SURGICAL TECHNIQUE
PROXIMAL TIBIAL PLATE

MEDIN

Proximal Tibial Plate

Description of medical device

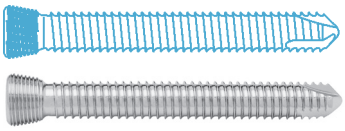
The Proximal Tibial Plate is used in epyphyseal and metaphyseal fractures of the proximal end of the tibia. The implantable system consists of a plate and angularly stable or cortical screws. Plates are anatomically shaped and laterally different for the left and right limb. The distal end is rounded to facilitate easier implementation of mini-invasive insertion. The distal portion is lighter at the bottom of the plate in order to minimize contact and possible compression of the periosteum. In the proximal part, the plate is extended to enable potential insertion of three angularly stable screws under the tibial plateau. In the proximal and distal shaft portion, the plate has holes for angular screws with a diameter of 5 mm. Below the proximal part is positioned an oval opening for attaching using a cortical screw with a diameter of 4.5 mm.

Indication

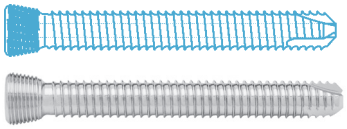
This surgical technique is intended for both simple dislocated and more complicated, fragmented intra-articular fractures of the proximal end of the tibia, primarily for the treatment of fractures types 41 – A2, A3, B1, B3, C1, C2, C3; based on the Muller classification, and of some storey fractures.

Proximal tibial plates
right

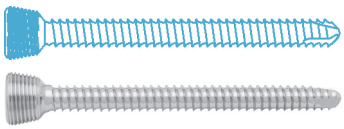
Proximal tibial plates
left



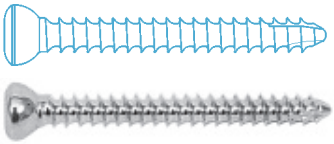
Locking Bone Screws
Ø 5 mm



Cannulated Locking Bone
Screws Ø 5 mm



Locking Bone Screws
Ø 5/3.5 mm



Cortical Screws
self-tapping Ø 4.5 mm

This brochure only serves as an illustrative guide for proximal tibial plates and the instrumentarium. The aim of the brochure is to give physicians and suture nurses a quick guide in the use of the instruments and implant and their composition in order to achieve the best operational outcome. If you have any questions, please contact the MEDIN, a.s. sales representative.

1. Preoperative planning and principle of surgery technique

The principle of the surgery is the fixation of anatomically repositioned fragments using angular stable screws that are secured in the plate. This system functions as an internal fixator and its tasks is to hold the fragments in place while the fracture is healing.

Before surgery, plan the following on preoperative X-rays:

- If it is suitable to use this surgical technique.
- Reposition of fragments or implementation of trans-fixation or additional implants and placement of soft tissue (arteries, nerves…) which must be not be injured during surgery.
- Access, placement and size of the incision.
- The size of the plate or length and screws.

NOTE: It is advisable to take X-ray images of both limbs and compare them in order to achieve the correct reposition.

2. Preparation

2.1. Preparation of implant

2.1.1. Choosing a plate

The implant (plate) is designed specifically for left and right tibia. Plates are supplied in non-sterile versions. Before use, they must be disinfected, washed and sterilized.
The length of the plate should be chosen so that the distal half of the plate is outside of fracture area and can be attached to the tibial shaft using screws.

2.2. Preparation of instruments

Before the surgery, it is necessary to check the completeness and functionality of all of the instruments. The instruments are supplied in non-sterile versions. Before use, they must be disinfected, washed and sterilized.

3. Surgical technique

3.1. Preoperative preparation

3.2. Positioning of the patient

Place the patient on a surgical table in the supine position, and the limb that the surgery is to be preformed on in such a way that X-rays can be projected in two perpendicular planes.

3.3. Drawing positions of the bones and tendons

It is a good idea to draw on the skin of the patient the place where the incision is to be made, and localization of soft tissue, for better visualization and preoperative planning.

3.4. Incision

Based on the nature of the fracture, the surgeon can choose the anterolateral (Fig. 1), or the mini-invasive (Fig. 2) approach if the surgeon wants to insert the plate using the minimally invasive technique.

