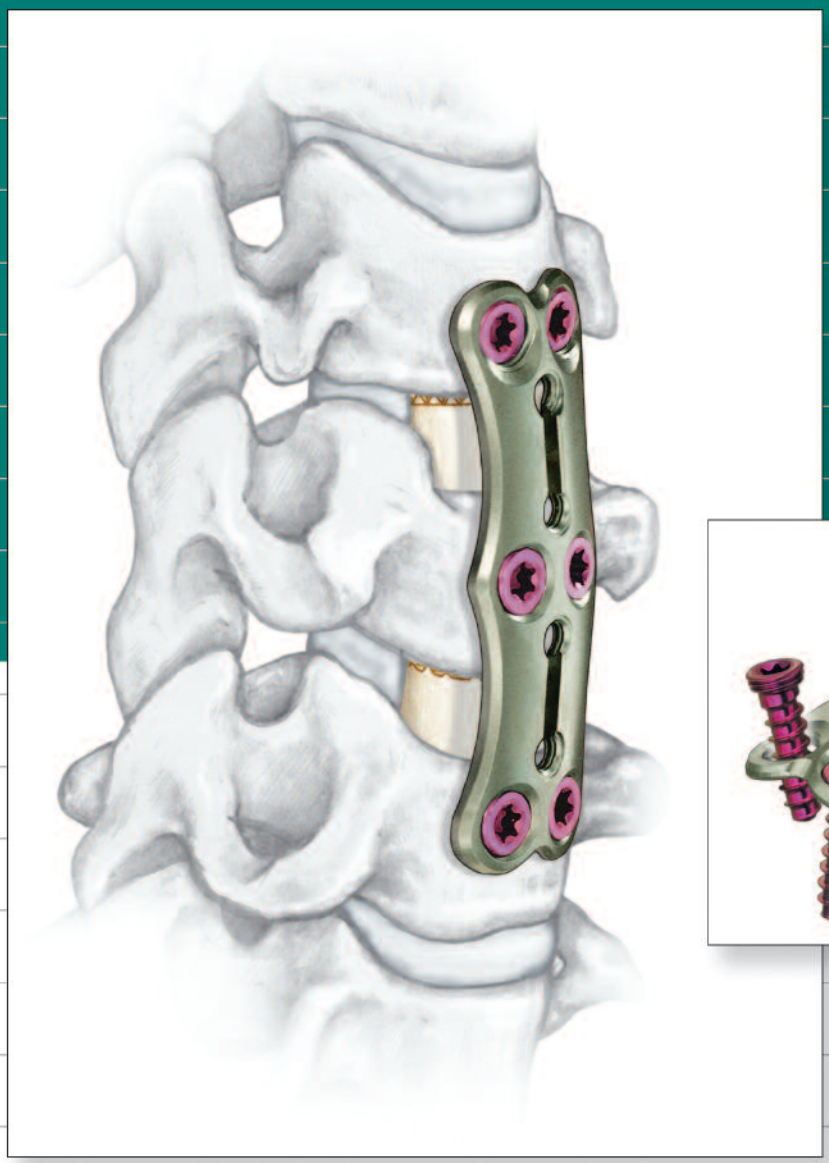
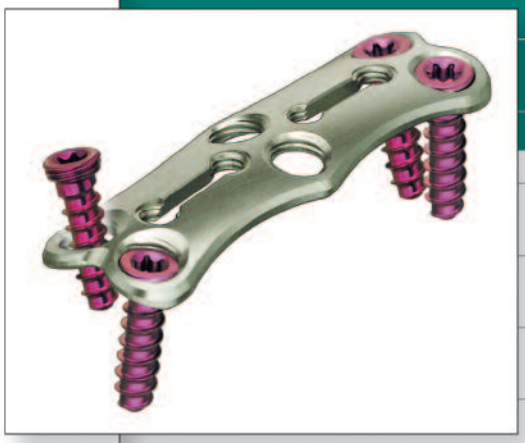
ACLP – Anterior Cervical Locking Plate System

TECHNIQUE GUIDE



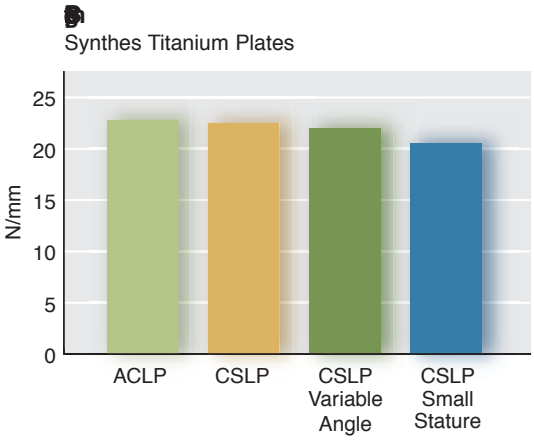


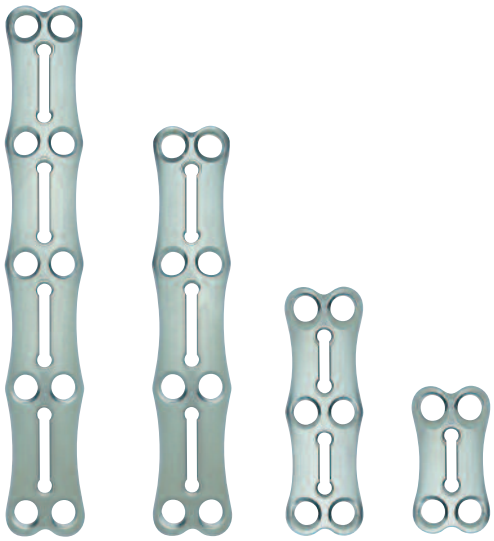
SYNTHES® Spine

Instruments and implants approved by the AO Foundation

ACLP—Anterior Cervical Locking Plate System

The ACLP System is designed to reduce the number of surgical steps by incorporating a one-step locking mechanism. ACLP increases versatility while retaining the mechanical properties of the Cervical Spine Locking Plate.





The "dogbone" slot in the plate provides graft visibility.

One-step Locking

The threaded conical screw head locks to the plate, eliminating the need for an additional locking or blocking mechanism.

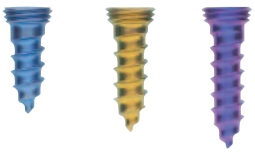
The one-step locking allows quick construction.

