medartis®

PRECISION IN FIXATION

SURGICAL TECHNIQUE – STEP BY STEP

Orthognathics 1.5/2.0

MODUS® Mandible

Publications

1) Joss, C.U., Vassalli, I.M.
Stability After Bilateral Sagittal Split Osteotomy Advancement Surgery With Rigid Internal Fiyation: A Systematic Review
J. Oral Maxillofac Surg. 67:301-313,2009

2) Sauerbier, S., Schön, R., Otten, J.-E., Schmelzeisen, R., Gutwald, R.
The development of plate osteosynthesis for the treatment of fracture of the mandibular body – A literature review
J. of Cranio-Maxillofacial Surgery, 2008, 36, 251-259

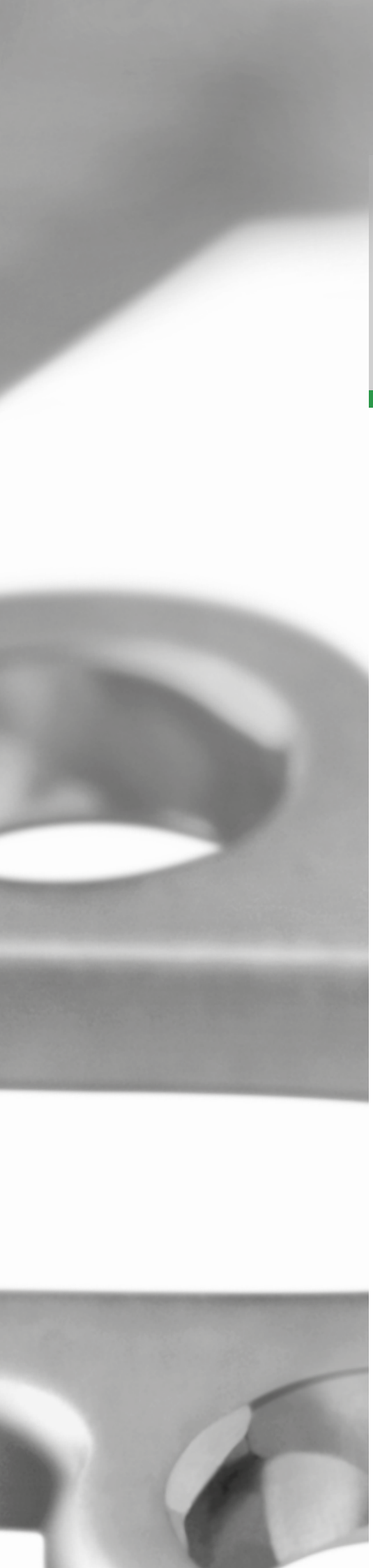
3) Prein, J., Assael, L.A.
Manual of Internal Fixation in the Cranio-Facial Skeleton
Springer-Verlag, Berlin Heidelberg, 1998, p. 187 - 198

4) Seeberger R, Asi Y, Thiele O.C, Stucke K, Hoffmann J, Engel M:
Neurosensory and temporomandibular joint function after high oblique sagittal split osteotomy (HSSO). An alternative technique in orthognathic surgery.
Br J Oral Maxillofac Surg 2012 Dec 18. Epub ahead of print.

5) Seeberger R, Thiele O. C., Mertens C., Hoffmann J., Engel M.:
Proximal segment positioning with high oblique sagittal split osteotomy (HSSO): Indications and limits of intraoperative mobile CBCT.
Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2013 Jan 8. Epub ahead of print.

6) U. Klammert, U.D.A. Müller-Richter, H. Böhm, A.C. Kübler, W. Kretschmer, T. Reuther
Aktuelle Osteosyntheseverfahren in der orthognathen Chirurgie
Springer Verlag, MKG-Chirurg 2011, 4:171-179

7) Martin Roser, Carl Peter Cornelius, Gerd Gehrke, Michael Ehrenfeld, Gerson Mast
Osteotomien im Gesichtsskelett - Basis der orthognathen Chirurgie: Befunderhebung, präoperative Planung und individuelle Realisation bei Korrekturoperationen von Kiefer- und Gesichtsdeformitäten
Georg Thieme Verlag, OP-Journal 2011, 27:200-221

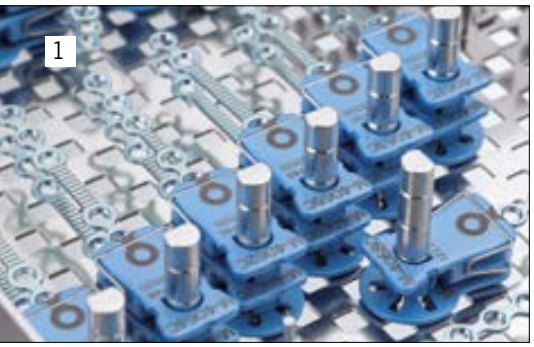


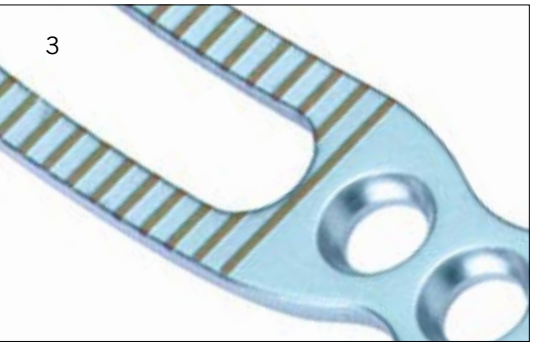
Orthognathics 1.5/2.0

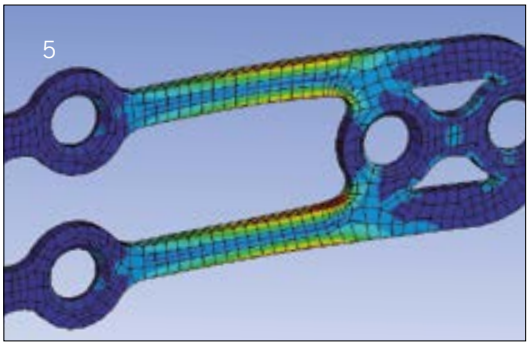
Contents

For further information regarding the MODUS product line see:
www.medartis.com/products

Features, Technique
Indication-Specific Solutions







1 Clip-stored implants in the module
2 Detail TriLock ramus plate
3 Laser markings for determining the osteotomy split width
4 Detail bone model
5 Finite elements analysis of an open sagittal split plate

→ www.medartis.com/products/modus/mandible

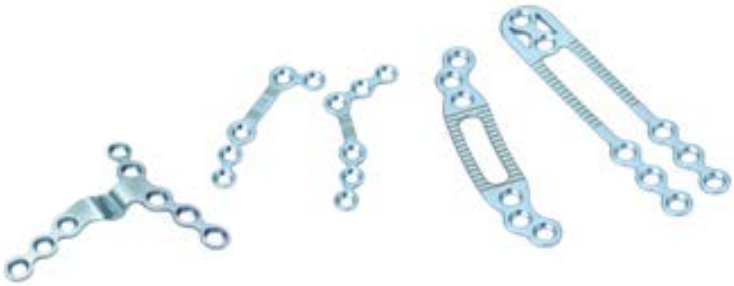
- L and Z plate design based on clinical CT data
- Slider as an aid for intraoperative occlusion adjustment
- Small increments in plate sizes for fixation nearer to the osteotomy split

System benefits

- TriLock ramus plates with the characteristics of an internal fixation plate for stable osteosynthesis on the ascending ramus
- Open sagittal split plates for transverse flexibility after sagittal split
- Closed sagittal split for semi-rigid fixation
- Innovative storage of plates and screws
- Intuitive and user-friendly instrument set

