

Aesculap Orthopaedics

Targon® PH Targon® H

Intramedullary Nail System for the
Proximal Humerus and the Humeral Shaft



Fractures of the humeral shaft are generally treated conservatively with early functional mobilization with great success. Nevertheless, there are a number of very good or relative indications for surgical treatment. Among the surgical methods involving internal fixation devices, intramedullary nailing has increasingly gained in importance. For such procedures, the retrograde approach proved to be an attractive surgical option as an alternative method to the traditional antegrade approach, for certain fracture constellations. Some of the therapeutic failures reported in literature in conjunction with the use of intramedullary nailing to treat humerus shaft fractures are attributable to non-union of bone fragments. The use of compression devices represents a simple method for counteracting the tendency to fragment displacement. The Targon® line of humeral nails developed by Aesculap incorporates such features and thereby creates the preconditions for achieving a low rate of complications in connection with the internal fixation of such fractures.

The fixation of humeral head fractures by conventional methods, especially in patients with severe osteoporosis, suffers from high failure rates. Therefore new, more successful fixation methods have been developed in recent years, among them Targon® PH and Targon® H, which have already convinced many users because they reflect recent efforts to prevent the predominant complications discussed in the literature.



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- Pseudarthrosis is caused by excess elasticity in the supporting system and by relative displacements between the metaphyseal fragments. To prevent this complication, the capitellar nail provides rigid fixation of the capitellar fragments with high angular and relative displacement stability.
- The development of capitellar necrosis is also promoted by the compressing effect of certain fixation techniques on the branches of the circumflex humeral artery feeding the capitellum. Insufficient stability of fixation is another likely negative factor. Because the new interlocking screws penetrate the soft tissue near the capitellum only at certain points, the blood supply is afforded maximum protection. The adjusting-screw effect of the interlock allows using the remaining possibilities to revascularize the fragments (even if the patient exercises early in the postoperative period). User experience over the first few years led to two modifications of the implant components:
 - The fixation of crushed tubercles is carried out with a short frame suture (rope-over-bitt method) around the head of the respective fixation screw. The screw head profile was slightly modified to hold of this suture more securely.
 - Especially in patients with severe osteoporosis, spontaneous untightening of the smoothly running fixation screws has been observed. Therefore a plastic inlay (PEEK: Poly-EtherEtherKetone) was inserted as a "screw brake" in the upper nail section. In tests, Targon® PH with PEEK inlays successfully underwent 200 processing cycles. Finally, the Targon® instruments were developed with special emphasis on easy handling and practicality to offer optimum cost-efficiency for both main indication areas (humerus stem and humerus head).

The Solution for Fractures of the Capitellum

■ Protection of the blood supply

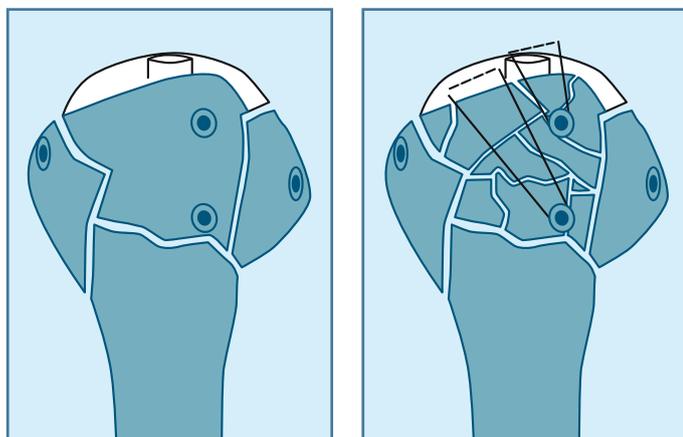
The blood supply to the capitellar fragments provided by the fine branches of the circumflex humeral artery can be damaged by surface compression, e.g. by a T-plate, and by the constricting effect of cerclage wires. Since the interlocking screws, as peripheral load-bearing fixation elements, penetrate the tissue only at certain points, damage to the soft-tissue zone near the capitellum is minimized so that the blood supply in the fractured capitellum is given a maximum chance of recovery.

■ Excellent fixation stability

To achieve optimally stable fracture fixation, the interlocking screws (fixation screws) in the capitellar area are anchored within the nail with angular and displacement stability at various insertion angles congruent with the tubercles in the capitellum. As a result, the position of the fragments relative to each other is maintained (SetScrew effect) even under exercise early in the post-operative period.

■ Rope over bitt

The nail locks the fragments in stable angular position. This is achieved by securing the 4.5 mm screws in the PEEK inlay and imbedding the screw heads in the cortical bone of the corresponding tubercle fragment. For splinter fractions, the fragments can be further fixated by short frame sutures between the tendon attachments and the screw heads.



Areas of Indication

Good subacromial passage

The impingement of implant edges (e.g. spiked wire ends, screw heads, plate edges, etc.) under the scapular roof causes painful irritation to such an extent that postoperative exercising schedules cannot be maintained. This poses the risk of permanent scarring in the subacromial space and a severe loss of movement in the shoulder.

To prevent this complication, the interlocking screw heads feature a new thread design that allows recessed insertion in the cortical bone of the capitellum. This allows the patient to start intensive exercising as soon as the postoperative inflammation subsides so that the articular functionality of the subacromial bursa can be restored rapidly.

| | | 2 | 3 | 4 |
|---------------------------|-----------|---|---|---|
| I Minimum dislocation | | | | |
| II Collum anatomicum | | | | |
| III Collum chirurgicum | | | | |
| IV Tuberculum majus | | | | |
| V Tuberculum minus | | | | |
| VI Luxation fractures | anterior | | | |
| | posterior | | | |

Neer-Classification

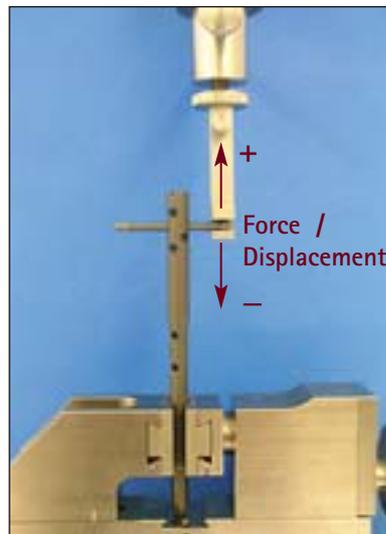
Targon® PH indication

Biomechanics

Measurement of the tilting displacement and tilting force of the fixation screw in the nail with and without screw brake

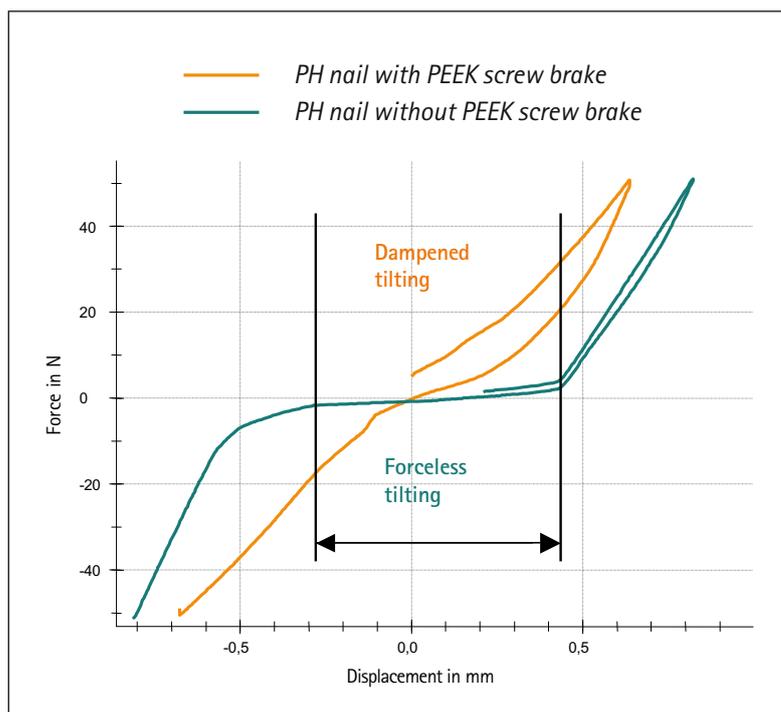
With the same force applied, nails with screw brake allow roughly the same degree of tilting as nails without screw brake

However, the tilting characteristic of nails without screw brake is abrupt whereas the tilting is softer, more dampened for nails with the screw brake feature. This buffer effect protects the joined bone-implant interface.



Experimental setup:

PH nail clamped in, with fixation screw and force transmission.



For the PH nail without screw brake the tilting curve is characterized by a forceless, abrupt region while the tilting of a PH nail with screw brake is softer, more dampened.

The Solution for Fractures of the Humeral Shaft

■ Antegrade or retrograde nail implantation

The selection of a suitable surgical approach is not just a question of the surgeon's personal preferences. The obvious advantage of retrograde nail implantation is the extra-articular access. On the other hand, the retrograde approach becomes more and more problematic (e.g. risk of fracture of the bone bridge between the edge of the fracture and the nail insertion hole) the further distal the fracture is located.

Even for shaft fractures located far toward proximal, the retrograde implantation of an intermedullary nail can be complicated by poor anchoring of interlocking screws in the metaphysis (e.g. screw loosening in an osteoporotic bone bed). However, the targeting device and the nail drill holes fully meet the requirements of both surgical approaches.

■ More stability through interfragmentary compression

In stable transverse fractures and short oblique fractures, in particular, inadequate contact between fragments has the effect of delaying or even preventing fracture healing. A compression device creates secure, close, interlocked fragment contact preventing rotation. The resulting freedom from pain and stability of the arm during early postoperative exercise promotes rapid fracture healing.

■ Fixation screw for optimized interlocking

In patients with high-grade osteoporosis there is a danger that the interlocking screws may come loose and migrate into the proximal humerus region. For this reason there is the option of using a fixation screw (Ø 4.5 mm) instead of a normal screw (Ø 3.5 mm) for optimal displacement and angular stability.

A long version of the proximal humeral nail is available offering several options for interlocking with fixation screws.

Implant



Proximal locking holes with PEEK inlay

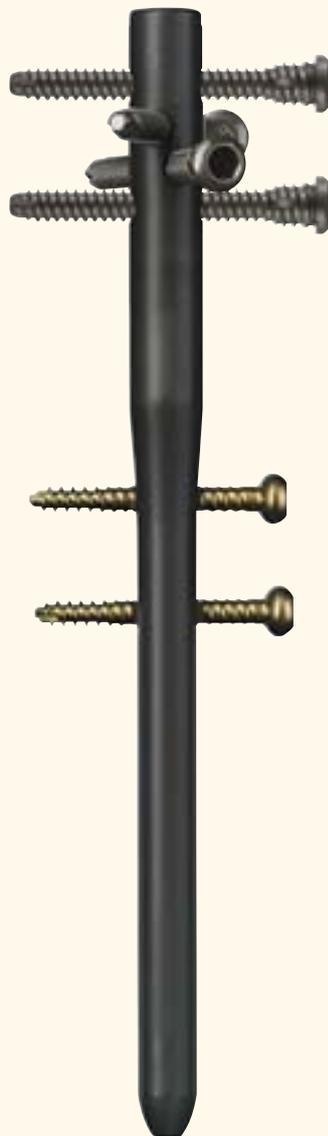
- Angular and displacement stability of the inserted screw

Anatomical angular positioning of the fixation screws (capitellum, lesser and greater tubercle of the humerus)

- Reduced probability of neural lesions
- Right and left versions

Distal diameter

- 8 mm/150 mm long
- 7 mm/200 – 280 mm long



Proximal diameter 10 mm

- Locking screws prevent bone ingrowth and allow easy explantation

Fixation screws

- Special threaded design for cancellous bone
- Large thread diameter on the screw head for secure hold on bone fragments
- Very flat screw head
- Suture channel in the screw head for "rope over bitt" fixation

Transfixation holes

- Hold 3.5 mm interlocking screws with proven, high-load thread design to stabilize on the distal side of the fracture line

Special surface treatment for:

- Simple implantation and explantation
- No osteointegration
- Minimal abrasion debris

Implant material:
Titanium alloy Ti6Al4V
PEEK (PolyEtherEtherKetone)

Implant



Antegrade or retrograde approach

Threaded locking hole

- Allows using fixation screws (e.g. patients with osteoporosis)
- Allows compression with one screw
- For angular and displacement stability of screw seating
- Slotted hole compression path of 8 mm

Special surface treatment for:

- Simple implantation and explantation
- No osteointegration
- Minimal abrasion debris

Four-way locking

- Offers alternatives to standard interlocking procedures
- Enhanced stability in patients with osteoporosis



