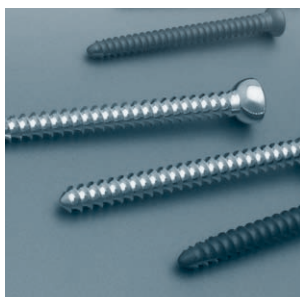
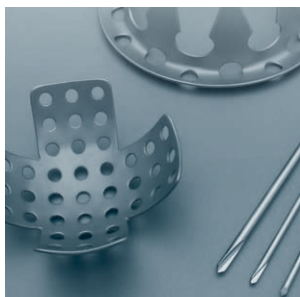




ANGULARLY STABLE PLATES

O P E R A T I O N I N S T R U C T I O N S



Angularly stable plates with screws up to 3,5 mm

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Caution: Only a specialist can work with the implants.

PRODUCT DESCRIPTION

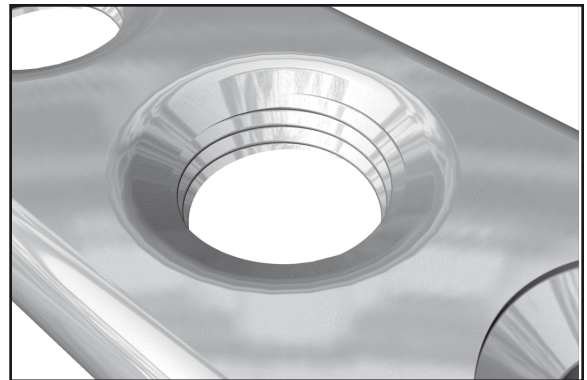
Angularly stable plate may have one of the three basic types of holes for plate fixing to the bone with the help of screws, namely in their optional combination. However, it always contains at least one locking hole.

Locking hole

Self-tapping or self-drilling screws can be introduced into the bone and “locked” by fastening of the conical thread on the screw head in the same screw in the plate hole. Such connection is towards the plate angularly stable, the whole system works on the principle of inner fixator. This solution helps to prevent from following problems:

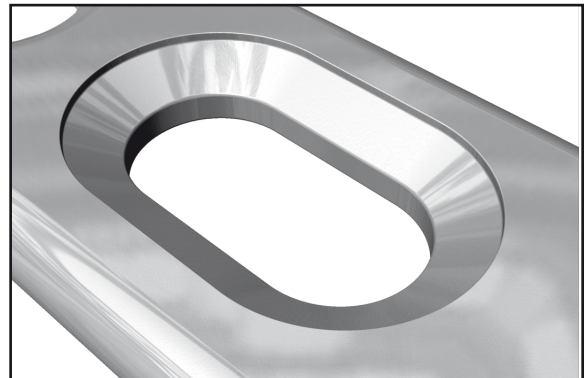
- primary loss of reposition
- secondary loss of reposition, in the first place in cases of fragmentation fractures without sufficient bone support, low quality or osteoporotic bone.
- periosteum compression and following worsening of blood supply of cortical bone.

Use locking screws up to 3,5 mm in this hole. It is also possible to use standard screw with ball head with stem up to 3,5 mm.



Standard oval hole

Standard oval hole enables to the surgeon to use compression screws for fastening of broken fragments and fracture fixation by axial compression. The screws can be introduced under different angles, lengthwise or transversally. Do not insert locking screws in this hole!



Autocompression locking hole

Autocompression hole enables dynamic compression in lengthwise axis of the plate at eccentric screw placing. Holes are not regular, compression is always effective in one direction only, from that reason the holes are placed in a way so that the compression would work towards the plate centre.

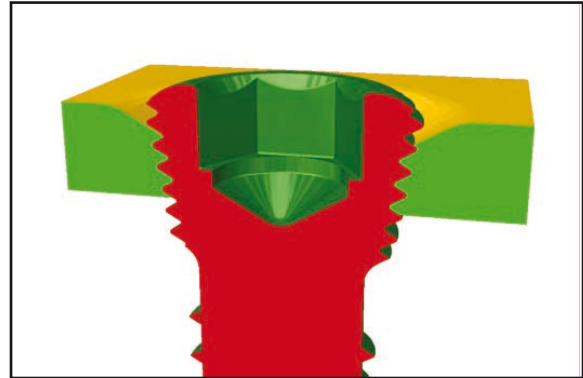
When using locking screws the hole behaves in the same way as locking hole.