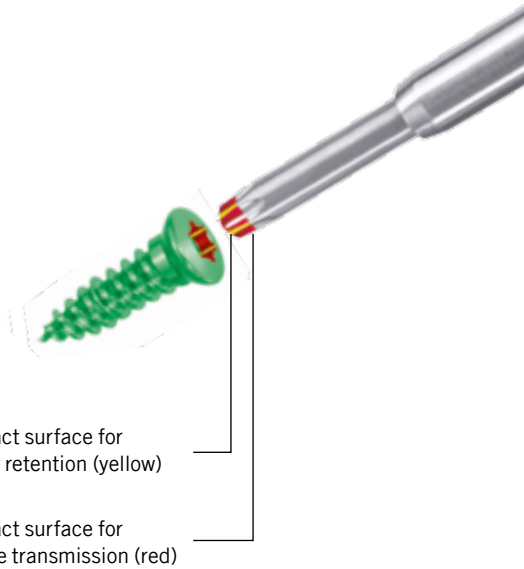
Plate features

- Plates can be contoured for intraoperative ease of use
- Midface: system size 1.5, plate thickness 0.7 mm
- Mandible: system size 2.0, plate thicknesses 0.6 to 1.3 mm
- Laser markings as an orientation guide



Screw features

- Choice of cross-drive and HexaDrive screws available
- HexaDrive technology:
  - Secure connection between screw and screwdriver
  - Increased torque transmission
  - Simplified screw pick-up due to patented self-holding properties
- Precision cut thread profile for sharpness and self-tapping properties
- Increased torsional, bending and shear stability due to conical core
- Thread pitch adapted to screw length
- Self-drilling SpeedTip screws with cross-drive or HexaDrive screw head design and patented thread for easy insertion with minimal force required



→ www.medartis.com/products/modus/mandible

Introduction and Indications

Introduction

MODUS Orthognathics offers an innovative range of products for use in orthognathic surgeries. A distinction is drawn between the two indications maxilla (midface) and mandible based on the different forces to which they are subjected and the properties of the bone. The 1.5 system size is used for surgeries on the bones of the midface. The 2.0 system size is used for the mandible, which is exposed to greater forces and exhibits a denser bone structure.

MODUS Orthognathics offers the user a selection of indication-specific plates specially designed for applications in the mandible to cover different approaches to surgery. The ideal implant can be selected based on the chosen osteotomy line, the desired degree of stability and the amount of displacement.

MODUS Orthognathics features anatomical plate designs to optimize osteosynthesis efficiency, with minimal plate contouring required. The small increments in plate size are another key benefit. These permit fixation close to the osteotomy line and help achieve greater stability. Laser markings serve as an orientation guide when bending plates and estimating the width of the osteotomy split.

Product materials

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

Indications

Maxillary (midface) and mandibular osteotomies performed as part of orthognathic surgery:

- LeFort I, II, and III
- Ramus and corpus osteotomies
- Genioplasties

Contraindications

- Pre-existing or suspected infection 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
- Blocking of cranial sutures/growth plates with plates and screws
- Not intended for use in direct contact with the dura mater and the central nervous system

Color coding

The system size of the implants is indicated by the colors of the clips used to hold the implants:

System	Color code
MODUS 1.5	green
MODUS 2.0	blue

Plates and Screws

The implant colors indicate the characteristics of the implant.

Gold implant plates:	Rigid fixation plates
Blue implant plates:	Semi-rigid fixation plates
Gold implant screws:	Cortical screws (fixation)
Green implant screws:	SpeedTip screws (self-drilling) IMF SpeedTip screws (self-drilling)
Silver implant screws:	TriLock screws (locking)

Instruments

The instrumentation belonging to a specific system size is color-coded accordingly. Instruments intended for use with a system are not color-coded.

Exception: 2.0/2.3/2.5 drill guide, TriLock M-2198; this instrument is not color coded but is intended only for system sizes 2.0/2.3/2.5.

Symbols

The symbols on plate clips, push-buttons, and implants have the following meanings:

TriLock (locking)

Self-drilling screws

Options for screw and plate combinations

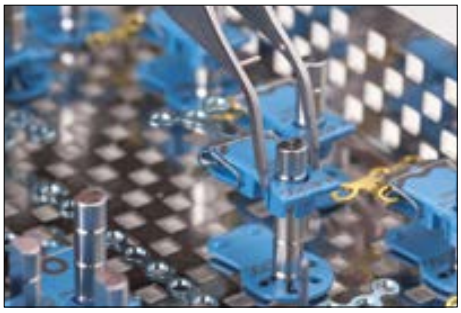
Screws and plates can be combined as follows within one system size:

Plates	Screws
1.5 Fixation Plates	1.5 Cortical screws, cross-drive 1.5 Cortical screws HexaDrive 4 1.5 SpeedTip screws, cross-drive 1.5 SpeedTip screws, HexaDrive 4 1.8 Cortical screws, cross-drive 1.8 Cortical screws, HexaDrive 4
2.0 Fixation Plates	2.0 Cortical screws, cross-drive 2.0 Cortical screws, HexaDrive 6 2.0 SpeedTip screws, cross-drive 2.0 SpeedTip screws, HexaDrive 6 2.3 Cortical screws, cross-drive 2.3 Cortical screws, HexaDrive 6
2.0 TriLock Fixation Plates (Ramus Plates)	2.0 TriLock screws (locking), HexaDrive 6 2.0 Cortical screws, HexaDrive 6 2.0 SpeedTip screws, HexaDrive 6 2.3 Cortical screws, HexaDrive 6

General Instrument Application

Removing the plate clip

Plate clips can be removed from the implant case using the angled plate and screw-holding forceps (M-2009/M-2019) or if necessary, directly by hand.
Using the forceps, grasp the plate clips in the indents on the sides and pull them upward.
All implant data is easy to identify thanks to clearly legible clip labeling (article number, lot number)



Notice:
When removing the plates, make sure that no other implants are loosened from their clip holders.
Once removed from the clip, implants must not be re-inserted into the clip, otherwise LOT traceability is not guaranteed.

Removing the plate from the clip

The plate can be transferred directly in the clip. To remove the plate from the plate clip, pull the plate forward out of the plate clip.

Collect the plate clips
Gather the empty plate clips and keep them separately so that the implant data can be recorded later.

Holding and positioning the plate

The plate and screw-holding forceps, angled, small (M-2009) and the plate and screw-holding forceps, angled, large (M-2019) are available for holding the plates and positioning them on the bone.

M-2009
Plate and screw holding forceps, small

M-2019
Plate and screw holding forceps, large

Always hold plates by the bars. The pin on the forceps ensures that the plates can be gripped optimally and prevents the tips from crossing. A locking mechanism also prevents the plate from springing away.

Cutting the plate

The principle «cut before bending» applies.

There are two different types of cutting pliers which can be used to cut MODUS Orthognathics plates:

Type 1:
1.2–2.8 Plate cutting pliers A-2046

Type 2:
0.9–2.0 Plate cutting pliers M-2170

Type 1:

A-2046
1.2–2.8 Plate cutting pliers

Type 2:

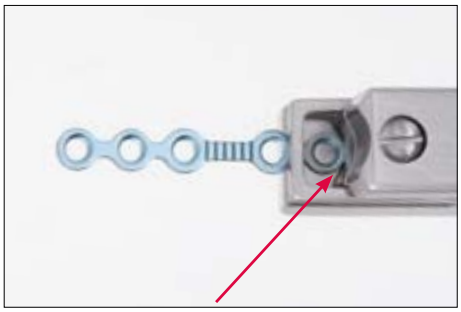
M-2170
0.9–2.0 Plate cutting pliers

→ www.medartis.com/products/modus/mandible

Type 1
Cutting pliers A-2046 can be used to cut all plates apart from the grid plates (M-4040C, M-4067C). Ensure that there are no remaining plate segments in the pliers (visual check). Insert the plate from the front into the open cutting pliers. The hole countersinks must face upward.

Notice:
To facilitate the insertion of the plate, support the cutting pliers gently with your middle finger.

You can visually check the desired cutting line through the cutting window in the head of the pliers (see figure). Always leave enough material on the rest of the plate to keep the adjacent hole intact. The cutting process rounds off the cut edge. The segment of the plate inserted in the pliers from the front is the desired plate length.



Type 2
The 0.9–2.0 plate cutting pliers (M-2170) can be used to cut all plates including the grid plates.

