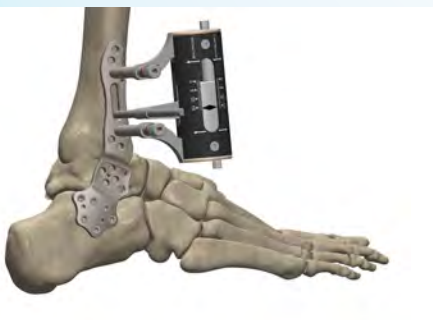




## Ankle Fix System 4.0

Surgical Technique



Titanium osteosynthesis system for tibio-talar and tibio-talo-calcaneal fusion

# Ankle Fix System 4.0 Titanium osteosynthesis system for tibio-talar and tibio-talo-calcaneal fusion

## Patient Positioning

- Place the patient in the supine position with an ipsilateral pelvic sand bag or midlateral position.

## Surgical Technique

### Step 1

#### Incision for Ankle Fix Plates (TT Fusion)

- Using a lateral approach, make a straight incision to enable the best view of the lateral talar and calcaneal walls. Mobilize the peroneal tendons.

#### Incision for Ankle Fix Plus Plates (TTC Fusion)

- Using a lateral approach, make a straight incision longer than the TT fusion incision to allow access to the subtalar joint. Mobilize the peroneal tendons and retract them posteriorly.

### Step 2

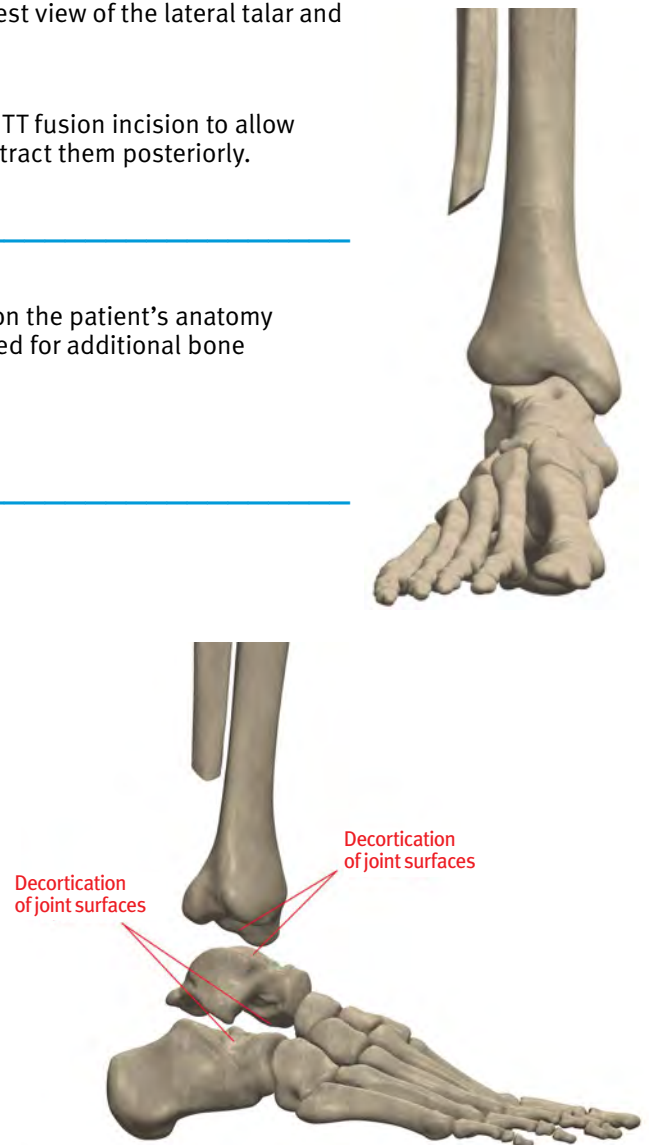
#### Fibular Resection

- Resect approximately 8 cm-10 cm of the distal fibula, depending on the patient's anatomy and according to the plate dimension. The fibula may be morselized for additional bone graft after removing the periosteum and all soft tissue.