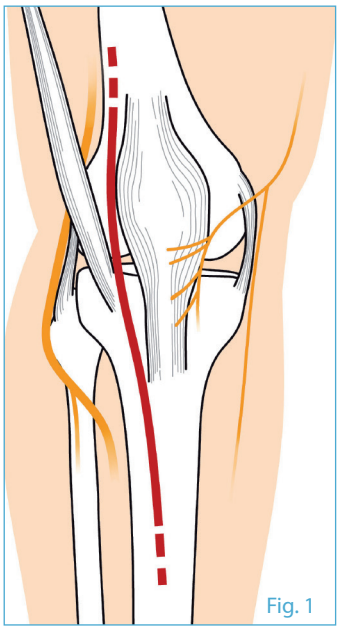


Fig. 1

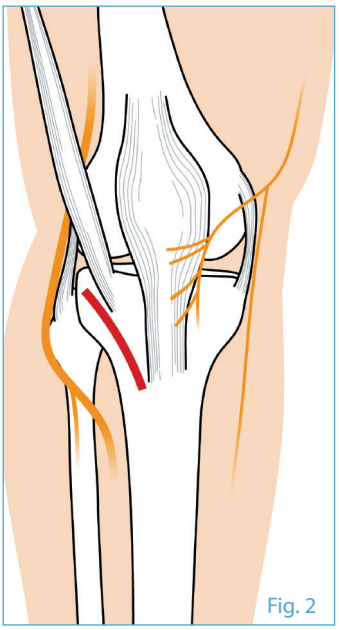


Fig. 2

3.5. Repositioning of the articular surface and the anatomical position and fixation of the repositioned fragments

3.5.1. Repositioning

Correct repositioning is one of the key components of osteosynthesis. Pay attention to this: it is very important to place the fragments into the original anatomical position, particularly the fragments of the articular surfaces. Otherwise, it is likely that the patient will feel pain during movement, or limited mobility.

3.5.2. Fixation using lag screws and K-wires

Attach the repositioned articular surface with two "lag screws" (Fig. 3), or K-wires; this will eliminate the dislocation of fragments when inserting the plate or screws.
Attach the other dislocated fragments in a similar manner.

Fig. 3

3.6. Inserting the plate

3.6.1. Preparation of the location for inserting the plate

If the plate is to be inserted via a large incision, we will check the soft tissues and attach the plate to the tibia from the lateral side.
If the plate is to be inserted using the mini-invasive method, it will be necessary to create space via a raspatorium on the lateral side between soft and bone tissues.

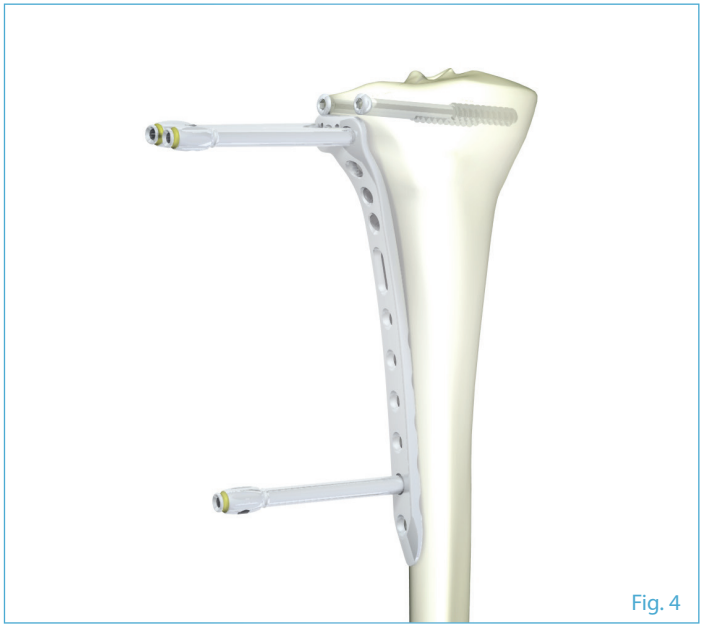


Fig. 4

3.6.2. Inserting the plate

Tightening the lockable sleeves into the plate will improve manipulability with the plate in the surgical wound (Fig. 4). Check the position of the plate using X-ray. Insert the plate and attach it. The attaching can be done in several ways:

- By using the HA 4.5 cortical screw in the oval opening (Fig. 5). This fixation allows for the movement and shifting of the plate around the cortex screw.
- By tightening the plate with K-wires in the proximal part of the plate where there are openings created for them.
- It is also possible to use K-wires to stabilize the plates in the surgical wound through the lock and guide sleeves, especially in the distal part.

Check the correct length and position of the plate. In the distal part, check that it was placed in the centre of the shaft, under the front edge of the tibia.
If you are using the minimally invasive method, insert the sleeve into the second most distal opening after inserting the plate.