Place the plate between the hardened metal cutters. When doing this, ensure that the hole countersinks face upward. Cut the plate by squeezing the pliers closed.

Notice:
When cutting with both types of pliers, keep your hand loosely around the pliers to ensure that no parts fly off.

Bending the plate

For each system size two different bending pliers are available for bending MODUS Orthognathics plates:

Instrument	**Functions**
1.5 Plate bending pliers (M-2002)	– Flat plier function – Bending outside the plane – Bending within the plane
2.0–2.5 Plate bending pliers (M-2006)	– Flat plier function – Bending outside the plane – Bending within the plane
0.9–1.5 Plate bending pliers with pin (M-2012)	– Simultaneous bending in multiple planes (3D)
2.0–2.5 Plate bending pliers with pin (M-2158)	– Simultaneous bending in multiple planes (3D)

The plate bending pliers with pins are always used in pairs.

M-2002
1.5 Plate bending pliers

M-2006
2.0–2.5 Plate bending pliers

M-2012
0.9–1.5 Plate bending pliers, with pin

M-2158
2.0–2.5 Plate bending pliers, with pin

Flat nose pliers (all plates)
1.5 Plate bending pliers (M-2002)
2.0–2.5 Plate bending pliers (M-2006)

The frontmost part of the jaws on the 1.5 and 2.0–2.5 plate bending pliers can be used as flat nose pliers with a holding function.

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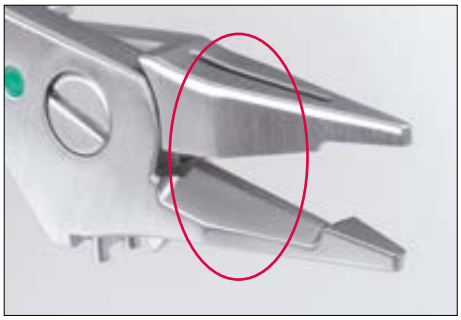
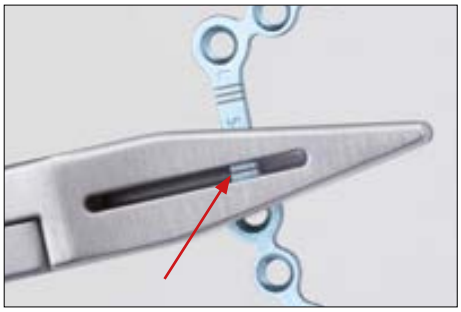
Bending outside the plane (all plates)
1.5 Plate bending pliers (M-2002)
2.0–2.5 Plate bending pliers (M-2006)

Bars can be bent using the 90° bending function between the jaws of the plate bending pliers.

Position the plate in the pliers between the jaws (to the rear). The slot permits the plate to be viewed to determine the exact location in which it is bent.



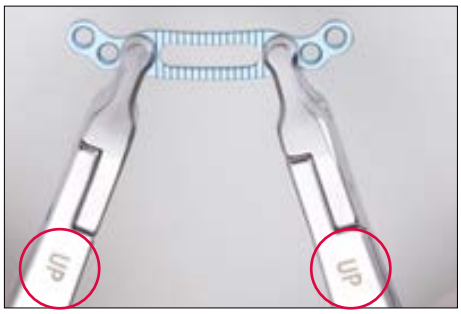


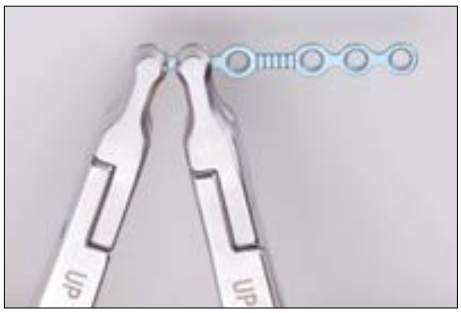
Bending within the plane (fixation plates)
1.5 Plate bending pliers (M-2002)
2.0–2.5 Plate bending pliers (M-2006)

Locate the plate in the pins. Closing the pliers will bend the plate within the plane (three-jaw plier function).

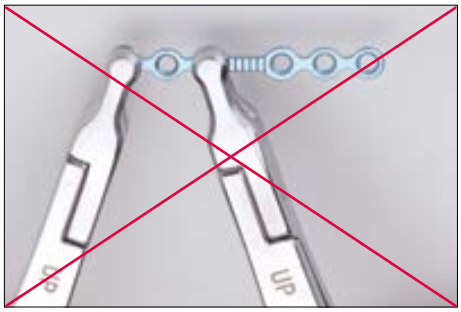
Simultaneous bending in multiple planes - 3D (fixation and TriLock plates)
0.9–1.5 Plate bending pliers with pin (M-2012)
2.0–2.5 Plate bending pliers with pin (M-2158)

If required, the plates can be bent using the plate bending pliers with pin. Hold the pliers so that the pin enters the plate hole from above (with the «UP» marking on the plate bending pliers pointing upward). The purpose of this process is to protect the plate hole from deformities. The plate bending pliers with pin (M-2158) can be used for 2.0 fixation plates and 2.0 TriLock plates.



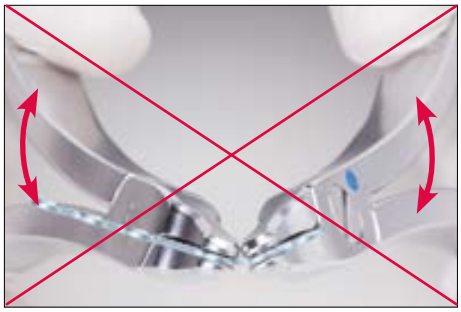


Notice:
While bending, the plate must always be held at two adjacent holes to prevent contour deformation of the intermediate plate hole.



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

Notice:
Avoid repeatedly bending the plate back and forth as this increases the risk of postoperative plate breakage. Always use the provided plate bending pliers to avoid damaging the plate holes. Damaged plate holes prevent correct and secure seating of the screw in the plate and increase the risk of system failure.



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Drilling

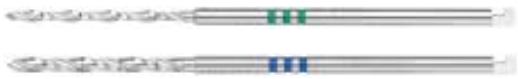
All twist drills are color-coded according to the system size to which they belong. The color and the number of rings indicate the size of the drill diameter.

System size 1.5
1 green colored ring drill diameter 1.1 mm
3 green colored rings drill diameter 1.5 mm (gliding hole*)

System size 2.0
1 blue colored ring drill diameter 1.5 mm
3 blue colored rings drill diameter 2.0 mm (gliding hole*)

*Lag screw technique, please see page 37

Core hole drills = one colored ring



Gliding hole drills = three colored rings

Matching drills to screws
The color rings on the twist drill match the color of the screw clip.

Core hole:
For system sizes 1.5 and 2.0, twist drills with one colored ring must be used to drill a core hole.

Lag screw technique:
When drilling a gliding hole, the diameter of the twist drill must match the screw diameter. For system sizes 1.5 and 2.0, twist drills with three colored rings must be used to drill a gliding hole. For other system sizes, please follow the diameter labeling on the drill shaft.

Notice:
Only clip-stored screws can be used with the new-generation twist drills (see the table on page 40). Using non-clip stored screws may result in screw breakage. Due to their different material properties, these screws require the use of a larger diameter drill and are therefore not compatible with the new twist drill design concept.

Drill guide

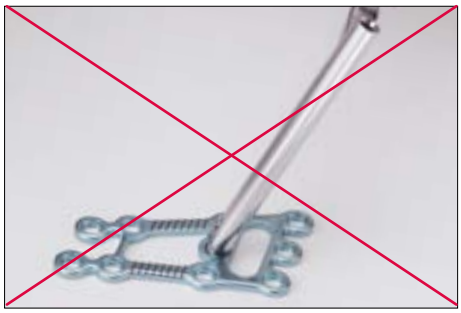
The 2.0/2.3/2.5 TriLock drill guide (M-2198) can be used to drill the screw holes for fixation of ramus plates.

M-2198
2.0/2.3/2.5 Drill guide TriLock

The drill guide also serves to limit the drilling angle.

