

SURGICAL PROCEDURE  
PROXIMAL HUMERAL PLATE



## Proximal humeral plate

### Medical device description

Implant system consists of the plate and required number of the locking bone screws and cortical screws.

### Proximal humeral plates angularly stable

The angularly stable plate for proximal humerus has locking holes for stabilisation of the fragments to the plate and further of the plate to the bone diaphysis with the locking bone screws. Characteristics of the angularly stable plates allow its successful use also in a inferior quality and osteoporotic bone.

The locking screws allow to use it particularly at articular fractures. The angles of screw introduction are chosen to fix the highest number of fragments and to minimise the possibility of the screws to be ripped out of the bone. The proximal part of the plate is equal at all sizes, it contains nine holes for locking screws and it has the holes of 2 mm diameter along its edge for temporary plate fixation with K-wires and for potential attachment of the soft tissues. The straight shaft part of the plate has from 2 to 11 locking holes and one oval hole.

The plates are made of titanium or steel.



### Locking screws

The locking screws with diameter of 3.5mm and 3.5/2.7mm are intended for proximal humeral plate.

The locking screws with diameter of 3.5mm are of lengths 8-50mm with an increment of 2mm and 50-75mm with an increment of 5mm.

The locking screws with diameter of 3.5/2.7mm are of lengths 10-50mm with an increment of 2mm .



### Cortical screws

The cortical screws HA 3.5mm are intended for proximal humeral plate.



### Indications

The plate is intended for fracture osteosynthesis of proximal part of humerus. Longer plates allow the osteosynthesis of the proximal humerus fractures with extension to the diaphysis area.

## Operating technique

### 1. Planning prior the procedure

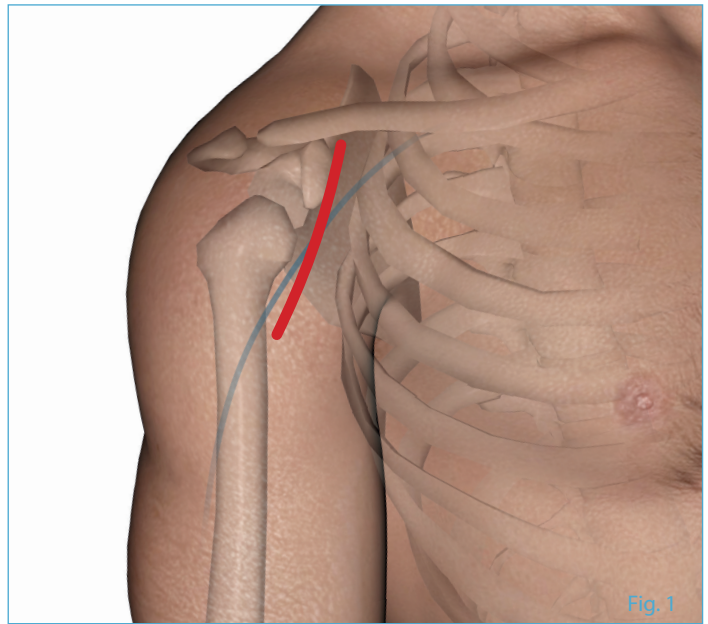
Compare operated extremity with the healthy one and carefully plan whole procedure. Protect nerve and venous tissues mainly at incisions and implant introduction, as it can cause permanent damage.

### 2. Patient position and incision

Position the patient on the operating table half-sitting so it will allow you to perform X-ray check in two perpendicular planes.

Access for the plate osteosynthesis of proximal humerus is between deltoid and pectoral muscles. Incision starts under processus coronoideus and continues by curve mediolaterally in front of the deltoid muscle insertion (Fig. 1).

Incision perform carefully – you must not damage the neurovascular bundle which passes through this place.



