LITERATURE

1. Ruchelsmann, D.E., Chaitanya, S.M., and Jupiter, J.B.
   The Role of Locking Technology in the Hand
APTUS Hand

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Medartis, APTUS, MODUS, TriLock, HexaDrive and SpeedTip are registered trademarks of Medartis AG, 4057 Basel, Switzerland.
Features, Technique
Combination is the Solution

1. Fixation plates in the module
2. Detail of fixation plate
3. Four corner fusion plate with screws
4. Part of hand bone model
5. Finite elements representation of a Medartis plate

For further information on the plate range, see the APTUS Ordering Catalog at www.medartis.com/meta/downloads/marketing-materials.
• Multidirectional (±15°) and angular stable TriLock locking technology
• Anatomic plate designs
• HexaDrive interface with excellent self-holding properties

TECHNOLOGY
• Multidirectional (±15°) and angular stable TriLock locking system
  o Spherical three-point wedge-locking
  o Friction locking through radial bracing of the screw head in the plate – without additional tensioning components
• TriLock screws can be re-locked in the same plate hole under individual angles up to three times
• Minimal screw head protrusion thanks to internal locking contour
• No cold welding between plate and screws
• Intra-operative fine tuning capabilities

PLATE FEATURES
• Anatomic plate designs
• Low overall profile height
• Chamfered plate contour to minimize soft tissue irritation
• Bending and cutting for multiple use

SCREW FEATURES
• HexaDrive – the optimal self-retaining mechanism between screw and screwdriver for increased torque transmission
• Precision cut thread profile for improved sharpness and self-tapping properties
General Instrument Application

INTRODUCTION

**Flexibility and stability for optimal and fast regeneration**
APTUS Hand products allow for an anatomically correct reconstruction of the bone and early functional stability. The unique TriLock locking technology stabilizes complex and intra-articular fractures by means of the internal fixator principle. With the option of multidirectional screw positioning, individual fragments are angularly stable fixated and anatomically reduced. The implant size can be reduced significantly, due to the high strength of the system and the innovative locking technology. Improved patient results may be achieved through early mobilization.

PRODUCT MATERIALS

All APTUS implants are made from pure titanium (ASTM F67, ISO 5832-2) or from titanium alloy (ASTM F136, ISO 5832-3). All of the titanium materials used are biocompatible, corrosion resistant and non-toxic in a biological environment. Instruments consist of stainless steel, PEEK or aluminum.

INDICATIONS

- Fractures of the distal, middle and proximal phalanges as well as of the metacarpals
- All transverse fractures, spiral fractures, fractures near joints with or without joint involvement, shaft fractures, comminuted fractures, dislocated fractures and ligament/bone avulsions
- DIP, PIP and carpal arthrodeses

CONTRAINDICATIONS

- Pre-existing or suspected infections at or near the implantation site
- Known allergies and/or hypersensitivity to foreign bodies
- Inferior or insufficient bone quality to securely anchor the implant
- Patients who are incapacitated and/or uncooperative during the treatment phase
- The treatment of at-risk groups is inadvisable

COLOR CODING

<table>
<thead>
<tr>
<th>System</th>
<th>Color Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>APTUS 1.2</td>
<td>red</td>
</tr>
<tr>
<td>APTUS 1.5</td>
<td>green</td>
</tr>
<tr>
<td>APTUS 2.0</td>
<td>blue</td>
</tr>
<tr>
<td>APTUS 2.3</td>
<td>brown</td>
</tr>
</tbody>
</table>

Plates and Screws

- Special implant plates and screws have their own color:
  - Gold implant plates: Fixation plates
  - Blue implant plates: TriLock plates (locking)
  - Gold implant screws: Cortical screws (fixation)
  - Blue implant screws: TriLock screws (locking)
HOLDING AND POSITIONING

The plate holding and positioning instruments A-2350/A-2650 are used to pick up the plate out of the container and position it on the bone.

Choose the appropriate plate holding and positioning instrument based on the system size of the plate. Pick up the plate at the bar.

Note:
The plate holding and positioning instruments are not compatible with the 1.5 TriLock plates (A-4350.xx).