Notice:

For TriLock plates ensure that the screw holes are pre-drilled with a pivoting angle of no more than ±15°. For this purpose the drill guides show a limit stop of ±15°.
A pre-drilled pivoting angle of >15° no longer allows the TriLock screws to correctly lock in the plate.



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Transbuccal set
If extraoral access is preferred due to tight plate locations, the 2.0/2.3/2.5 transbuccal set can be used.

For furher information regarding the Transbuccal set please visit www.medartis.com/meta/downloads/product-brochures

2.0 Transbuccal trocar and drill guide

Core hole drills for system size 2.0:
M-3459 Twist drill, ∅ 1.5 × 25 mm, L 99 mm, Dental
M-3469 Twist drill, ∅ 1.5 × 25 mm, L 112 mm, Stryker

Core hole drills = one colored ring

Gliding hole drills for system size 2.0:
M-3279 Twist drill, ∅ 2.0 × 25 mm, L 99 mm, Dental
M-3289 Twist drill, ∅ 2.0 × 25 mm, L 112 mm, Stryker

Gliding hole drills = three colored rings

Assigning the screw length

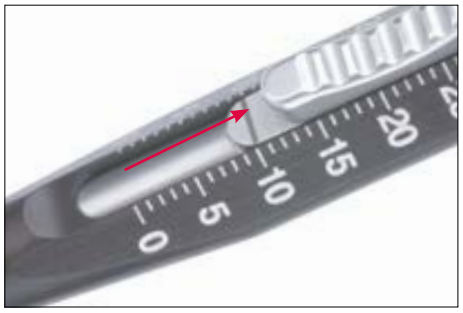
The 1.5–2.5 depth gauge (M-2250) is used to determine the ideal screw length for use in monocortical or bicortical screw fixation.

M-2250
1.5–2.5 Depth gauge

To assign the screw length, place the tip of the depth gauge onto the implant plate or directly onto 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 using the depth gauge, the caliper stays static, only the slider is adjusted.

The ideal screw length for the assigned drill hole can be read on the scale of the depth gauge.



Screwdriver handles

1.5 Screwdriver handle (M-2032)
Designed for system size 1.5.
Ergonomic design with enlarged diameter rotating plate, including the grip end. This ensures easier screw insertion using a two-finger technique.

2.0–2.5 Screwdriver handle (M-2046)
Designed for system sizes 2.0–2.5.
Flexible combination handle permitting a two-finger or fist technique.

Both screwdriver handles can be combined with HexaDrive or cross-drive blades.

When using cross-drive blades, users can choose between self-holding and non-self holding blades which can be combined with tension sleeves.

M-2032
1.5 Screwdriver handle

M-2662

M-2522

M-2512

M-2552

M-2046
2.0–2.5 Screwdriver handle

M-2663

M-2523

M-2513

M-2553

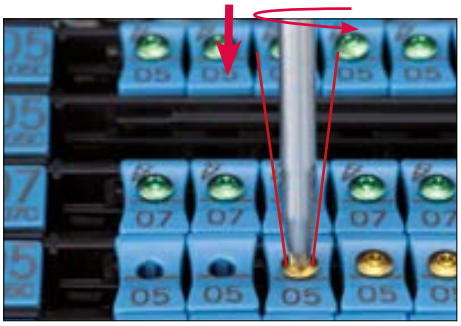
Removing the screw

To ensure the first in, first out principle, the screw nearest to the screw labeling push-button must be selected.

To remove the screw from the clip, proceed as follows:

Screwdrivers with self-holding blades

- Place the screwdriver blade on the screw head (HexaDrive or cross-drive)
- Pick up the screw by performing a gentle twisting motion and exerting light downward axial pressure
- Extract the screw vertically from the clip; the screw is held securely by the blade.



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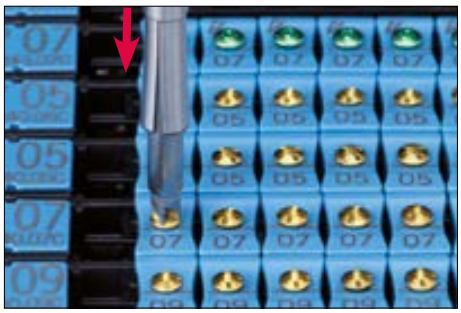
Screwdrivers with tension sleeve

- Pull back the tension sleeve
- Insert the screwdriver blade in the cross-drive head
- Slide the tension sleeve forward to



- Secure the screw

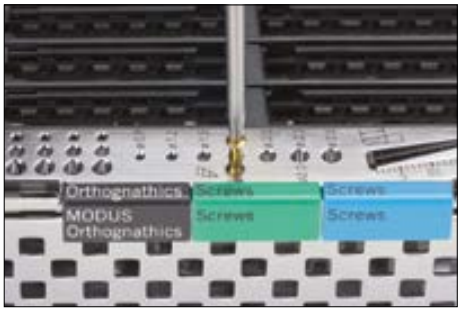
- Extract the screw vertically from the clip

Notice:
Once removed from the clip, implants must **not** be re-inserted into the clip.

The screw diameter and length can be checked on the lower end of the implant case.

Check the screw diameter: The screw will fit in the hole for the correct system size. The screw will not fit in the hole for the next screw size down.

Notice:
Check SpeedTip screws in hole diameters 1.8 and 2.3.



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Check the screw length

- Self-holding blades:
  read off the screw length at the end of the head
- Non self-holding blades with tension sleeve:
  read off the screw length at the marking (ring) on the tension sleeve

Interim storage

For interim screw storage there are five positions in the implant module which are graduated according to system size.

90° Screwdriver

The 90° screwdriver (M-2440) can be used in tight anatomical locations (e.g. osteosynthesis on the ascending ramus).

For the purpose of drilling, the 90° screwdriver can be fitted to a standard ISO connection. It is recommended not to exceed a maximum drilling speed of 1'000 revolutions per minute to avoid overheating the bone. Twist drills may only be used for a maximum of ten times.

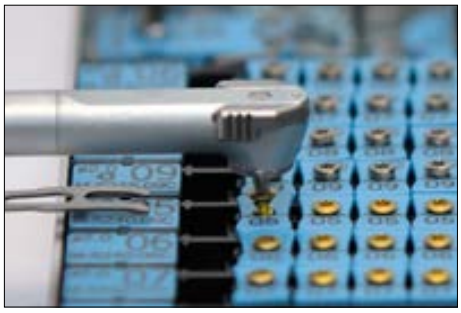
There is a selection of different blades from system sizes 1.5/2.0 available for inserting screws:

– HexaDrive 4 and HexaDrive 6 blades
– Self-holding cross-drive blades
– Non self-holding cross-drive blades which are used in combination with the screw holding fork

M-2440
90° Screwdriver, complete

→ www.medartis.com/products/modus/mandible

The screw is removed from the clip using the 90° screwdriver and self-holding blades in the same manner as with the normal screwdriver.



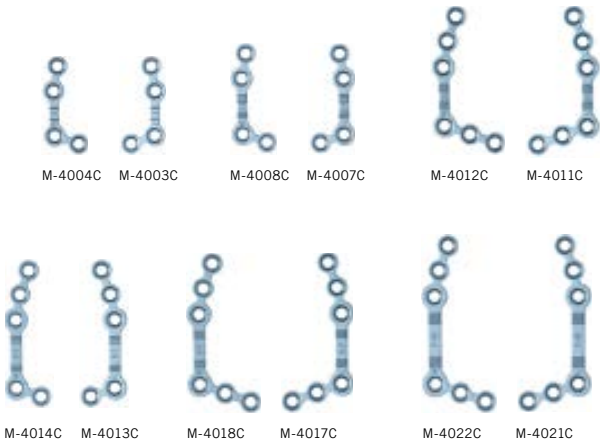
When using blades without self-holding, place the screwdriver blade on the cross-drive head of the screw and then secure with the holding fork before pulling the screw vertically out of the clip.

