Mandible External Fixator.
Provides treatment for fractures of the mandible.

Technique Guide

SYNTHES® Instruments and implants approved by the AO Foundation
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The Mandible External Fixator allows the surgeon to create a rigid construct using three basic components: 4.0 mm rods, 2.5 mm/4.0 mm Schanz screws, and snap-on, adjustable clamps.

**Features**
- Lightweight single-phase system
- Adjustable throughout application

**Note:** While rigid internal fixation is preferred, there are certain circumstances that lend themselves to external fixation.

**Adjustable Clamp**
- Accepts a 2.5 mm/4.0 mm Schanz screw, 2.5 mm Kirschner wire, or 4.0 mm rod on each end of the clamp
- Snap-on design allows clamp placement between previously applied clamps
- Connects two rods in any orientation, for greater versatility of Schanz screw/Kirschner wire placement and frame construction
- Maintains rod position during frame assembly and fracture reduction

**2.5 mm/4.0 mm Titanium Schanz Screws**
- Biocompatible titanium alloy*
- Two tip options, self-tapping and self-drilling, allow predrilling (if desired) or direct screw implantation
- Three lengths (50 mm, 60 mm and 70 mm) accommodate various soft tissue and bone thicknesses
- Self-tapping, blunt tip option reduces irritation on lingual side of the mandible

**4.0 mm Titanium Pre-Bent Rods**
- Pre-bent to shape of mandible
- Available in four sizes
- Can be contoured to match patient anatomy

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* Titanium-6% aluminum-7% niobium
AO Principles

In 1958, the AO formulated four basic principles which have become the guidelines for internal fixation.¹ Those principles, as applied to the Mandible External Fixator, are:

Anatomic reduction
Construct adjustability allows optimal reduction of the fracture or osteotomy.

Stable fixation
Clamps, screws, wires and rods provide stability to fractured region.

Preservation of blood supply
Placement of Schanz screws does not require stripping or compression of the periosteum.

Early, active mobilization
Construct features combined with AO technique create an environment for bone healing, expediting a return to optimal function.

The Mandible External Fixator is intended to stabilize and provide treatment for fractures of the maxillofacial area, including:

– Severe open mandibular fractures
– Highly comminuted closed fractures
– Nonunions and delayed unions (especially associated with infection)
– Fractures associated with infection
– Tumor resections
– Facial deformity corrections
– Gunshot wounds
– Panfacial fractures
– Burn maintenance
– Bone grafting defects

Photo courtesy of Steven Sewall, DDS
Fixation Using Schanz Screws

1  
Patient preparation

Place the patient in maxillomandibular fixation when appropriate.

2  
Identify appropriate rods

Identify the appropriate rod or combination of rods for fixation. In most cases, the pre-bent rods will not need additional contouring. If contouring is needed, follow Steps 3–4, otherwise proceed to Step 5.

3  
Contour the rod template

<table>
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<tr>
<th>Instrument</th>
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<tbody>
<tr>
<td>03.305.009 Rod Template</td>
</tr>
</tbody>
</table>

Contour the rod template to match the patient’s bony anatomy.

Note: The rod should be positioned approximately one fingerbreadth away from the patient’s skin, evenly throughout the entire length of the rod.
4

Contour the rod(s)

Instrument

03.305.007 4.0 mm Rod Bender

Using the 4.0 mm rod bender, contour the selected pre-bent rod to match the rod template.

5

Verify fit and screw location

Verify the fit of the pre-bent rod on the patient. Identify the desired Schanz screw locations for the first and last screw (furthest from the defect on the proximal and distal side) and mark accordingly.

Note: A minimum of two Schanz screws per segment (two screws in greatest segment and two in other segments) is recommended to ensure adequate stability. Optimal location of Schanz screws will place one screw 10 mm distal and another screw 10 mm proximal to the defect.
6  
**Make small stab incision**

Prepare for Schanz screw insertion by making a small stab incision at the first marked screw location.

7  
**Dissect soft tissue**

**Instruments**

- 03.305.000 4.0 mm Obturator
- 03.305.002 Drill Guide/Cannula, short or
- 03.305.003 Drill Guide/Cannula, long
- 395.911 Drill Sleeve Handle

Examine the soft tissue thickness and select the appropriate length drill guide/cannula to ensure protection of the soft tissue.