### Step 3

#### Bone Preparation

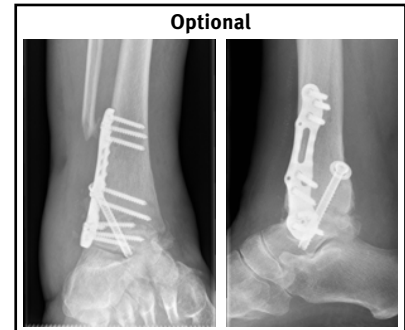
- Prepare the joint in the usual manner. Use burrs, curettes, and osteotomes (such as a Charcot chisel or special osteotomes for joint surface preparation) to decorticate the involved joint surfaces until subchondral bone is fully exposed on each side. Ensure that the joint surfaces are prepared congruently.
- Note: Care should be taken to maintain the desired position of the arthrodesis throughout the procedure. In particular, when the compression is applied to the arthrodesis, the surgeon should prevent the hindfoot drifting into excessive valgus alignment.



## Step 4

### Temporary Positioning of the Arthrodesis

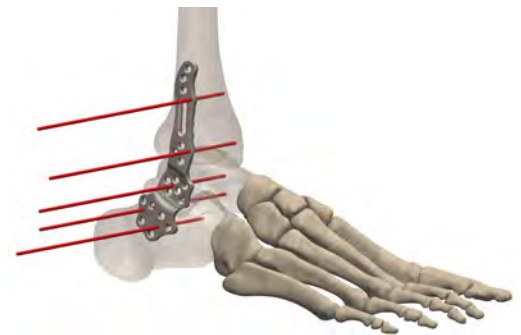
- Temporarily position and fix the ankle alignment with 2 mm K-wires.
- Optional:** With the fibula removed, there is easy access to the postero-lateral aspect of the tibial metaphysis. A K-wire can be placed from the postero-lateral tibia into the neck of the talus over which a cannulated single- and partial threaded screw (with or without a washer) can be applied to provide compression across the arthrodesis. Ensure the screw is of sufficient strength and does not lock the arthrodesis in the direction in which compression will be applied by the Compression/Distraction Device later on in Step 12. The Ankle Fix plate is then used to neutralize the fixation.



## Step 5

### Temporary Fixation of the Plate

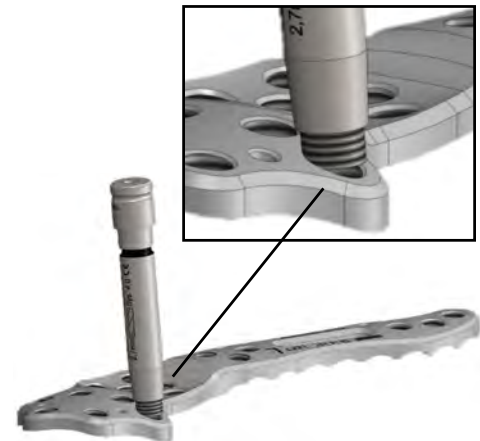
- Select the appropriate anatomical plate side and size (see page 6), according to the patient's bony anatomy and chosen procedure (TT or TTC fusion). Apply the plate to the bone surface and temporarily hold it with 2 mm K-wires while using image intensification to ensure that it is correctly positioned. Some contouring of the tibial incisura may be required to seat the plate flush with the bone.



## Step 6

### Drilling the Distal Screw Holes

- Drill distal screw holes accordingly to each specific plate:  
Ankle Fix – drill only the talus screw holes  
Ankle Fix Plus – drill only the calcaneus screw holes
- Bicortically drill the distal screw holes (calcaneus/talus) through the holes in the plate, using the 2.7 mm Twist Drill (black mark). Use as many screw holes as possible to ensure stable fixation. For locking screws, the corresponding 2.7 mm threaded-tip Drill Guide (black mark) **must** be used to avoid damaging the threads and to ensure correct drill direction. While not required, the Drill Guide is also recommended for standard screws to help minimize wear on the drill bit and damage to the threads on the plate.
- Note: Because of the plate contours, a threaded screw will not always engage the screw hole at a 90° angle to that portion of the plate's surface that surrounds the hole. For proper threading of the Drill Guide into the hole, ensure that the Drill Guide is aligned with the direction of the threads in the hole (see illustration). Then tighten it gently.