Surgical Techniques

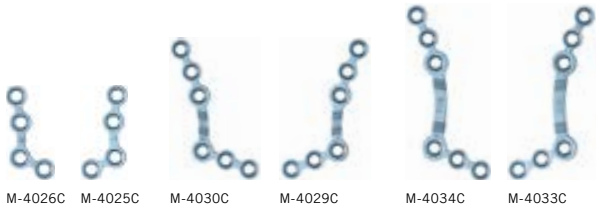
Treatment after a LeFort I osteotomy

The following plates can be selected for osteosynthesis for a LeFort I osteotomy:
A left plate and a right plate are available for each plate size.

L	R	
M-4003C,	M-4004C	Medial L plates for forward displacements up to a max. 3 mm and backward displacements
M-4007C, M-4008C, M-4011C,	M-4012C	Medial L plates for forward displacements up to a max. 5 mm
M-4013C, M-4014C, M-4017C,	M-4018C	Medial L plates for forward displacements up to a max. 7 mm
M-4021C,	M-4022C	Medial L plates for forward displacements up to a max. 10 mm



L	R	
M-4025C,	M-4026C	Lateral Z plates for backward displacements
M-4029C,	M-4030C	Lateral Z plates for forward displacements up to a max. 5 mm
M-4033C,	M-4034C	Lateral Z plates for forward displacements up to a max. 10 mm



Selecting the plate
After performing the LeFort I osteotomy, set the occlusion and fix with a temporary IMF. Then select the plates based on the offset width.

Workflow:
Perform the osteosynthesis first medially and then laterally.
L plates are especially well suited for osteosynthesis in the medial region.
Z plates are especially well suited for osteosynthesis in the lateral region.

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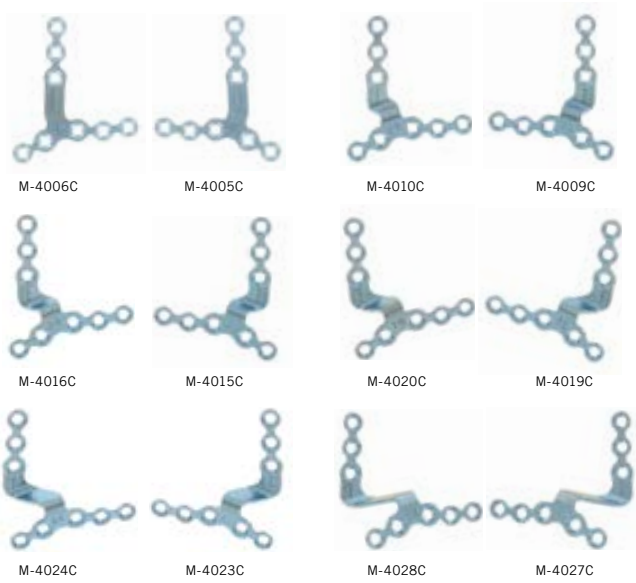
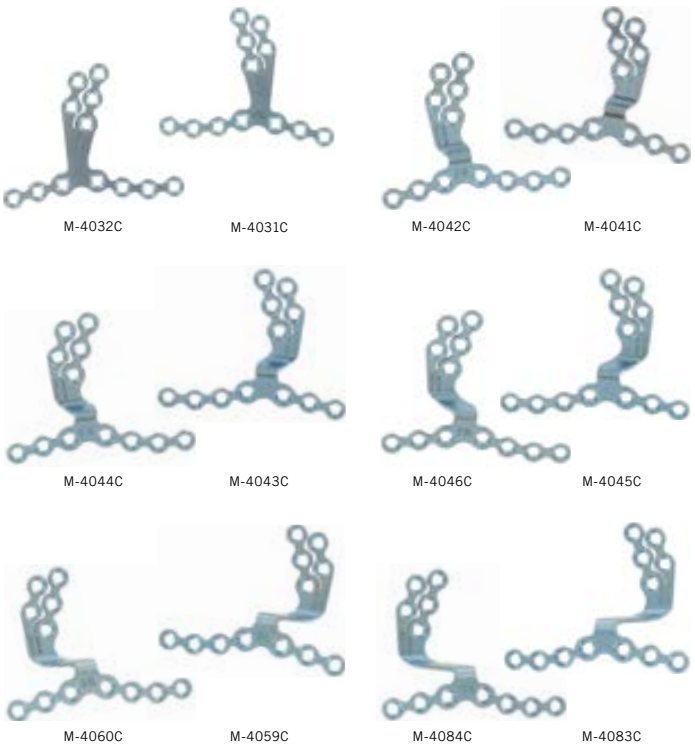
L	R	
M-4005C,	M-4006C	Medial pre-shaped maxillary plates for forward displacements of 0 mm
M-4009C,	M-4010C	Medial pre-shaped maxillary plates for forward displacements of 3 mm
M-4015C,	M-4016C	Medial pre-shaped maxillary plates for forward displacements of 5 mm
M-4019C,	M-4020C	Medial pre-shaped maxillary plates for forward displacements of 7 mm
M-4023C,	M-4024C	Medial pre-shaped maxillary plates for forward displacements of 9 mm
M-4027C,	M-4028C	Medial pre-shaped maxillary plates for forward displacements of 11 mm



L	R	
M-4031C,	M-4032C	Medial pre-shaped maxillary plates for forward displacements of 0 mm
M-4041C,	M-4042C	Medial pre-shaped maxillary plates for forward displacements of 3 mm
M-4043C,	M-4044C	Medial pre-shaped maxillary plates for forward displacements of 5 mm
M-4045C,	M-4046C	Medial pre-shaped maxillary plates for forward displacements of 7 mm
M-4059C,	M-4060C	Medial pre-shaped maxillary plates for forward displacements of 9 mm
M-4083C,	M-4084C	Medial pre-shaped maxillary plates for forward displacements of 11 mm

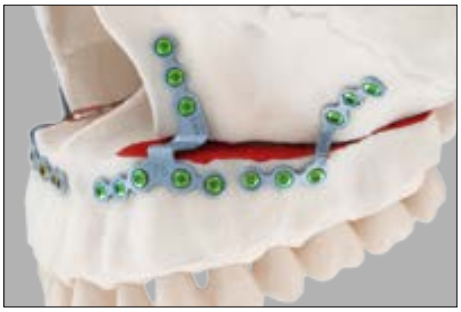


Selecting the plate

After performing the LeFort I osteotomy, set the occlusion and fix with a temporary IMF. Then select the plates based on the offset width.

Workflow:

Pre-shaped maxillary plates are intended for osteosythesis in the medial region.



→ www.medartis.com/products/modus/mandible

1) Cutting the plate

If required, the plate can be cut with plate cutting pliers M-2170 or A-2046.

Notice:
Leave enough material on the rest of the plate to keep the adjacent hole intact.

2) Bending the plate

Use the plate bending pliers (M-2012/M-2002) to contour the plate to the patient's bone structure, as described on page 11 onwards.

The laser markings serve as guides for bending by providing an indication of the size of the potential offset.

If required, the plate can get positioned more medially or laterally following the below steps:

Hold the plate by means of the plate bending pliers (M-2002/M-2012).

Bend the plate arms by means of the plate bending pliers (M-2002/M-2012) medially (see green arrow) or laterally (see red arrow).

3) Fixing the plate

Fix the plate with 1.5 SpeedTip screws (with no pre-drilling) or with 1.5 cortical screws (with pre-drilling, green colored ring).

Notice:
A minimum of 2 cortical screws must be used on each side of the osteotomy.

Repeat steps 1–3 until all four plates are fixed.

Fixation of a sagittal split in the horizontal mandibular ramus with an open, flexible sagittal split plate with slider option (M-4047C, M-4048C, M-4049C)

The following plates can be selected for flexible osteosynthesis for sagittal splits:

M-4047C	Forward displacements up to a max. 5 mm and backward displacements
M-4048C	For forward displacements up to a max. 10 mm
M-4049C	For forward displacements up to a max. 15 mm

Sliders:

M-5242.08C	2.0 Slider, fenestrated, 8 mm, HexaDrive
M-5252.08C	2.3 Slider, fenestrated, 8 mm, HexaDrive
M-5142.08C	2.0 Slider, fenestrated, 8 mm, cross-drive
M-5152.08C	2.3 Slider, fenestrated, 8 mm, cross-drive

The fixation of the sagittal split with the open, flexible plate design follows the treatment concept of Prof. Dr. Dr. Dr. h.c. Ulrich Joos (Münster, Germany). According to this concept, IMF is used for 1–3 days postoperatively, followed by rubber bands.