### 3. Reposition the fracture

Reposition the fracture under X-ray check. It's necessary to return fragment into their original position. Reposition the articular surface of humeral head so that the surface will not contain dislocations. Wrong reposition can cause permanent movement limitations to the patient or ache when moving. When necessary, fix the reposition using K-wires, traction screws or forceps.

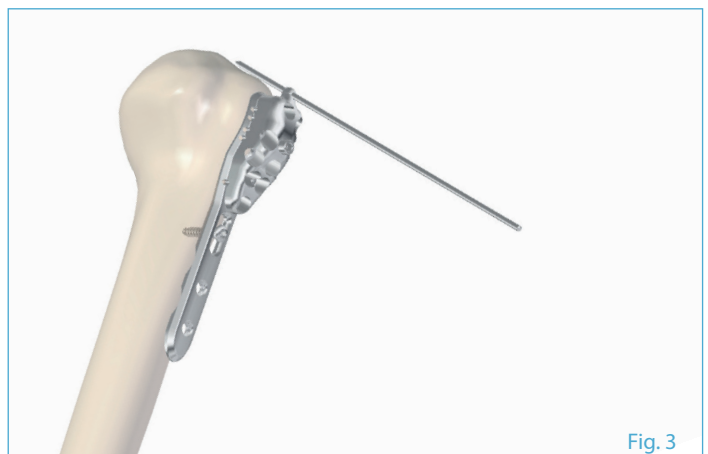
### 4. Insert the aiming device

Attach the aiming device to the plate so the pegs of the aiming device will fit into the plate holes and tighten the device by screw and screwdriver with hexagon 2.5 mm. The aiming device helps with direction of the screw introduction into the plate (Fig. 2).



### 5. Position the plate and fix it temporarily

Attach the plate to the right place, you can insert locking sleeve into the plate which makes easier manipulation with it. Fix the plate temporarily using cortical screw into the oval hole, K-wires through the sleeve or forceps (Fig. 3).



## 6. Pre-drill a hole

Remove potential K-wire and guide sleeve for screws and leave the drilling sleeve of diameter 2.9 mm in place. Pre-drill a hole for screw using this sleeve (Fig. 4).

It's necessary for the right function of the locking screw in the plate to insert the screws into the plate keeping the screw axis same as the corresponding hole axis in the plate. Deviation less than 5° decreases the connection firmness up to 70%.

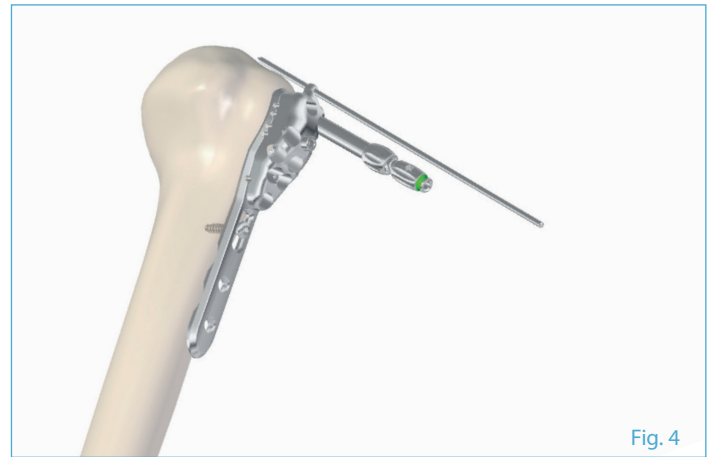


Fig. 4

Use K-wires for the correct position determination. Insert the sleeve 5.9/5.1mm into the required block hole, insert the aiming locking sleeve and guide sleeve for wire of diameter 1.5 mm and insert K-wire. You will find out if the position is correct using X-rays. The K-wires represent the final position of the locking screws (Fig. 5).

Drill through the first cortical bone further to the second cortical bone in the proximal part/head of humerus. The second cortical bone must not be penetrated to prevent further damage of joint surface and other soft tissues.