Implant material:
Titanium alloy Ti6Al4V



Locking screws

- Prevent bone ingrowth and allow easy explantation

Extension screws

- Allow bicortical proximal locking

Angulation of 4°

- for easier retrograde implantation of the nail

Slender nail, 7 or 8 mm diameter

3.5 mm interlocking screws

- Made of a high-strength titanium alloy; proven design

Asymmetric sliding tip

- For easy implantation

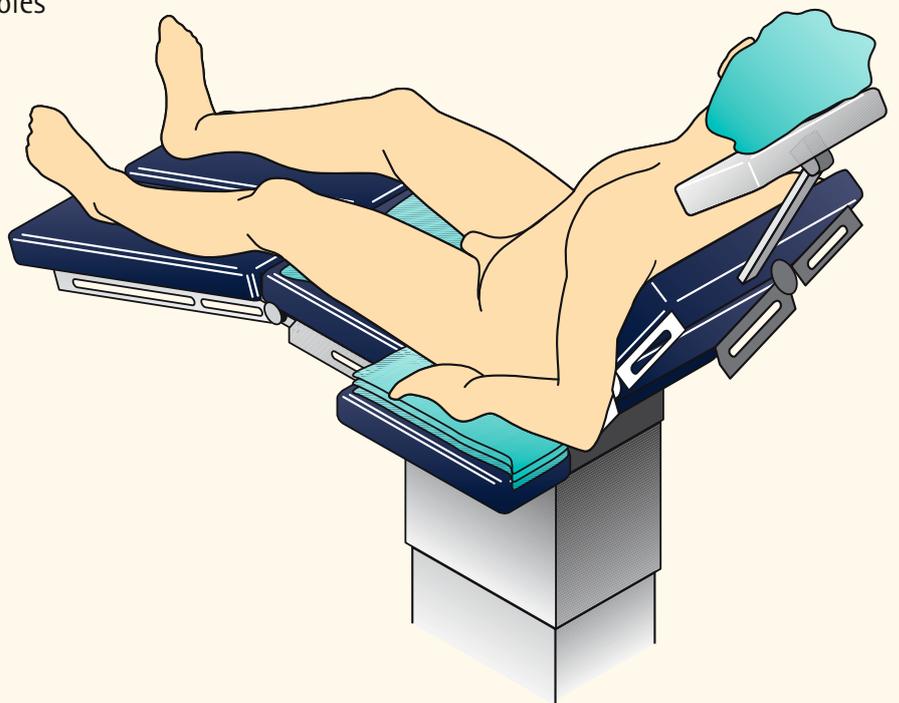
Operating Manual

Preoperative planning

- Nail sizes
- Positioning of the fixation screws
- Allocation of transfixation holes

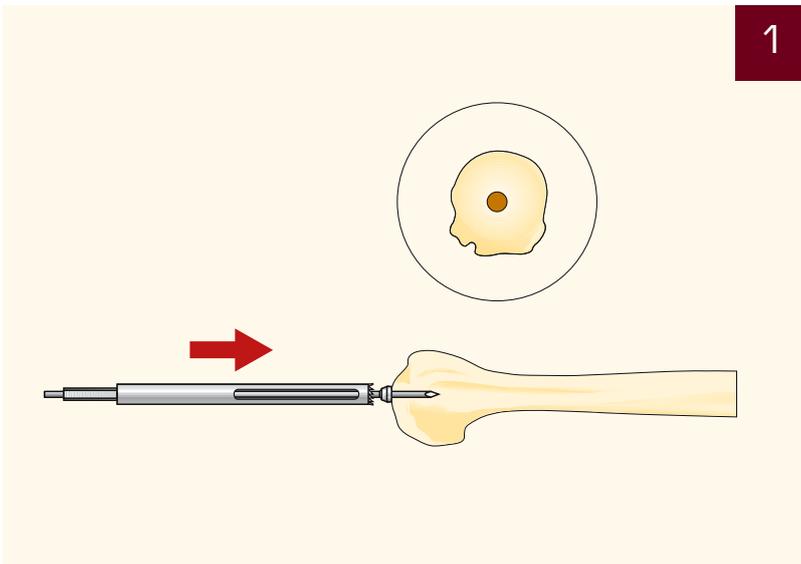
Patient position

- Beach chair position
- Shoulder free



Approach

- Deltoid-split approach at the frontal end of the acromial margin.
Opening of the subacromial bursa.
- Patients with an intact rotator cuff: Longitudinal incision of the cuff 1 cm dorsolateral of the palpated bicipital groove in the direction of the fibers toward medial. Looping of the two incision edges and exposures of the capitellum. Repositioning of the capitellum (possibly with a Steinmann pin); monitoring by image converter.
- Patients with a defective rotator cuff: Dislocated tubercles, enlargement of the tear in the rotator cuff via an incision in the direction of the fibers. Opening and holding back of the tubercles laterally; repositioning of the capitellum with a Steinmann pin ("joystick procedure").



Opening

- Guide pin KH161R
- Hollow reamer Ø 10.5 mm KH160R

Repositioning of the capitellum-bearing main fragment with a Steinmann pin ("joystick procedure"). Longitudinal incision of the supraspinatus tendon in fiber direction.

Insertion of the guide pin at the most cranial point of the capitellum. Image converter control in two planes. Opening of the capitellum with a hollow reamer.

Operating Manual

2

Mounting the nail at the targeting device

- Targeting device base KH165T
- Nail-adapter screw KH172R
- Targeting attachment KH166P
- Fastening screw KH167T
- Targeting bow R / L KH170R / KH171R
- Tightening sleeve KH321R
- Wrench KH324C

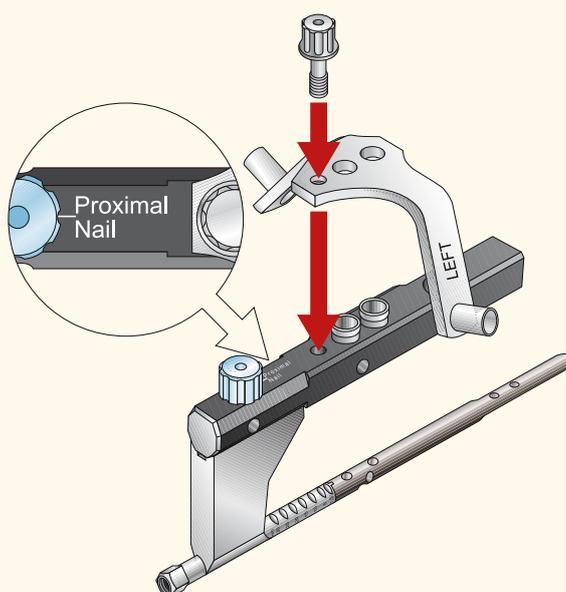
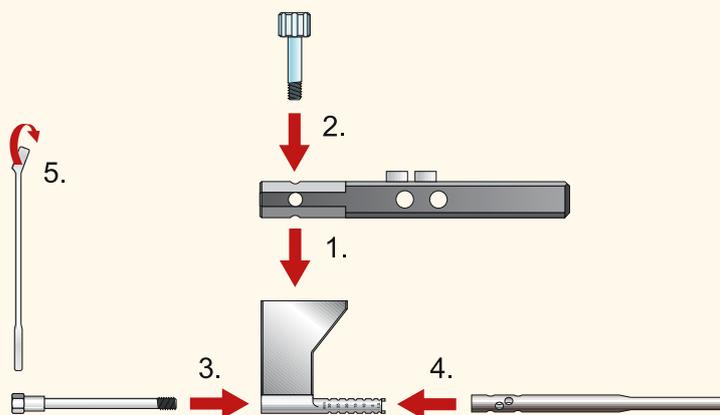
Fasten the targeting device base to the targeting attachment with the fastening screw.

Note:

To the right of the fastening screw, the inscription "proximal humerus nail" should be visible now.

Push the nail adapter screw through the targeting device base and slightly tighten the nail by hand. The grooves of different sizes on the nail tip allow only one nail position on the targeting device. Firmly tighten the nail with the tightening sleeve or wrench. The right-hand or left-hand targeting bows can be attached either before or after manual insertion of the nail.

If only fixation screws are used for placement in the capitellum, it is not necessary to attach the targeting bow. Insert the nail manually.



3

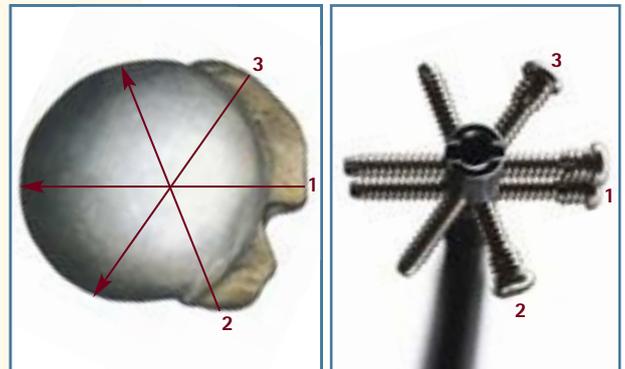
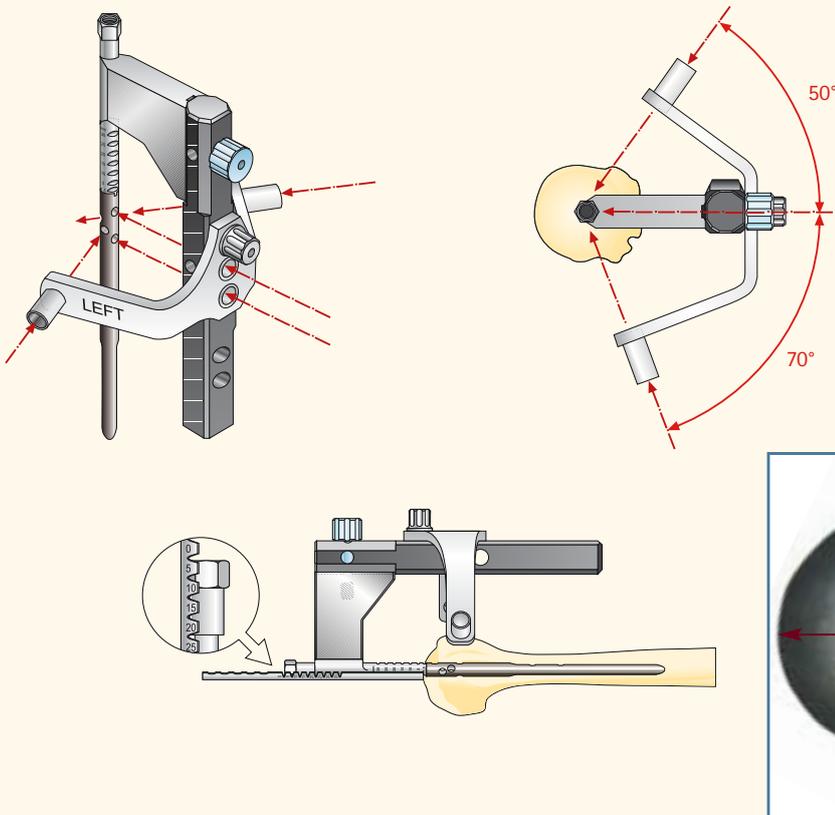
Checking the nail position

■ Nail depth gauge KH169R

Precise positioning of the greater tubercle and alignment of the targeting bow. Image converter control.

The nail depth can be checked either by sliding the nail depth gauge along the targeting device or with the X-ray marking at the targeting device. At the height of the hexagon screw, the nail insertion depth can be read on the nail depth gauge.

Care should be taken that the nail does not protrude beyond the calotte.



4

Applying the fixation screw holes

■ Tissue-protection sleeve KH182R

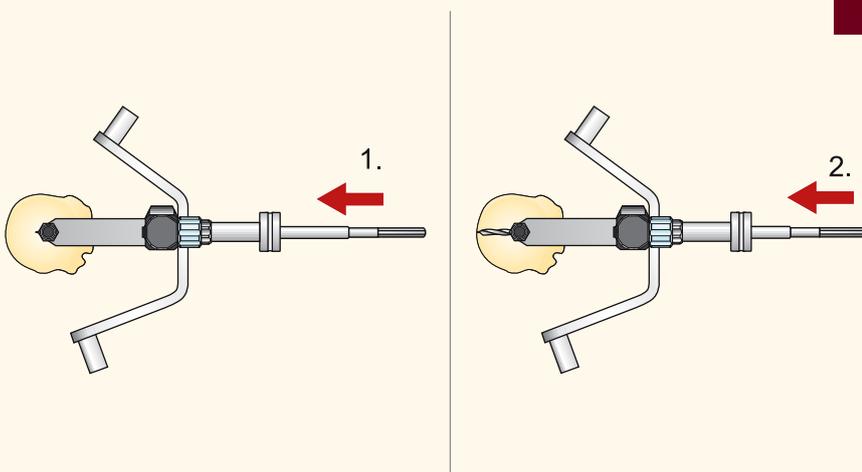
■ Obturator KH181R

■ Spiral drill Ø 3.5 mm KH184R

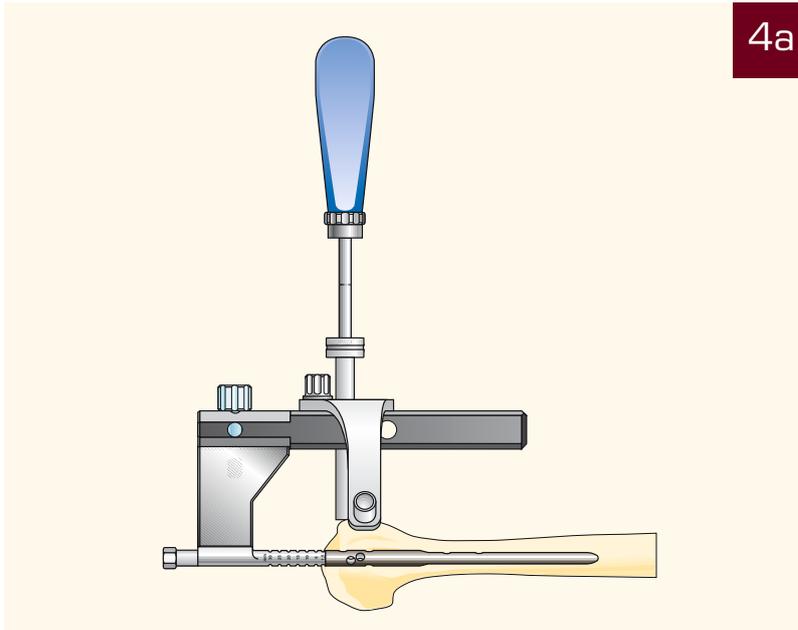
■ Screw length gauge KH398R

■ Screwdriver KH189R

Insert the obturator with the tissue-protection sleeve up to the bone. Drill the screw channel with the spiral drill (Ø 3.5 mm). Determine the length of the fixation screw. Insert the first fixation screw. Depending on the particular fracture, repeat this procedure until fixation screws are seated in all four nail holes.