Thread the cannula into the drill sleeve handle. Insert the 4.0 mm obturator into the handle/cannula assembly. Bluntly dissect the soft tissue and pass the cannula and obturator through the stab incision to the bone.

Remove the obturator, leaving the cannula in place.

Select a Schanz screw tip style. If use of a blunt tip is desired, continue with Step 8.

If using a self-drilling Schanz screw, load approximately 5 mm of the screw directly into a Jacobs chuck drill. Using the cannula as a guide, drive the self-drilling Schanz screw into the mandible, stopping when the Schanz screw pierces the lingual cortex. Proceed to Step 14.
8

Predrill bone

Instruments

<table>
<thead>
<tr>
<th>Instrument Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.305.004</td>
<td>1.8 mm/4.0 mm Stepped Drill Bit</td>
</tr>
<tr>
<td>511.701</td>
<td>ComPact Air Drive II</td>
</tr>
</tbody>
</table>

Use the 1.8 mm/4.0 mm stepped drill bit through the cannula to drill into the bone.

**Note:** Synthes recommends using the ComPact Air Drive II or an equivalent drill with an operating speed of approximately 900 rpm.

9

Use measuring device

Instrument

<table>
<thead>
<tr>
<th>Instrument Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.305.005</td>
<td>Measuring Device</td>
</tr>
</tbody>
</table>

Insert the measuring device through the cannula and hook the lingual cortex of the mandible. Record the number indicated on the measuring device.

**Note:** The reading from the device does not represent the bone thickness.

Remove the measuring device from the cannula.

* Also available
10 Select and measure Schanz screw

Select the appropriate Schanz screw for the patient’s bony anatomy.

Slide the selected Schanz screw into the cannulated end of the measuring device and align the tip of the Schanz screw with the number recorded in Step 9.

Note: As an alternative, use the measuring gauge etched inside the case.

11 Load Schanz screw

**Instruments**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.305.008</td>
<td>Cannulated T-Handle</td>
</tr>
<tr>
<td>395.35</td>
<td>Combination Wrench</td>
</tr>
<tr>
<td>395.36</td>
<td>Socket Wrench</td>
</tr>
</tbody>
</table>

Slide the cannulated T-handle over the exposed end of the Schanz screw. Hand-tighten the thumbscrew on the T-handle to capture the Schanz screw. Using the combination wrench or socket wrench, tighten the thumbscrew at least 1/4 turn.
12

**Implant Schanz screw**

With clockwise rotation, insert the Schanz screw through the cannula until the adaptor contacts the cannula, ensuring proper implant depth.

13

**Remove adaptor from implanted Schanz screw**

<table>
<thead>
<tr>
<th>Instruments</th>
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</thead>
<tbody>
<tr>
<td>395.35 Combination Wrench</td>
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<tr>
<td>395.36 Socket Wrench</td>
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</table>

Remove the adaptor from the Schanz screw by loosening the thumbscrew with a wrench.

Remove the cannula.
**14**

**Implant second Schanz screw**

Position and insert the second Schanz screw on the opposite side of the defect and furthest from the defect, as outlined in Steps 6–13.
15
Assemble rigid construct

Instrument

03.305.006 Adjustable Clamp

Snap adjustable clamps onto both Schanz screws and rod.

Reduce the fracture and tighten the clamp nuts.

Verify the correct alignment before proceeding.
Add third clamp

Attach a third clamp to the rod approximately 10 mm proximal or distal to the defect.

Select the appropriate length cannula, based on soft tissue thickness, and insert the cannula into the clamp, as shown. Angle the cannula and clamp for the desired screw placement. Mark the incision site.

Temporarily rotate the cannula and clamp upward to minimize obstruction while making the incision. Make a small incision and bluntly dissect the soft tissue. Rotate the clamp and cannula to the original position. Insert the obturator and pass the cannula through the incision to the bone. Remove the obturator. Tighten the clamp, securing the cannula to the rod.

Note: Do not over-tighten the clamp, as this will result in damage to the cannula.
17

**Implant third Schanz screw**

Insert a Schanz screw as outlined in Steps 7–13. Loosen the clamp slightly and slide the cannula off the Schanz screw.

With the clamp capturing the Schanz screw and the rod, tighten the clamp nut.
Complete construct

Note: A minimum of two Schanz screws are required on each side of the defect.

