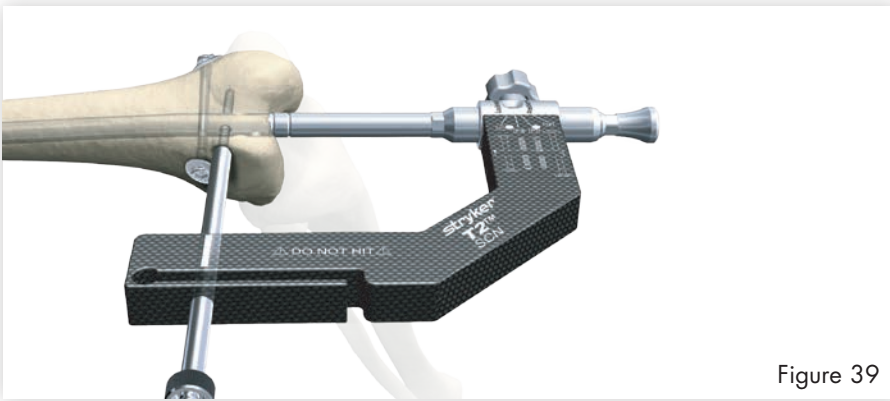


Figure 39

Note: The position of the end of the drill as it relates to the far cortex is equal to where the end of the screw will be. Therefore, if the end of the drill is 3mm beyond the far cortex, the end of the screw will also be 3mm beyond.

When the long drill sleeve is removed, the correct locking screw is inserted through the long tissue protection sleeve using the long screwdriver shaft with teardrop handle. The screw is advanced through both cortices (Fig. 39). The screw is near its proper seating position when the groove around the shaft of the screwdriver is approaching the end of the long tissue protection sleeve.

Turn and pull back the targeting arm around the nail adapter until the system is locked in the oblique plane to gain access to the most distal oblique locking hole (Fig. 40), the position is fixed by tightening the thumb screw.

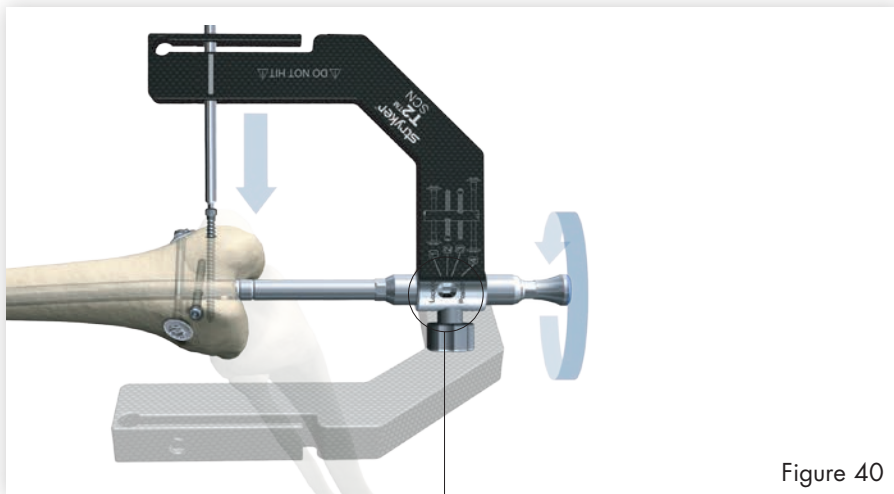


Figure 40



Note: Check that position 3 is indicated in the locking window (Fig. 40).

Repeat the locking procedure.