Operating Manual

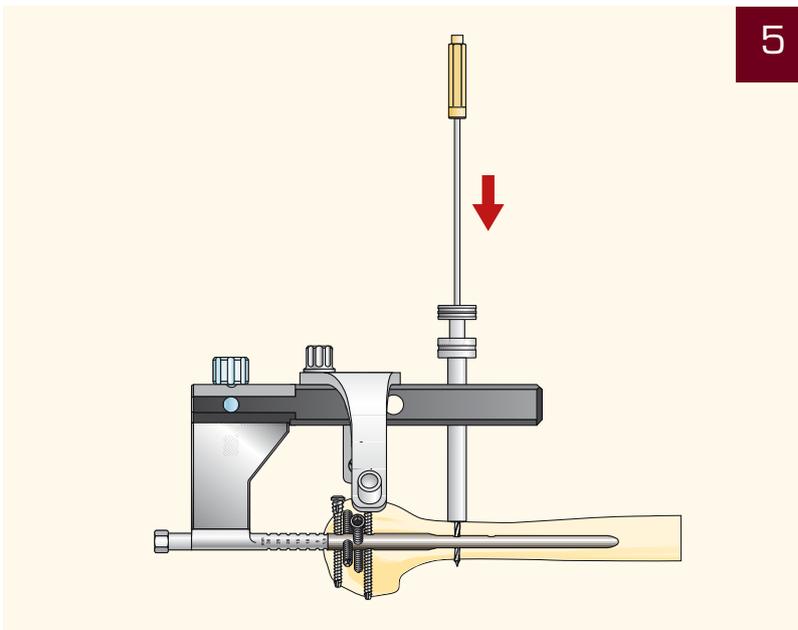


4a

Inserting the fixation screw

- Tissue-protection sleeve KH182R
- Obturator KH181R
- Spiral drill Ø 3.5 mm KH184R
- Screw length gauge KH398R
- Screwdriver KH189R

The marking on the screwdriver indicates when the screw head touches the cortical bone.



5

Inserting the transfixation screws

- Tissue-protection sleeve KH182R
- Obturator KH181R
- Drilling sleeve Ø 2.7 mm KH186R
- Spiral drill Ø 2.7 mm KH183R
- Screw length gauge KH398R
- Screwdriver KH189R

Advance the tissue-protection sleeve with the obturator until contact is made with bone.

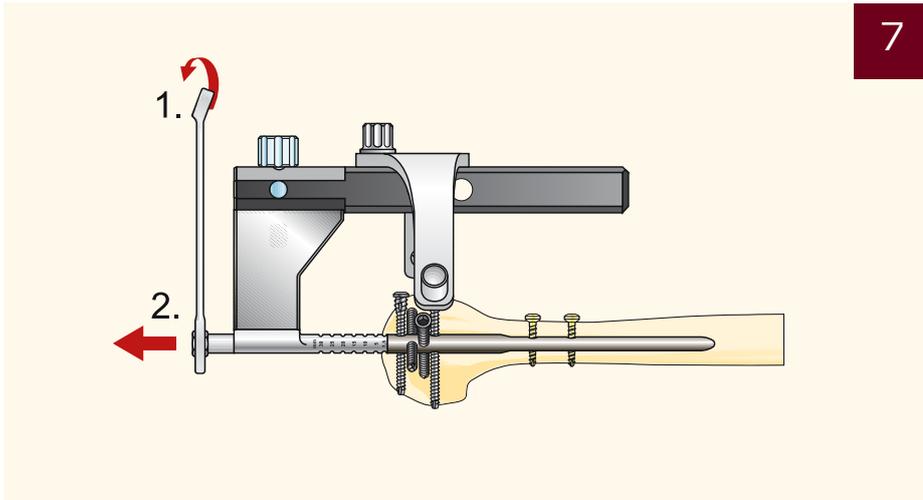
Push the drilling sleeve (Ø 2.7 mm) into the tissue-protection sleeve and drill through both cortical layers with the spiral drill (Ø 2.7 mm). Determine the screw length and insert the transfixation screw (Ø 3.5 mm).

6

Distal locking (for long nail only)

- Spiral drill Ø 2.7 mm KH183R
- Screw length gauge KH398R
- Screwdriver KH189R

If the long-nail version is used, the distal locking holes are locked through the freehand technique, using the shorter spiral drill Ø 2.7 mm KH190R. This technique is described in Section 4 of the Operating Manual for Targon[®] H.

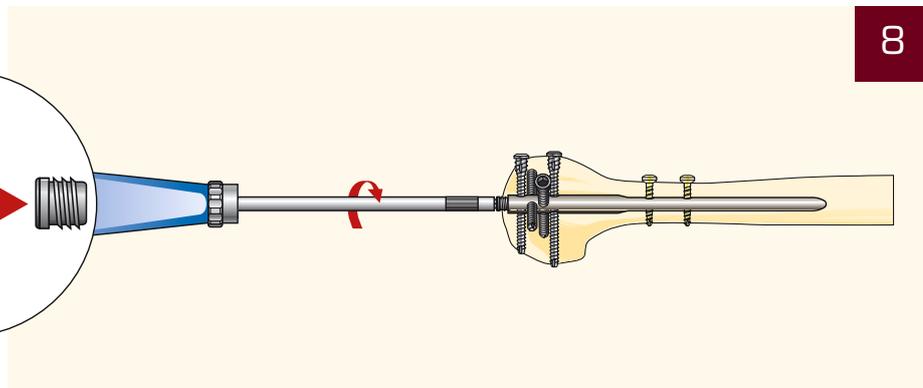


7

Removing the targeting device

- Tightening sleeve KH321R
- Wrench KH324C
- Screwdriver KH189R

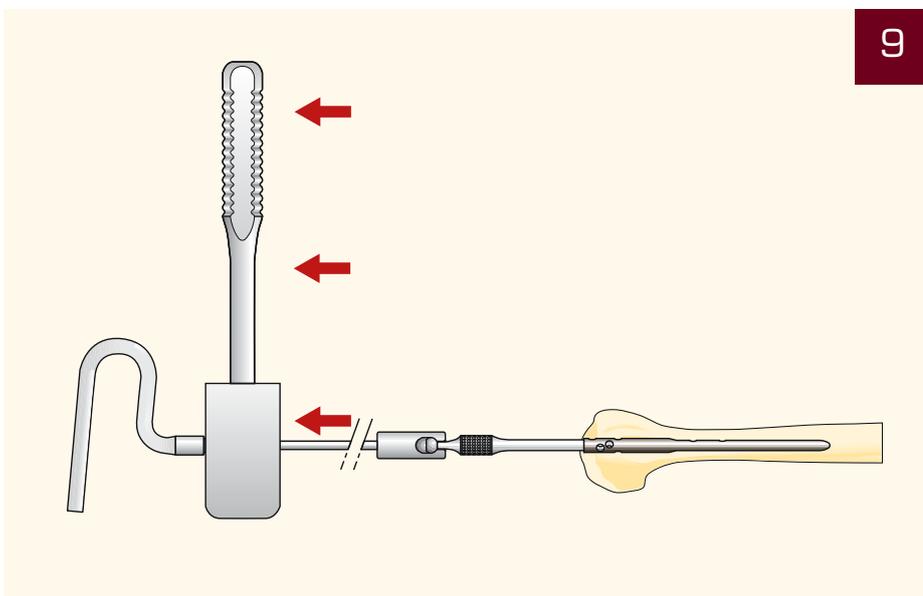
Using the tightening sleeve or wrench, loosen the adapter screw from the nail. Then disassemble the targeting device into its components.



8

- Screwdriver KH189R

Fixate the locking screw on the screwdriver and screw it into the nail.



9

Metal removal

- Screwdriver LS013R
- Extractor adapter KH188R
- Extractor instrument KH310R
- Slotted hammer KH113R
- Screwdriver KH189R

Access is via the old scar. Push the guide pin centrally into the nail tip under image converter monitoring; carefully pre-drill with the hollow reamer. Remove the proximal fixation screws and screw in the extractor adapter. Remove the interlocking screws that have been inserted and then remove the nail with the extractor instrument and the slotted hammer.

Note:

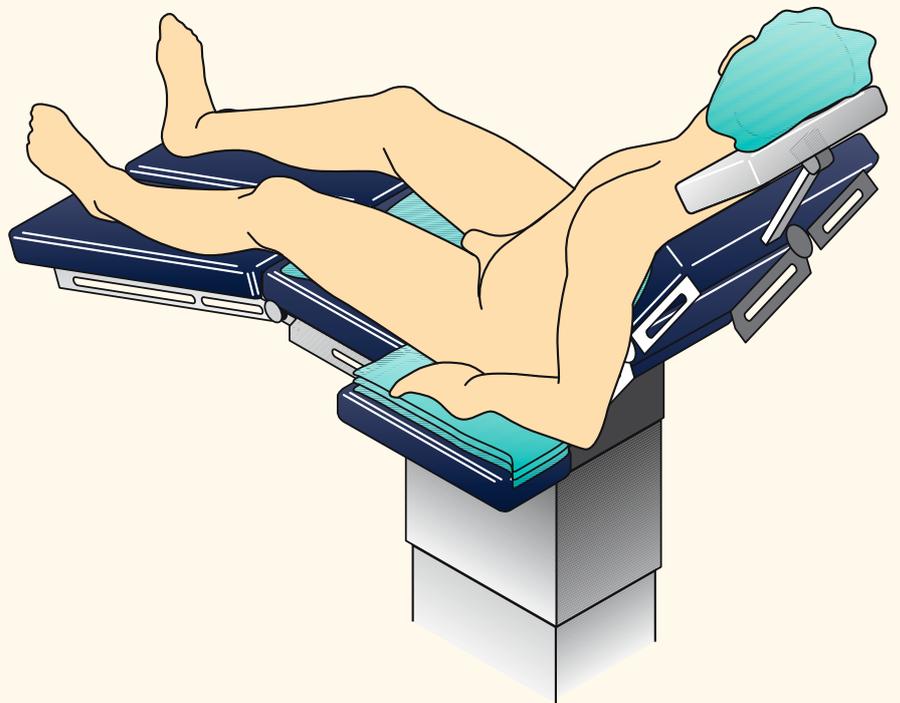
For further information on the standard and special instrument sets for metal removal, see page 34.

Operating Manual

Preoperative Planning

- Nail lengths
- Nail diameters
- Selection of screw type to maintain compression

Patient Position



Antegrade Approach

A1

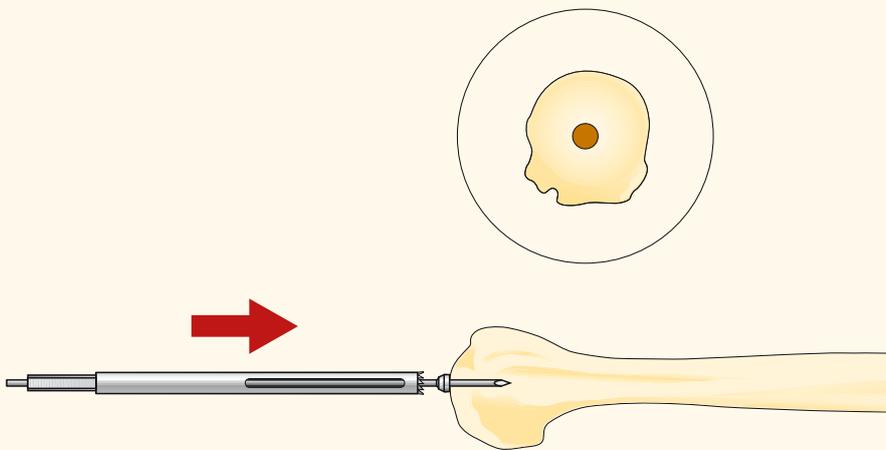
Access and preparation of the nail bed

- Guide pin KH159R
- Hollow reamer Ø 8.5 mm KH158R

Deltoid-split access on the front acromial margin.

Insertion of the guide pin (Ø 8.5 mm) to the most cranial edge of the capitellum under image converter control.

Drill the entry hole with the hollow reamer (Ø 8.5 mm).