The ball tip end of the plate holding instrument A-2350 facilitates positioning, moving and securing the implant on the bone surface and can be used for all system sizes.
**BENDING**

If required, bend the plate using the plate bending pliers A-2040. The pin fits all 1.2/1.5 and 2.0/2.3 APTUS plates and protects the plate hole against deformation.

While inserting the plate in the bending pliers, the labeled side of the plate must always face up. The letters "UP" must be legible from above when bending the plate. This assures that the plate holes cannot get damaged.

While bending, the plate must always be held at 2 adjacent holes preventing deformation of the other adjacent holes.

Do not bend the plate more than 30°. Bending the plate further may deform the plate holes and may cause the plate to break postoperatively.

**Note:**
Repeated bending of the plate in opposite directions may cause the plate to break postoperatively. Always use the provided plate bending pliers to avoid damaging the plate holes. Damaged plate holes prevent precise seating of the screws in the plate and increase the risk of system failure.
CUTTING

For the APTUS hand system, there are two different types of plate cutting pliers available

**Plate cutting pliers type 1**

The Vario plate cutting pliers are marked with three different color coded cutting positions:

1. **1.2/1.5 Fixation plates (excluding 1.5 TriLock plates!)**
2. **2.0/2.3 Fixation plates**
3. **2.0/2.3 Compression and TriLock plates up to 1.0 mm thickness**

**Grid plates in general as well as compression and TriLock plates with a thickness of 1.3 mm cannot be cut with this type of cutting pliers!**

Position the implant plate over the pin with the appropriate color code. Insert the pin into the last plate hole that should remain on the implant. The labeled side of the plate must face up!

The Vario plate cutting pliers hold both sides of the plate securely after it has been cut.

**Tip:**
To optimize the smooth edges of the cut surfaces, turn the implant over and repeat the process.
**Plate cutting pliers type 2**

With these plate cutting pliers, the 1.2/1.5 and 2.0/2.3 hand plates as well as the 1.4 mm (A-2048) and 1.8 mm (A-2046) K-wires can be cut.

K-wires are cut by inserting them in the opening on the side of the plate cutting pliers (1). The wire is cut by performing the cutting motion.

Before cutting a plate, check that there are no remaining plate segments in the pliers (visual check). Insert the plate from the front into the open cutting pliers. Always control that the labeled side of the plate is facing up.

**Tip:**
To facilitate the insertion of the plate, support the cutting pliers slightly with your middle finger.

You can visually check the desired cut through the cutting window in the head of the pliers (see picture). Always leave enough material on the rest of the plate to keep the adjacent hole intact. Always cut the plate hole by hole. If two plate holes need to be cut off, two cutting procedures are necessary.

While cutting, loosely put your hand around the pliers to ensure that all parts are retained.

→ www.medartis.com/products/aptus/hand
**DRILLING**

Color-coded twist drills are available for every APTUS system size. The diameters are color-coded via a ring system. Two different twist drills are available for each system size: one for core holes and one for gliding holes (lag screw technique).

The twist drills are guided by the drill guide to prevent damaging the plate hole and to protect the surrounding tissue.

**Note:**
Drill guide A-2020 is not intended for use with 1.5 TriLock plates.

This symbol marks the side used for centric drilling with the drill guide. It is used for all TriLock and fixation plates, as well as for lag screws.

This symbol marks the side used for excentric drilling with the drill guide. It is used for compression plates only.

**Note:**
While drilling, the arrow must always point towards the fracture line.
Position the plate onto the bone. Insert the drill guide and the corresponding color-coded twist drill into the plate hole. In the APTUS system, the drill is guided by the shaft of the drill and not the drill flute.
SURGICAL TECHNIQUE LAG SCREWS

1. Drilling the core hole
Use the twist drill for core holes (one colored ring) of the required system size and drill up to the opposite cortex.

2. Drilling the gliding hole
Use the twist drill for gliding holes (two colored rings) of the same system size. Drill at a right angle up to the fracture site.

3. Compressing the fracture
Compress the fracture with the corresponding screw size.

4. Optional steps before compressing the fracture
If required, the countersinks A-3310/A-3610 can be used to create a recess for the screw head.
Tip: Use the handle with quick connector A-2071 instead of a power drive.