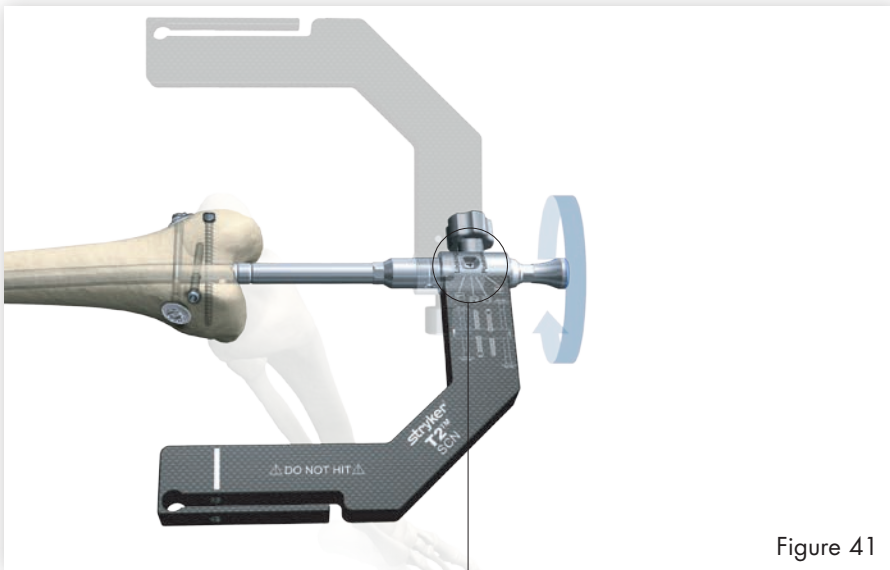


Figure 41

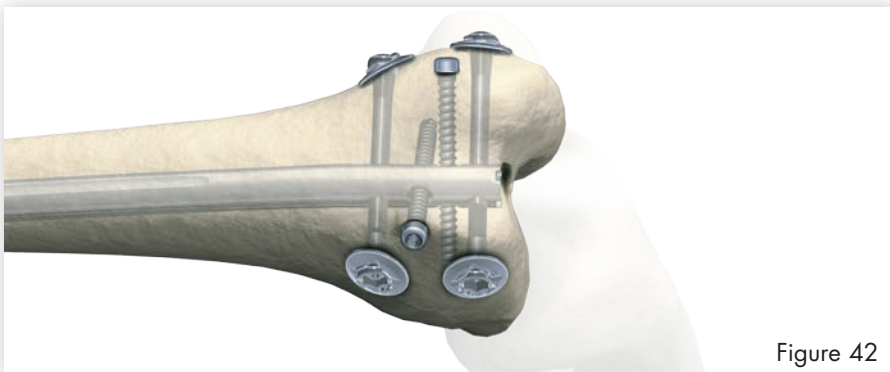


Figure 42

Distal locking – fully threaded or condyle screw

Turn the targeting arm around the nail adapter until the system is locked in the M/L plane to gain access to the most distal locking hole. (Fig. 41)

The position is fixed by tightening the thumb screw.

Note: Check that position 4 is indicated in the locking window.

Depending on fracture patterns either a fully threaded screw (page 17) or a condyle screw (page 20) can be inserted (Fig. 42).

Note:

- In cases where the chosen condyle screw is too long it may be easier to extract the screw with the revision condyle screwdriver bit placed on top of the condyle screwdriver.
- Do not use the revision condyle screwdriver bit for screw insertion and/or compression.