SYSTEM OF ANGULARLY STABLE PLATES

The system is based on the principle of the inner fixator. By means of the tight connection “screw – plate”, the angularly stable connection is achieved between the plate system and the bone. This transfers part of the weight from the screw-bone connection to the screw-plate connection. Thanks to that it is possible to use the system successfully even in a less quality and an osteoporotic bone.

If the angularly stable plate is used with locking screws, the plate and the screws make tight system together. The plate does not have to be pushed against the bone therefore the bone still gets sufficient supply of blood. Locking screws can be introduced monocortically without enfeebling the strength of the configuration or the fracture fixation, because the screws are firmly anchored in the plate.



PRINCIPLES OF FIXATION

1. Only compression screws

It is about a commonly used method of fracture fixation with the help of plate and compression screws.

Fragments of a bone are fastened to the plate, the plate is closely pushed against the bone and stability of the whole system is reached by bone pressure on the bottom part of the plate with the help of compression screws.

Shape of the plate is crucial for the correct function of osteosynthesis.

2. Only locking screws

If you use only locking screws then you make a system that works on a very similar principle as outer fixator.

When using only locking screws, the plate shape is not what matters but high-quality fracture reposition before tightening of the locking screws.

3. Combination of locking and compression screws

- Use the plate on the base of the common plating principle; first perform fracture reposition and fixation by compression screws. (You can use the spacer to keep the space between the bone and the plate). Then screw the locking screws to reach the angularly stable plate fixation towards the bone.
- After the fracture reposition and plate fixation by locking screws, it is possible to fasten the separated fragment (e.g. multi-fragmentation or splintery fractures) to the fixed part of the bone by compression screw.
- After fixation of one fracture fragment by locking screws, it is possible to push the second fragment to the first one with compression screws and eventually after that to fix even the second fragment with other locking screws.

NOTE: Do not use locking screws closely to both sides of the fracture because the strain, to which the plate is exposed, would be concentrated only to the space between these screws and the plate could get broken. It is generally recommended to leave from 1 to 3 holes empty above the fracture area.

NOTE: To use the locking plate system correctly, it is necessary to understand the principles of fixation and their biomechanical properties. Draw your attention to pre-operation planning.

INDICATION

T-PLATE

T-shape plate is primary determined for open inner osteosynthesis of distal radius fractures, properties of angularly stable plates enable their successful using even in less quality and osteoporotic bones. Angularly stable connection is mainly useful during intraarticular fractures treatment. It is also possible to use the plate as a supportive plate during fracture treatment in the area of bone ends: femur, tibia, fibula, humerus and ulna.

T-PLATE ANATOMICAL

T-plate anatomical is shaped in way so that it would copy anatomical shape of common bone of distal radius the best. This plate is only intended for treatment of distal radius fractures from volar side.

T-PLATE WITH PROTRUSION

Plate of T shape provided with protrusion that can be easily bent, with locking hole for better styloid fixation. This plate is only intended for treatment of distal radius fractures from volar side.

RECONSTRUCTION PLATE

Straight plate with holes is suitable for fracture fixation of straight bones, hollow bones and the collar bone. It is possible to shape the plate before using so that it would copy the anatomical shape of the bone better. Use the plate only in places where you can presume low weight.

RECONSTRUCTION PLATE THICK

This plate has the same indication as reconstruction plate but it is thicker and from this reason it is suitable for heavier patients and bone fractures where medium and higher weight can be expected. In the areas of higher strain, use some of the plates using screws of 5 mm. It is possible to shape the plate before using so that it would copy the anatomical shape of the bone better.



T-PLATE



T-PLATE ANATOMICAL



T-PLATE WITH PROTRUSION



RECONSTRUCTION PLATE



RECONSTRUCTION PLATE THICK

CONTRAINDICATION

T-PLATE

In case of supportive using of the plate during fracture treatment of legs, it is necessary to realise, that the plate's thickness is only 1,6 mm and its construction does not allow heavy load. Do not use it in cases of heavy strain.

See general information about implants using – Instructions nr. PL0088.

PLATE RECONSTRUCTION LOCKING, T-PLATE ANATOMICAL, T-PLATE WITH PROTRUSION, T-PLATE RECONSTRUCTION THICK

See general information about implants using – Instructions nr. PL0088.