M-4047C


M-4048C


M-4049C


M-5242.08C M-5252.08C M-5142.08C M-5152.08C

1) Selecting the plate

After performing the sagittal split, set the occlusion and perform temporary IMF. Select the suitable plate based on the width of the osteotomy split. Fixation close to the fracture ensures increased stability in the area of the fracture split.

2) Cutting the plate

The plate can optionally be shortened using the cutting pliers (M-2170 or A-2046).

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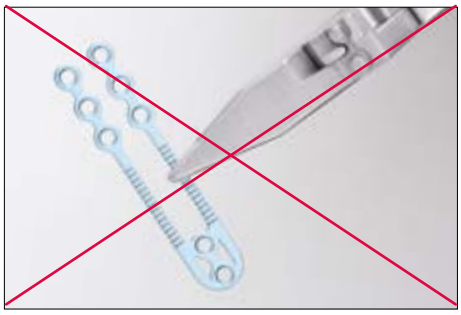
3) Bending the plate

Do **NOT** use the plate bending pliers to contour the plate to the patient's bone structure.



4) Proximal fixation

Position the plate in situ. When doing this, the nerve must run **centrally** between the two arms.

Fix the plate with 2.0 SpeedTip screws (with no pre-drilling) or with 2.0 cortical screws (with pre-drilling, one blue colored ring, see page 14).

Insert the first screw proximally, monocortically and next to the osteotomy split (distance to osteotomy split approx. 3 mm).

Note:
Perform only monocortical screw insertion in the proximal segment.

5) Positioning the slider

Position the slider in the distal segment (centrally) as an intraoperative aid for occlusion adjustment.

6) Repeat steps 4 and 5 on the opposite side of the mandible

7) Checking occlusion

Loosen the IMF and check the occlusion. If necessary, make adjustments by loosening the slider and making slight adjustments to the position of the distal segment. Adjustments can be made in both the vertical and horizontal planes.
Re-tighten the slider and check dental and jaw positioning until the desired occlusion is achieved.
Repeat the IMF.

Laser markings help when estimating the width of the osteotomy split.

8) Final proximal fixation

Perform final fixation of the first proximal screw and insert the second proximal screw (monocortical).

9) Final distal fixation

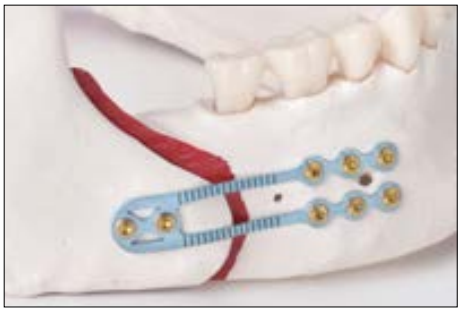
Insert screws in the distal plate holes not covered by the slider.

Notice:
A minimum of 4 cortical screws must be used on the distal side. It is essential that screws are inserted in the plate holes next to the bar.

10) Removing the slider

Remove the slider and insert screws in the remaining distal screw holes.

Notice:
The slider is only an intraoperative aid for adjusting the occlusion and **must** be removed after the osteosynthesis has been completed.



Fixation of a sagittal split in the horizontal mandibular ramus with a closed, semi-rigid sagittal split plate with slider option (M-4050C, M-4051C, M-4052C)

The following plate designs can be selected for semi-rigid osteosynthesis for sagittal splits:

M-4050C	For forward displacements up to a max. 5 mm and backward displacements (without slider)
M-4051C	For forward displacements up to a max. 10 mm
M-4052C	For forward displacements up to a max. 15 mm

Sliders:

M-5242.08C	2.0 Slider, fenestrated, 8 mm, HexaDrive
M-5252.08C	2.3 Slider, fenestrated, 8 mm, HexaDrive
M-5142.08C	2.0 Slider, fenestrated, 8 mm, cross-drive
M-5152.08C	2.3 Slider, fenestrated, 8 mm, cross-drive

M-4050C

M-4051C

M-4052C

M-5242.08C

M-5252.08C

M-5142.08C

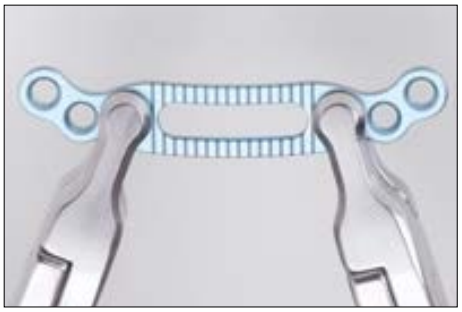
M-5152.08C

1) Selecting the plate

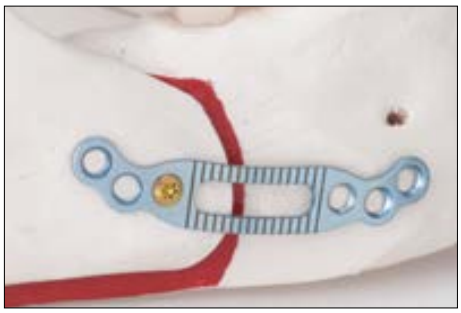
After performing the sagittal split, set the occlusion and perform temporary IMF. Select the suitable plate based on the width of the osteotomy split. Fixation close to the fracture ensures increased stability in the fracture split.

2) Bending the plate

If required, use the plate bending pliers (M-2158/M-2006) to contour the plate to the patient's bone structure, as described on page 11 onwards.



3) Proximal fixation



Position the plate in situ. Fix the plate with 2.0 SpeedTip screws (with no pre-drilling) or with 2.0 cortical screws (with pre-drilling, one blue colored ring, see page 14).

Insert the first screw proximally, monocortically and next to the osteotomy split (distance to osteotomy split approx. 3 mm).
Do not tighten screw fully (makes adjustment easier, see step 5).

Notice:
Perform only monocortical screw insertion in the proximal segment.

4) Positioning the slider

With M-4051C and M-4052C, a slider can optionally be affixed in the distal segment as an intraoperative aid for occlusion adjustment.
If working without a slider, the screws can be inserted directly, first proximally (monocortical) and then distally.

5) Repeat steps 3 and 4 on the opposite side of the mandible.

6) Checking occlusion

Loosen the IMF and check the occlusion. If necessary, make adjustments by loosening the slider and making slight adjustments to the position of the distal segment.
Adjustments can be made in both the vertical and horizontal planes.
Re-tighten the slider and check dental and jaw positioning until the desired occlusion is achieved.
Repeat the IMF.
Laser markings help when estimating the width of the osteotomy split.
Without slider: loosen the screws and adjust the position of the distal segment.

7) Final proximal fixation

Insert the remaining proximal screws (monocortical).

Note:
A minimum of 2 screws must be used on each side of the osteotomy.

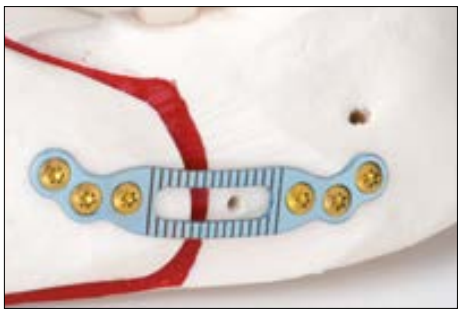
8) Final distal fixation

Insert screws in the distal plate holes not covered by the slider.

9) Removing the slider

Remove the slider and insert screws in the remaining distal plate holes.