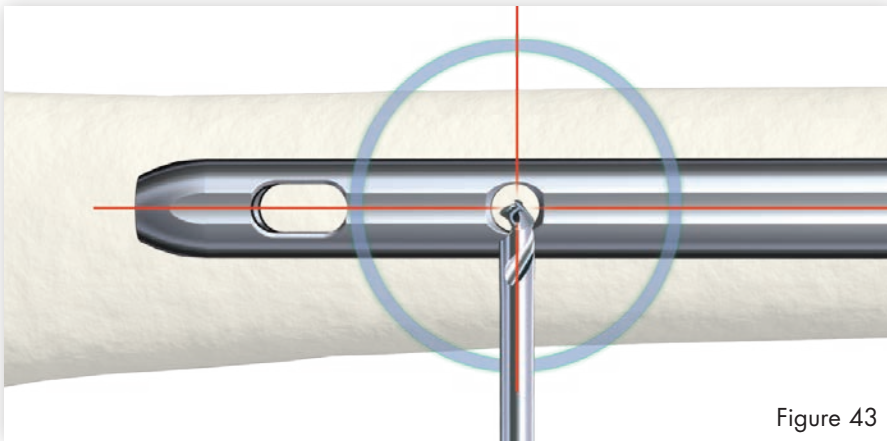


Figure 43

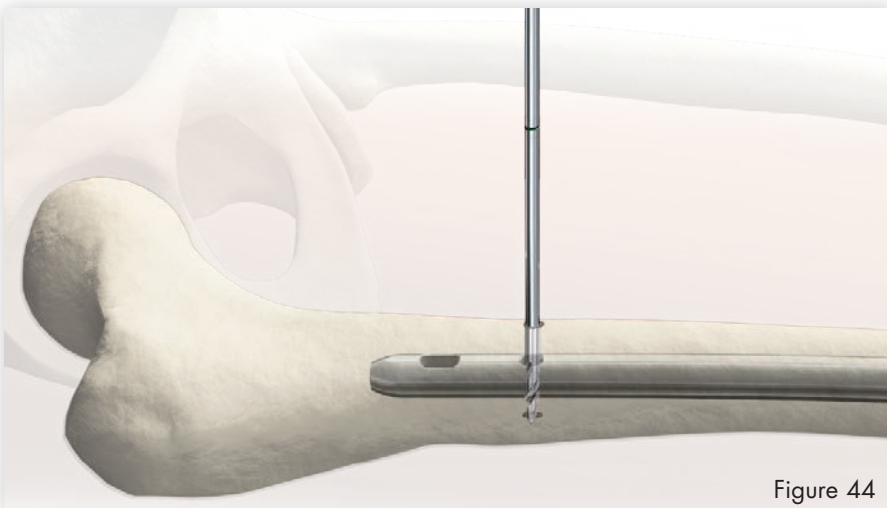


Figure 44

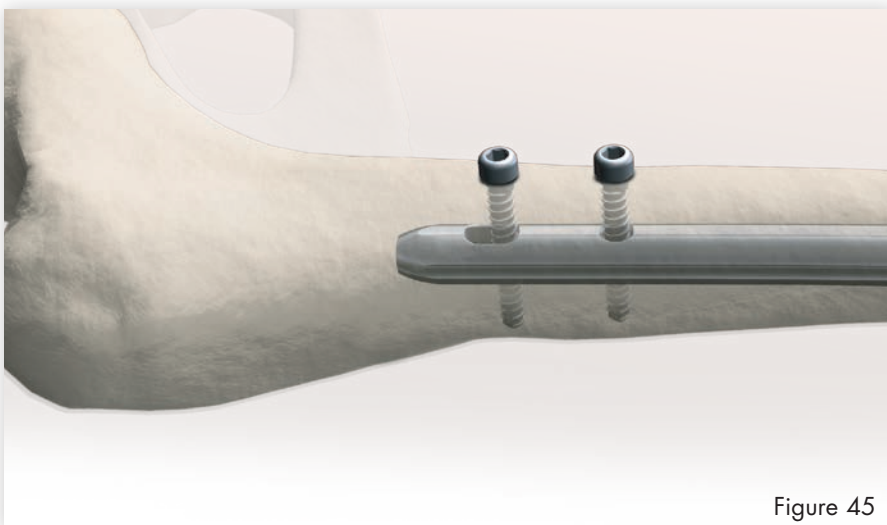


Figure 45

Freehand proximal locking

The freehand technique is used to insert locking screws into both A/P holes for the T2 SCN Long version.

Freehand proximal locking is not necessary for the T2 SCN short version. The use of a corresponding targeting arm proximal for the T2 SCN short version, is described in the chapter for guided proximal locking on page 26.

Multiple locking techniques and radiolucent drill devices are available for freehand locking. The critical step with any freehand locking technique, proximal or distal, is to visualize a perfect round locking hole or perfect oblong locking hole with the C-Arm.

The center-tipped $\text{Ø}4.2 \times 230\text{mm}$ drill is held at an oblique angle to the center of the locking hole (Fig. 43). Upon X-Ray verification, the drill is placed perpendicular to the nail and drilled through the anterior and posterior cortex. Confirm that the drill passes through the hole in the nail in both the A/P and M/L planes by X-Ray.

After drilling both cortices (Fig. 44) the screw length may be read directly off of the screw scale, long (1806-0365) by placing the screw scale next to the drill shaft and holding it down to the bone.

Alternatively, the screw gauge 20mm – 120mm (1806-0331) can be used to determine the screw length.