Indications

The ACLP System is intended for anterior screw fixation to the cervical spine (C2–C7) for the following indications: degenerative disc disease (DDD), spondylolisthesis, trauma (including fractures), spinal stenosis, tumors (primary and metastatic), failed previous fusions, pseudoarthrosis, and deformity (defined as kyphosis, lordosis and scoliosis).

Self-drilling Screws

Eliminate the need for drilling or tapping.



*Test results on file at Synthes.

Table of Contents

The AO Principles

In 1958, the AO formulated four basic principles, which have become the guidelines for internal fixation.[1] They are:

- Anatomic reduction
- Stable internal fixation
- Atraumatic surgical technique
- Early, active mobilization

The fundamental aims of fracture treatment in the limbs and fusion of the spine are the same. A specific goal in the spine is returning as much function as possible to the injured neural elements.[2]

Anatomical alignment in the cervical spine means restoring and maintaining the lordosis and the original disc height. The goal of stable internal fixation in the cervical spine is to maintain not only the integrity of the mobile segment and facilitate fusion, but also to maintain the balance and the physiologic three-dimensional form of the cervical spine.[3]

Atraumatic surgical technique creates an optimal environment for fusion. Early, active mobilization is achieved through the use of atraumatic technique, which minimizes trauma to the patient and may lead to pain reduction and improved function.

1. M.E. Müller, M. Allgöwer, R. Schneider, and H. Willenegger. *Manual of Internal Fixation,* 3rd Edition. Berlin: Springer-Verlag. 1991.
2. Ibid.
3. M. Aebi, J.S. Thalgott, J.K. Webb. *AO ASIF Principles in Spine Surgery*. Berlin: Springer-Verlag. 1998.

ACLP System Features

The major features of the ACLP System include:

- One-step locking
- Low-profile, prelordosed plates
- Conical threaded screw heads
- Self-drilling and self-tapping screws
- Drill, Tap and Screw Guides

One-step Locking

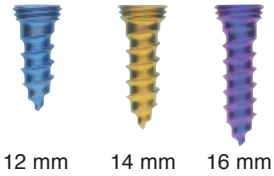
The threaded conical screw head locks to the plate, eliminating the need for an additional locking or blocking mechanism.

The one-step locking allows quick construction.

ACLP Plates

- Prelordosed to fit the anatomy
- Slim and low-profile (16 mm x 1.8 mm)
- Fixed screw angulation (12° cranial and 6° caudal)
- Made of titanium alloy, Ti-6Al-7Nb
- Etched arrows point cranially to ensure correct plate orientation

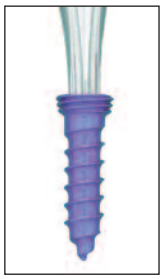
ACLP Screws

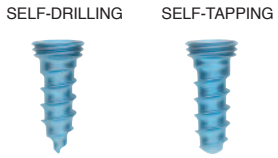


Threaded Conical Head Locking Screws

- Screw lengths from 12 mm to 16 mm, in 1 mm increments
- Color-coded to indicate length of cortex and cancellous bone screws
- T15 StarDrive screw head for self-retention
- Wide selection of self-tapping and self-drilling screws (cortex and cancellous) with respective drill bit lengths

Conical design of screw head enhances locking capabilities





Self-drilling and Self-tapping Screws

- Self-drilling cortex and cancellous bone screws in 4.0 mm and 4.5 mm diameters
- Self-tapping cortex and cancellous bone screws in 4.0 mm and 4.5 mm diameters
- Made of titanium alloy, Ti-6Al-7Nb

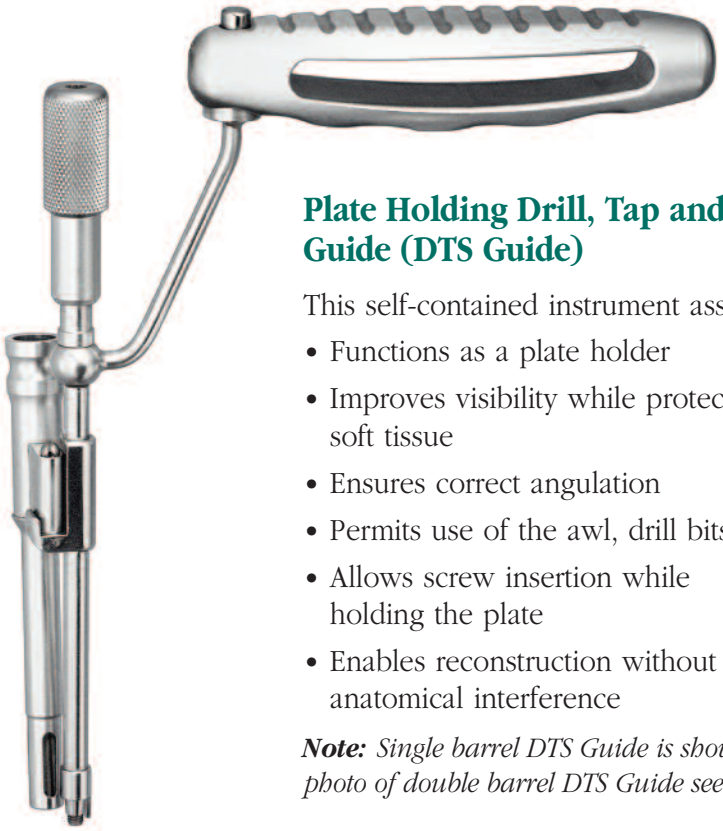
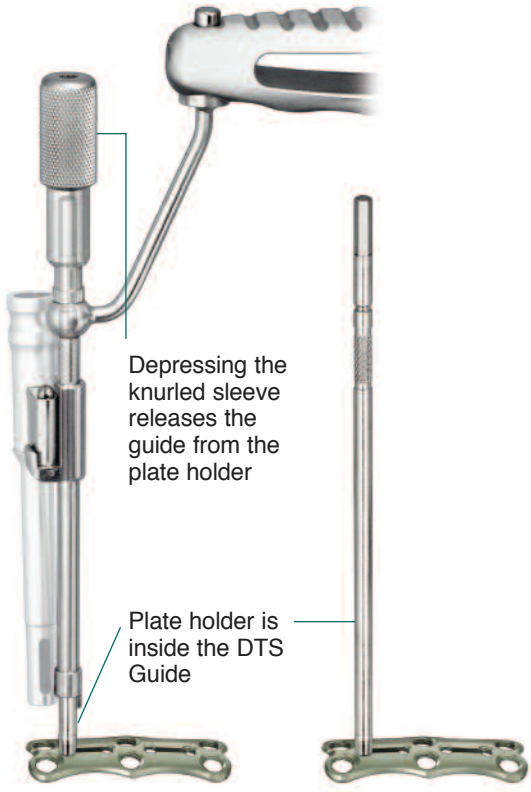