## Step 7

### Depth Measurement for Distal Screws

- Position the Depth Gauge on the plate hole and advance the probe into the predrilled hole until it penetrates the opposite cortex. Read the length directly from the Depth Gauge.
- Note: If the drill hole does not penetrate the opposite cortex, measure where the probe bottoms out. Read the length directly from the gauge and subtract 1 mm to determine the appropriate screw length. (The screw length includes the length of the head.)



## Step 8

### Distal Screw Insertion

- Use as many screws as possible to ensure stable fixation.
- Attach the screwdriver blade to the handle by pulling back on the coupling, inserting the blade into the shaft, and releasing the coupling. Pull on the blade to ensure that it is locked into the handle. The screwdriver has a ratchet function to simplify screw insertion. Insert the screws bicortically, if possible. The screwdriver can be used to facilitate removal of the screws from the tray by pushing the tip of the blade firmly into the screw head in a vertical direction to achieve a secure grip.
- Note: Use only the screwdrivers available with the Ankle Fix System. Inserting the screws with inappropriate instruments may damage the screw threads. Do not use damaged screws.

## Step 9

### Adjustment of Compression/Distracton Device

- Attach the Hinge Blade to the screwdriver handle and use it to move the fixation pin sleeve into the middle of the Compression/Distracton Device (see illustration 1).

## Step 10

### Application of Compression/Distracton Device

- Remove any K-wires that were used for temporary plate or bone positioning.
- While holding the device in a proximal/distal direction as marked on the device (see illustration 1), insert the two 3.2 mm Threaded Drill Guides (with red markings) through the holes in the proximal and distal arms of the Compression/Distracton Device, and thread the guides into the plate holes directly above and below the slotted hole (see illustration 2).

## Step 11

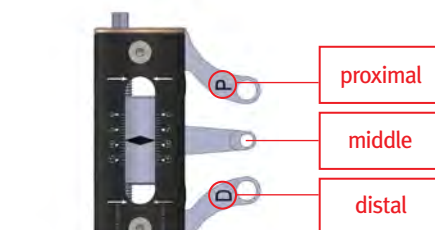
### Fixation Pin Insertion

- Insert a 4.0 threaded fixation pin (28.14.140) into the middle of the slotted hole on the tibial part of the plate (see illustration 2) until bicortical fixation is achieved.

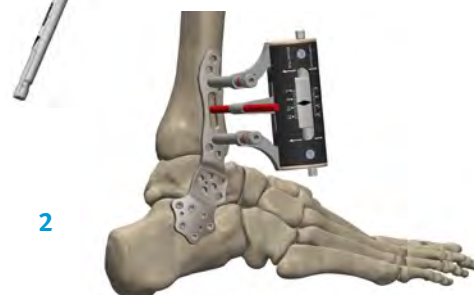
## Step 12

### Joint Compression

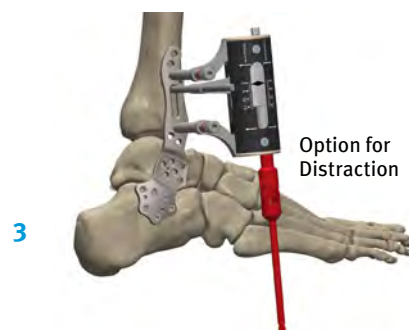
- Compress the joint by using the Hinge Screwdriver to turn the bolt clockwise on the distal end of the Compression/Distracton Device (see illustration 3/4). Use image intensification to assess the progress of the compression.
- Note: Be careful to ensure that the desired position of the arthrodesis is maintained during compression. In particular, avoid drifting of the hindfoot into excessive valgus which may create a valgus orientation in the construct. Congruent preparation of the joint surfaces will aid in maintaining the desired position.
- Note: The middle pin position provides the possibility to distract prior to compression, which allows additional joint preparation if necessary.