Insert all remaining Schanz screws to complete the frame, as outlined in Steps 16–17.
19
Verify reduction and adjust

Verify reduction and alignment. If adjustment is needed, loosen the clamp nuts, manipulate the mandible, and retighten the clamps.

20
Trim Schanz screws and rod (optional)

Optional instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>359.217*</td>
<td>Cutter (small)</td>
</tr>
<tr>
<td>388.72*</td>
<td>Rod Cutter (large)</td>
</tr>
<tr>
<td>392.24</td>
<td>Protective Caps</td>
</tr>
<tr>
<td>394.99</td>
<td></td>
</tr>
</tbody>
</table>

Trim the Schanz screws or rod, if necessary, using the cutter or the rod cutter. Place protective caps over the cut ends.

* Also available
**Alternative Frame Configurations**

**One-half Frame**
As applied on an infected angle fracture.

<table>
<thead>
<tr>
<th>Items to build construct</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.305.006 Adjustable Clamp</td>
<td>4</td>
</tr>
<tr>
<td>04.305.103 4.0 mm Titanium Pre-Bent Rod, One-Half Mandible</td>
<td>1</td>
</tr>
<tr>
<td>04.305.003 2.5 mm/4.0 mm Titanium Schanz Screws, blunt tip, 50 mm</td>
<td>4</td>
</tr>
<tr>
<td>or 04.305.010 2.5 mm/4.0 mm Titanium Schanz Screws, self-drilling, 50 mm</td>
<td>4</td>
</tr>
</tbody>
</table>

**Modular Carbon Fiber Frame**
As applied on an infected angle fracture. The modular carbon fiber frame provides improved x-ray imaging.

<table>
<thead>
<tr>
<th>Items to build construct</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.305.006 Adjustable Clamp</td>
<td>6</td>
</tr>
<tr>
<td>395.60 4.0 mm Carbon Fiber Rods, 60 mm</td>
<td>2</td>
</tr>
<tr>
<td>395.61 4.0 mm Carbon Fiber Rod, 80 mm</td>
<td>1</td>
</tr>
<tr>
<td>04.305.003 2.5 mm/4.0 mm Titanium Schanz Screws, blunt tip, 50 mm</td>
<td>4</td>
</tr>
<tr>
<td>or 04.305.010 2.5 mm/4.0 mm Titanium Schanz Screws, self-drilling, 50 mm</td>
<td>4</td>
</tr>
</tbody>
</table>
Double-stacked Frame
As applied on a resected mandible.

<table>
<thead>
<tr>
<th>Items to build construct</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.305.006 Adjustable Clamp</td>
<td>7</td>
</tr>
<tr>
<td>04.305.103 4.0 mm Titanium Pre-Bent Rod, One-Half Mandible</td>
<td>1</td>
</tr>
<tr>
<td>04.305.100 4.0 mm Titanium Pre-Bent Rod, Full Mandible with Ramus</td>
<td>1</td>
</tr>
<tr>
<td>04.305.005 2.5 mm/4.0 mm Titanium Schanz Screws, blunt tip, 70 mm</td>
<td>2</td>
</tr>
<tr>
<td>or 04.305.012 2.5 mm/4.0 mm Titanium Schanz Screws, self-drilling, 70 mm</td>
<td>2</td>
</tr>
<tr>
<td>04.305.004 2.5 mm/4.0 mm Titanium Schanz Screws, blunt tip, 60 mm</td>
<td>3</td>
</tr>
<tr>
<td>or 04.305.011 2.5 mm/4.0 mm Titanium Schanz Screws, self-drilling, 60 mm</td>
<td>3</td>
</tr>
</tbody>
</table>

Modular Frame
As applied on a comminuted fracture. A modular frame can be created to accommodate the fracture location.