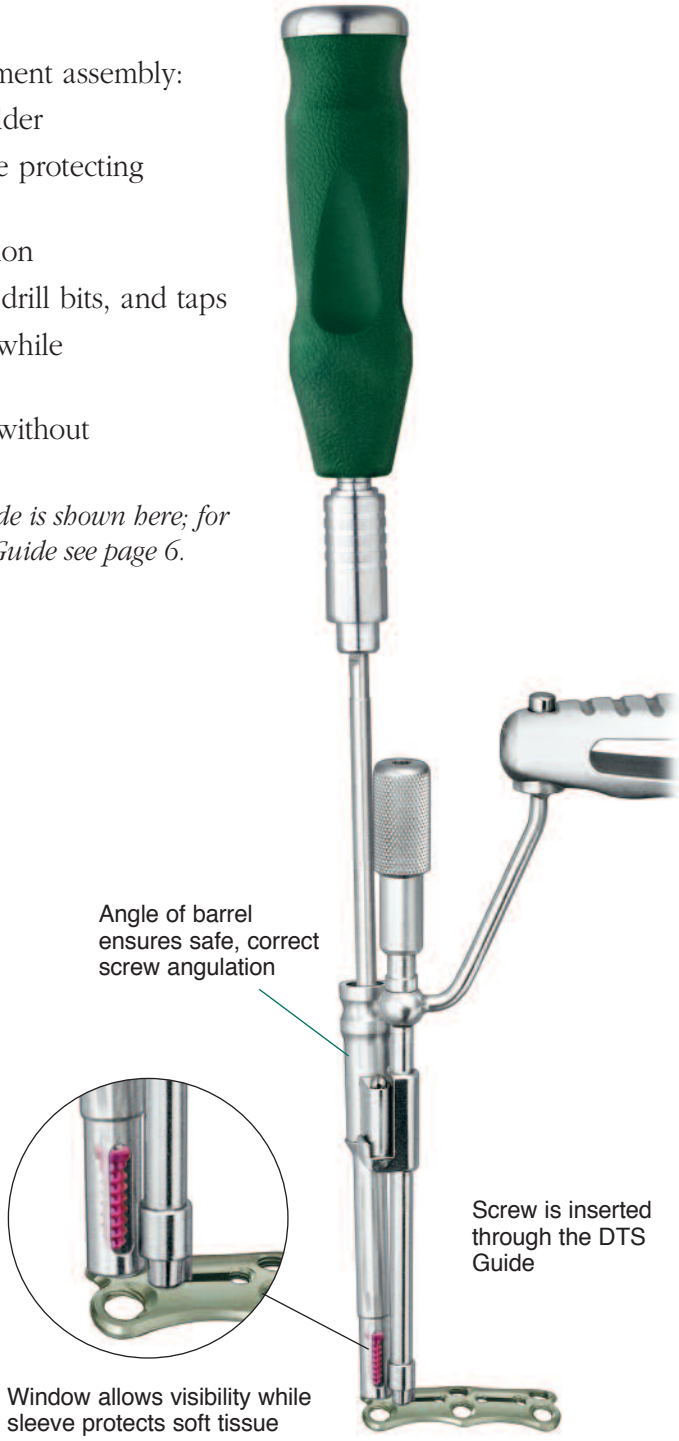
Plate Holding Drill, Tap and Screw Guide (DTS Guide)

This self-contained instrument assembly:

- Functions as a plate holder
- Improves visibility while protecting soft tissue
- Ensures correct angulation
- Permits use of the awl, drill bits, and taps
- Allows screw insertion while holding the plate
- Enables reconstruction without anatomical interference

Note: *Single barrel DTS Guide is shown here; for photo of double barrel DTS Guide see page 6.*

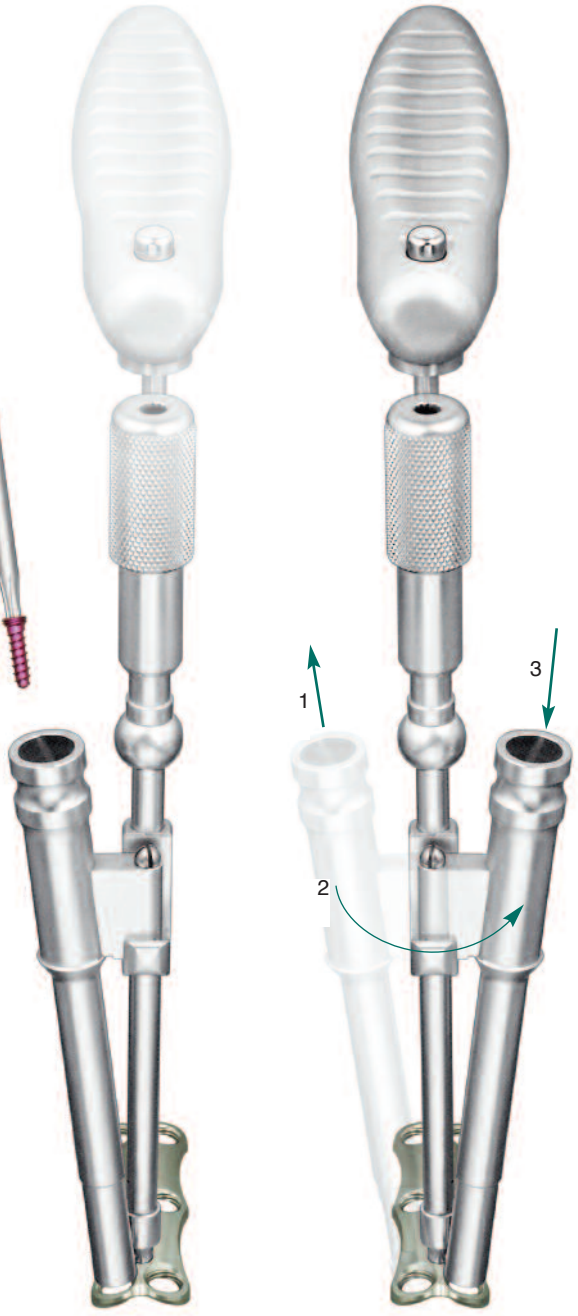




ACLP System Features (continued)