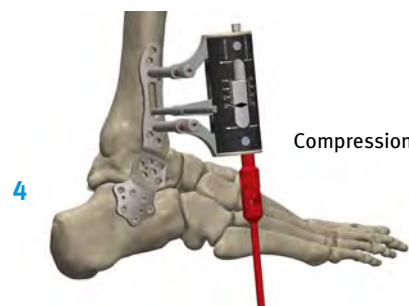
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2



3



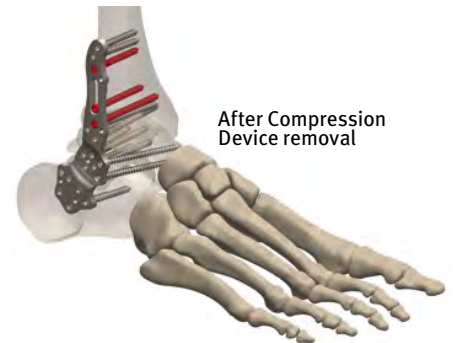
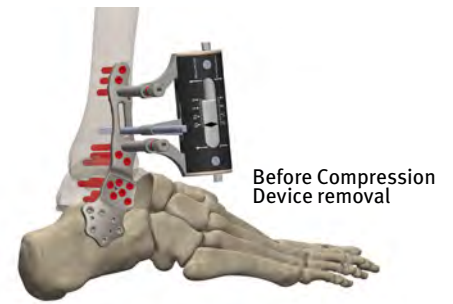
4



### Step 13

#### Proximal Screw Fixation

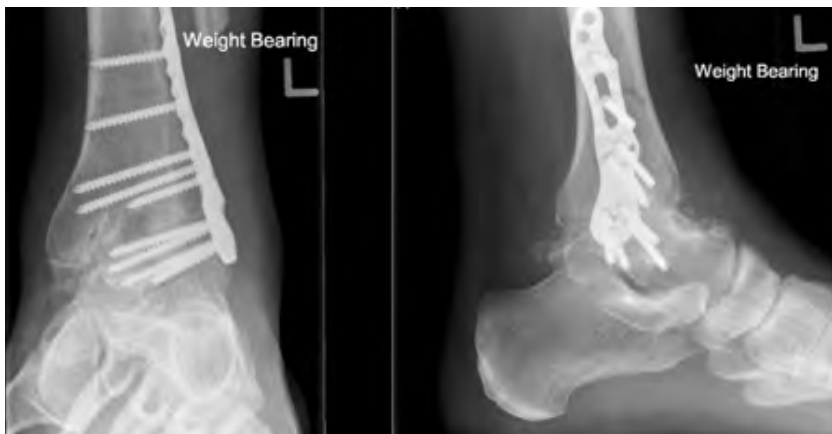
- Once adequate compression has been achieved, drill, measure, and insert locking screws in the plate in the same manner as with the distal screws for:  
Ankle Fix – insert screws in the tibial part  
Ankle Fix Plus – insert screws in the talus and tibial part  
For tibial screws, use the 3.2 mm instruments (with red markings).
- After achieving adequate fixation, remove the fixation pin and the Compression/Distractor Device. Then insert locking screws into the remaining tibial holes. For improved stabilization, always insert a standard screw in the fixation pin hole.
- Note: Only standard screws may be used in the slotted hole.



### Step 14

#### Wound Closure and Dressing

- Use image intensification to confirm adequate plate and screw placement. Then close the wound in layers, and apply a cast in the usual manner.

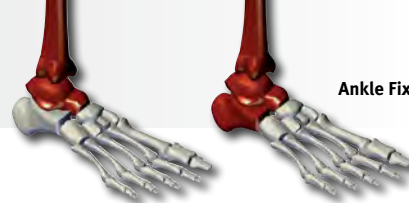


### Postoperative Treatment

- Postoperatively the limb is elevated in a back slab plaster cast for the first two weeks.
- A wound check is performed at two weeks, and if the wound is healing, a new cast or boot is applied with the patient allowed to partially weight bear as dictated by the strength of the bone and the fixation at the time of the surgery.
- At 6-8 weeks post-op, the cast is removed (an X-ray may be performed at this stage depending on surgeon preference), and the patient may then commence full weight bearing in a removable boot or cast.
- At 12 weeks post-op, an X-ray is taken, and if healing is established, the patient may fully weight bear without support.