Fig. 5

Pre-drill the hole in the bone (Fig. 6) carefully using drill of diameter 2.9 mm for the screw of diameter 3.5 mm and wire of diameter 2 mm for the screws of diameter 2.7 mm (when pre-drilling the screw of shaft diameter 2.7 mm it's necessary to insert reduction sleeve of diameter 2 mm). Use drill for mechanical pre-drilling.

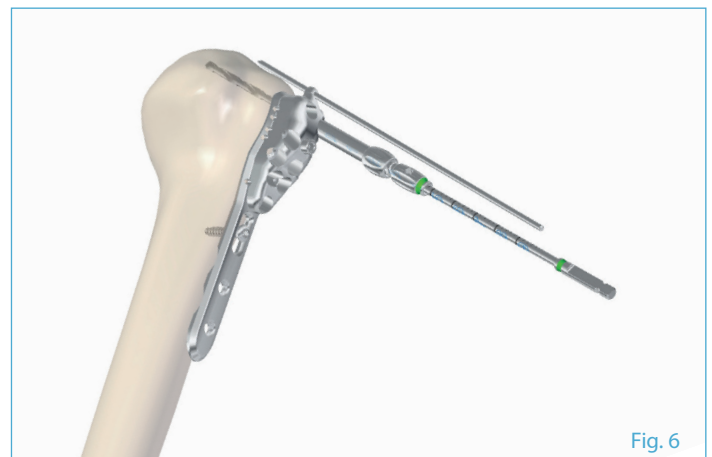


Fig. 6

## 7. Measure the hole depth and choose the right screws

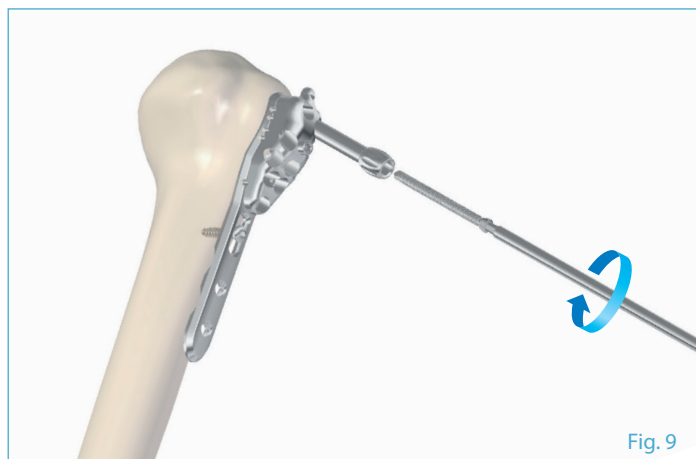
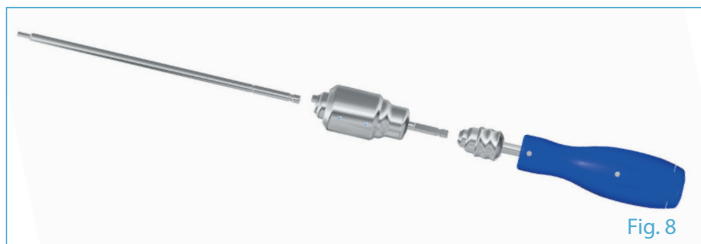
Measure the depth of pre-drilled hole using the drill scale and locking sleeve or depth gauge. Depth gauge allows to measure the depth through aiming device (Fig. 7). Perform the measurement from the upper surface of the plate – screw lengths are stated including the head. Choose the appropriate screw length carefully. It is important in the area of humerus head that the screws will not reach the joint surface. You can choose between the screws inserted monocortically or bicortically in the area of diaphysis. In every case use at least 2 screws for distal plate end fixation.