A2

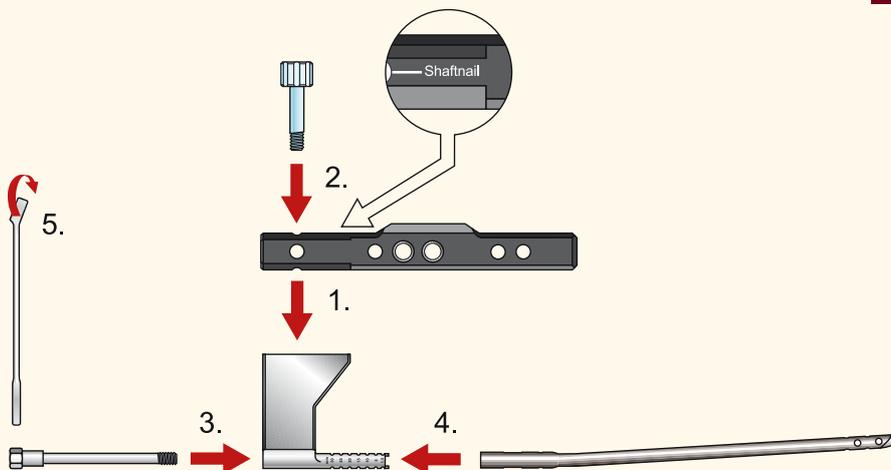
Mounting the nail to the targeting device

- Targeting device base KH165T
- Targeting attachment KH166P
- Fastening screw KH167T
- Nail adapter screw KH172R
- Tightening sleeve KH321R
- Wrench KH324C

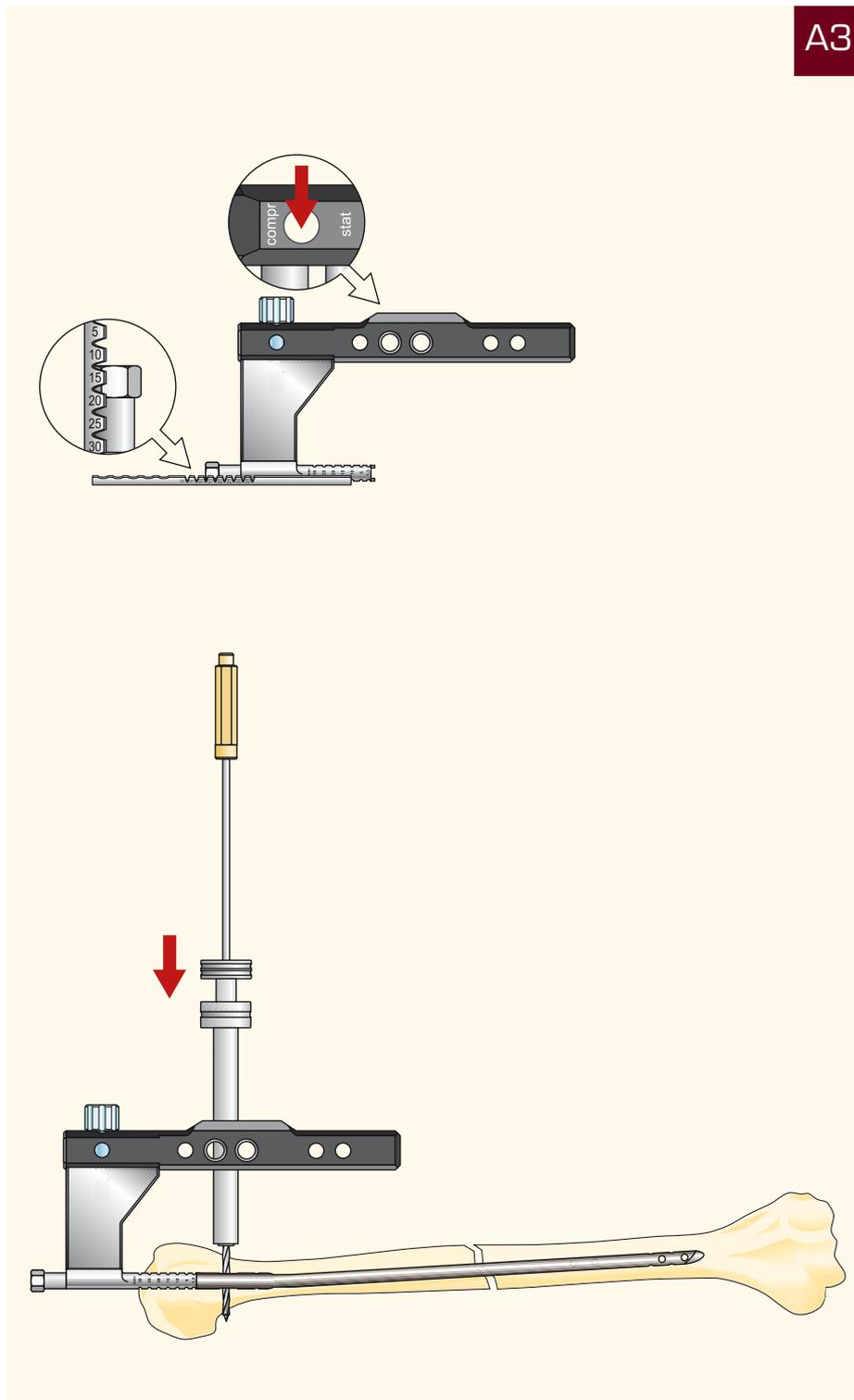
Fasten the targeting attachment to the targeting device base with the fastening screw.

Note:

Insert the nail adapter screw through the targeting device and slightly tighten the nail by hand before tightening it firmly with the tightening sleeve or wrench. The grooves of different sizes on the nail tip allow only one nail position.



Operating Manual



A3

Insertion of the nail and locking of the compression hole

- Nail depth gauge KH169R
- Tissue protection sleeve KH182R
- Obturator KH181R
- Spiral drill Ø 2.7 mm KH183R

Note:

If fracture compression is necessary, the nail must be inserted deeper by the length of the compression required. To achieve better support, we recommend bicortical insertion of the first proximal interlocking screw under the capitellum.

Following manual insertion of the nail, check its position on the image converter. The nail insertion depth can be checked with the nail depth gauge, which is slid along the targeting device up to the capitellum. At the upper edge of the hexagon nut, the insertion depth can now be read on the scale or, alternatively, by means of the X-ray mark at the targeting device. To prevent protrusion of the nail the displayed value should be between 5 and 10 mm. Using the obturator, push the tissue-protection sleeve up to the bone in the hole marked as "compr".

Insert the spiral drill (Ø 2.7 mm) through the corresponding drilling sleeve to drill open the screw hole. Determine the screw length and insert the interlocking screw (Ø 3.5 mm).

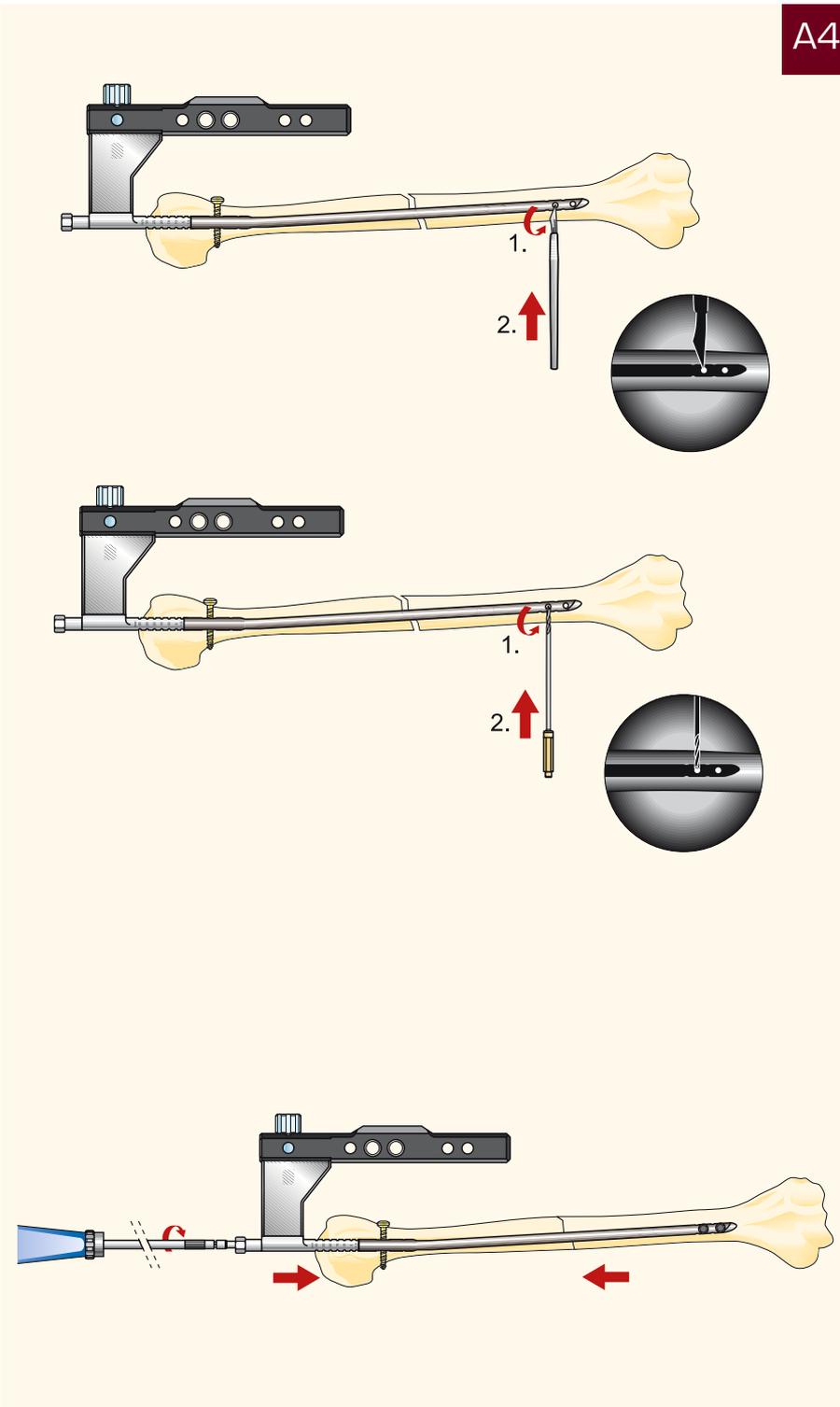
Antegrade Approach

A4

Compressing the fracture

- Spiral drill Ø 2.7 mm KH190R

The first step is the freehand locking of the distal portion with the spiral drill (Ø 2.7 mm) and insertion of the screws (Ø 3.5 mm) in the selected locking holes.

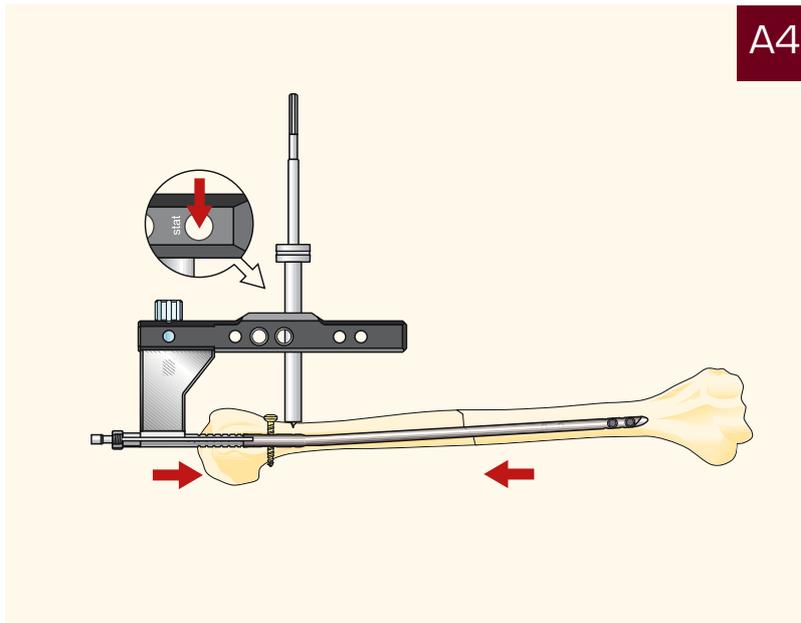


- Compression screw KH173R

- Screwdriver KH189R

Screw in the compression screw through the targeting device. With the screwdriver, turn the compression screw in the opposite direction to the interlocking screw until contact is made with bone in the fracture area. The compression maximum is 8 mm.

The compression screw is left in this position.

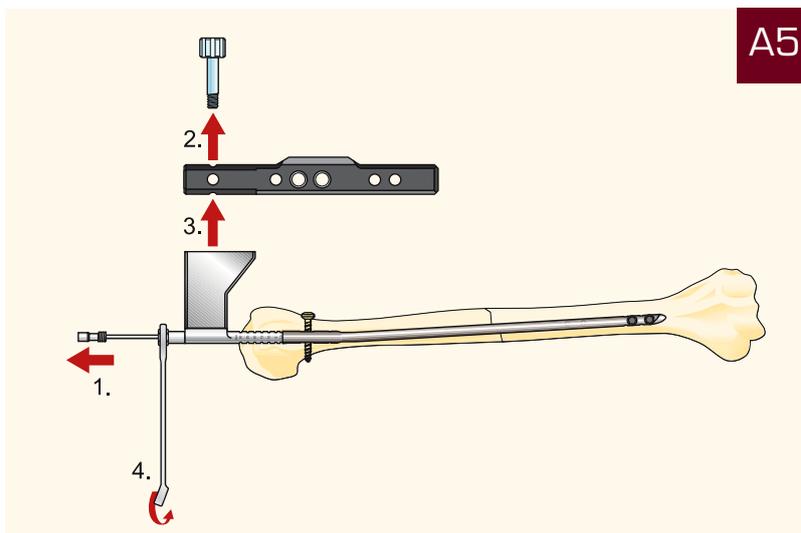


A4

Compressing the fracture

- Spiral drill Ø 2.7 mm KH183R
- Tissue-protection sleeve KH182R
- Obturator KH181R
- Screw length gauge KH398R
- Spiral drill Ø 3.5 mm KH184R

Using the obturator, advance the tissue protection sleeve through the hole in the targeting bow marked with Stat. Open the screw hole by drilling with the spiral drill (Ø 3.5 mm). Determine the screw length and insert the selected fixation screw (Ø 4.5 mm). The screw hole geometry in the nail allows inserting in the 2nd screw an interlocking screw Ø 3.5 mm or a fixation screw Ø 4.5 mm.