Routine locking screw insertion is employed with the assembled long screwdriver shaft and the teardrop handle.

Repeat the locking procedure to insert the second screw (Fig. 45).

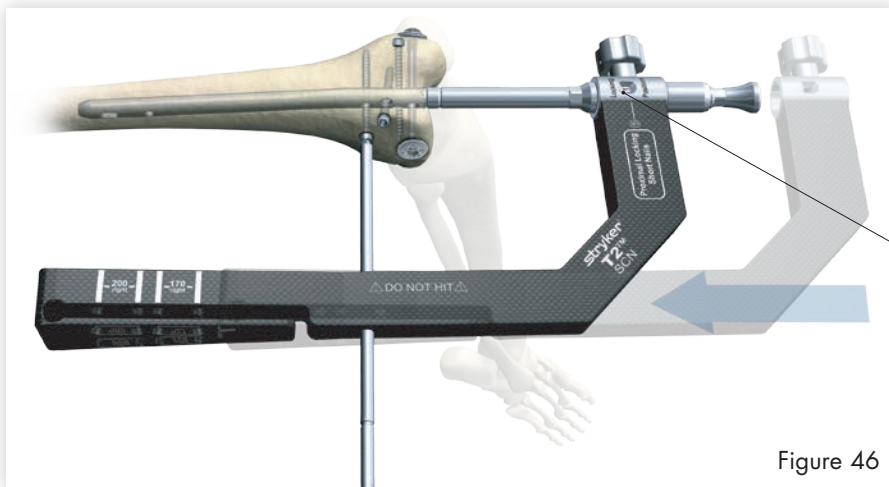


Figure 46



Figure 47



Figure 48



Figure 49

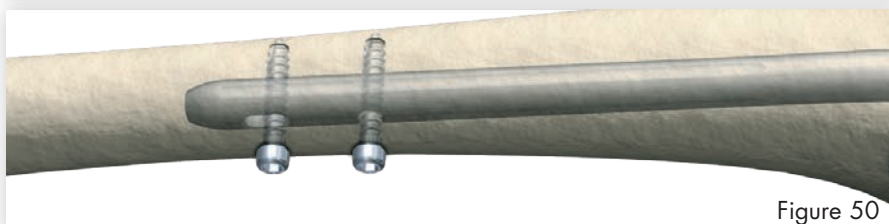


Figure 50

Guided proximal locking T2 SCN short version

The targeting arm proximal, SCN is designed to provide guided proximal locking for the T2 SCN short version 170 and 200mm.

Remove the targeting arm proximal, SCN and slide the targeting arm proximal, SCN onto the nail adapter (Fig. 46).

Note:

- **The targeting arm proximal, SCN must be locked in position 1.**
- **A load on the targeting arm proximal, SCN may lead to a deflection of the arm which will have a negative influence during the drilling procedure.**

Only if a 5.0mm fully threaded locking screw is located in position 1, you may insert the screwdriver, long (1806-0232) through the optional "stabilizing" hole provided in the targeting arm proximal, SCN. Ensure correct engagement of the screwdriver tip into the hex of the 5.0mm fully threaded locking screw located in position 1 (Fig. 46 & 47). This technique cannot be used if a condyle screw has been used in position 1 since their hex size requires the dedicated condyle screwdriver, which is too large in diameter to fit through the "stabilizing" hole.

The long tissue protection sleeve together with the long drill sleeve and the long trocar are inserted into the corresponding hole of the targeting arm for the selected nail (Fig. 47).

Routine drilling and the locking procedure are employed for the proximal locking (Fig. 47–50).