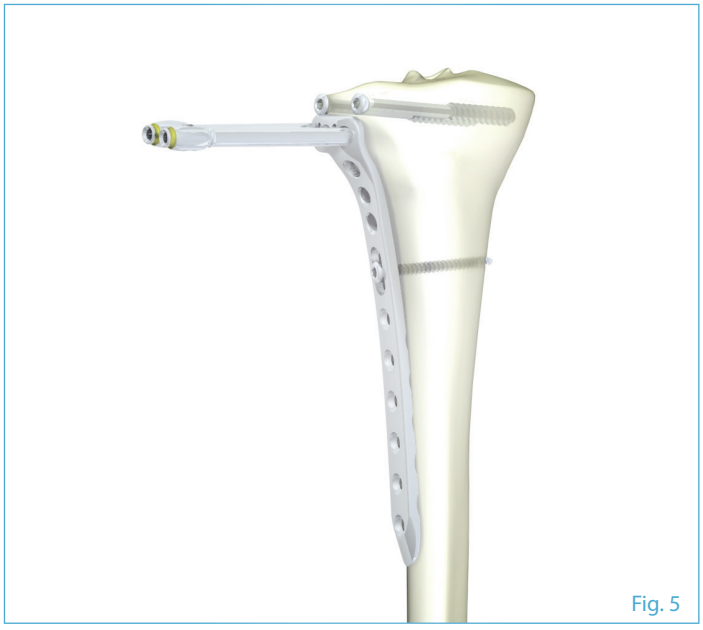


Fig. 5

3.6.3. Inserting angularly stable screws

Insert the locking targeted sleeves into the proximal openings in the stabilized plate, and insert the guide sleeves for K-wires, diameter 1.5 mm (Fig. 6) into the proximal opening. Use these K-wires to check the correct positioning of the screws. The screws may not perforate the articular surface of the tibia and must not collide with the screws and K-wires.

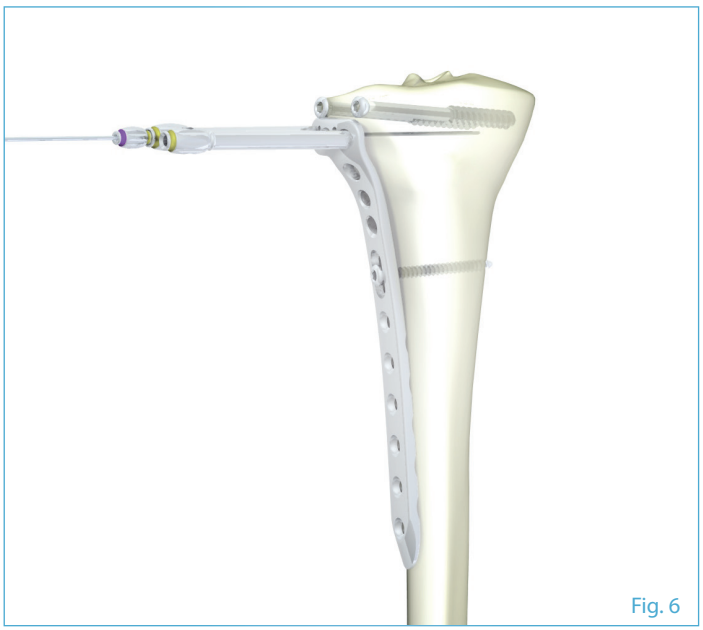


Fig. 6

After you have checked the position of the screws, drill an opening with a diameter of 3.9 mm (Fig. 7).

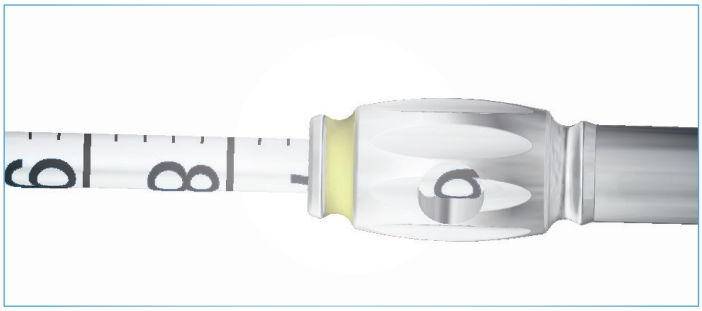


Fig. 7

On the drill, you can read the length of the screws, or measure it with a depth gauge (Fig. 8).

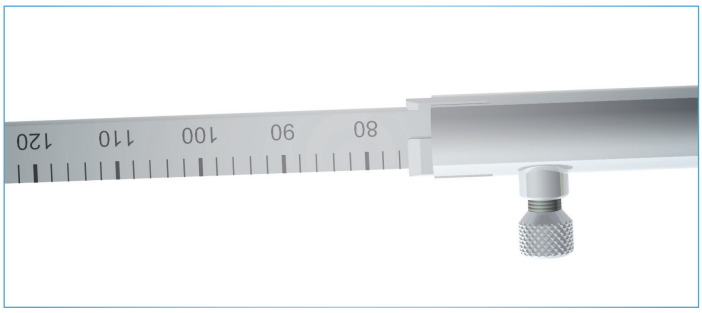


Fig. 8

Only insert the screws in the proximal part monocortically. Complete the handle with the torque coupling and 3.5 mm hexagonal screwdriver and insert the screw (Fig. 9).

Apply this procedure for all the screws that are necessary for stable fixation. In the distal part, below the area of the fracture, insert at least three screws bicortically and insert the final screw monocortically. The force will thus be spread over the last two screws.

The three holes above the oval opening support the three proximal screws under the tibial plateau. Thus, if the tibial plateau width is greater than 65 mm, the maximum length of the fourth and fifth proximal screws is 55 mm and the sixth proximal screw at most 70 mm. If you insert longer screws, the screws will collide with each other (Fig. 10 and 11).