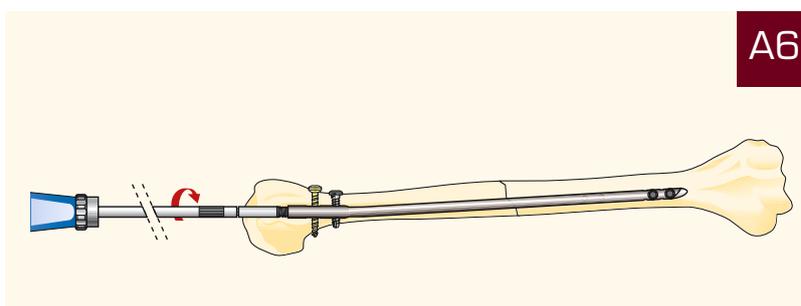
A5

Removing the targeting device

- Screwdriver KH189R
- Tightening sleeve KH321R
- Wrench KH324C

Remove the compression screw. Loosen the connection between targeting device and device base.

Loosen the nail adapter screw, using the tightening sleeve or the wrench.



A6

Fixating the locking screw on the screwdriver and screwing it into the nail.

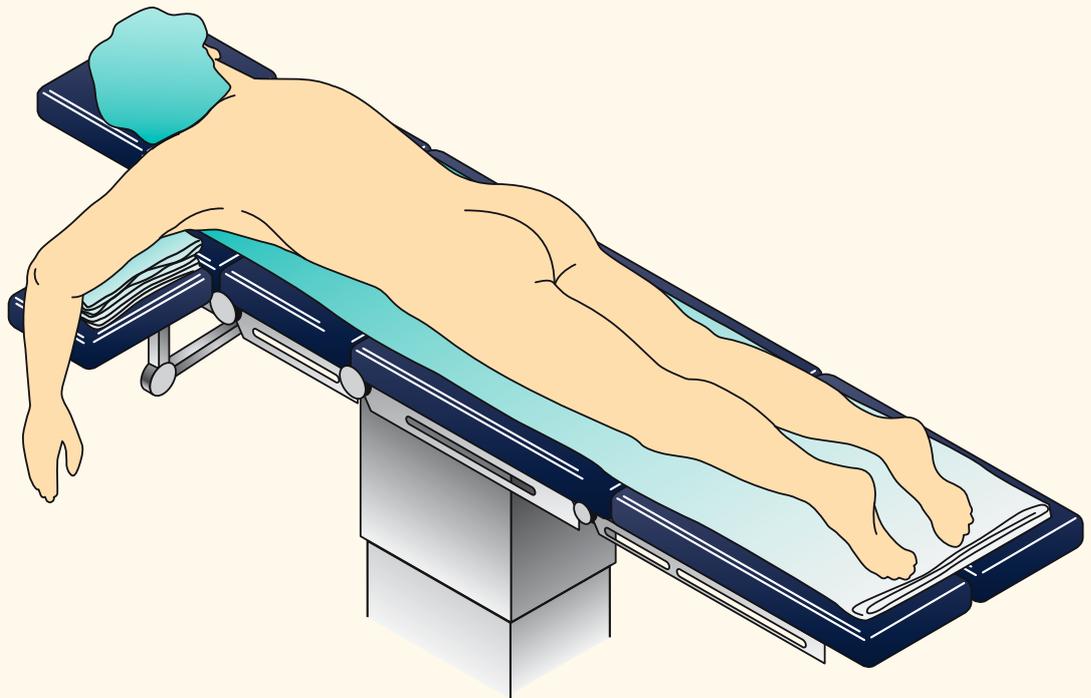
If extending locking screws are used, care must be taken that the proximal locking holes of the nail are positioned deeper, by the appropriate extension length, in the bone.

For this situation we recommend the short fixation screws, 22-28 mm, with their more slender threading. These screws were developed especially for fixation in the harder and thicker cortical bone in this region.

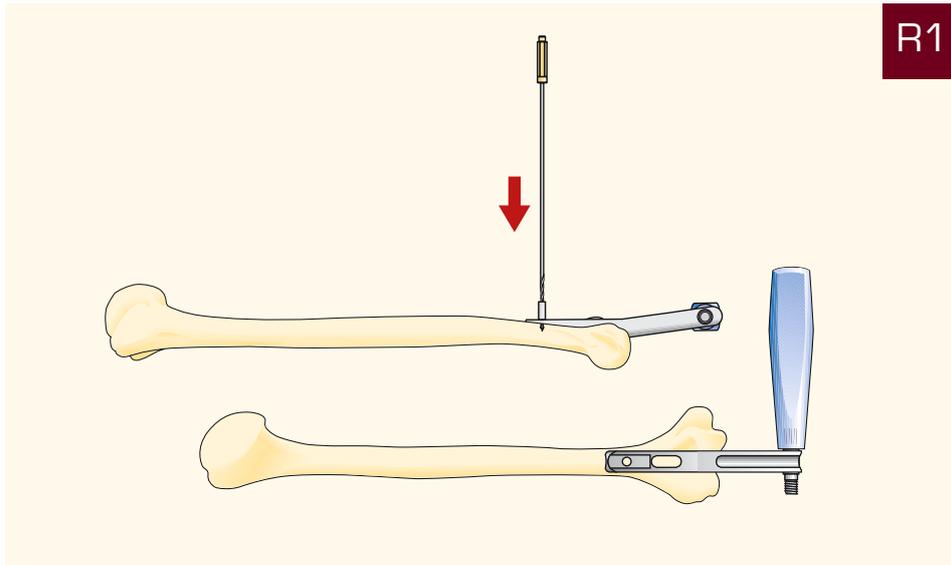
Preoperative Planning

- Nail lengths
- Nail diameters
- Selection of screw type to maintain compression

Patient Position



Operating Manual



R1

Access and preparation of the nail bed

- Guide instrument KH163R
- Access reamer KH162R
- Spiral drill Ø 2.7 mm KH183R
- Screw length gauge KH398R
- Screwdriver KH189R
- Reamer Ø 8 mm KH177R
- Reamer Ø 9 mm KH178R

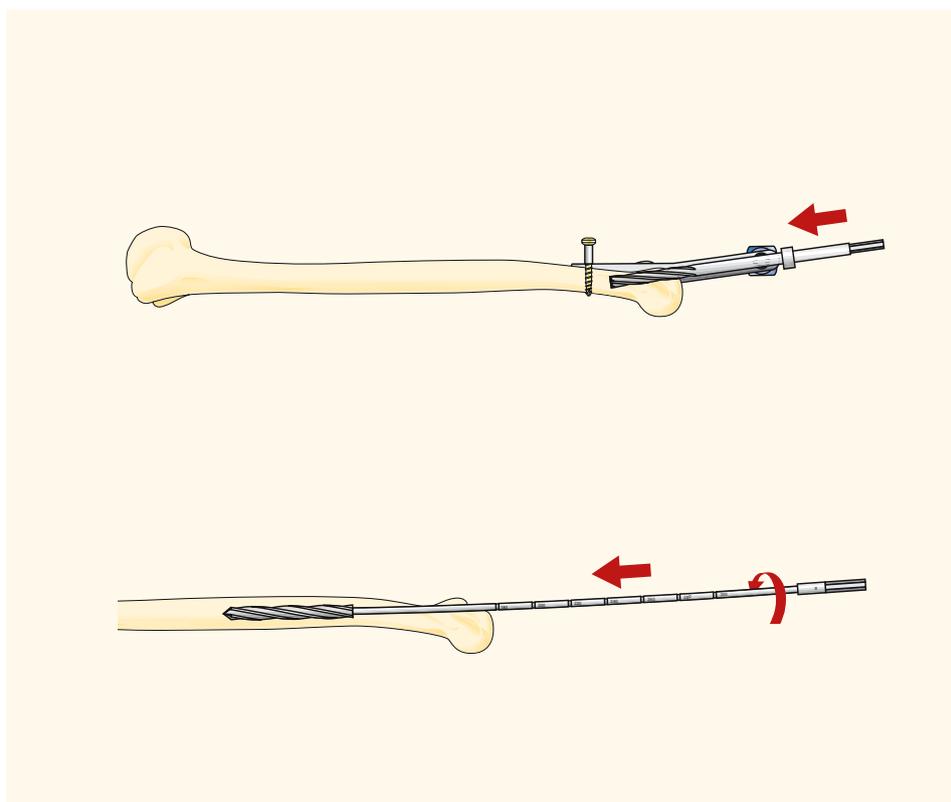
Splitting of the triceps tendon and exposure of the fossa olecrani. The guide instrument for the access reamer is placed on the fossa until the nail tip marked on the guide instrument corresponds to the planned nail tip. Using the spiral drill (Ø 2.7 mm), drill through the pin of the guide instrument and screw the guide instrument to the bone with a fixation screw (Ø 3.5 mm). The drilled hole can be used later as a locking hole for compression.

Prepare the entry portal by advancing the motor-powered access reamer on the guide instrument up to the stop. Remove the guide instrument.

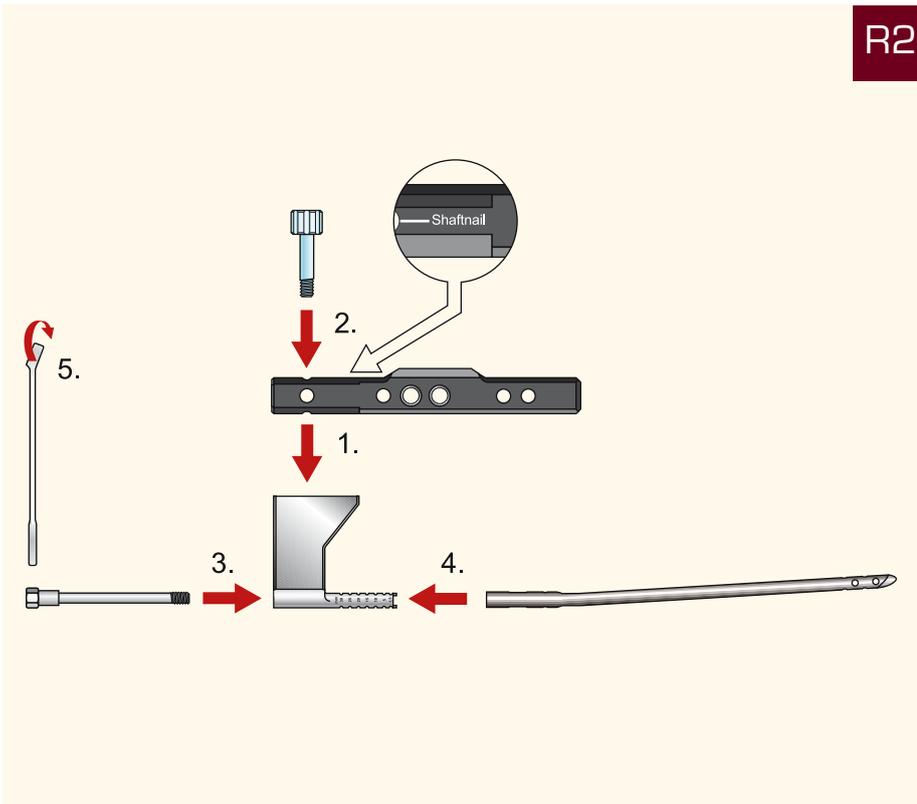
Note:

The access reamer cannot come into contact with the fixation screw.

To ensure easy insertion of the nail, rework the entry portal with the reamers after removing the guide instrument.



Retrograde Approach



R2

Mounting the nail to the targeting device

- Targeting device base KH165T
- Targeting attachment KH166P
- Fastening screw KH167T
- Nail adapter screw KH172R
- Tightening sleeve KH321R
- Wrench KH324C

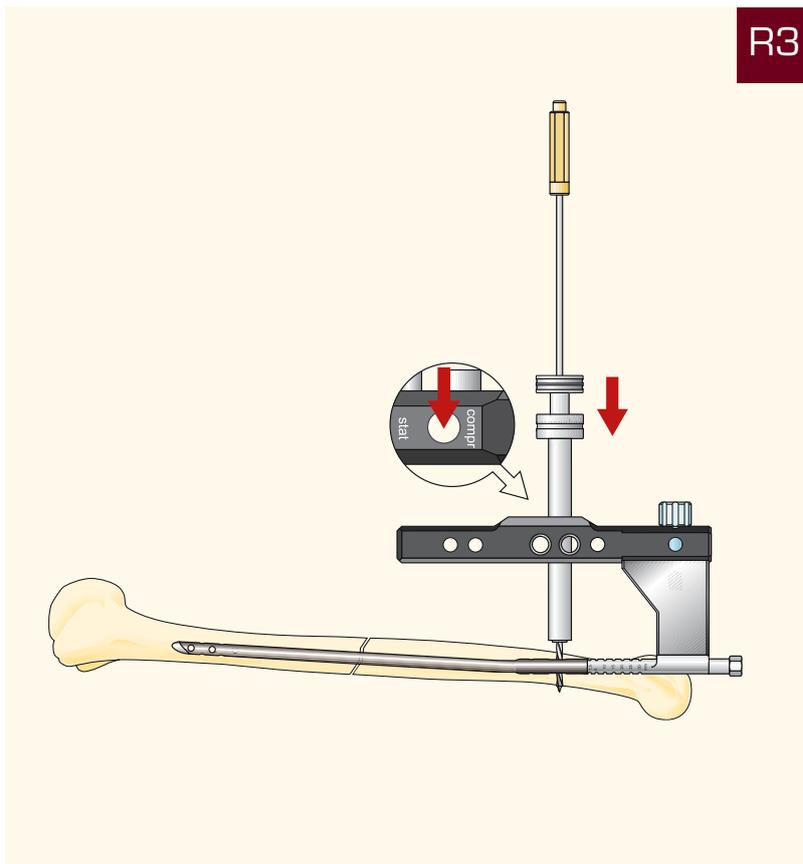
Fasten the targeting attachment to the targeting device base with the fastening screw.