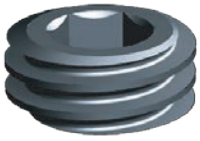


Figure 51

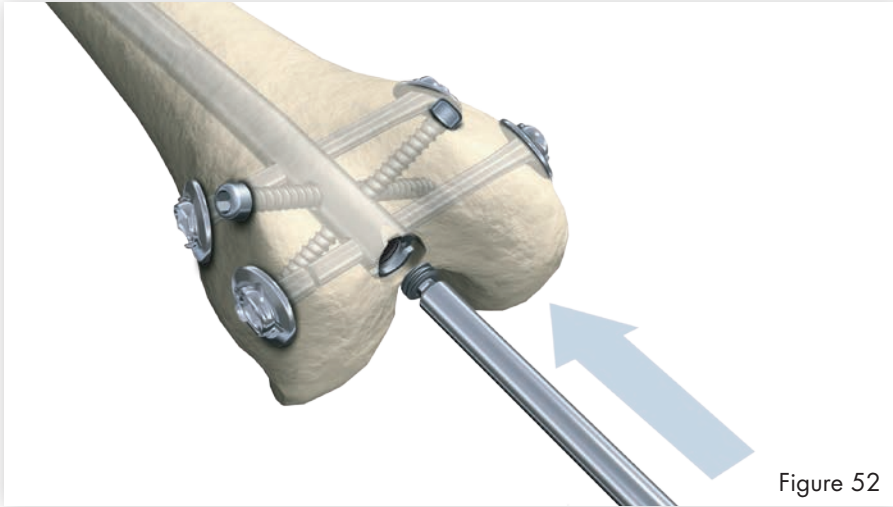


Figure 52

End cap insertion

After removal of the target device, the end cap should be used in order to avoid bony ingrowth into the distal thread of the nail. One cannulated end cap is available for all nail sizes (Fig. 51).

Note: The end cap will lock the locking screw at the distal end of the nail. This will create a fixed angle between nail and locking screw and prevent lateral sliding of the nail.

The end cap is inserted with the long screwdriver shaft (1806-0227) and the teardrop handle after intra-operative radiographs show satisfactory reduction and hardware implantation (Fig. 52). Fully seat the end cap to minimize the potential for loosening.

Thoroughly irrigate the wound to prevent debris from remaining within the knee joint and close using standard technique.