Fig. 9

3.6.4. Inserting other fixation screws

The instrumentation allows for angularly stable screws with a diameter of 3.5 mm bone thread to be inserted. Pre-drill these screws using a 2.9 mm diameter drill through lockable guide sleeve, diameter of 3.9/3 mm.
In certain cases it will be necessary to insert cannulated angularly stable 5 mm diameter screw. This screw is pre-drilled using a cannulated 3.9 mm diameter drill. The cannulated screw and drill is guided using1.5 mm diameter wire.
If necessary, it is possible to insert into the plate 4.5 mm diameter cortex screws. To insert these screws, use the instrumentation intended for this purpose.

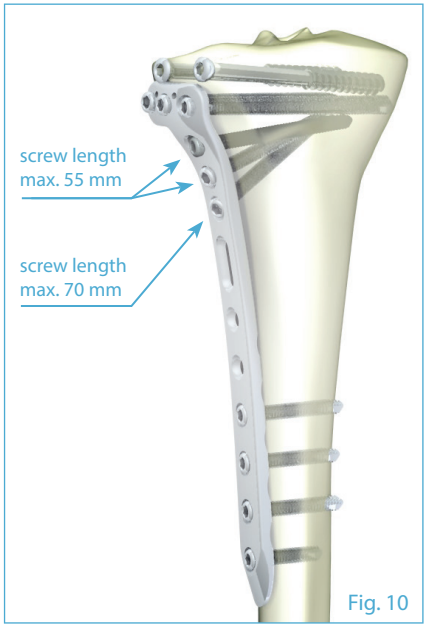


Fig. 10

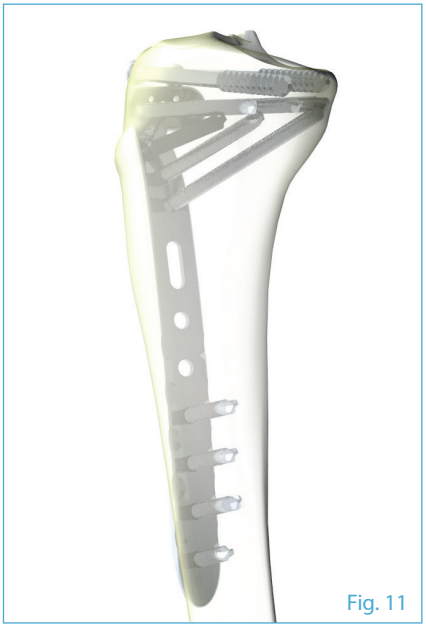


Fig. 11

3.7. Final check and end of surgery

Check the reposition, placement and length of the plate and screws. Take a final X-ray and close the wound with sutures.

3.8. Final comments

a) The various materials can under no circumstances ever be combined for one patient.

b) In order to guarantee the safe use of implants, MEDIN requires that only the recommended implants are used - they may not be combined with implants from other companies.

c) Patients must be informed that the implant will not bear their full weight. Patients must use a means of support while walking, and gradually place more weight on the implant based on how the callus forms at the location of the fracture.

d) The implants are intended for one use; repeated use is prohibited.

3.9. Recommended procedure for extracting the implant

The implants may be left in permanently if the risks associated with extracting them are more serious that the reasons to extract them. We recommend the potential extracting of the implants after a minimum of 12 months from when they were implanted, after a callus has formed and the fracture has healed – unless there are reasons to extract them earlier.

Extraction procedure:

– Loosening of screws (Fig. 12)

– Removal of screws (Fig. 13)

– Extraction of plate (Fig. 14)

Fig. 12

4. Follow up

After the surgery, it is necessary to examine motion. We recommend a CT scan to check the correct fixation to the joint. On the first postoperative day the patient will begin to practice mobility in the knee joint. Gradual load on the limb is possible only after 6–8 weeks after the operation, depending on the forming of the callus. Full load placed on the joint is only possible 10 weeks after surgery.
An X-ray is recommended after surgery: at 2, 4 and 8 weeks.