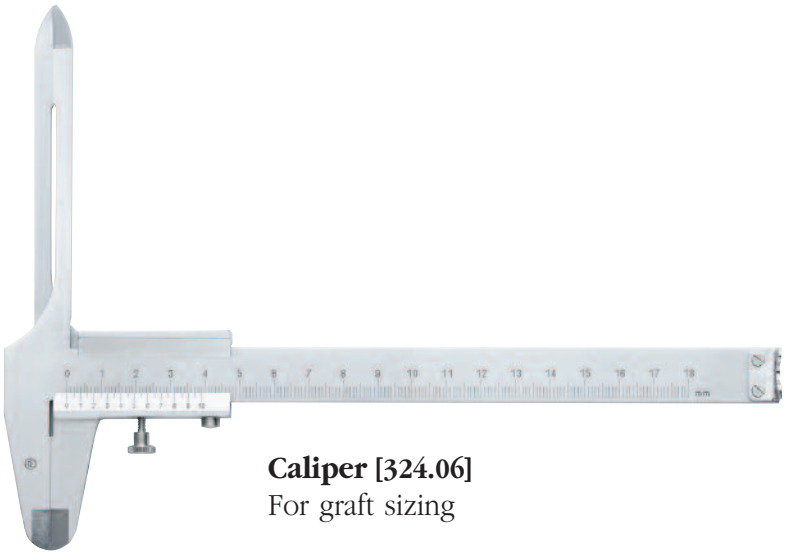
Four different instruments can operate through the barrel of the DTS Guide.

Barrel of DTS Guide can be rotated to function contralaterally without detaching instrument from plate.



The DTS Guide handle rotates in 45° increments by depressing the handle button, enabling reconstruction without anatomical interference.

Instruments

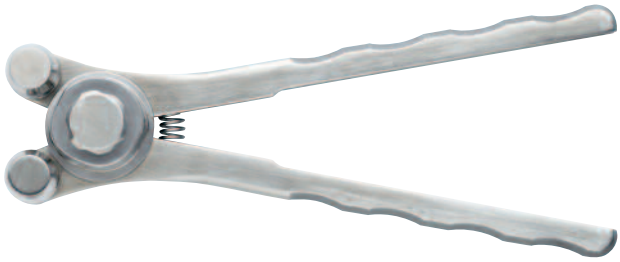


Caliper [324.06]
For graft sizing

Templates [350.260 – 350.312]
- Contourable
- Matched to plate size

Holding Sleeve [388.028]
Holds Temporary Fixation Pin [387.685] to Screwdriver Shaft [387.686]

Temporary Fixation Pin [387.685]
- Holds the ACLP plate securely to the bone prior to final placement of screws
- Compatible with the self-retaining StarDrive Screwdriver Shaft [387.686]
- Use with Holding Sleeve [388.028]



Universal Plate Bender [387.684]
For contouring ACLP plates to the desired curvature (to increase or decrease lordosis)

Caution: *Repeated bending will weaken plate.*

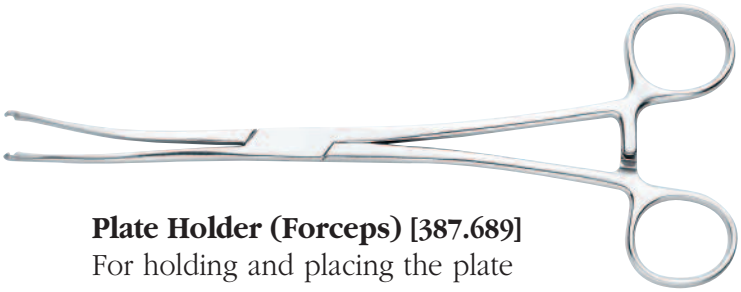


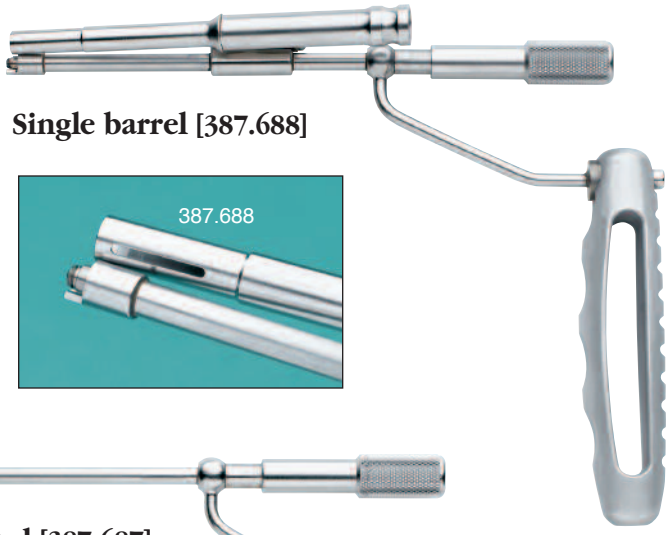
Plate Holder (Forceps) [387.689]
For holding and placing the plate

Plate Holder [387.645]
Can be used alone or as part of the DTS Guides

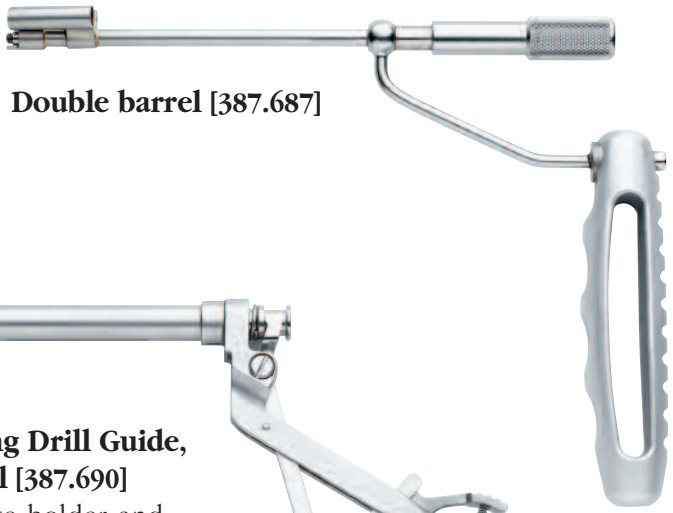
Instruments (continued)

Plate Holding Drill, Tap and Screw Guides (DTS Guides)

- Work as a plate holder and guide for drill bits, taps and screws
- Ensure correct angulation of the screws

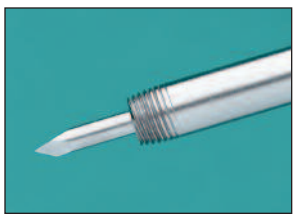


Single barrel [387.688]



Double barrel [387.687]

Plate Holding Drill Guide, single barrel [387.690]
Works as plate holder and guide for drill bits