### Implant Removal

- There is no need to routinely remove the implant or any screws once bony consolidation is confirmed. If the hardware is causing tendon or soft tissue irritation, then removal may be carried out, but care must be taken to confirm that the underlying joint is completely consolidated with bone. This step may require a CT scan. If there is no irritation, then the plate and screws should remain in the bone indefinitely.



## Ankle Fix System 4.0 Implant Kit ST-5885-280-50

**Titanium Ankle Fix Plates 4.0 mm** Plate profile = 3.0 – 3.5 mm

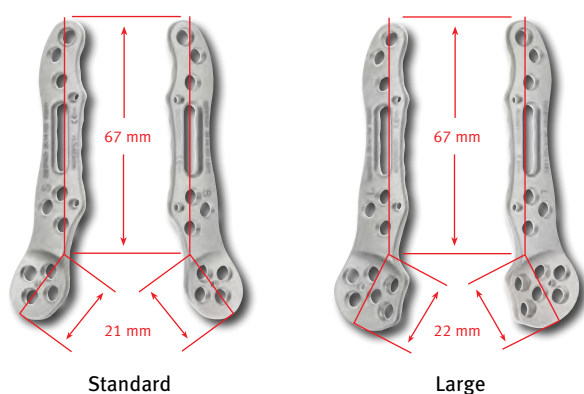
### Tibia-Talus Fusion

Cat.No.	Description	Basic Set
<b>28.14.101</b>	Ankle Fix titanium plate, Standard, left	1
<b>28.14.102</b>	Ankle Fix titanium plate, Standard, right	1
<b>28.14.103</b>	Ankle Fix titanium plate, Large, left	1
<b>28.14.104</b>	Ankle Fix titanium plate, Large, right	1

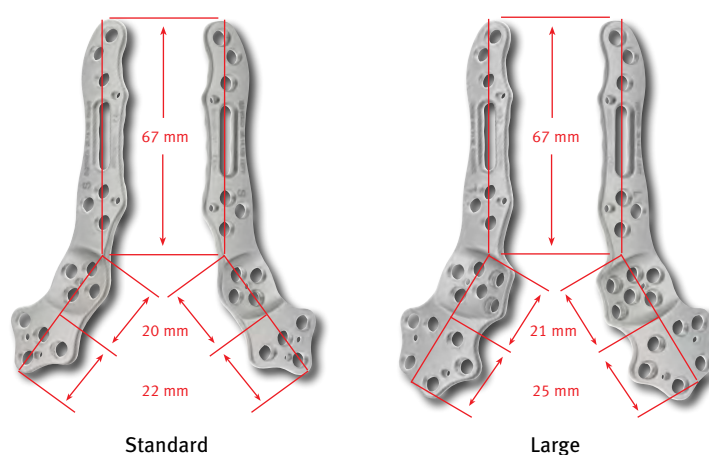
### Tibia-Talus-Calcaneus Fusion

Cat.No.	Description	Basic Set
<b>28.14.105</b>	Ankle Fix Plus titanium plate, Standard, left	1
<b>28.14.106</b>	Ankle Fix Plus titanium plate, Standard, right	1
<b>28.14.107</b>	Ankle Fix Plus titanium plate, Large, left	1
<b>28.14.108</b>	Ankle Fix Plus titanium plate, Large, right	1