Note:

To the right of the attachment screw, the inscription "shaft nail" should be visible now.

Insert the nail adapter screw through the targeting device, turn the nail lightly by hand and tighten it firmly with the tightening sleeve or wrench. The grooves of different sizes on the nail tip allow only one nail position.

Operating Manual



R3

Insertion of the nail and locking of the compression hole

- Tissue-protection sleeve KH182R
- Spiral drill Ø 2.7 mm KH183R
- Screw length gauge KH398R
- Screwdriver KH189R

Note:

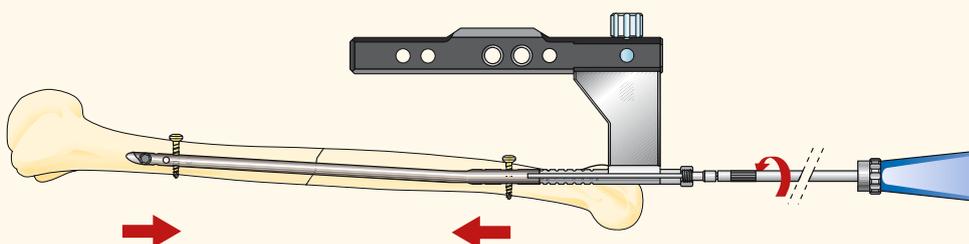
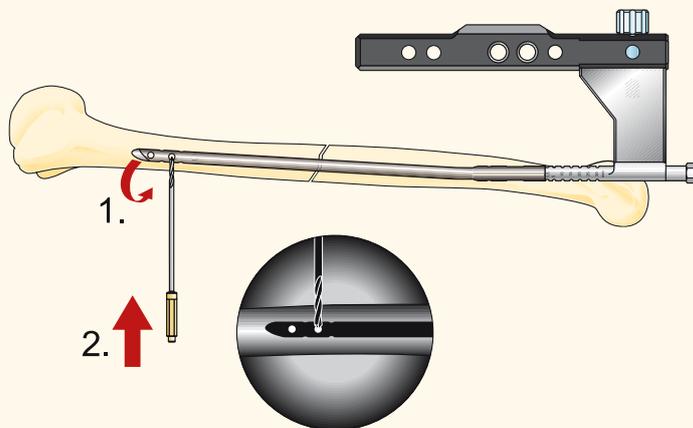
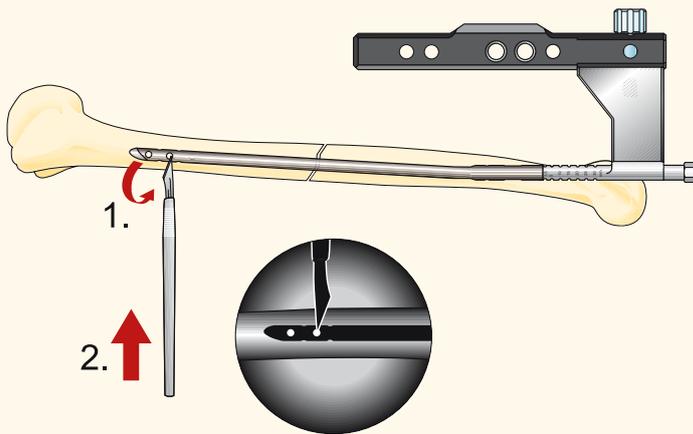
If fracture compression is necessary, the nail must be inserted deeper by the amount of compression.

Following manual insertion of the nail, check the position of the implant. The drilled hole through which the guide instrument is fixed can be used to lock the compression hole. To locate this hole, the spiral drill (Ø 2.7 mm) can be pushed through the tissue-protection sleeve with the drilling sleeve. Once the hole is located, the screw length is determined and the corresponding interlocking screw (Ø 3.5 mm) is inserted.

R4 Compression of the fracture

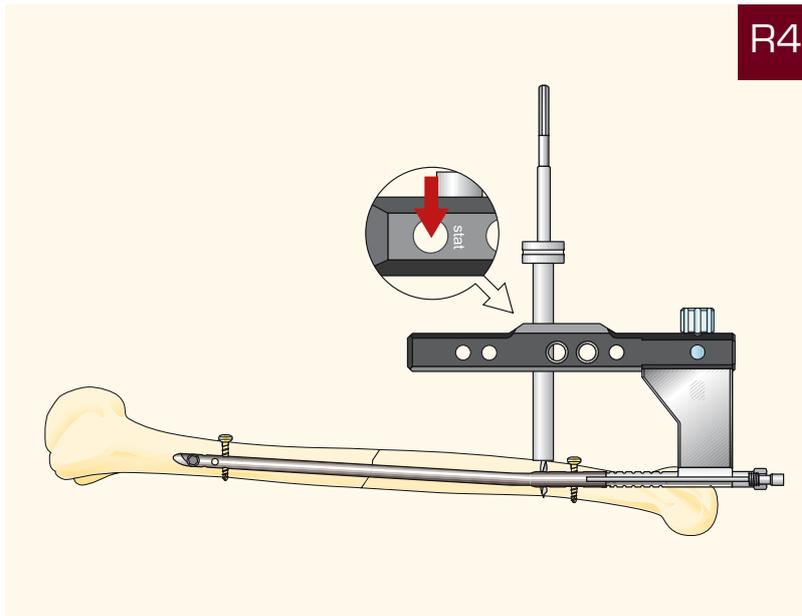
- Spiral drill Ø 2.7 mm KH190R

The first step is the freehand interlocking of the proximal area with the spiral drill (Ø 2.7 mm) and insertion of the screws (Ø 3.5 mm) into the selected locking holes.



- Compression screw KH173R
- Screwdriver KH189R

Screw in the compression screw through the targeting device. The compression screw is turned opposite to the interlocking screw, using the screwdriver, until contact is made with bone in the fracture area. The compression screw is left in this position.



R4

Compression of the fracture

- Tissue-protection sleeve KH182R
- Obturator KH181R
- Screw length gauge KH398R
- Spiral drill Ø 3.5 mm KH184R

With the obturator, push the tissue-protection sleeve through the hole marked "Stat" in the targeting bow.

Open the screw hole with the spiral drill (Ø 3.5 mm). Measure the screw length and screw in the fixation screw (Ø 4.5 mm).

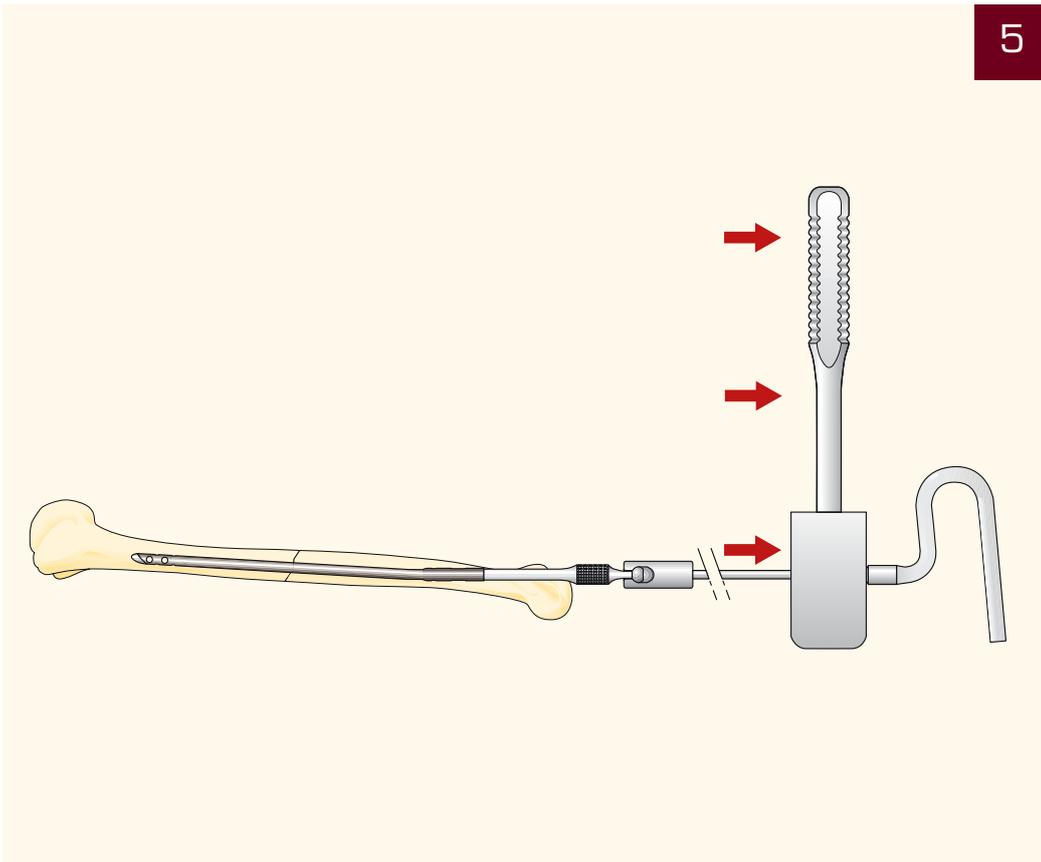
Antegrade/ Retrograde Approach

5

Metal removal

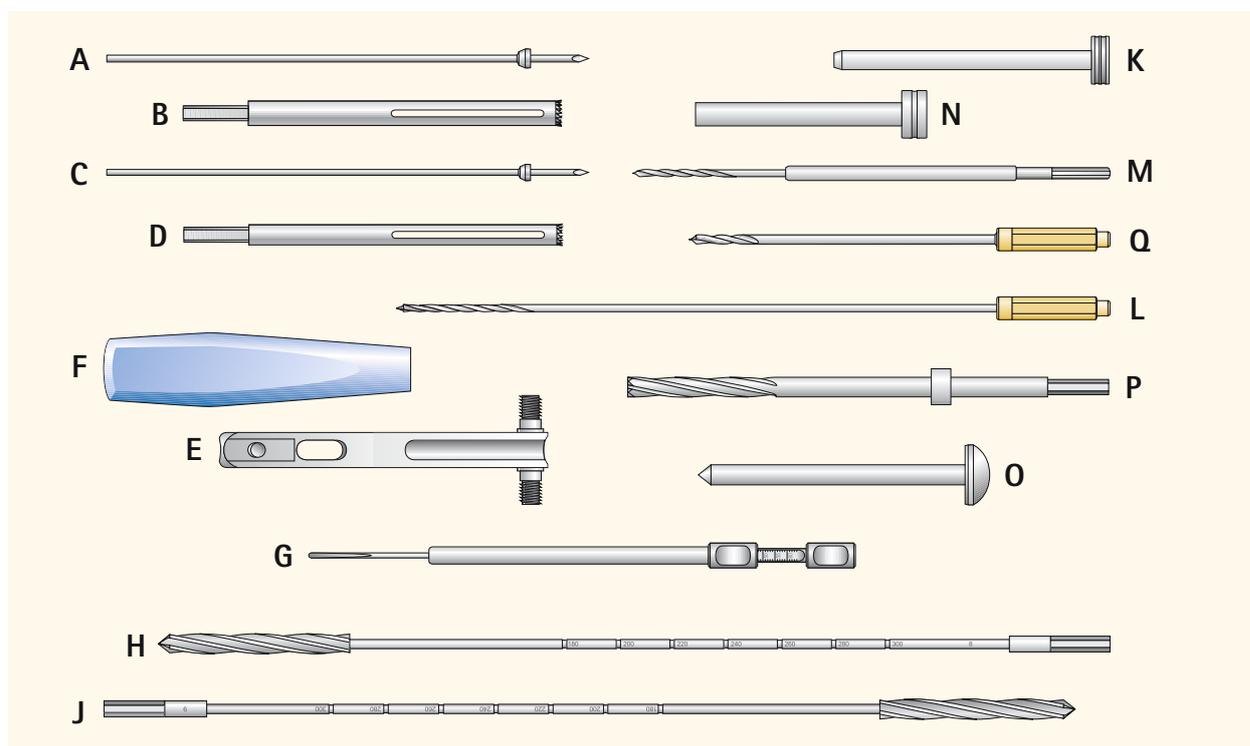
- Screwdriver KH189R
- Extractor adapter KH188R
- Extractor instrument KH310R
- Slotted hammer KH113R

Once the fixation screw and the interlocking screws have been removed, the extractor adapter is screwed in and the nail is removed with the extractor instrument and the slotted hammer.