For better stress distribution in soft or osteoporotic bone, a biconcave washer of the corresponding system size can be used.
DEPTH MEASURING

The 1.2-2.3 depth gauge A-2030 is used to determine the ideal screw length for use in monocortical or bicortical screw fixation.

Place the tip of the depth gauge on the implant plate or directly on the bone.

The depth gauge caliper has a hooked tip that is either inserted to the bottom of the hole or is used to catch the far cortex of the bone. When measuring, the caliper stays static, only the slider is adjusted.

A scale on the depth gauge shows the ideal screw length for the measured drill hole.
SCREW PICK-UP

The screwdrivers A-2310/A-2610 feature the patented HexaDrive self-holding system.

To pick up the screw from the implant container, position the screwdriver, with the corresponding color code, directly in line with the screw. Pick-up the screw applying slight axial pressure downwards before retracting the screwdriver with the attached screw from the implant container.

**Note:** The screw will not hold without this axial pressure. Ensure the screw remains in line with the screwdriver during extraction (no tilting). The screw is held securely by the blade. If self-retention between screwdriver and screw cannot be achieved despite being picked up correctly, usually the screw has already been picked up before. This often leads to a permanent deformation of the self-retaining area of the HexaDrive inside the screw head.

Hold the screw with the screwdriver to measure the length and diameter using the scale of the measuring module.
CORRECT APPLICATION OF THE TRILOCK LOCKING TECHNOLOGY

The screw is inserted through the plate hole into a pre-drilled canal in the bone. An increase of the tightening torque will be felt as soon as the screw head gets in contact with the plate surface.

This indicates the start of the “Insertion Phase” as the screw head starts entering the locking zone of the plate (section “A” in the diagram). Afterwards, a drop of the tightening torque occurs (section “B” in the diagram). Finally the actual locking is initiated (section “C” in the diagram) as a friction connection is established between screw and plate when tightening firmly.

The torque applied during fastening of the screw is decisive for the quality of the locking as described in section “C” of the diagram.
CORRECT LOCKING OF THE TRILOCK LOCKING SCREWS IN THE PLATE

Visual inspection of the screw head projection provides an additional indicator of correct locking. Correct locking has occurred only when the screw head has locked flush with the plate surface (figures 1 + 3).

However, if the screw head can still be seen or felt (figures 2 + 4), the screw head has not completely entered the plate and reached the locking position. In this case, the screw has to be retightened to obtain full penetration and proper locking. Due to the system characteristics, a screw head protrusion of 0.2 mm exists when using plates with 1.0 mm thickness.

Do not overtighten the screw, otherwise the locking function cannot be guaranteed anymore.

Correct: LOCKED

Incorrect: UNLOCKED

Correct: LOCKED

Incorrect: UNLOCKED

![Figure 1](image1.png)

![Figure 2](image2.png)

![Figure 3](image3.png)

![Figure 4](image4.png)
Surgical technique rotation plate

1. Plate positioning
Position the long bar of the plate A-4350.23 over the fracture/osteotomy site.

2. Pre-fixation of the plate
Use 2 screws (blue TriLock or gold cortical screws) to fix the plate on the shaft.

   Note:
See pages 11 and 14 for drilling and depth measuring instructions.

3. Rotation adjustment
Adjust the rotation by sliding the plate along the screw in the oblong hole. Once the correct rotation is reached, tighten the screw.

4. Plate fixation
Fix the plate with additional screws.
Surgical technique hook plate

1. Plate pick-up
Take the hook plate A-4340.32 from the implant container and position it on a firm and sterile surface.
Pick up the hook plate with the plate holding and positioning instrument A-2350 in a 90° angle with axial pressure.

2. Drilling
While holding the plate with the plate holding and positioning instrument on the bone, the hole is drilled with the drill guide A-2020/A-2025.

3. Depth measuring
Measure the required screw length with the depth gauge A-2030.

4. Screw insertion
Insert the screw carefully and fix the avulsed fragment to the bone.

Postoperative status.