### Ankle Fix



### Ankle Fix Plus



## Titanium screws for osteosynthesis 4.0 mm

### Locking Screws

4.0 mm, TX 10

Cat.No.	Description	Basic Set
<b>28.30.018</b>	18 mm	10
<b>28.30.020</b>	20 mm	10
<b>28.30.022</b>	22 mm	10
<b>28.30.024</b>	24 mm	10
<b>28.30.026</b>	26 mm	10
<b>28.30.028</b>	28 mm	10
<b>28.30.030</b>	30 mm	10
<b>28.30.032</b>	32 mm	10
<b>28.30.034</b>	34 mm	5
<b>28.30.036</b>	36 mm	5
<b>28.30.038</b>	38 mm	5
<b>28.30.040</b>	40 mm	5
<b>28.30.042</b>	42 mm	5
<b>28.30.044</b>	44 mm	5
<b>28.30.046</b>	46 mm	5
<b>28.30.048</b>	48 mm	5
<b>28.30.050</b>	50 mm	5
<b>28.30.055</b>	55 mm	5

### Standard Screws

4.0 mm, TX 10

Cat.No.	Description	Basic Set
<b>28.30.118</b>	18 mm	5
<b>28.30.120</b>	20 mm	5
<b>28.30.122</b>	22 mm	5
<b>28.30.124</b>	24 mm	5
<b>28.30.126</b>	26 mm	5
<b>28.30.128</b>	28 mm	5
<b>28.30.130</b>	30 mm	5
<b>28.30.132</b>	32 mm	5
<b>28.30.134</b>	34 mm	5
<b>28.30.136</b>	36 mm	5
<b>28.30.138</b>	38 mm	5
<b>28.30.140</b>	40 mm	5
<b>28.30.142</b>	42 mm	5
<b>28.30.144</b>	44 mm	5
<b>28.30.146</b>	46 mm	5
<b>28.30.148</b>	48 mm	5
<b>28.30.150</b>	50 mm	5
<b>28.30.155</b>	55 mm	5



## Ankle Fix System 4.0 Complete Quad-paq Tray KT-5885-280-50

### Instruments and Storage Trays

Cat.No.	Description	Basic Set
508004275	Quad-paq instrument tray for Ankle Fix System 4.0, w/o instruments	1
508002000	Quad-paq tray for implant modules w/ 4 lids, w/o implant modules	1
508005012	Quad-paq Ankle Fix plate-tray system 4.0, w/o implants	1
508005013	Quad-paq Ankle Fix Plus plate-tray system 4.0, w/o implants	1
508005016	Quad-paq Ankle Fix screw tray system 4.0, 34-55 mm locking, w/o implants	1
508005017	Quad-paq Ankle Fix screw tray system 4.0, 34-55 mm standard, w/o implants	1
508003009	Quad-paq Ankle Fix screw tray system 4.0 18-32 mm, w/o implants	1
28.14.000	Compression/Distractor device for Ankle Fix System, 0-15 mm	1
28.14.100	Hinge blade HEX 5 for 28.14.000, 112 mm, AO-style shaft	1
28.14.140*	Pin with screw thread 4.0 for 28.14.000, 140 mm, AO-style shaft	2
503004680	Silicone ratchet T-handle, black, cannulated, AO-style connection	1
503004660	Silicone ratchet handle straight, black, non-cannulated, AO-style connection	1
503004187	Screwdriver blade TX 10, 90 mm, non-cannulated, AO-style shaft	2
503004046	Drill guide for drill 2.7, threaded tip, 65 mm, black marker	3
503004047	Drill guide for drill 3.2, threaded tip, 65 mm, red marker	3
502015217	Twist drill 2.7 x 125 mm, for 4.0 mm screws, AO-style shaft, black marker	2
502015650	Twist drill 3.2 x 145 mm, for 4.0 mm screws, AO-style shaft, red marker	2
503004262	Depth gauge 60 mm, round, for 2.3 – 4.5 mm screws	1
503004250	Titanium plate and screw holding forceps, angled, 150 mm	1
605202150*	K-wire 150 x 2.0 mm, trocar/trocar, 10/Pack	1

\* Disposable Instrument



Developed in cooperation with Dr. Mark Davies and Dr. Chris Blundell, Sheffield, UK.  
Text, pictures and x-rays by courtesy of Dr. Mark Davies and Dr. Chris Blundell, Sheffield, UK.

Note: Zimmer is not affiliated with AO.

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