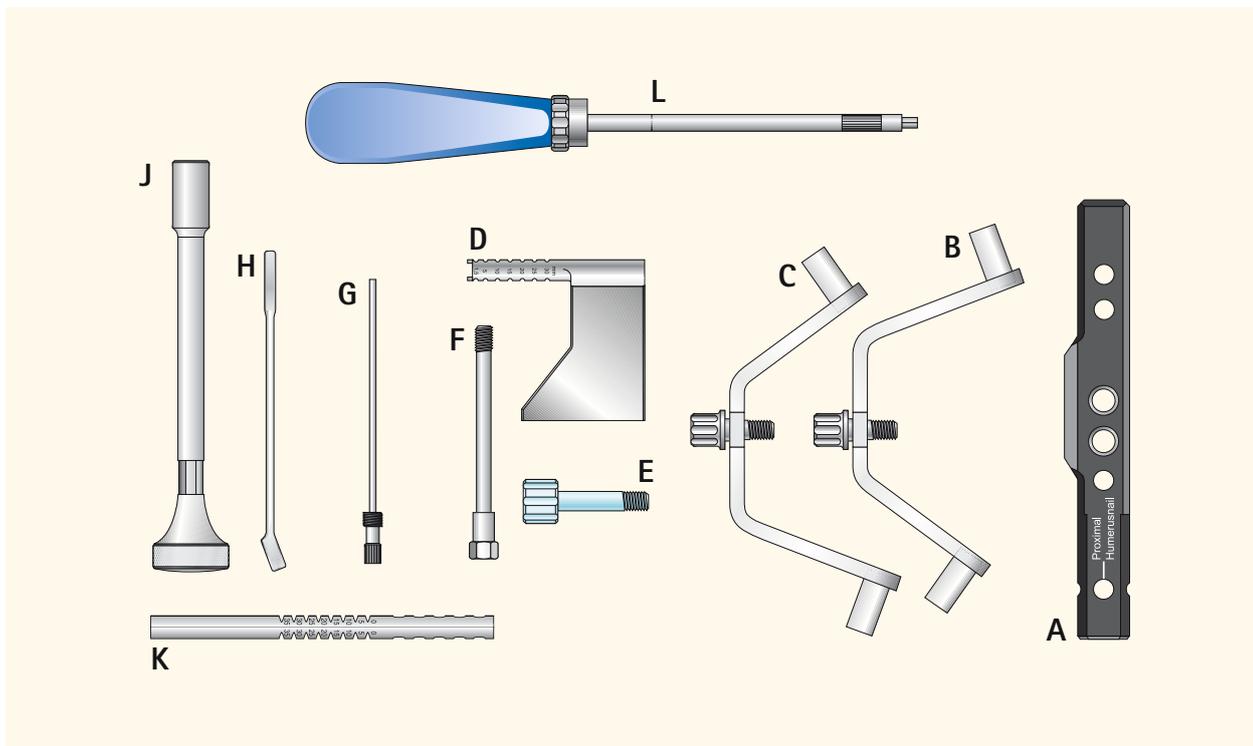
Instruments Overview

Set 1



| | Art. no. | Designation |
|---|--|-------------------------------------|
| A | KH161R | Guide pin Ø 10.5 mm |
| B | KH160R | Hollow reamer Ø 10.5 mm |
| C | KH159R | Guide pin Ø 8.5 mm |
| D | KH158R | Hollow reamer Ø 8.5 mm |
| E | KH163R | Guide instrument including handle |
| F | | Handle of guide instrument KH 163 R |
| G | KH398R | Screw length gauge |
| H | KH178R | Reamer Ø 9 mm |
| J | KH177R | Reamer Ø 8 mm |
| K | KH186R | Drilling sleeve Ø 2.7 mm |
| L |  KH183R | Spiral drill Ø 2.7 mm |
| M | KH184R | Spiral drill Ø 3.5 mm |
| N | KH182R | Tissue protection sleeve |
| O | KH181R | Obturator |
| P | KH162R | Access reamer |
| Q | KH190R | Freehand drill Ø 2.7 mm |

Set 2



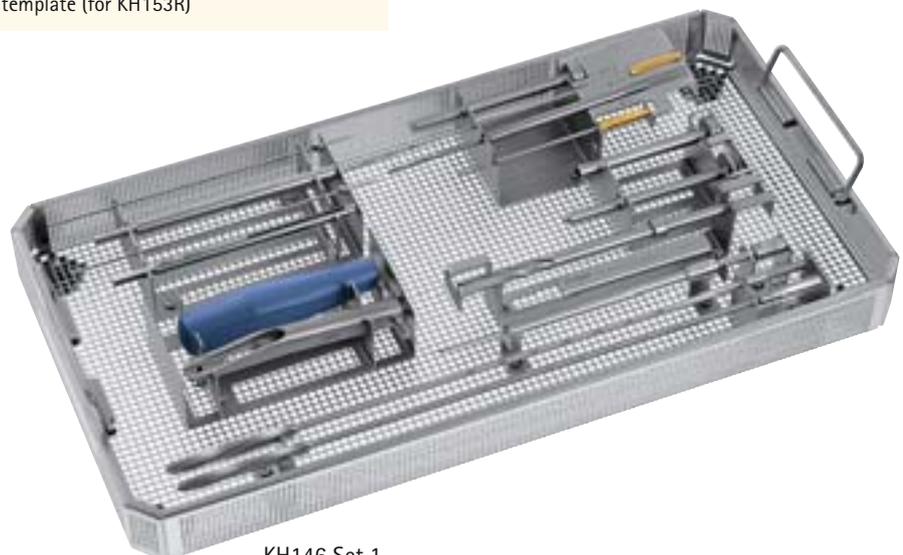
| | Art. no. | Designation |
|---|----------|-----------------------|
| A | KH166P | Targeting attachment |
| B | KH171R | Targeting bow, left |
| C | KH170R | Targeting bow, right |
| D | KH165T | Targeting device base |
| E | KH167T | Attachment screw |
| F | KH172R | Nail adapter screw |
| G | KH173R | Compression screw |
| H | KH324C | Wrench |
| J | KH321R | Tightening sleeve |
| K | KH169R | Nail depth gauge |
| L | KH189R | Screwdriver |

Instruments

KH146 Targon® PH/H Complete Instrument Set

Basic Instrument Set 1

| Quantity | Art. no. | Description |
|----------|----------|--|
| 1 | KH158R | Hollow reamer Ø 8.5 mm |
| 1 | KH159R | Guide pin Ø 8.5 mm |
| 1 | KH160R | Hollow reamer Ø 10.5 mm |
| 1 | KH161R | Guide pin Ø 10.5 mm |
| 1 | KH162R | Access reamer |
| 1 | KH163R | Guide instrument for KH162R including handle |
| 1 | KH177R | Reamer Ø 8 mm |
| 1 | KH178R | Reamer Ø 9 mm |
| 1 | KH182R | Tissue protection sleeve |
| 1 | KH183R | Spiral drill Ø 2.7 mm |
| 1 | KH186R | Drilling sleeve Ø 2.7 mm |
| 1 | KH184R | Spiral drill Ø 3.5 mm |
| 1 | KH398R | Screw length gauge |
| 1 | JF511 | Wrapping drape |
| 1 | JG785B | Identification plate, labeled, red |
| 1 | KH181R | Obturator |
| 1 | KH151R | Tray with storage rack |
| 1 | KH190R | Freehand drill Ø 2.7 mm |
| 1 | TE820 | Packing template (for KH151R) |
| 1 | TE823 | Packing template (for KH153R) |



KH146 Set 1

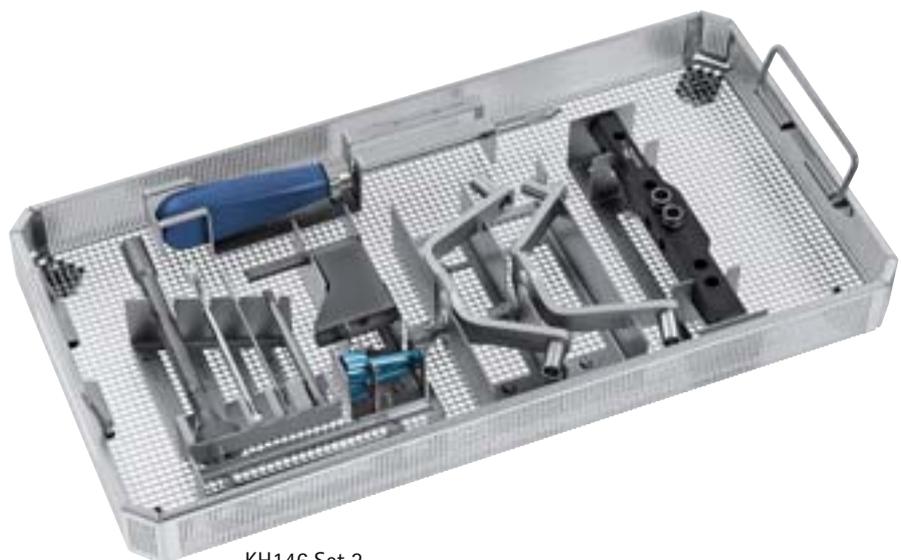
Basic Instrument Set 2

| Quantity | Art. no. | Designation |
|----------|----------|---------------------------------------|
| 1 | KH165T | Targeting device base |
| 1 | KH166P | Targeting attachment for humerus nail |
| 2 | KH167T | Attachment screw |
| 1 | KH169R | Nail depth gauge |
| 1 | KH170R | Targeting bow, right |
| 1 | KH171R | Targeting bow, left |
| 1 | KH172R | Nail adapter screw |
| 1 | KH173R | Compression screw |
| 1 | KH321R | Tightening sleeve SW 10 |
| 1 | KH324C | Wrench |
| 1 | KH189R | Screwdriver |
| 1 | JF511 | Wrapping drape |
| 1 | JG786B | Identification plate, labeled, blue |
| 1 | KH153R | Tray with storage rack |
| 1 | KH164 | X-ray template |

Extraction Instruments

| Quantity | Art. no. | Designation |
|----------|----------|----------------------|
| 1 | KH310R | Extractor instrument |
| 1 | KH188R | Extractor adapter |
| 1 | KH113R | Slotted hammer |

to be ordered separately;
the expeller instrument set is also used for the removal procedure.



KH146 Set 2

Container for KH146 (recommended):
Base JK441
Lid PrimeLine JPO01

Instruments

KH150 Targon® H – Instrument Set

Basic Instrument Set

| Quantity | Art. no. | Designation |
|----------|----------|--|
| 1 | KH158R | Hollow reamer Ø 8.5 mm |
| 1 | KH159R | Guide pin Ø 8.5 mm |
| 1 | KH162R | Access reamer Ø 9 mm |
| 1 | KH163R | Guide instrument for KH162R incl. handle |
| 1 | KH177R | Reamer Ø 8 mm |
| 1 | KH178R | Reamer Ø 9 mm |
| 1 | KH182R | Tissue protection sleeve |
| 1 | KH183R | Spiral drill Ø 2.7 mm |
| 1 | KH184R | Spiral drill Ø 3.5 mm |
| 1 | KH186R | Drilling sleeve Ø 2.7 mm |
| 1 | KH398R | Screw length gauge |
| 1 | KH181R | Obturator |
| 1 | KH151R | Tray with storage rack |
| 2 | JF511 | Wrapping drape |
| 1 | KH165T | Targeting device base |
| 1 | KH166P | Targeting attachment for humerus nails |
| 1 | KH190R | Freehand drill Ø 2.7 mm |
| 1 | TE821 | Packing template (KH151R) |
| 1 | TE824 | Packing template (KH153R) |

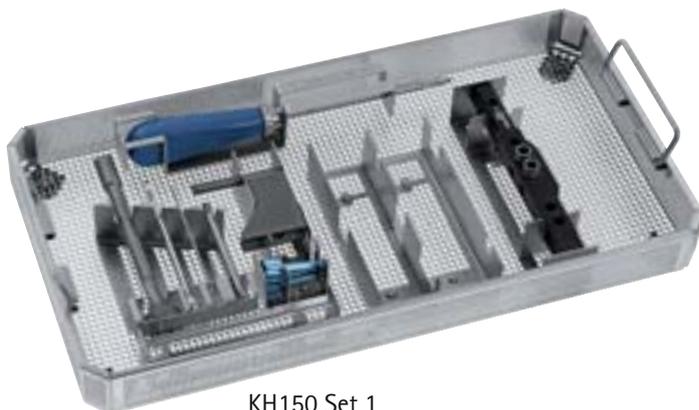
| Quantity | Art. no. | Designation |
|----------|----------|-------------------------------------|
| 2 | KH167T | Fastening screw |
| 1 | KH169R | Nail depth gauge |
| 1 | KH172R | Nail adapter screw |
| 1 | KH173R | Compression screw |
| 1 | KH321R | Tightening sleeve SW 10 |
| 1 | KH324C | Wrench |
| 1 | KH189R | Screwdriver |
| 1 | KH153R | Tray with storage rack |
| 1 | JG785B | Identification plate, labeled, red |
| 1 | JG786B | Identification plate, labeled, blue |

Container for KH150 (recommended):