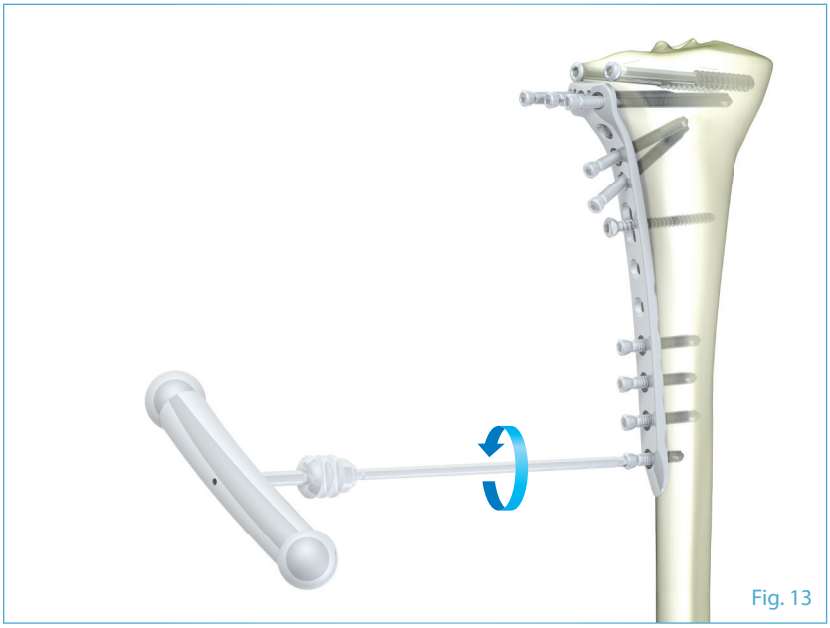


Fig. 13

Fig. 14

5. Set of instruments

Set of instruments for 5 mm angularly stable screws	**139 09 0260**
Sieve for instruments	**129 69 5180**
Sieve for tibial proximal plates	**129 69 5920**

Instruments:

pcs	Name	order number
2	Guide sleeve Ø 3.9/1.8 mm	**129 69 4410**
2	Guide sleeve Ø 3.9/2.9 mm	**129 69 4430**
4	Aiming sleeve lockable Ø 6.8/3.9×80 mm	**129 69 4300**
1	Screwdriver handle	**129 69 5130**
2	Screwdriver; hexagon 3.5 mm	**129 69 5261**
2	Screwdriver; hexagon 3.5 mm	**129 69 5251**
1	Depth gauge	**129 79 8910**
1	Drill Ø 3.9×220; cannulated	**129 69 4401**
1	Drill Ø 2.9×220	**129 69 5201**
1	Drill Ø 3.9×220	**129 69 5141**
3	K-wire MEDIN 1.5×300 mm	**129 09 2550**
1	Torque limiter 4 Nm	**129 69 5121**

Recommended equipment in addition to the basic surgery set:

1. Retractor
2. Hook
3. Elevator
4. Pliers for K-wires
5. Scalpel
6. Sutures
7. Suction pump
8. Coagulation
9. Raspatorium

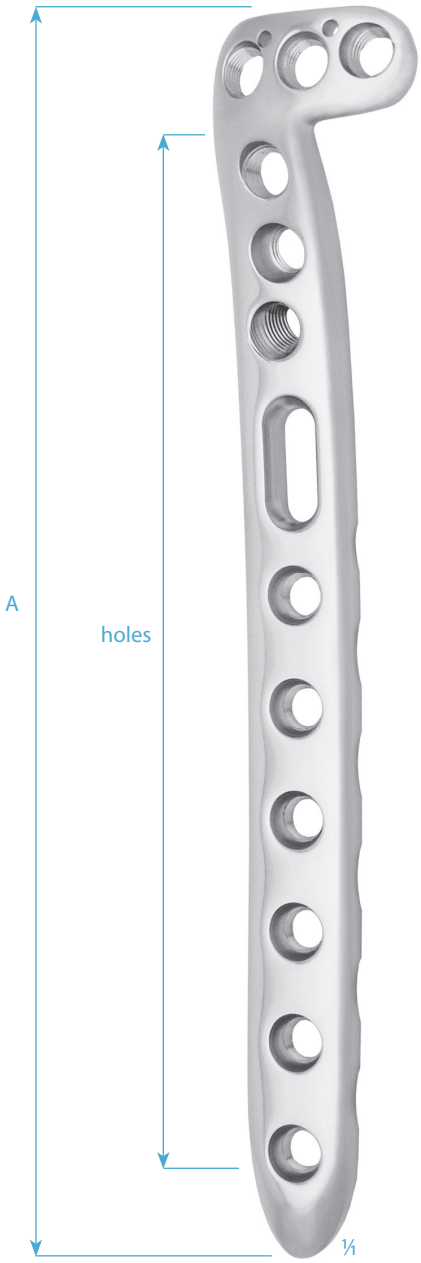
Recommended cleaning method

1. Mechanically cleaned with water using a brush.
2. Rinse instruments with pressurized water
3. Place the instruments into disinfectant solution for 20 to 30 minutes. Our recommended disinfectant is KORSOLEX plus. If you are using another solution, there is risk of damage to the instruments.
4. Re-flush using pressured water until clean water begins flowing. Flushing is possible in conventional pressure washers when connecting the instruments to jets.
5. Blow the instruments with compressed air.

Recommended sterilization procedure

Before use, the instruments should be thoroughly washed and disinfected. We recommend steam sterilization. The sterilization temperature must not exceed 135 °C. If the temperature exceeds 135 °C, the plastic parts and colour coding of the instruments will be degraded. Instruments damaged in such a way must not be put into use.