Awl, for self-drilling screws [387.683]
Centers in the screw hole to break the near cortex for proper screw alignment

3.0 mm Drill Bits with stop, 12 mm to 16 mm [324.122–324.126]
Color-coded to match screw lengths

Handle with quick coupling, small [388.396]
For use with drill bits and taps

Tap for 4.0 mm Cancellous Bone Screws [311.402]

StarDrive Screwdriver Shaft, T15, quick coupling [387.686]
Used to insert the self-retaining StarDrive screws. Also used to insert the Temporary Fixation Pin [387.685] when required. Can be used with the 2.5 Nm Torque Limiting Handle [389.482] or the Handle with quick coupling [388.396]

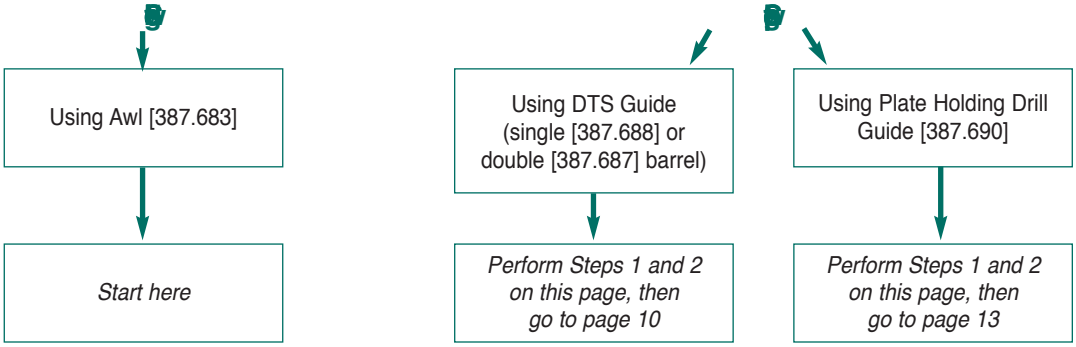
2.5 Nm Torque Limiting Handle [389.482]
For use with the StarDrive Screwdriver Shaft [387.686] to ensure correct locking with 2.5 Nm of torque

Conical Extractor [387.682]
For screw removal, if required

Cervical Depth Gauge [387.292]
For determining the correct screw length

Surgical Technique

The instruments as well as the technique steps depend on which type of screw is used:

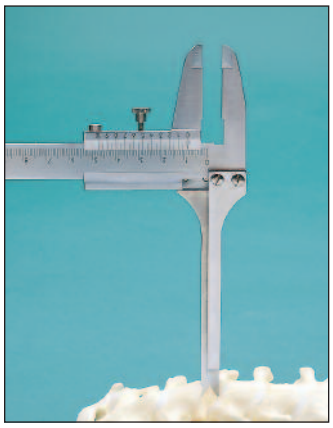


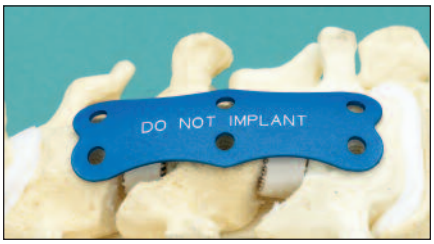
Self-drilling Screws, using the Awl

1 Select and insert graft

Following approach and decompression, measure for graft size using the Caliper [324.06]. Insert the appropriate size graft.

Note: *For recommended grafting technique refer to the* Synthes ACF Instruments Technique Guide.





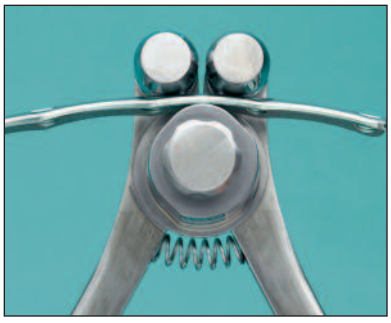
2 Select plate

Select a template of the estimated length. Place it on the vertebral body to determine plate length and screw position relative to the endplates.

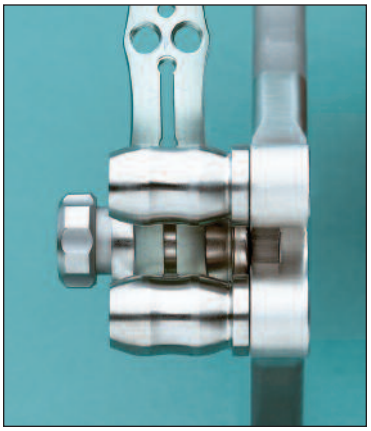
After plate length has been determined, ensure that the prelordosed plate fits the anatomy.

The plate contour can be adjusted using the Universal Plate Bender [387.684].

Caution: *Repeated bending may weaken the plate.*



Increase lordotic bend



Positioning of plate in bender

Decrease lordotic bend

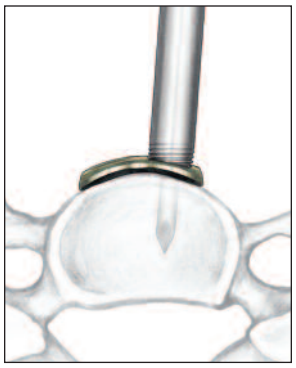
3 Place plate

Insert the Awl [387.683] into the screw hole and turn the knurled sleeve to thread it firmly into place.

Using the awl, place the plate onto the vertebral body with the arrow pointing cranially.

Alternatively, the Plate Holder [387.645] can be used to position the plate. If desired, hold the plate in place with a Temporary Fixation Pin [387.685]. The pin can be inserted using the self-retaining screwdriver and Holding Sleeve [388.028].

Note: *The awl, correctly threaded in the plate, establishes the trajectory of the screws (12° cranial and 6° caudal).*



Note: *The awl centers in the screw hole for proper screw alignment*

4 Break cortex

Simultaneously push down and turn the awl handle.

5 Insert self-drilling screws

Remove the awl by turning the knurled sleeve counterclockwise until completely unthreaded.

Attach the self-retaining StarDrive Screwdriver Shaft [387.686] to the 2.5 Nm Torque Limiting Handle [389.482]. Load the appropriate length self-drilling screw. Advance the screw until the head of the screw is flush with the top surface of the plate.

Lock the screw into the plate by turning the torque limiting handle until there is an audible "click."

Notes:

Ensure that the plate is seated on the bone before the head of the screw engages the threaded hole in the plate.

Provisionally tighten the first screw to the plate to maintain placement of the plate on the bone.