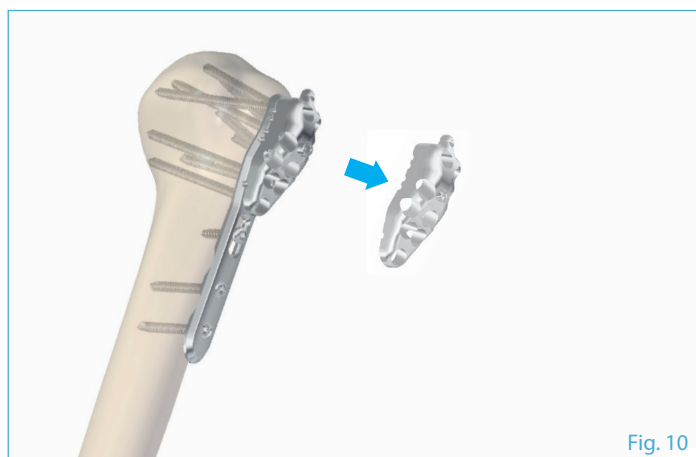
Fig. 7

## 8. Screw insertion

Make sure that the plate is firmly fixed before the first locking screw insertion. Plate rotation around the screw axis could happen when tightening the screw. Insert the screws using the torque limiter holder and screwdriver (Fig. 8). You will screw in the screw easily thanks to the tip with self-tapping grooves (Fig. 9).

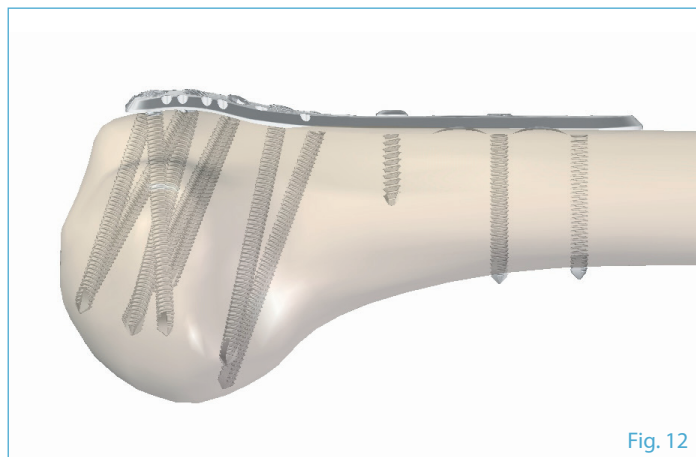
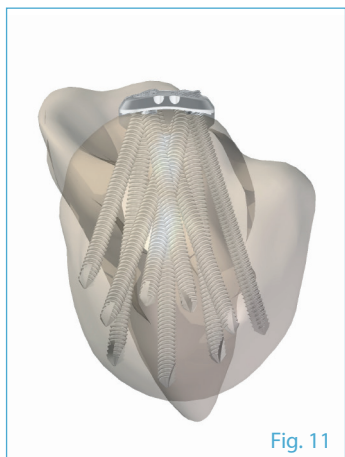


Insert all required screws using similar procedure. Remove the aiming device afterwards (Fig. 10).



## 9. Check

Check that the screws don't reach the joint and check their tightening (Fig. 11-13). Remove potential instruments required for temporary plate fixation.