COMBINATION WITH OTHER PRODUCTS

It is possible to combine plates with screws and wires of MEDIN, a.s., providing the instructions and producer's recommendations are followed, particularly compatibility of the materials. (it is not allowed to combine products of different materials)

The products are not determined to be combined with products of other producers.

PLATE INTRODUCTION AND LOCKING WITH STANDARD SCREWS

In case of using only standard i.e. unlocking screws, the operating procedure is the same as during plating of standard plates for osteosynthesis.

1. REPOSITION THE FRACTURE

Reposition the fracture under X-ray control. If essential, fixate it with K-wires MEDIN or forceps.

2. SHAPE THE PLATE

Get to know the fracture place really well. For correct function, it is necessary to shape the plate anatomically correct in advance, mainly for internal-articular fractures. Anatomical plates are pre-shaped already so that they would correspond to the shape of common bone; their next bending is only possible in the place of oval hole.

Use only allowed shaping instruments, those that are identical with instruments for standard plates.

It is possible to bend protrusion with hole at the plate with protrusion (397 129 77 7790 and 8700). CAUTION! It is not allowed to bend the plate more times than once!

3. INSERT GUIDE SLEEVE LOCKING (ALTERNATIVE)

Screw the guide sleeve locking carefully into the thread of chosen plate hole until it is tightly hold in the thread. Use the guide sleeves locking for manipulation and correct plate placing.

4. PLACE THE PLATE

Place the plate on the bone and fix it temporarily with forceps (397 129 99 0040) or K-wires MEDIN.

5. PRE-DRILL THE HOLE FOR SCREW

Pre-drill the hole for the screw with the help of standard instruments for plate osteosynthesis. Screw can be introduced under angle either lengthwise or transversely with the plate axis.

6. INSERT THE SCREW

Introduce chosen standard screw neutrally or in case of autocompression holes you can place the screw eccentrically and to reach dynamic compression this way.

7. MAKE SURE EVERYTHING IS ALL RIGHT

Check that the screws are tight. Remove instruments necessary for temporary plate fixation.

8. PLATE REMOVAL

The plate removal procedure is the same as procedure of standard plates. If the hexagon head of the screw gets stripped or during other problems with screws removing use the instrumentation for removal of MEDIN screws.

PLATE INTRODUCTION AND LOCKING WITH LOCKING SCREWS

Despite of the fact that locking screws are introduced bicortically in most cases, it is possible to introduce them even monocortically in quality and strong bones. Monocortical introduction of the screws is mainly used in case when the screw is not desired to go through the whole bone e.g. in the area of epiphysis.

Pay attention to locking screws, they do not behave as standard compression screws. It is necessary to realise that during fastening the screw and locking the screw's head in the plate hole, the screw is strongly fixed and the force compression of bone fragments does not happen. Therefore, careful anatomical bone reconstruction is necessary (mainly in intra-articular fractures) with the help of compression (standard) screws, K-wires or cannulated screws. If the intra-fragment compression is required, using of standard screws is also necessary.

1. REPOSITION THE FRACTURE

Reposition the fracture under X-ray control. If essential, fixate it with K-wires MEDIN or forceps (397 129 99 0040).

2. SHAPE THE PLATE

Shape the plate before operation suitably. Use only allowed shaping instruments, those that are identical with instruments for standard plates.

It is not necessary to shape the plate exactly on the bone for correct and quality reposition. Quality and stability of the connection does not depend on the contact of the plate with bone surface. This is mainly suitable for mini-invasive operation methods, when it is not possible to shape the plate in advance. Anatomical plates are pre-shaped already so that they would correspond to the shape of common bone; their next bending is only possible in the place of oval hole.

When bending prevent from deformation of the holes with thread, they could get damaged. Do not use locking screws or spacers to protect the thread during bending, they could get stuck in the hole, and thus their removal would be impossible or damage of the thread would happen. Do not use locking drilling sleeves for bending. It is possible to bend protrusion with hole at the plate with protrusion (397 129 77 7790 and 8700). CAUTION! It is not allowed to bend the plate more times than once!

3. INSERT THE SPACER

To minimise the contact of the plate with the bone, it is possible to place the spacer (397 129 77 7420) in the hole with thread before fixation of standard screws, it ensures the space between the plate and the bone 2 mm.

It is possible to remove it again after plate securing with locking screws.

4. INSERT GUIDE SLEEVE LOCKING

Screw the guide sleeve locking carefully into the thread of chosen plate hole until it is tightly hold. Use the guide sleeves locking for manipulation and correct plate placing.