Base JK441

Lid PrimeLine

JP001



KH150 Set 1



KH150 Set 2

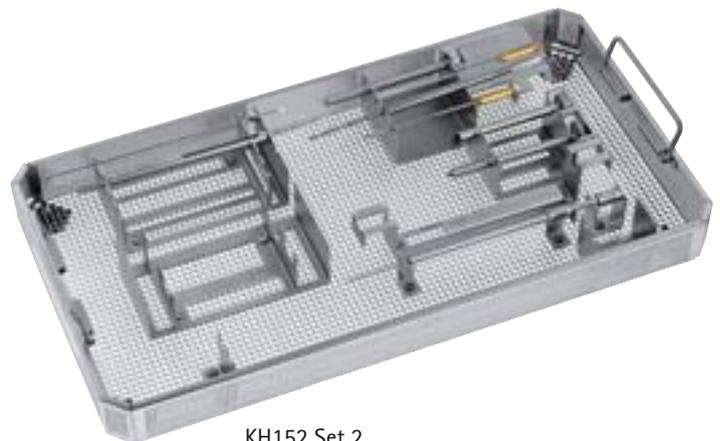
KH152 Targon[®] PH – Instrument Set

Basis Instrument Set

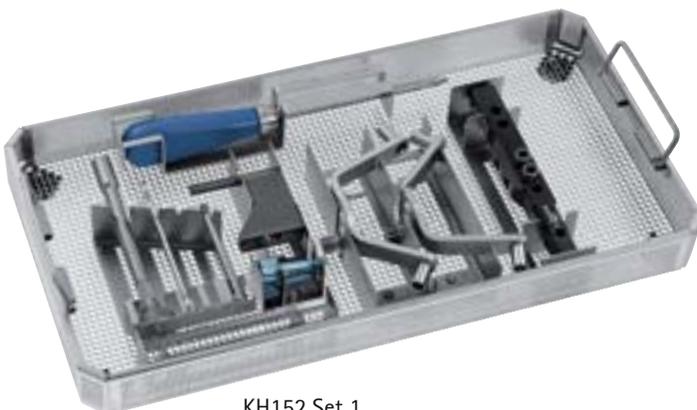
| Quantity | Art. no. | Designation |
|----------|----------|--|
| 1 | KH160R | Hollow reamer Ø 10.5 mm |
| 1 | KH161R | Guide pin KH160R |
| 1 | KH182R | Tissue protection sleeve |
| 1 | KH184R | Spiral drill Ø 3.5 mm |
| 1 | KH183R | Spiral drill Ø 2.7 mm |
| 1 | KH186R | Drilling sleeve Ø 2.7 mm |
| 1 | KH398R | Screw length gauge |
| 1 | KH181R | Obturator |
| 1 | KH151R | Tray with storage rack |
| 2 | JF511 | Wrapping drape |
| 1 | KH165T | Targeting device base |
| 1 | KH166P | Targeting attachment for humerus nails |
| 2 | KH167T | Fastening screw |
| 1 | KH169R | Nail depth gauge |
| 1 | KH170R | Targeting bow right |
| 1 | KH171 | Targeting bow left |
| 1 | KH190R | Freehand drill Ø 2.7 mm |
| 1 | TE822 | Packing template (KH151R) |
| 1 | TE825 | Packing template (KH153R) |

| Quantity | Art. no. | Designation |
|----------|----------|-------------------------------------|
| 1 | KH172R | Nail adapter screw |
| 1 | KH321R | Tightening sleeve SW 10 |
| 1 | KH324C | Wrench |
| 1 | KH189R | Screwdriver |
| 1 | KH153R | Tray with storage rack |
| 1 | JG785B | Identification plate, labeled, red |
| 1 | JG786B | Identification plate, labeled, blue |

Container for KH152 (recommended):
 Base JK441
 Lid PrimeLine JP001



KH152 Set 2



KH152 Set 1

Instruments

Loaner Set 0-0011

Standard Metal Removal

| Quantity | Art. no. | Designation |
|----------|----------|--|
| 1 | GB020R | Tightening key standard hexagonal |
| 1 | JF212R | 1/1 Tray perforated 485 x 253 x 56 mm |
| 1 | JF222R | 1/1 Tray perforated 540 x 253 x 56 mm |
| 1 | JF932 | Silicone positioning mat 470 x 230 x 30 mm |
| 1 | JK441 | Basin only, for JK401P/T JK411P/T JK431P/T |
| 1 | JK489 | Basis 1/1 inner lid silver |
| 1 | KH113R | Slotted hammer for extraction hook |
| 1 | KH188R | Targon® H/PH extractor adapter |
| 2 | KH215R | Targon® PF extractor for support sleeves |
| 2 | KH216R | Targon® PF external extractor for support sleeves |
| 1 | KH275R | Targon® hollow reamer for screw shaft Ø 3.5 mm |
| 1 | KH276R | Targon® hollow reamer for screw shaft Ø 4.5 - 6 mm |
| 2 | KH278R | Targon® extractor for screw shaft Ø 7.0 mm |
| 2 | KH279R | Targon® extractor for screw shaft Ø 8.0 mm |
| 1 | KH286R | Targon® oversleeve for support sleeves |
| 1 | KH289R | Targon® screwdriver SW 4.5, quick-action chuck adapter |
| 1 | KH290R | Targon® T-handle SW 6.0 for explantation instrument |
| 1 | KH291R | Targon® extractor for defective hexagon socket SW 4.5 |
| 1 | KH292R | Targon® extractor for defective hexagon socket SW 3.5 |
| 1 | KH293R | Targon® extractor for support sleeves |
| 1 | KH294R | Targon® hollow reamer for screw head Ø 7.0 und 8.0 mm |
| 2 | KH296R | Targon® extractor for screw shaft Ø 3.5 mm |
| 2 | KH297R | Targon® extractor for screw shaft Ø 4.5 mm |
| 2 | KH298R | Targon® extractor for screw shaft Ø 5.0 mm |
| 2 | KH299R | Targon® extractor for screw shaft Ø 6.0 mm |
| 1 | KH310R | Targon® expeller instrument for femur and tibia |
| 1 | KH311R | Targon® expeller adapter for nails 8 - 11 mm |
| 1 | KH312R | Targon® expeller adapter for nails 12 - 16 mm |
| 1 | KH319R | Targon® Universal T-handle |
| 1 | KH325R | Targon® Screwdriver SW 4.5 with holding device |
| 1 | KH377R | Targon® PF driver instrument for support screws |
| 1 | KH378R | Targon® PF holding screw for driver instrument |
| 1 | KH404R | Targon® RF T-key for threaded sleeves |
| 1 | KH427R | Targon® PF driver instrument for support sleeves |
| 1 | KH428R | Targon® PF T-socket wrench SW 6.0 |
| 1 | LS013R | Screwdriver SW 3.5 length 200 mm |

Loaner Set 0-0012

Instrument Set for Removal of Broken Nails

| Quantity | Art. no. | Designation |
|----------|----------|--|
| 1 | KH113R | Slotted hammer for extraction hook |
| 1 | KH326R | Targon® extractor for broken nails Ø 7 mm |
| 1 | KH327R | Targon® lever instrument for extractor |
| 1 | KH328R | Targon® extractor for broken nails Ø 8 mm |
| 1 | KH329R | Targon® extractor for broken nails Ø 9 mm |
| 1 | KH330R | Targon® extractor for broken nails Ø 10 mm |
| 1 | KH331R | Targon® extractor for broken nails Ø 11 mm |
| 1 | KH332R | Targon® extractor for broken nails Ø 12 mm |
| 1 | KH217R | Targon® extractor for broken nails Ø 13 mm |
| 1 | KH218R | Targon® extractor for broken nails Ø 14 -15 mm |
| 1 | KH219R | Targon® extractor for broken nails Ø 17 mm |

Instrument sets for the explantation of Targon® nails can be ordered from Loaner Service:

Phone: +49 7461 95-2019

Implant Sets

KH154

Targon® H Nail Set

| Quantity | Art. no. | Designation/mm |
|----------|----------|------------------------|
| 1 | KE206T | Shaft nail 7 x 180 mm |
| 1 | KE208T | Shaft nail 7 x 200 mm |
| 1 | KE210T | Shaft nail 7 x 220 mm |
| 1 | KE212T | Shaft nail 7 x 240 mm |
| 1 | KE214T | Shaft nail 7 x 260 mm |
| 1 | KE306T | Shaft nail 8 x 180 mm |
| 1 | KE308T | Shaft nail 8 x 200 mm |
| 1 | KE310T | Shaft nail 8 x 220 mm |
| 1 | KE312T | Shaft nail 8 x 240 mm |
| 1 | KE314T | Shaft nail 8 x 260 mm |
| 1 | KH155R | Tray with storage rack |
| 1 | TE818 | Packing template |

recommended container for KH156 and KH154: JK400
recommended tray lid: JP001



KH156

Targon® PH Nail Set

| Quantity | Art. no. | Designation/mm |
|----------|----------|-------------------------------------|
| 1 | KE004T | Targon® PH nail 10/8 x 150 mm right |
| 1 | KE019T | Targon® PH nail 10/7 x 200 mm right |
| 1 | KE021T | Targon® PH nail 10/7 x 220 mm right |
| 1 | KE024T | Targon® PH nail 10/7 x 250 mm right |
| 1 | KE054T | Targon® PH nail 10/8 x 150 mm left |
| 1 | KE069T | Targon® PH nail 10/7 x 200 mm left |
| 1 | KE071T | Targon® PH nail 10/7 x 220 mm left |
| 1 | KE074T | Targon® PH nail 10/7 x 250 mm left |
| 1 | KH157R | Tray with storage rack |

Additional Sizes

| Quantity | Art. no. | Designation/mm |
|----------|----------|-------------------------------------|
| 1 | KE023T | Targon® PH nail 10/7 x 235 mm right |
| 1 | KE026T | Targon® PH nail 10/7 x 265 mm right |
| 1 | KE027T | Targon® PH nail 10/7 x 280 mm right |
| 1 | KE073T | Targon® PH nail 10/7 x 235 mm left |
| 1 | KE076T | Targon® PH nail 10/7 x 265 mm left |
| 1 | KE077T | Targon® PH nail 10/7 x 280 mm left |

KH148 – Interlocking Screws

Screw Set Targon® PH/H



| Ø/mm | Quantity | Art. no. | Length/mm |
|--------|----------|----------|-----------|
| 3.5 mm | 4 | KB518T | 18 mm |
| 3.5 mm | 4 | KB521T | 21 mm |
| 3.5 mm | 4 | KB524T | 24 mm |
| 3.5 mm | 4 | KB527T | 27 mm |
| 3.5 mm | 4 | KB530T | 30 mm |
| 3.5 mm | 4 | KB533T | 33 mm |
| 3.5 mm | 4 | KB536T | 36 mm |
| 3.5 mm | 4 | KB539T | 39 mm |
| 3.5 mm | 4 | KB542T | 42 mm |
| 3.5 mm | 4 | KB545T | 45 mm |
| 3.5 mm | 4 | KB548T | 48 mm |
| 3.5 mm | 2 | KB551T | 51 mm |
| 3.5 mm | 2 | KB554T | 54 mm |
| 3.5 mm | 2 | KB557T | 57 mm |
| 3.5 mm | 2 | KB560T | 60 mm |



recommended container for KH148: JK400
recommended tray lid: JP001

KH148 – Fixation Screws

Screw Set Targon® PH/H



| Ø/mm | Quantity | Art. no. | Length/mm |
|--------|----------|----------|-----------|
| 4.5 mm | 2 | KB062T | 22 mm |
| 4.5 mm | 2 | KB064T | 24 mm |
| 4.5 mm | 2 | KB066T | 26 mm |
| 4.5 mm | 2 | KB068T | 28 mm |
| 4.5 mm | 2 | KB070T | 30 mm |
| 4.5 mm | 2 | KB072T | 32 mm |
| 4.5 mm | 2 | KB074T | 34 mm |
| 4.5 mm | 2 | KB076T | 36 mm |
| 4.5 mm | 2 | KB078T | 38 mm |
| 4.5 mm | 2 | KB080T | 40 mm |
| 4.5 mm | 2 | KB082T | 42 mm |
| 4.5 mm | 2 | KB084T | 44 mm |
| 4.5 mm | 2 | KB086T | 46 mm |
| 4.5 mm | 2 | KB088T | 48 mm |
| 4.5 mm | 2 | KB090T | 50 mm |
| 4.5 mm | 2 | KB092T | 52 mm |
| 4.5 mm | 2 | KB094T | 54 mm |
| 4.5 mm | 2 | KB096T | 56 mm |
| 4.5 mm | 2 | KB098T | 58 mm |
| 4.5 mm | 2 | KB100T | 60 mm |



KH148 – Locking Screws

Screw Set Targon® PH/H



| Quantity | Art. no. | Extension/mm | OD Ø/mm | Length |
|----------|----------|--------------|---------|----------|
| 2 | KB610T | 0 mm | (PH) | 6 x 7 mm |
| 2 | KB615T | 0 mm | (H) | 6 x 9 mm |
| 2 | KB617T | 5 mm | (PH/H) | |
| 2 | KB618T | 10 mm | (PH/H) | |
| 2 | KB619T | 15 mm | (PH/H) | |
| 2 | KB620T | 20 mm | (H) | |
| 2 | KB621T | 25 mm | (H) | |
| 2 | KB622T | 30 mm | (H) | |
| 2 | KB623T | 35 mm | (H) | |



Implant Program

Nail Type Right

| Ø prox./distal mm | Length/mm | Art. no. |
|-------------------|-----------|----------|
| 10/8 mm | 150 mm | KE004T |
| 10/7 mm | 200 mm | KE019T |
| 10/7 mm | 220 mm | KE021T |
| 10/7 mm | 235 mm | KE023T |
| 10/7 mm | 250 mm | KE024T |
| 10/7 mm | 265 mm | KE026T |
| 10/7 mm | 280 mm | KE027T |

Nail Type Left

| Ø prox./distal mm | Length/mm | Art. no. |
|-------------------|-----------|----------|
| 10/8 mm | 150 mm | KE054T |
| 10/7 mm | 200 mm | KE069T |
| 10/7 mm | 220 mm | KE071T |
| 10/7 mm | 235 mm | KE073T |
| 10/7 mm | 250 mm | KE074T |
| 10/7 mm | 265 mm | KE076T |
| 10/7 mm | 280 mm | KE077T |



Nail Ø 7 mm

| Length/mm | Art. no. |
|-----------|----------|
| 180 mm | KE206T |
| 200 mm | KE208T |
| 220 mm | KE210T |
| 240 mm | KE212T |
| 260 mm | KE214T |
| 280 mm | KE216T |
| 300 mm | KE218T |



Nail Ø 8 mm

| Length/mm | Art. no. |
|-----------|----------|
| 180 mm | KE306T |
| 200 mm | KE308T |
| 220 mm | KE310T |
| 240 mm | KE312T |
| 260 mm | KE314T |
| 280 mm | KE316T |
| 300 mm | KE318T |





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