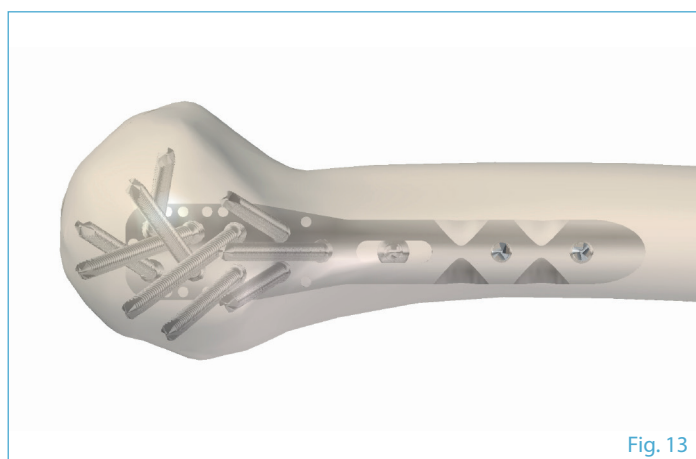


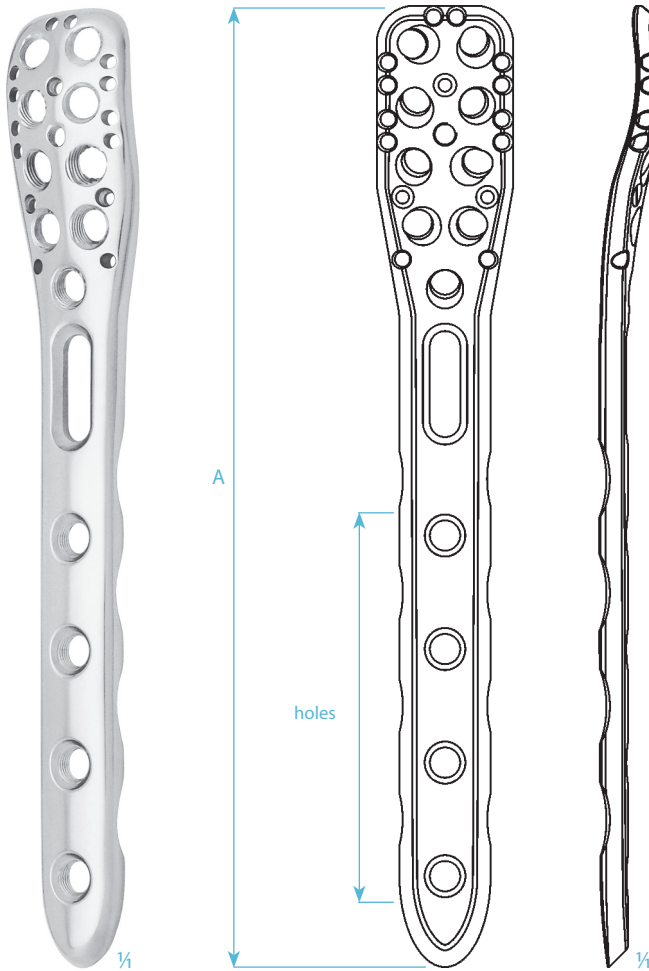
## 10. Suture

If the osteosynthesis has been performed correctly, perform sutures of single layers. If necessary insert a drain into the surgical wound.

## 11. Plate removal

When removing the plate first release all screws and then start to pull them out one after the other. This way you will prevent plate rotation around the axis of the last extracted screw. When stripping of hexagon in the screw head or having other problems with removing of the screws, use instrumentarium MEDIN for the screw extraction.



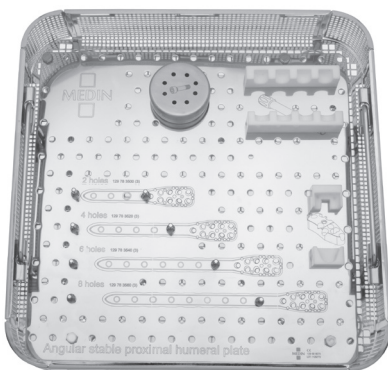


**Proximal humeral plate angularly stable**

SSt	Ti	A	holes
<b>129 78 3500</b>	<b>129 78 3503</b>	97 mm	2
<b>129 78 3520</b>	<b>129 78 3523</b>	127 mm	4
<b>129 78 3540</b>	<b>129 78 3543</b>	157 mm	6
<b>129 78 3560</b>	<b>129 78 3563</b>	187 mm	8
for special order			
<b>129 78 3510</b>	<b>129 78 3513</b>	112 mm	3
<b>129 78 3530</b>	<b>129 78 3533</b>	142 mm	5
<b>129 78 3550</b>	<b>129 78 3553</b>	172 mm	7

plate thickness \_\_\_\_\_ 2.7 mm

SCREWS:  
locking bone screws 3.5 and 3.5/2.7 mm  
cortical screws HA 3.5



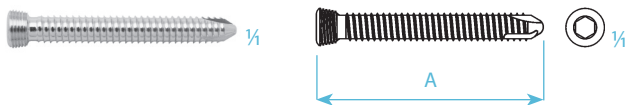
**129 69 6070** Sieve for proximal humeral plates  
240 × 240 × 50 mm  
*excluding implants and instruments*