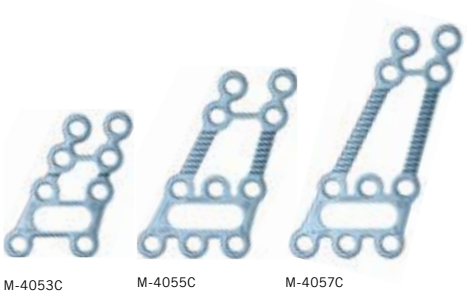
Notice:
The slider is only an intraoperative aid for adjusting the occlusion and **must** be removed after the osteosynthesis has been completed.

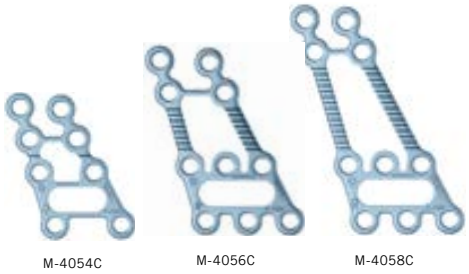


Using the ramus plate (TriLock) with slider option (M-4053C, M-4054C, M-4055C, M-4056C, M-4057C, M-4058C) for fixation after a horizontal ramus osteotomy

The following plate sizes are available for osteosynthesis following osteotomies on the ascending ramus:

M-4053C	Purely horizontal forward or backward displacement (left side of the patient)
M-4054C	Purely horizontal forward or backward displacement (right side of the patient)
M-4055C	Vertical displacements of max. 7 mm (left side of the patient) and horizontal forward or backward displacement
M-4056C	Vertical displacements of max. 7 mm (right side of the patient) and horizontal forward or backward displacement
M-4057C	Vertical displacements of max. 14 mm (left side of the patient) and horizontal forward or backward displacement
M-4058C	Vertical displacements of max. 14 mm (right side of the patient) and horizontal forward or backward displacement





Sliders:

M-5242.08C	2.0 Slider, fenestrated, 8 mm, HexaDrive
M-5252.08C	2.3 Slider, fenestrated, 8 mm, HexaDrive
M-5142.08C	2.0 Slider, fenestrated, 8 mm, cross-drive
M-5152.08C	2.3 Slider, fenestrated, 8 mm, cross-drive

1) Selecting the plate

After performing the ramus osteotomy, set the occlusion and perform temporary IMF. Select the suitable plate based on the width of the osteotomy split.

2) Bending the plate

If necessary, use the plate bending pliers (M-2158/M-2006) to contour the plate to the patient's bone structure, as described on page 11 onwards. When using TriLock screws, the benefits of an internal fixator can be used, dispensing with the need for perfect plate contouring.

3) Proximal fixation

Position the plate in situ. If the displacement is purely horizontal (M-4053C, M-4054C), the laser markings must be positioned over the osteotomy split. Drill the screw holes located in the proximal segment using a twist drill (one blue colored ring, see page 14). At least three 2.0 TriLock screws must be inserted up to just before the start of the locking procedure in order to prevent the plate from shifting. Once all of the screws have been inserted on the proximal side, they can be locked.

Note:
During the locking procedure, the torque is initially increased during the first phase. This is followed by a brief drop in torque. Only then is a friction connection established to lock the screw as it is tightened.
For details about the TriLock locking process, see pages 38 and onward.

Case I: Purely horizontal forward or backward displacement (M-4053C, M-4054C)

4 a) Positioning the slider

For intraoperative occlusion adjustment with a purely horizontal offset, a slider with a slider fenestration for this purpose can optionally be affixed.

To affix the slider, pre-drill with a twist drill (blue colored ring). Position the slider as centrally as possible so that adjustments can be made in any direction as required.

Case II: Vertical displacements and horizontal forward or backward displacement (M-4055C, M-4056C, M-4057C, M-4058C)

4 b) Positioning the slider

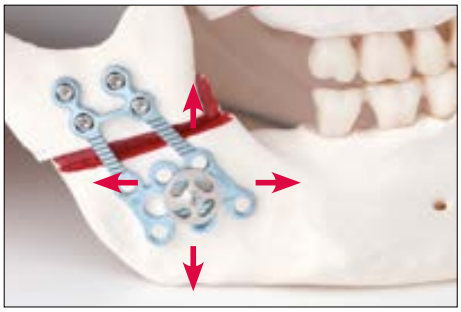
For intraoperative occlusion adjustment with a combined horizontal/vertical offset, a slider with a slider fenestration for this purpose can optionally be affixed.

To affix the slider, pre-drill with a twist drill (blue colored ring). Position the slider as centrally as possible so that adjustments can be made in any direction as required.

The laser markings on the implant serve as a vertical positioning guide.

5) Repeat steps 3 and 4 (a or b) on the opposite side of the mandible.

6) Checking occlusion



Loosen the IMF and check the occlusion. If necessary, make adjustments by loosening the slider and making slight adjustments to the position of the distal segment. The distal segment can be adjusted vertically and horizontally.
Re-tighten the slider and check dental and jaw positioning until the desired occlusion is achieved.

Repeat the IMF.

7) Final distal fixation

Insert screws in the distal plate holes not covered by the slider (at least 3 holes).

8) Removing the slider

Remove the slider and insert screws in the remaining distal plate holes.

Notice:
The slider is only an intraoperative aid for adjusting the occlusion and **must** be removed after the osteosynthesis has been completed.

Genioplasty with a pre-shaped chin plate

The following pre-shaped plates are available for genioplasty:

M-4074C	For chin shortening
M-4076C	For forward and backward chin displacement – 3 mm
M-4078C	For forward and backward chin displacement – 5 mm
M-4080C	For forward and backward chin displacement – 7 mm
M-4082C	For forward and backward chin displacement – 10 mm

1) Selecting the plate

After performing the osteotomy and positioning the distal segment, select the plate which best fits with size of the displacement.

2) Bending the plate

If necessary, bend the plate slightly using the plate bending pliers with pin (M-2158).

3) Proximal fixation

Position the plate in situ. Drill the three screw holes located proximally using a twist drill (one blue colored ring, see page 14), then insert the screws.

4) Distal fixation

Position the mobilized segment. Drill the distal screw holes using a twist drill (blue colored ring) and insert the screws.

Notice:
A minimum of two screws must be used on each side of the osteotomy.

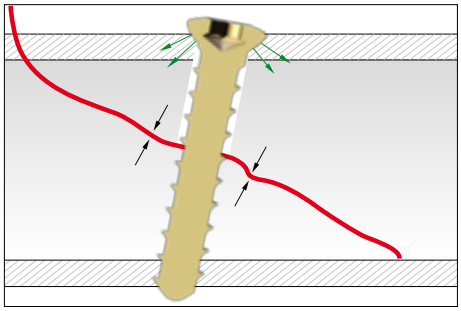
For backward chin displacement, perform steps 3 and 4 by means of a plate turned by 180° in the plane.

Lag screw technique

1. Drilling the core hole
Use the core hole drill (one colored ring) of the same system size to drill to the far cortex.

2. Drilling the gliding hole
Use the gliding hole drill (for system size 2.0, the drill with three blue colored rings) to drill up to the osteotomy line.