LOCKING BONE SCREW
ø 3,5 mm
size: 8–75 mm



LOCKING BONE SCREW
ø 2,7 mm
size: 10–50 mm



LOCKING SPACER
6 mm



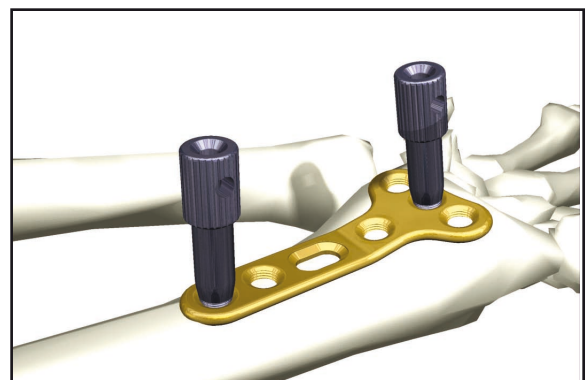
GUIDE SLEEVE LOCKING
60 mm



GUIDE SLEEVE 60 mm
for rods ø 1,5 mm
75 mm



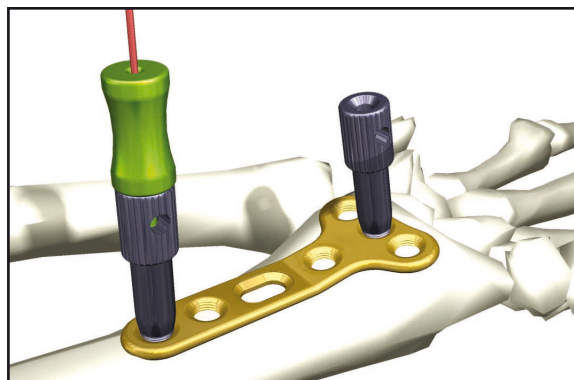
GUIDE SLEEVE 60 mm
for rods ø 2,0 mm
75 mm



5. PLACE THE PLATE AND FIX IT TEMPORARILY

Place the plate where it should be with the help of guide sleeves locking and fix it with K-wires MEDIN or forceps.

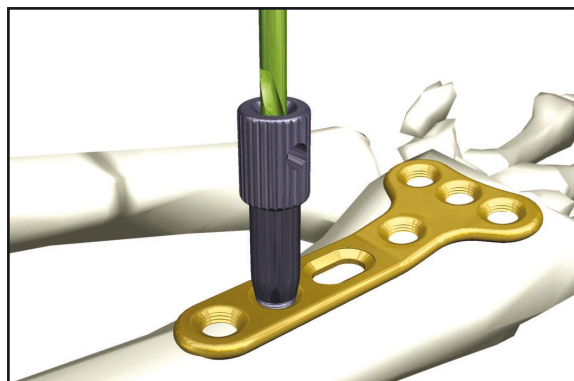
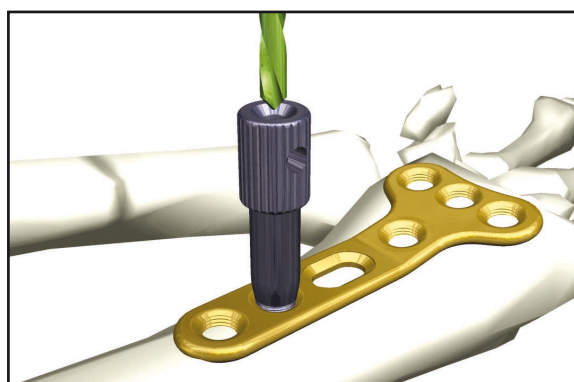
Correct position of the screws is necessary for right function, mainly screw alignment with the plate hole. To determine correct screw position you can use K-wires. Screw locking sleeve 2,9 mm into required plate hole and insert reduction into it for wires 1,5 mm and introduce the wire. Use RTG to picture the wires – they represent final position of locking screws.