PROXIMAL TIBIAL PLATES ANGULARLY STABLE, LEFT

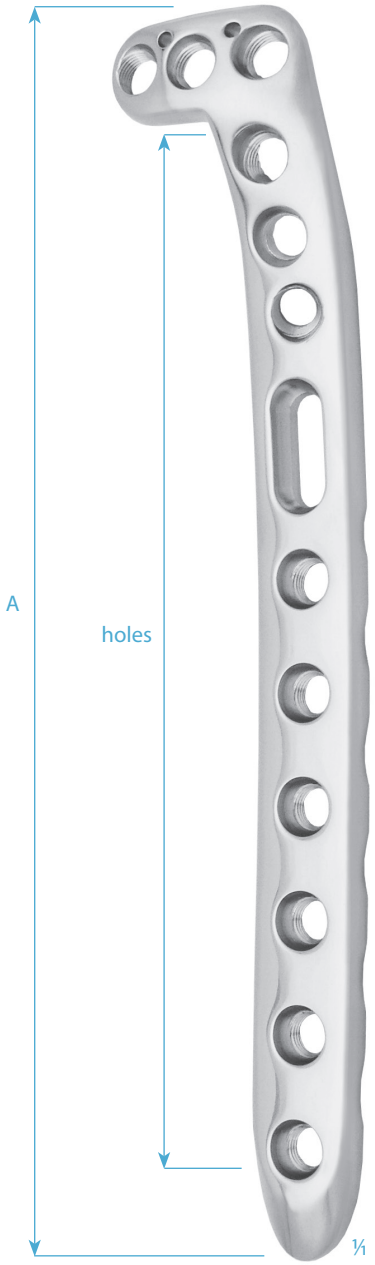


LEFT
thickness 4.5 mm

SSt	Ti	A	holes
129 78 2490	**129 78 2493**	135 mm	8
129 78 2510	**129 78 2513**	165 mm	10
129 78 2530	**129 78 2533**	195 mm	12
129 78 2550	**129 78 2553**	225 mm	14
129 78 2590	**129 78 2593**	285 mm	18
for special order			
129 78 2480	**129 78 2483**	120 mm	7
129 78 2500	**129 78 2503**	150 mm	9
129 78 2520	**129 78 2523**	180 mm	11
129 78 2540	**129 78 2543**	210 mm	13
129 78 2560	**129 78 2563**	240 mm	15
129 78 2570	**129 78 2573**	255 mm	16
129 78 2580	**129 78 2583**	270 mm	17
129 78 2600	**129 78 2603**	300 mm	19

NOTES: SSt – stainless steel version, material in accordance with ISO 5832-1 Ti – titanium version, material Ti6Al4V ELI in accordance with ISO 5832-3

PROXIMAL TIBIAL PLATES ANGULARLY STABLE, RIGHT



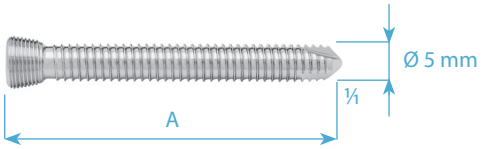
RIGHT
thickness 4.5 mm

SSt	Ti	A	holes
129 78 2350	**129 78 2353**	135 mm	8
129 78 2370	**129 78 2373**	165 mm	10
129 78 2390	**129 78 2393**	195 mm	12
129 78 2410	**129 78 2413**	225 mm	14
129 78 2450	**129 78 2453**	285 mm	18
for special order			
129 78 2340	**129 78 2343**	120 mm	7
129 78 2360	**129 78 2363**	150 mm	9
129 78 2380	**129 78 2383**	180 mm	11
129 78 2400	**129 78 2403**	210 mm	13
129 78 2420	**129 78 2423**	240 mm	15
129 78 2430	**129 78 2433**	255 mm	16
129 78 2440	**129 78 2443**	270 mm	17
129 78 2460	**129 78 2463**	300 mm	19

NOTES: SSt – stainless steel version, material in accordance with ISO 5832-1 Ti – titanium version, material Ti6Al4V ELI in accordance with ISO 5832-3

PROXIMAL TIBIAL PLATE

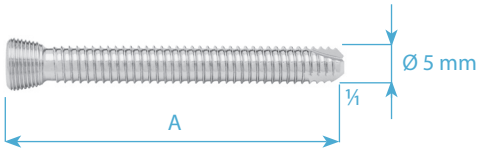
LOCKING BONE SCREWS 5 mm



NOTES:
drilled with Ø 3.9 mm drill
introduction by a screwdriver with 3.5 mm socket