6 Insert the remaining screws

Repeat steps 4 and 5 to insert the remaining screws. Ensure that all screws are completely tightened.

Surgical Technique (continued)

Self-tapping Screws, using the DTS Guide

Steps 1 and 2 are shown on page 8.

3 Place plate

Insert the prong of the Plate Holding Drill, Tap and Screw Guide, double barrel [387.687] or single barrel [387.688] into the "dogbone" slot of the plate and turn the knurled sleeve clockwise, until threaded. The "dogbone" slot is designed to correctly angle the DTS Guide (12° cranial and 6° caudal).

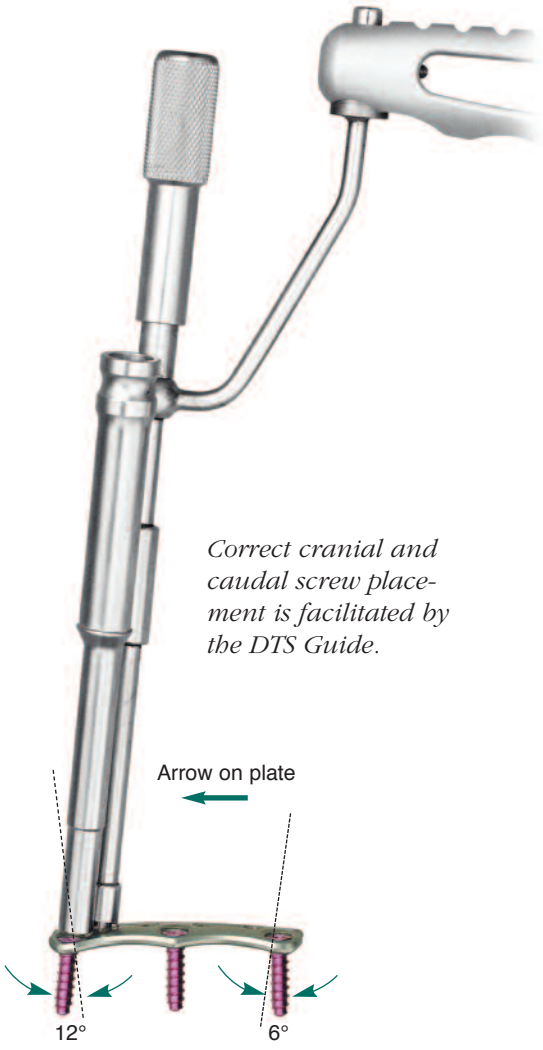
Place the plate with the DTS Guide onto the vertebral body with the arrow facing cranially.

Hold the plate in place with a Temporary Fixation Pin [387.685]. The pin can be inserted with the self-retaining StarDrive Screwdriver Shaft [387.686], Holding Sleeve for temporary fixation pins [388.028], and quick coupling Handle [388.396].

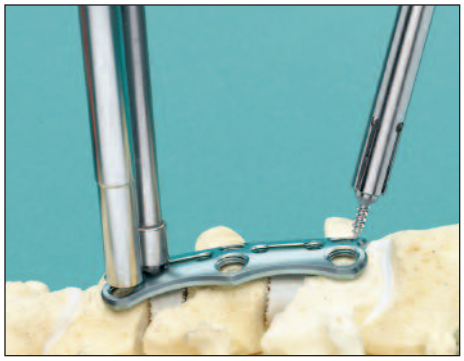
Attach the appropriate drill bit [324.12x] to the quick coupling Handle [388.396].

Note: *The ring on the drill bit is a visible indicator that the drill bit has reached the appropriate depth.*

Prong in "dogbone"



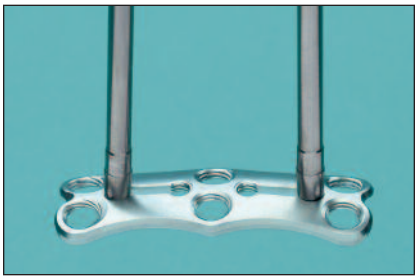
Correct cranial and caudal screw placement is facilitated by the DTS Guide.



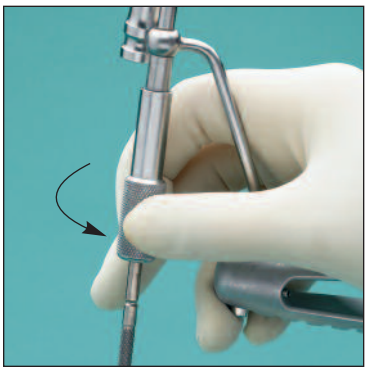
Alternative technique using two Plate Holders [387.645]:
Remove the Plate Holder [387.645] from the tube on the DTS Guide while pressing down on the knurled sleeve to release.

Thread the Plate Holder [387.645] clockwise into the "dogbone" slot of the plate.

Assemble the construct, which consists of the plate and the two plate holders, outside of the wound.



Assemble the construct outside of the wound.



Note: *To loosen the plate holder from the plate, invert the DTS Guide, place the knurled sleeve over the plate holder, and turn counter-clockwise.*

Place the plate with both plate holders on the bone, with the arrow facing cranially.

Proceed to steps 4, 5 and 6.

Slide DTS Guide onto the Plate Holder and press knurled sleeve to engage.

Turn the knurled sleeve counter-clockwise to remove from plate.

4 Drill hole for screw

Insert the drill bit into the barrel of the DTS Guide and drill to the stop. Remove the drill bit.

Surgical Technique (continued)

Self-tapping Screws, using the DTS Guide (continued)

5 Insert self-tapping screw

Attach the StarDrive Screwdriver Shaft [387.686] to the 2.5 Nm Torque Limiting Handle [389.482] and load the appropriate length self-tapping screw.

Insert the screwdriver shaft loaded with a self-tapping screw through the barrel of the DTS Guide.

Note: *Ensure that the plate is seated on the bone before the head of the screw engages the threaded hole in the plate.*

Advance the screw until the head of the screw is flush with the top surface of the plate.

Turn the torque limiting handle until it locks with an audible "click." Remove the screwdriver shaft.