6. PRE-DRILL THE HOLE

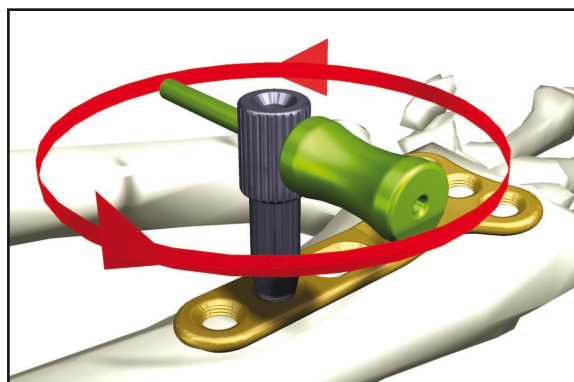
Remove the reduction 1,6 mm and leave the drilling sleeve 2,9 mm in the place. With the help of this sleeve, pre-drill the hole for screw. Drill only until first cortex then you can screw the screw easily thanks to the self-tapping thread on the tip.

Carefully with a drill (\varnothing 2,9 mm for screw of \varnothing 3,5 mm; for screws \varnothing 2,7 mm pre-drill the bone with wire of \varnothing 2 mm and using guide wire 129 69 4360) pre-drill hole in the bone with the help of attached guide sleeve. Use the electric drill for mechanical pre-drilling. Use the hand-handle of the drill for more exact control above depth of drilling and to prevent the soft tissues from damage on the opposite side of the bone.



7. UNSCREW THE GUIDE SLEEVE

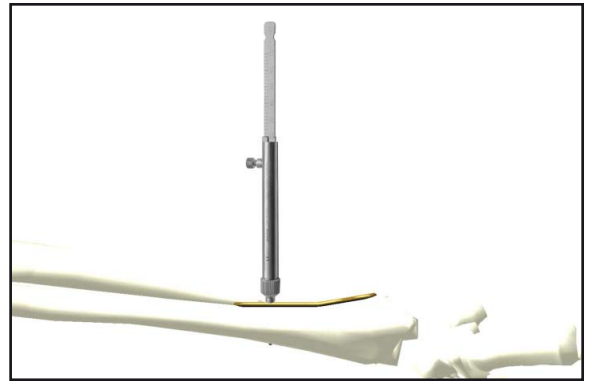
Unscrew the guide sleeve carefully. In case that it is not possible to unscrew the sleeve only by hand from some reason, you can help yourself with guide sleeve for wires – insert it into the hole of the drilling sleeve handle and use it as an elevator. Use the wire hole for screw depth determination with gauge.



8. MEASURE THE HOLE DEPTH AND CHOOSE THE CORRECT SCREWS

Measure the depth of the pre-drilled hole with the help of the depth gauge (397 129 79 8900). Perform it from the upper surface of the plate – the lengths of the screws are mentioned including the head. Choose the correct length of the screw carefully. If the bone is strong and of a good quality, it is possible to use the screws monocortically. For osteoporotic or less quality bone, we recommend using of bicortical screws. For proper system function it is the screw density important (proportion of the number of the screws to number of the holes in the plate). Ideal proportion is 0,4 – 0,5. In contrast with standard plates, using of screw in each plate hole is not recommended.

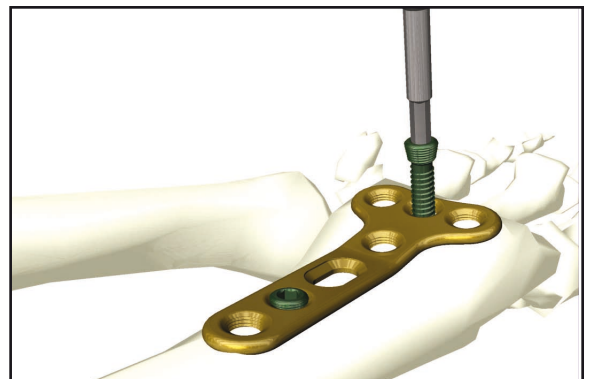
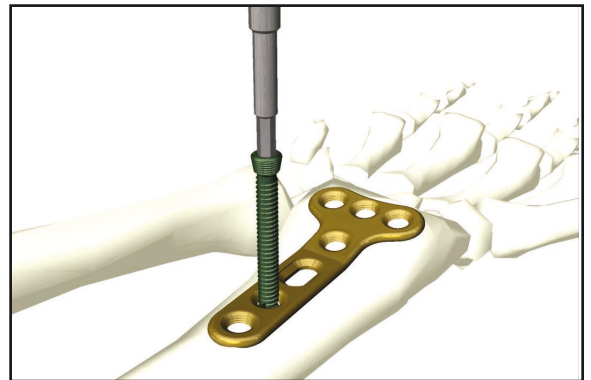
Nevertheless, plate fixation proximally or distally towards the fracture place is still very important. At least two screws should be used monocortically for fixation of each main fragment, we recommend using 2 or 3 screws into main fragments, and in case fixation some of the screws were not optimal. To enhance the quality and stability of the system we recommend using at least one screw bicortically.