SSt	Ti	A
129 77 7981	**129 77 7984**	16 mm
129 77 7991	**129 77 7994**	18 mm
129 77 8001	**129 77 8004**	20 mm
129 77 8011	**129 77 8014**	22 mm
129 77 8021	**129 77 8024**	24 mm
129 77 8031	**129 77 8034**	26 mm
129 77 8041	**129 77 8044**	28 mm
129 77 8051	**129 77 8054**	30 mm
129 77 8061	**129 77 8064**	32 mm
129 77 8071	**129 77 8074**	34 mm
129 77 8081	**129 77 8084**	36 mm
129 77 8091	**129 77 8094**	38 mm
129 77 8101	**129 77 8104**	40 mm
129 77 8111	**129 77 8114**	42 mm
129 77 8121	**129 77 8124**	44 mm
129 77 8131	**129 77 8134**	46 mm
129 77 8141	**129 77 8144**	48 mm
129 77 8151	**129 77 8154**	50 mm
129 77 8161	**129 77 8164**	55 mm
129 77 8171	**129 77 8174**	60 mm
129 77 8181	**129 77 8184**	65 mm
129 77 8191	**129 77 8194**	70 mm
129 77 8201	**129 77 8204**	75 mm
129 78 7401	**129 78 7404**	80 mm
129 78 7411	**129 78 7414**	85 mm
129 78 7421	**129 78 7424**	90 mm
129 78 7431	**129 78 7434**	95 mm
129 78 7441	**129 78 7444**	100 mm
129 78 7451	**129 78 7454**	105 mm

CANNULATED LOCKING BONE SCREWS 5 mm



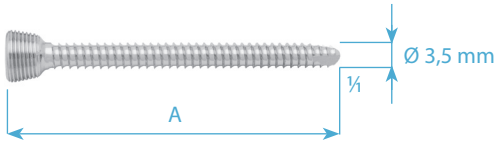
NOTES:
drilled with Ø 3.9 mm cannulated drill
introduction by a screwdriver with 3.5 mm socket
guide wire Ø 1.5 mm

CANNULATED

SSt	Ti	A
129 77 8681	**129 77 8684**	16 mm
129 77 8691	**129 77 8694**	18 mm
129 77 8701	**129 77 8704**	20 mm
129 77 8711	**129 77 8714**	22 mm
129 77 8721	**129 77 8724**	24 mm
129 77 8731	**129 77 8734**	26 mm
129 77 8741	**129 77 8744**	28 mm
129 77 8751	**129 77 8754**	30 mm
129 77 8761	**129 77 8764**	23 mm
129 77 8771	**129 77 8774**	34 mm
129 77 8781	**129 77 8784**	36 mm
129 77 8791	**129 77 8794**	38 mm
129 77 8801	**129 77 8804**	40 mm
129 77 8811	**129 77 8814**	42 mm
129 77 8821	**129 77 8824**	44 mm
129 77 8831	**129 77 8834**	46 mm
129 77 8841	**129 77 8844**	48 mm
129 77 8851	**129 77 8854**	50 mm
129 77 8861	**129 77 8864**	55 mm
129 77 8871	**129 77 8874**	60 mm
129 77 8881	**129 77 8884**	65 mm
129 77 8891	**129 77 8894**	70 mm
129 77 8901	**129 77 8904**	75 mm
129 78 7541	**129 78 7544**	80 mm
129 78 7551	**129 78 7554**	85 mm
129 78 7561	**129 78 7564**	90 mm
129 78 7571	**129 78 7574**	95 mm
129 78 7581	**129 78 7584**	100 mm
129 78 7591	**129 78 7594**	105 mm

NOTES: SSt – stainless steel version, material in accordance with ISO 5832-1 Ti – titanium version, material Ti6Al4V ELI in accordance with ISO 5832-3

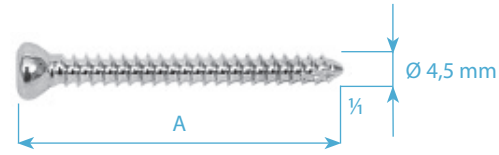
LOCKING BONE SCREWS 5/3.5 mm



NOTES:
drilled with Ø 2.9 mm drill
introduction by a screwdriver with 3.5 mm socket

SSt	Ti	A
129 77 8231	**129 77 8234**	16 mm
129 77 8241	**129 77 8244**	18 mm
129 77 8251	**129 77 8254**	20 mm
129 77 8261	**129 77 8264**	22 mm
129 77 8271	**129 77 8274**	24 mm
129 77 8281	**129 77 8284**	26 mm
129 77 8291	**129 77 8294**	28 mm
129 77 8301	**129 77 8304**	30 mm
129 77 8311	**129 77 8314**	32 mm
129 77 8321	**129 77 8324**	34 mm
129 77 8331	**129 77 8334**	36 mm
129 77 8341	**129 77 8344**	38 mm
129 77 8351	**129 77 8354**	40 mm
129 77 8361	**129 77 8364**	42 mm
129 77 8371	**129 77 8374**	44 mm
129 77 8381	**129 77 8384**	46 mm
129 77 8391	**129 77 8394**	48 mm
129 77 8401	**129 77 8404**	50 mm
129 77 8411	**129 77 8414**	55 mm
129 77 8421	**129 77 8424**	60 mm
129 77 8431	**129 77 8434**	65 mm
129 77 8441	**129 77 8444**	70 mm
129 77 8451	**129 77 8454**	75 mm
129 78 7471	**129 78 7474**	80 mm
129 78 7481	**129 78 7484**	85 mm
129 78 7491	**129 78 7494**	90 mm
129 78 7501	**129 78 7504**	95 mm
129 78 7511	**129 78 7514**	100 mm
129 78 7521	**129 78 7524**	105 mm