Note: *Provisionally tighten the first screw to the plate to maintain placement of the plate on the bone.*

6 Insert remaining screws

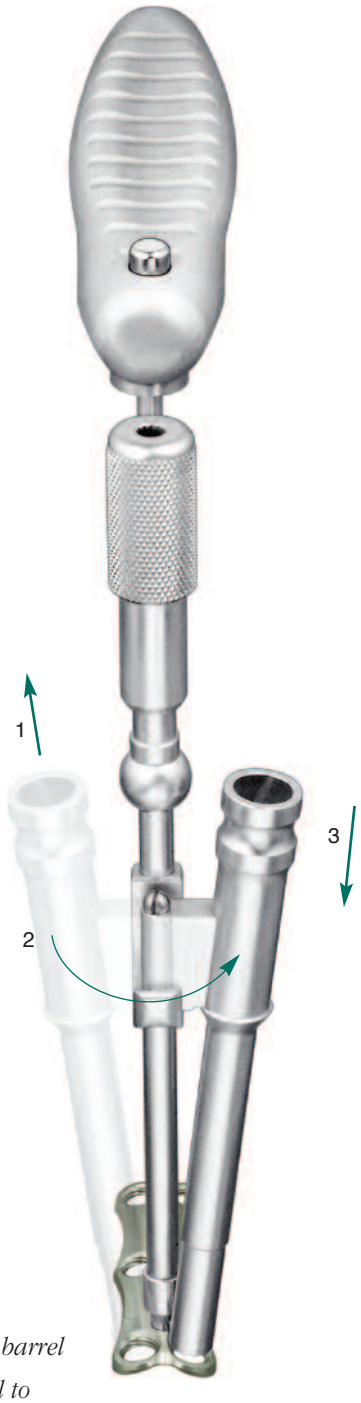
Repeat steps 4 and 5 to insert the contralateral screw without removing the DTS Guide from the center slot.

Drill the contralateral hole. If using the double barrel DTS Guide, drill both sides without changing the position of the DTS Guide.

If using the single barrel DTS Guide, raise the barrel and rotate 180° to the opposite side. Depress barrel until it stops.

Unthread the DTS Guide and attach it to the center "dogbone" slot for the remaining holes.

Ensure that all screws are completely tightened.



Step 1 *Raise barrel*

Step 2 *Swivel to contralateral position*

Step 3 *Push down*

Steps 1 and 2 are shown on page 8.

Note: *After the Plate Bender has been used to contour the plate, it is recommended that only the Plate Holding Drill Guide [387.690] is used to drill holes for the self-tapping screws.*

3 Place plate

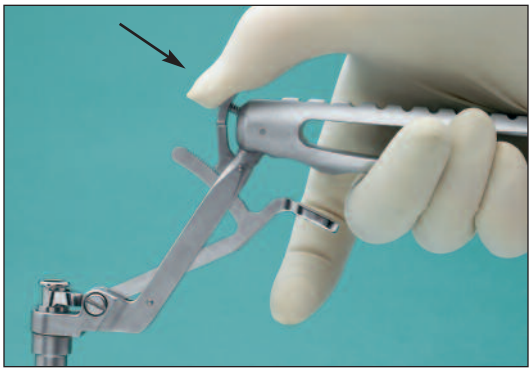
Insert the Plate Holding Drill Guide [387.690] into the screw hole of the plate. Squeeze the trigger to lock the drill guide until it grasps firmly.

Place the drill guide with the plate onto the vertebral body with the arrow facing cranially.

Note: *The attachment of the drill guide [387.690] to the most cranial set of screw holes is 12° from the normal axis to the surface of the plate.*

Hold the plate in place with a Temporary Fixation Pin [387.685]. The pin can be inserted using the self-retaining StarDrive Screwdriver Shaft, Holding Sleeve, and quick coupling Handle.

Squeeze the trigger to lock the drill guide until it grasps firmly.



Press the thumb release to unlock the drill guide and release it from the plate.

Surgical Technique (continued)

Self-tapping Screws, using the Plate Holding Drill Guide (continued)

4 Drill hole for screw

Load the appropriate length drill bit onto the quick coupling Handle [388.396] and insert it through the barrel of the drill guide. Drill to the stop. Remove the drill bit.

Note: *The ring on the drill bit is the indicator of appropriate depth.*

5 Insert self-tapping screw

Release and remove the drill guide from the plate by depressing the thumb latch. Insert the appropriate length screw using the StarDrive Screwdriver Shaft [387.686] with the 2.5 Nm Torque Limiting Handle [389.482]. Turn the screw until it is fully seated and the handle clicks.

Notes:
Ensure that the plate is seated on the bone before the head of the screw engages the threaded hole in the plate.

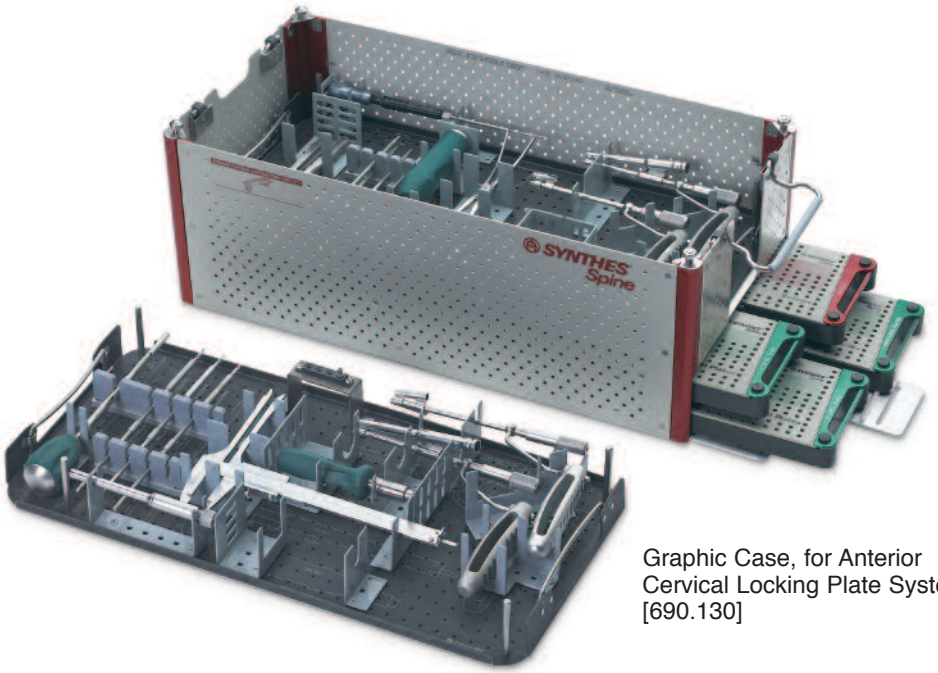
Provisionally tighten the first screw to the plate to maintain placement of the plate on the bone.

6 Insert remaining screws

Reposition drill guide and repeat steps 4 and 5 to insert the remaining screws.

Ensure that all screws are completely tightened.