3. Compressing
Compress with the cortical screw of the corresponding system size.



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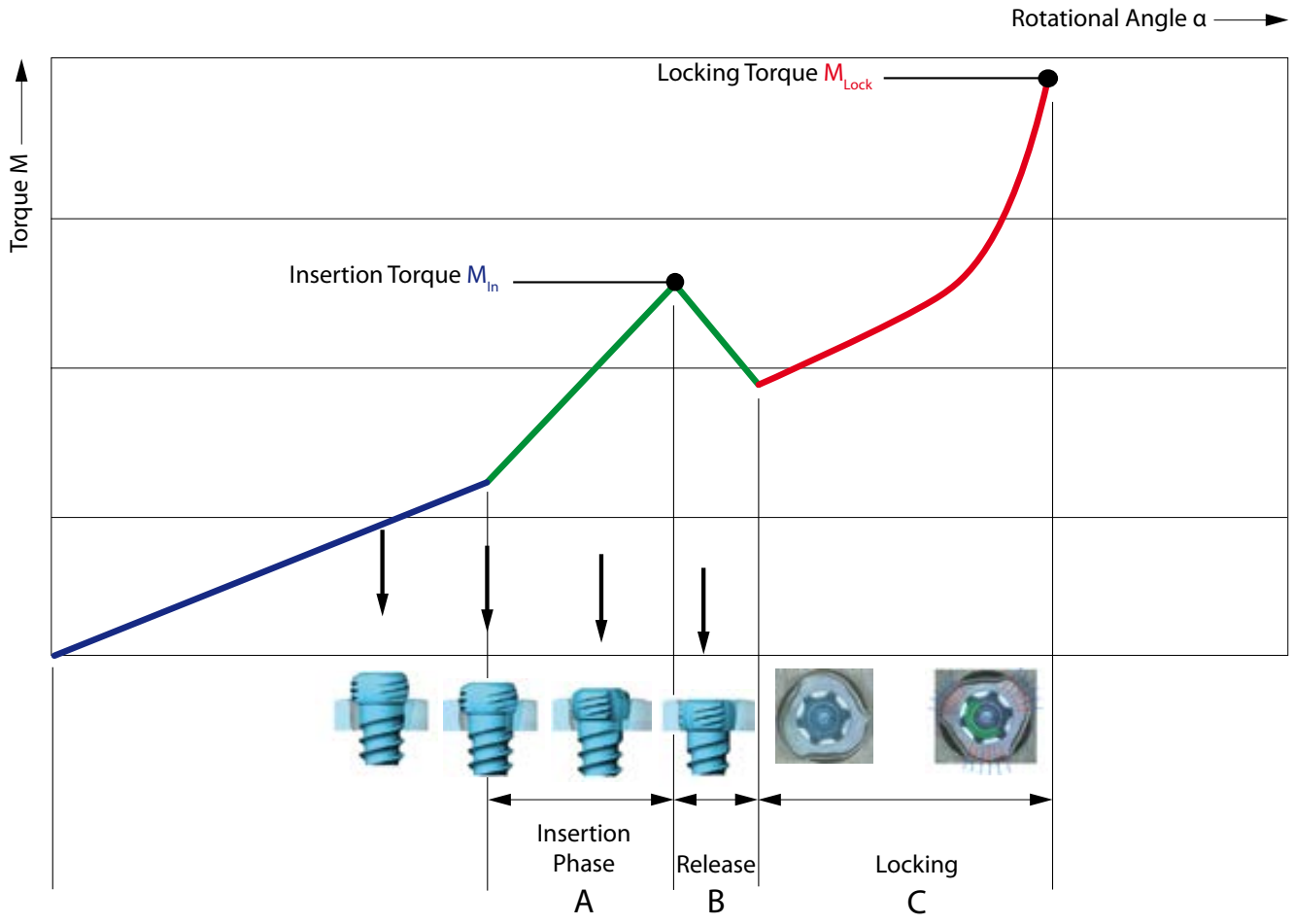
Correct Application of the TriLock Locking Technology

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.



→ www.medartis.com/products/modus/mandible

Correct Locking (± 15°) of the TriLock Srews in the Plate

Visual inspection of the screw head projection provides an addi- tional 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 there is still a noticeable protrusion (Fig. 2 and 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. In case of poor bone quality a slight axial pressure might be necessary to achieve proper locking. Due to the system characteristics, a screw head protrusion of around 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

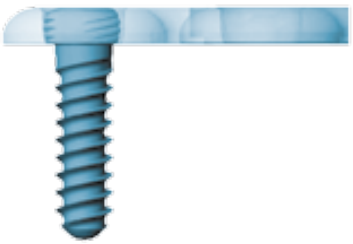


Figure 1

Incorrect: UNLOCKED

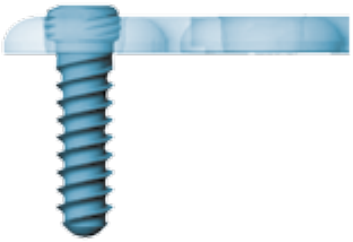


Figure 2

Correct: LOCKED

Figure 3

Incorrect: UNLOCKED

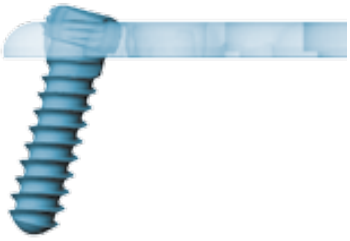


Figure 4

New Generation MODUS Twist Drills

Only screws stored in the clip can be used with the twist drills listed below.

	Article Number	Description - English	Color Code
System Size 1.5	M-3019	Twist drill ∅ 1.1 × 5 mm, L 35 mm, Dental	green
	M-3029	Twist drill ∅ 1.1 × 5 mm, L 48 mm, Stryker	green
	M-3039	Twist drill ∅ 1.1 × 7 mm, L 37 mm, Dental	green
	M-3049	Twist drill ∅ 1.1 × 7 mm, L 50 mm, Stryker	green
	M-3059	Twist drill ∅ 1.1 × 16 mm, L 46 mm, Dental	green
	M-3069	Twist drill ∅ 1.1 × 16 mm, L 59 mm, Stryker	green
	M-3099	Twist drill ∅ 1.5 × 25 mm, L 55 mm, Dental	green
	M-3109	Twist drill ∅ 1.5 × 25 mm, L 68 mm, Stryker	green

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		Article Number	Description - English	Color Code
System Size 2.0		M-3119	Twist drill ∅ 1.5 × 5 mm, L 35 mm, Dental	blue
		M-3129	Twist drill ∅ 1.5 × 5 mm, L 48 mm, Stryker	blue
		M-3139	Twist drill ∅ 1.5 × 7 mm, L 37 mm, Dental	blue
		M-3149	Twist drill ∅ 1.5 × 7 mm, L 50 mm, Stryker	blue
		M-3159	Twist drill ∅ 1.5 × 25 mm, L 55 mm, Dental	blue
		M-3169	Twist drill ∅ 1.5 × 25 mm, L 68 mm, Stryker	blue
		M-3239	Twist drill ∅ 2.0 × 7 mm, L 37 mm, Dental	blue
		M-3249	Twist drill ∅ 2.0 × 7 mm, L 50 mm, Stryker	blue
		M-3259	Twist drill ∅ 2.0 × 25 mm, L 55 mm, Dental	blue
		M-3269	Twist drill ∅ 2.0 × 25 mm, L 68 mm, Stryker	blue
	MODUS Transbuccal Set	M-3459	Twist drill ∅ 1.5 × 25 mm, L 99 mm, Dental	blue
		M-3469	Twist drill ∅ 1.5 × 25 mm, L 112 mm, Stryker	blue
		M-3279	Twist drill ∅ 2.0 × 25 mm, L 99 mm, Dental	blue
		M-3289	Twist drill ∅ 2.0 × 25 mm, L 112 mm, Stryker	blue
	MODUS 90° Screwdriver M-2410	M-3319	Twist drill ∅ 1.5 × 5 mm, L 14.5 mm, Dental	blue
		M-3339	Twist drill ∅ 1.5 × 7 mm, L 16.5 mm, Dental	blue
		M-3359	Twist drill ∅ 1.5 × 13 mm, L 22.5 mm, Dental	blue
		M-3419*	Twist drill ∅ 2.0 × 7 mm, L 19 mm, Dental	blue
		M-3439*	Twist drill ∅ 2.0 × 13 mm, L 25 mm, Dental	blue
	MODUS 90° Screwdriver M-2440/M-2441	M-3529	Twist Drill ∅ 1.5 × 5 mm, L 14 mm, W&H	blue
		M-3539	Twist Drill ∅ 1.5 × 7 mm, L 16 mm, W&H	blue
		M-3549	Twist Drill ∅ 1.5 × 10 mm, L 19 mm, W&H	blue
		M-3559	Twist Drill ∅ 1.5 × 13 mm, L 22 mm, W&H	blue
		M-3589*	Twist Drill ∅ 1.9 × 7 mm, L 16 mm, W&H	blue
		M-3599*	Twist Drill ∅ 1.9 × 13 mm, L 22 mm, W&H	blue

* for lag screw technique

→ www.medartis.com/products/modus/mandible

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