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 HUMERAL PLATE

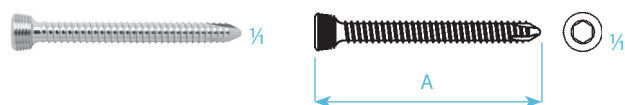
## LOCKING BONE SCREWS 3.5



thread diameter	3.5 mm
core diameter	3.0 mm
head diameter	5.0 mm
drill bit for threaded hole	Ø 2.9 mm
screwdriver	Ø 2.5 mm

### Locking bone screw 3.5

SSt	Ti	A
129 77 7021	129 77 7024	8 mm
129 77 7031	129 77 7034	10 mm
129 77 7041	129 77 7044	12 mm
129 77 7051	129 77 7054	14 mm
129 77 7061	129 77 7064	16 mm
129 77 7071	129 77 7074	18 mm
129 77 7081	129 77 7084	20 mm
129 77 7091	129 77 7094	22 mm
129 77 7101	129 77 7104	24 mm
129 77 7111	129 77 7114	26 mm
129 77 7121	129 77 7124	28 mm
129 77 7131	129 77 7134	30 mm
129 77 7141	129 77 7144	32 mm
129 77 7151	129 77 7154	34 mm
129 77 7161	129 77 7164	36 mm
129 77 7171	129 77 7174	38 mm
129 77 7181	129 77 7184	40 mm
129 77 7191	129 77 7194	42 mm
129 77 7201	129 77 7204	44 mm
129 77 7211	129 77 7214	46 mm
129 77 7221	129 77 7224	48 mm
129 77 7231	129 77 7234	50 mm
129 77 7241	129 77 7244	55 mm
129 77 7251	129 77 7254	60 mm
129 77 7261	129 77 7264	65 mm
129 77 7271	129 77 7274	70 mm
129 77 7281	129 77 7284	75 mm



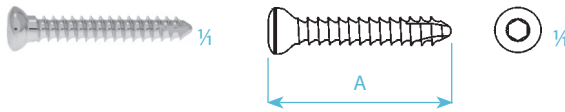
thread diameter	2.7 mm
core diameter	2.2 mm
head diameter	5.0 mm
drill bit for threaded hole	Ø 2.0 mm
screwdriver	Ø 2.5 mm

### Locking bone screw 3.5/2.7

SSt	Ti	A
129 77 7431	129 77 7434	10 mm
129 77 7441	129 77 7444	12 mm
129 77 7451	129 77 7454	14 mm
129 77 7461	129 77 7464	16 mm
129 77 7471	129 77 7474	18 mm
129 77 7481	129 77 7484	20 mm
129 77 7491	129 77 7494	22 mm
129 77 7501	129 77 7504	24 mm
129 77 7511	129 77 7514	26 mm
129 77 7521	129 77 7524	28 mm
129 77 7531	129 77 7534	30 mm
129 77 7541	129 77 7544	32 mm
129 77 7551	129 77 7554	34 mm
129 77 7561	129 77 7564	36 mm
129 77 7571	129 77 7574	38 mm
129 77 7921	129 77 7924	40 mm
129 77 7931	129 77 7934	42 mm
129 77 7941	129 77 7944	44 mm
129 77 7951	129 77 7954	46 mm
129 77 7961	129 77 7964	48 mm
129 77 7971	129 77 7974	50 mm