9. INSERT THE SCREW

Before introduction of the first locking screw, make sure that the plate is firmly fixed – when fastening the screw the rotation could happen – the plate round the screw axis. Make the screws tight with the help of hexagonal moment screwdriver (397 129 69 2810).

Pre-drill the holes for locking screws with the help of the guide sleeve. For proper plate function, it is necessary to introduce the screws in the plate in a way that the lengthwise axis of the screw is identical to the axis of the corresponding hole in the plate. At a divergence smaller than 5° the connection of the screw's head and the plate is decreased to 70 %.



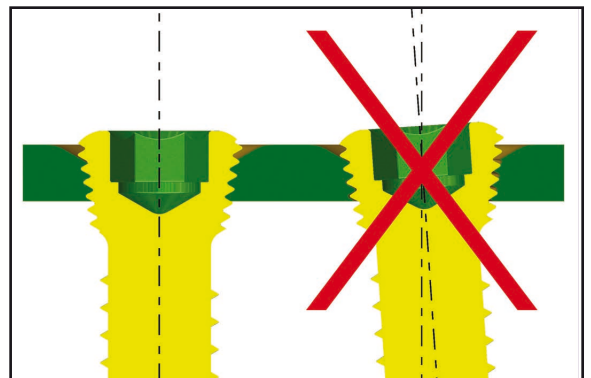
10. MAKE SURE EVERYTHING IS ALL RIGHT

Check that the locking screws are tight. Remove instruments necessary for temporary plate fixation.

11. PLATE REMOVAL

When removing the plate, loose all the screws first, after that start to take them out one after the other. In this way, you prevent from possible rotation of the plate round the axis of the screw that was taken out as the last one.

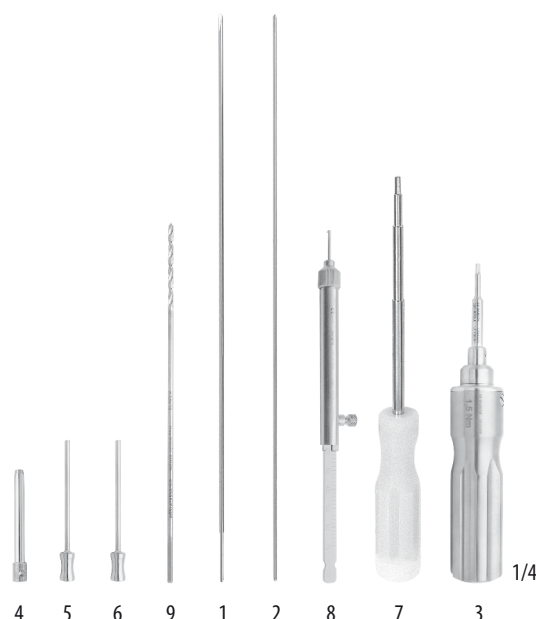
If the hexagon head of the screw gets stripped or during other problems with screws removing, use the instrumentation for removal of MEDIN screws.



ANGULARLY STABLE PLATES INSTRUMENTS



INSTRUMENTS FOR ANGULARLY STABLE PLATES



139 09 0250

set

			number of pcs
1	129 09 2571	K-WIRE WITH SHANK; 2,0 mm; 300 mm	2
2	129 09 3000	GUIDE ROD 1,5 mm; 300 mm	2
3	129 69 2810	TORQUE SCREWDRIVER; HEXAGON 2,5 mm; 16,7 cm	1
4	129 69 3360	GUIDE SLEEVE LOCKING 2,9 mm; 60 mm	3
5	129 69 3370	GUIDE SLEEVE FOR RODS 1,5 mm; 75 mm	2
6	129 69 4360	GUIDE SLEEVE FOR RODS 2,0 mm; 75 mm	2
7	129 79 4340	SCREWDRIVER; HEXAGON 2,5 mm; 214 mm	1
8	129 79 8900	DEPTH GAUGE FOR SCREWS HA 2,7; HA 3,5; HB 4,0	1
9	129 79 9981	DRILL 2,9 mm; 190 mm	1

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