Anterior Cervical Locking Plate Instruments



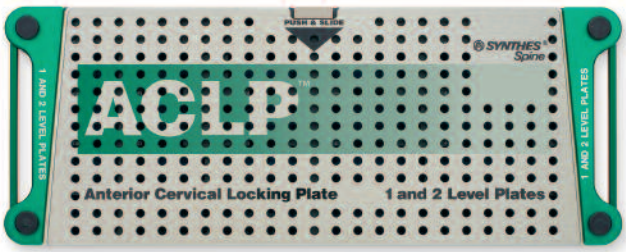
Graphic Case, for Anterior Cervical Locking Plate System [690.130]

Instruments

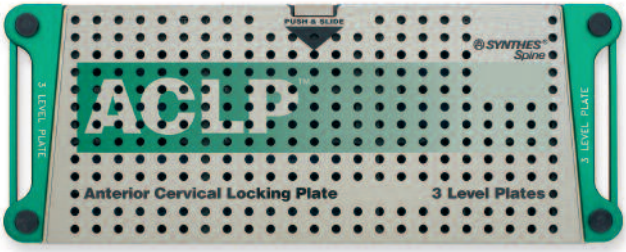
311.402	Tap for 4.0 mm Cancellous Bone Screws
324.06	Caliper
324.122	3.0 mm Drill Bit with stop, 12 mm (light blue), 2 ea.
324.124	3.0 mm Drill Bit with stop, 14 mm (gold), 2 ea.
324.126	3.0 mm Drill Bit with stop, 16 mm (fuchsia), 2 ea.
387.292	Cervical Depth Gauge
387.645	Plate Holder
387.682	Conical Extractor
387.683	Awl, for self-drilling screws
387.684	Universal Plate Bender
387.685	Temporary Fixation Pin, for use with 387.686, 3 ea.
387.686	StarDrive Screwdriver Shaft, T15, quick coupling, 2 ea.
387.687	Plate Holding Drill, Tap and Screw Guide, double barrel
387.688	Plate Holding Drill, Tap and Screw Guide, single barrel
387.689	Plate Holder (Forceps)
387.690	Plate Holding Drill Guide, single barrel
388.028	Holding sleeve, for Temporary Fixation Pins
388.396	Handle, with quick coupling, small, 2 ea.
389.482	2.5 Nm Torque Limiting Handle, with quick coupling, 2 ea.
324.123	3.0 mm Drill Bit with stop, 13 mm (aqua)
324.125	3.0 mm Drill Bit with stop, 15 mm (dark blue)
311.401	Tap for 4.0 mm Cortex Screws
311.403	Tap for 4.5 mm Cortex Screws
311.404	Tap for 4.5 mm Cancellous Bone Screws

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

Titanium Anterior Cervical Locking Plates



Module, for 1- and 2-Level Anterior Cervical Locking Plates [304.932]



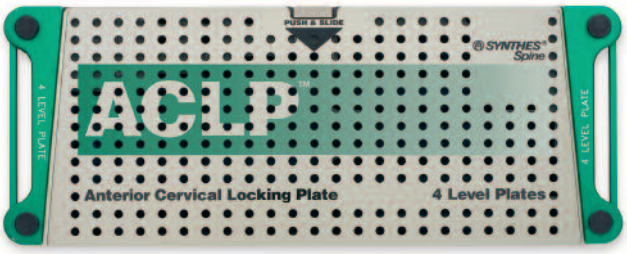
Module, for 3-Level Anterior Cervical Locking Plates [304.933]

Titanium Anterior Cervical Locking Plates

	HOLE PAIR LENGTH (mm)	TOTAL LENGTH (mm)
■		
450.271	12	21
450.272	14	23
450.273	16	25
450.274	18	27
450.275	20	29
450.276	22	31
450.277	24	33
450.278	26	35
■		
450.281	26	35
450.282	28	37
450.283	30	39
450.284	32	41
450.285	34	43
450.286	36	45
450.287	38	47
450.288	40	49
450.289	42	51
450.290	44	53
450.291	46	55

	HOLE PAIR LENGTH (mm)	TOTAL LENGTH (mm)
■		
450.260	42	51
450.261	45	54
450.262	48	57
450.263	51	60
450.264	54	63
450.265	57	66
450.266	60	69
450.267	63	72
450.268	66	75
450.269	69	77

Corresponding Templates for Anterior Cervical Locking Plates [350.260–350.312] are also available.

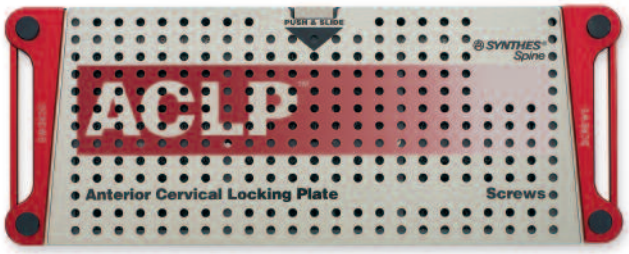


Module, for 4-Level Anterior Cervical Locking Plates
[304.934]

Titanium Anterior Cervical Locking Plates

	HOLE PAIR LENGTH (mm)	TOTAL LENGTH (mm)
■		
450.301	60	69
450.302	64	73
450.303	68	77
450.304	72	81
450.305	76	85
450.306	80	89
450.307	84	93
450.308	88	97
450.309	92	101
450.311	96	105
450.312	100	109

Titanium Anterior Cervical Locking Plate Screws



Module, for Anterior Cervical Locking Plate Screws [304.931]

4.0 mm Cancellous Bone Screws, self-drilling		4.0 mm Cancellous Bone Screws, self-tapping	
407.102	12 mm, 12 ea.	407.112	12 mm, 12 ea.
407.104	14 mm, 12 ea.	407.114	14 mm, 12 ea.
407.106	16 mm, 12 ea.	407.116	16 mm, 12 ea.

4.5 mm Cancellous Bone Screws, self-drilling		4.5 mm Cancellous Bone Screws, self-tapping	
407.202	12 mm, 12 ea.	407.212	12 mm, 12 ea.
407.204	14 mm, 12 ea.	407.214	14 mm, 12 ea.
407.206	16 mm, 12 ea.	407.216	16 mm, 12 ea.

304.931.27	for 4.0 mm Cancellous Bone Screws, self-drilling
304.931.28	for 4.5 mm Cancellous Bone Screws, self-drilling
304.931.29	for 4.0 mm Cancellous Bone Screws, self-tapping
304.931.30	for 4.5 mm Cancellous Bone Screws, self-tapping

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