**129 79 9960** Stand for locking screws 3.5  
225 × 161 × 86 mm  
excluding implants



thread diameter	3.5 mm
core diameter	2.4 mm
head diameter	6.0 mm
drill bit for threaded hole	Ø 2.7 mm
drill bit for gliding hole	Ø 3.6 mm
screwdriver	Ø 2.5 mm

**Self-tapping cortical bone screw HA 3.5**

SSt	Ti	A
129 79 5201	129 79 5204	8 mm
129 79 5211	129 79 5214	10 mm
129 79 5221	129 79 5224	12 mm
129 79 5231	129 79 5234	14 mm
129 79 5241	129 79 5244	16 mm
129 79 5251	129 79 5254	18 mm
129 79 5261	129 79 5264	20 mm
129 79 5271	129 79 5274	22 mm
129 79 5281	129 79 5284	24 mm
129 79 5291	129 79 5294	26 mm
129 79 5301	129 79 5304	28 mm
129 79 5311	129 79 5314	30 mm
129 79 5321	129 79 5324	32 mm
129 79 5331	129 79 5334	34 mm
129 79 5341	129 79 5344	36 mm
129 79 5351	129 79 5354	38 mm
129 79 5361	129 79 5364	40 mm
129 79 5371	129 79 5374	42 mm
129 79 5441	129 79 5444	44 mm
129 79 5451	129 79 5454	46 mm
129 79 5461	129 79 5464	48 mm
129 79 5391	129 79 5394	50 mm
129 79 5401	129 79 5404	55 mm
129 79 5411	129 79 5414	60 mm
129 79 5421	129 79 5424	65 mm
129 79 5431	129 79 5434	70 mm

INSTRUMENTS FOR ANGULARLY STABLE PLATES WITH SCREWS 3.5 mm



**Supplementary instruments**

129 77 9200	Aiming device
129 69 4590	Sleeve Ø5.9/5.1 mm; 40 mm

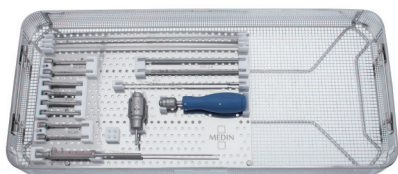
NOTES: SSt – stainless steel version, material in accordance with ISO 5832-1

Ti – titanium version, material Ti6Al4V ELI in accordance with ISO 5832-3



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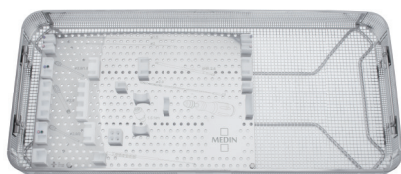
### INSTRUMENTS FOR ANGULARLY STABLE PLATES WITH SCREWS 3.5 mm



**139 09 0255** Instruments for ASP with screws 3.5 mm  
540 × 240 × 50 mm  
including instruments



<b>139 09 0250</b>	set		
1	<b>129 09 2550</b>	K-wire MEDIN; 1.5 mm; 300 mm	pcs
2	<b>129 09 2570</b>	K-wire MEDIN; 2.0 mm; 300 mm	3
3	<b>129 69 3360</b>	Guide sleeve locking 2.9 mm; 60 mm	4
4	<b>129 69 3370</b>	Guide sleeve for wires 1.5 mm; 75 mm	2
5	<b>129 69 4360</b>	Guide sleeve for wires 2.0 mm; 75 mm	2
6	<b>129 69 4780</b>	Depth gauge	1
7	<b>129 69 5131</b>	Screwdriver handle	1
8	<b>129 69 5126</b>	Torque limiter 1.5 Nm	1
9	<b>129 69 5231</b>	Screwdriver; hexagon 2.5 mm; 160 mm	2
10	<b>129 79 9981</b>	Drill 2.9 mm; 190 mm	1



**129 69 4390** Sieve for instrumentarium ASP 3.5  
540 × 240 × 50 mm  
excluding instruments

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