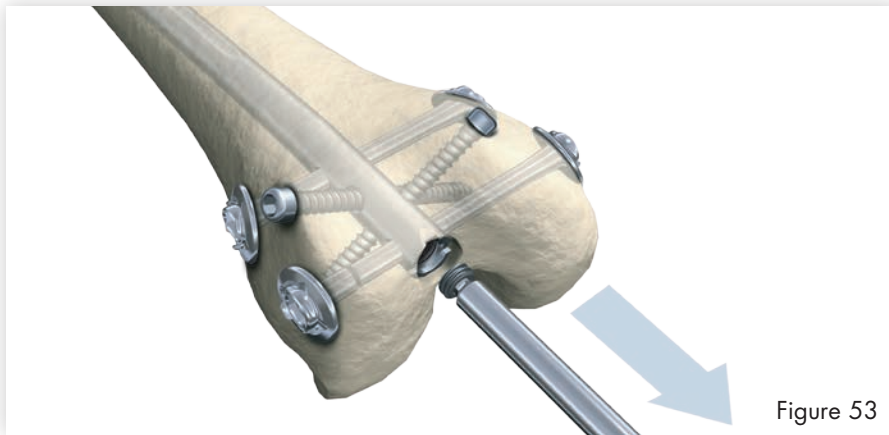


Figure 53

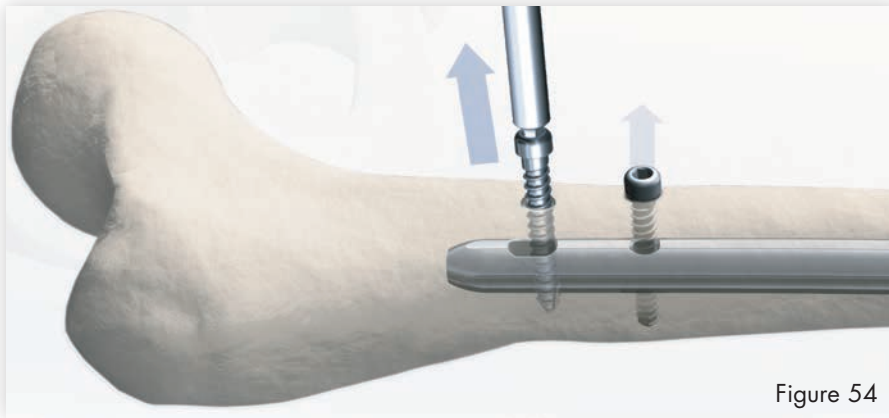


Figure 54

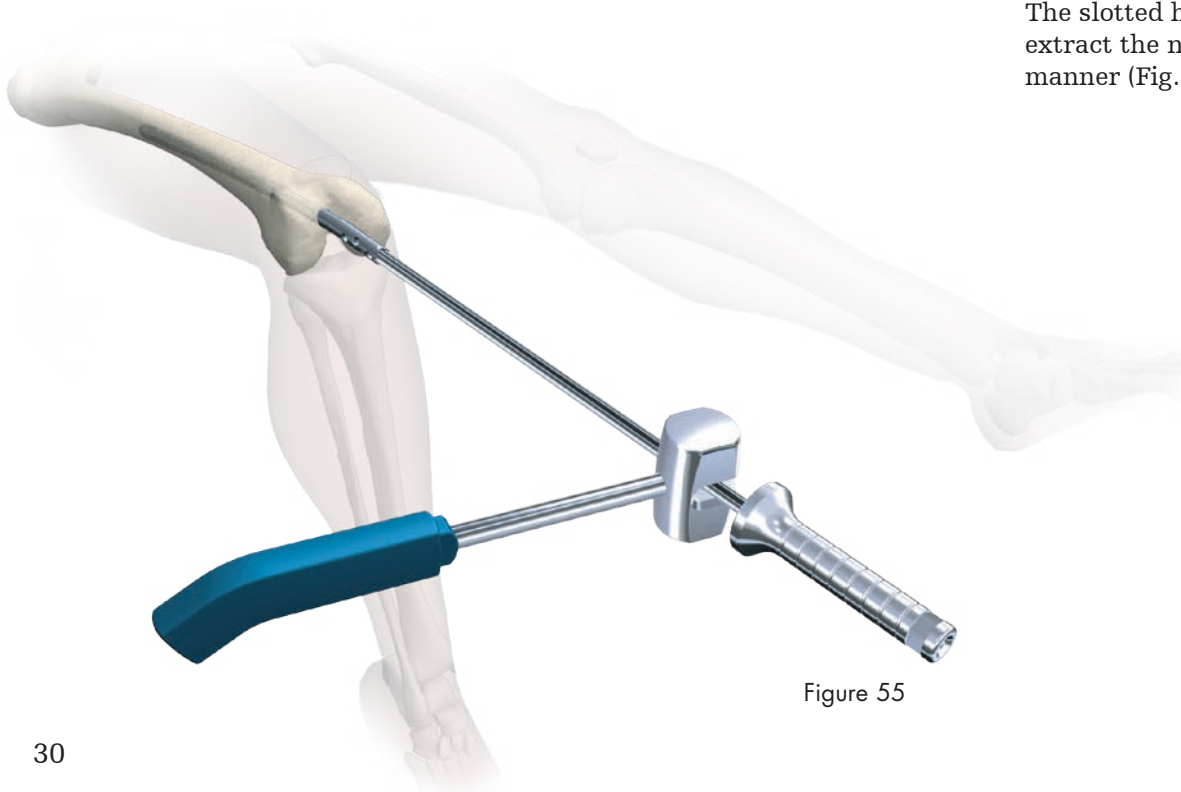


Figure 55

Nail removal

Nail removal is an elective procedure. If needed, the end cap and the most distal screw are removed first with the long screwdriver shaft and the teardrop handle (Fig. 53).

Note:

- **Special care must be taken to check if the nail moves off-center of the entry point when screws are removed. Any attempt to remove a nail that is off-center may result in fractures of the distal condylar region.**
- **When extracting a condyle screw, it may be easier extracted with the revision condyle screwdriver bit placed on top of the condyle screwdrivers.**

The universal rod is inserted into the driving end of the nail. All locking screws are then removed. The slotted hammer is used to extract the nail in a controlled manner (Fig. 54 & 55).

Notes:

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Literature Number: T2-ST-16, 03-2016
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CE0123

Manufactured by:

Stryker Trauma GmbH
Prof.-Küntschers-Str. 1-5
24232 Schönkirchen
Germany

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