<table>
<thead>
<tr>
<th>Items to build construct</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.305.006 Adjustable Clamp</td>
<td>7</td>
</tr>
<tr>
<td>04.305.103 4.0 mm Titanium Pre-Bent Rod, One-Half Mandible</td>
<td>1</td>
</tr>
<tr>
<td>04.305.101 4.0 mm Titanium Pre-Bent Rod, Full Mandible</td>
<td>1</td>
</tr>
<tr>
<td>04.305.003 2.5 mm/4.0 mm Titanium Schanz Screws, blunt tip, 50 mm</td>
<td>5</td>
</tr>
<tr>
<td>or 04.305.010 2.5 mm/4.0 mm Titanium Schanz Screws, self-drilling, 50 mm</td>
<td>5</td>
</tr>
</tbody>
</table>
## Instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.305.000</td>
<td>4.0 mm Obturator</td>
</tr>
<tr>
<td>03.305.002</td>
<td>Drill Guide/Cannula, short</td>
</tr>
<tr>
<td>03.305.003</td>
<td>Drill Guide/Cannula, long</td>
</tr>
<tr>
<td>03.305.004</td>
<td>1.8 mm/4.0 mm Stepped Drill Bit</td>
</tr>
<tr>
<td>03.305.005</td>
<td>Measuring Device</td>
</tr>
<tr>
<td>03.305.007</td>
<td>4.0 mm Rod Bender</td>
</tr>
</tbody>
</table>
03.305.008  Cannulated T-Handle

03.305.009  Rod Template

395.35   Combination Wrench

395.36   Socket Wrench

395.911  Drill Sleeve Handle
**Mandible External Fixator Set (01.305.000)**

### Graphic Case
- 306.710 Mandible External Fixator Set Graphic Case Base
- 306.711 Mandible External Fixator Set Graphic Case Lid

### Instruments
- 03.305.000 4.0 mm Obturator, for Mandible External Fixator
- 03.305.002 Drill Guide/Cannula, short, 2 ea.
- 03.305.003 Drill Guide/Cannula, long, 2 ea.
- 03.305.004 1.8 mm/4.0 mm Stepped Drill Bit, Stryker J-latch, with 24 mm stop, 2 ea.
- 03.305.005 Measuring Device, for Mandible External Fixator
- 03.305.007 4.0 mm Rod Bender, for Mandible External Fixator
- 03.305.008 Cannulated T-Handle, for Mandible External Fixator
- 03.305.009 Rod Template, for 4.0 mm rods, for Mandible External Fixator
- 395.35 Combination Wrench, 7 mm width across flats
- 395.36 Socket Wrench, 7 mm width across flats
- 395.911 Drill Sleeve Handle

### Implants
- 292.75 2.5 mm Kirschner Wire with Thread, 150 mm, trocar point, 15 mm thread length, 1 pkg. of 10
- 2.5 mm/4.0 mm Titanium Schanz Screws, blunt tip, 3 ea.
- 04.305.003 50 mm
- 04.305.004 60 mm
- 04.305.005 70 mm
- 2.5 mm/4.0 mm Titanium Self-Drilling Schanz Screws, 3 ea.
- 04.305.010 50 mm
- 04.305.011 60 mm
- 04.305.012 70 mm

### Fixation Material
- 03.305.006 Adjustable Clamp, 8 ea.
- 392.24 Protective Caps, for 2.5 mm Kirschner wires, 1 pkg. of 10
- 394.99 Protective Caps, for 4.0 mm bars and rods, 1 pkg. of 10
- 4.0 mm Titanium Pre-Bent Rods, 2 ea.
- 04.305.100 Full mandible with ramus
- 04.305.101 Full mandible
- 04.305.102 Three-quarter mandible
- 04.305.103 One-half mandible
- 395.60 60 mm Carbon Fiber Rods, 2 ea.
- 395.61 80 mm
- 395.62 100 mm

### Also Available
- 03.305.500S Mandible External Fixator, 500 mm Rod Kit, sterile (includes one straight 500 mm titanium rod and one 500 mm rod template)
- 359.217 Cutter (small)
- 388.72 Rod Cutter (large)
- 494.769 4.0 mm/2.5 mm Titanium Self-Drilling Schanz Screw, 20 mm thread length, 80 mm

Note: For additional information, please refer to package insert.

For detailed cleaning and sterilization instructions, please refer to [http://us.synthes.com/Medical+Community/Cleaning+and+Sterilization.htm](http://us.synthes.com/Medical+Community/Cleaning+and+Sterilization.htm) or to the below listed inserts, which will be included in the shipping container:
- Processing Synthes Reusable Medical Devices—Instruments, Instrument Trays and Graphic Cases—DJ1305
- Processing Non-sterile Synthes Implants—DJ1304