SELF-TAPPING CORTICAL BONE SCREWS – HA 4.5 mm



NOTES:
drilled with Ø 3.2 mm drill
introduction by a screwdriver with 3.5 mm socket

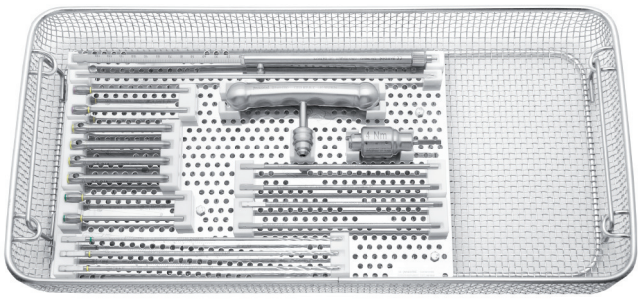
SSt	Ti	A
129 79 9421	**129 79 9424**	14 mm
129 79 9431	**129 79 9434**	16 mm
129 79 9441	**129 79 9444**	18 mm
129 79 5521	**129 79 5524**	20 mm
129 79 9451	**129 79 9454**	22 mm
129 79 9461	**129 79 9464**	24 mm
129 79 5541	**129 79 5544**	26 mm
129 79 9471	**129 79 9474**	28 mm
129 79 5551	**129 79 5554**	30 mm
129 79 9481	**129 79 9484**	32 mm
129 79 9491	**129 79 9494**	34 mm
129 79 5571	**129 79 5574**	36 mm
129 79 9501	**129 79 9504**	38 mm
129 79 5581	**129 79 5584**	40 mm
129 79 9511	**129 79 9514**	42 mm
129 79 9521	**129 79 9524**	44 mm
129 79 9531	**129 79 9534**	46 mm
129 79 9541	**129 79 9544**	48 mm
129 79 5601	**129 79 5604**	50 mm
129 79 9551	**129 79 9554**	52 mm
129 79 9561	**129 79 9564**	54 mm
129 79 9571	**129 79 9574**	56 mm
129 79 9581	**129 79 9584**	58 mm
129 79 5621	**129 79 5624**	60 mm
129 79 5631	**129 79 5634**	65 mm
129 79 5641	**129 79 5644**	70 mm
129 79 5651	**129 79 5654**	75 mm
129 79 5661	**129 79 5664**	80 mm
129 79 5671	**129 79 5674**	85 mm
129 79 5681	**129 79 5684**	90 mm
129 79 5691	**129 79 5694**	95 mm
129 79 5701	**129 79 5704**	100 mm
129 79 5711	**129 79 5714**	105 mm
129 79 5721	**129 79 5724**	110 mm

NOTES: SSt – stainless steel version, material in accordance with ISO 5832-1 Ti – titanium version, material Ti6Al4V ELI in accordance with ISO 5832-3

INSTRUMENTS FOR ANGULARLY STABLE PLATES WITH SCREWS 5 mm

139 09 0260
set

			number of pcs
1	**129 09 2550**	K-wire MEDIN Ø 1.5 mm; 300 mm	3
2	**129 69 4300**	Aiming sleeve lockable Ø 6.8/Ø 4 mm; 80 mm	4
3	**129 69 4401**	Cannulated drill Ø 3.9 mm; 220 mm	1
4	**129 69 4410**	Guide sleeve Ø 4/1.8 mm; 95 mm	2
5	**129 69 4430**	Guide sleeve Ø 4/3 mm; 95 mm	2
6	**129 69 5121**	Torque limiter 4 Nm	1
7	**129 69 5130**	Screwdriver handle	1
8	**129 69 5141**	Drill Ø 3.9 mm; 220 mm	1
9	**129 69 5201**	Drill Ø 2.9 mm; 220 mm	1
10	**129 69 5251**	Screwdriver; hexagon 3.5 mm	2
11	**129 69 5261**	Cannulated screwdriver; hexagon 3.5 mm	2
12	**129 79 8910**	Depth gauge for screws Ø 4.5–6.5 mm	1



Instruments for angularly stable plates with screws 3,5 and 5/3,5 mm
139 09 0265
540 × 240 × 90 mm
sieve with instruments

dlaha_tibialni_proximalni_OP023EN-R00_2013-04-19

STANDS FOR LOCKING SCREWS

Stand for locking screws 5
129 69 5741
214 × 186 mm
height 120 mm

Stand for locking screws 5/3,5
129 69 6390
214 × 126 mm
height 120 mm

Stand for cannulated locking screws 5
129 69 6395
214 × 126 mm
height 120 mm


2013