3.0 HCS. The Countersinkable Compression Screw.

Technique Guide

SYNTHES® Original Instruments and Implants of the Association for the Study of Internal Fixation – AO ASIF

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Image intensifier control

Warning
This description is not sufficient for immediate application of the instrumentation. Instruction by a surgeon experienced in handling this instrumentation is highly recommended.

Features and Benefits

Stardrive T8
For optimal torque transmission

Available in two materials
Titanium alloy (TAN) and stainless steel

Identical pitch of head and shaft threads (1.25 mm)

∅ 3.5 mm head thread with double start
For countersinking in cortical bone

Self-tapping flutes
Facilitate countersinking of the screw

∅ 2.0 mm core diameter

∅ 3.0 mm shaft thread
For optimal retention in cancellous bone

Short and long thread lengths
For treating a wide range of indications

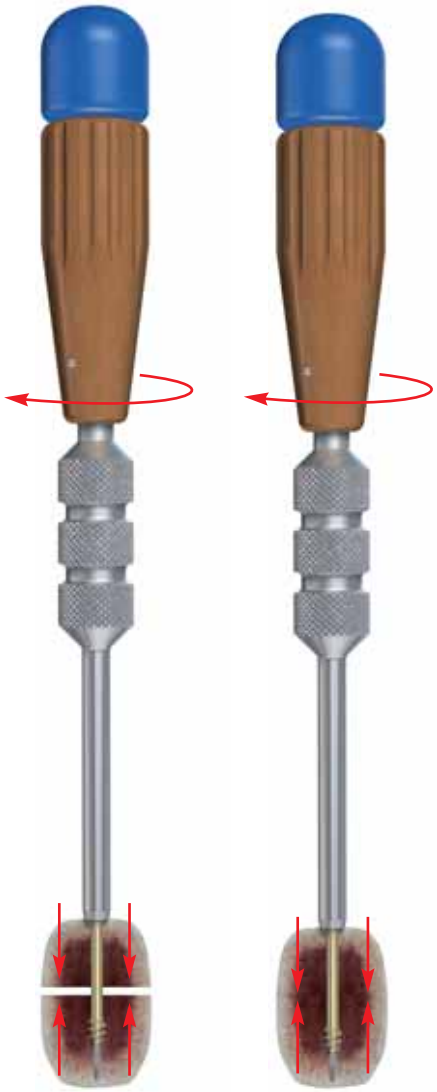
Self-drilling tip
Facilitates time-saving surgical technique

∅ 1.1 mm guide wire
For guided screw insertion

Functional Principle

Lag Screw Technique with Compression Sleeve

Step 1: Screw insertion
Insertion of the screw into the bone with the compression sleeve.



Step 2: Closure of gap and compression
Once the tip of the compression sleeve lies on the bone, the fracture gap is closed and compressed by further turning of the sleeve.

Step 3: Countersinking
Once the desired degree of compression is reached, the screw is countersunk into the bone with the screwdriver while the compression sleeve is held stationary. During countersinking no additional compression is generated.

Indications

Fractures, pseudarthroses, arthrodeses and osteotomies of small bones

Examples:

– Scaphoid and other carpals
– Metacarpals
– Radial and ulnar styloid process
– Radial head
– Tarsals, metatarsals, phalanges
– Patella

Scaphoid

This surgical technique describes the procedure for a palmar approach. Depending on the type and location of the fracture/pseudarthrosis, a dorsal approach may be more suitable.

1

Insert the guide wire

Instruments	
292.622/ 292.623	Guide Wire
312.151	Double Drill Guide

While monitoring with the image intensifier, advance the guide wire through the double drill guide from distal/radial to proximal/ulnar into the bone until the thread tip is anchored in the far cortex.

Note: Do not forcefully insert the guide wire. This may cause it to bend. Verify that the guide wire lies in the frontal and lateral plane along the central axis of the scaphoid.

2
Option: ream the trapezium

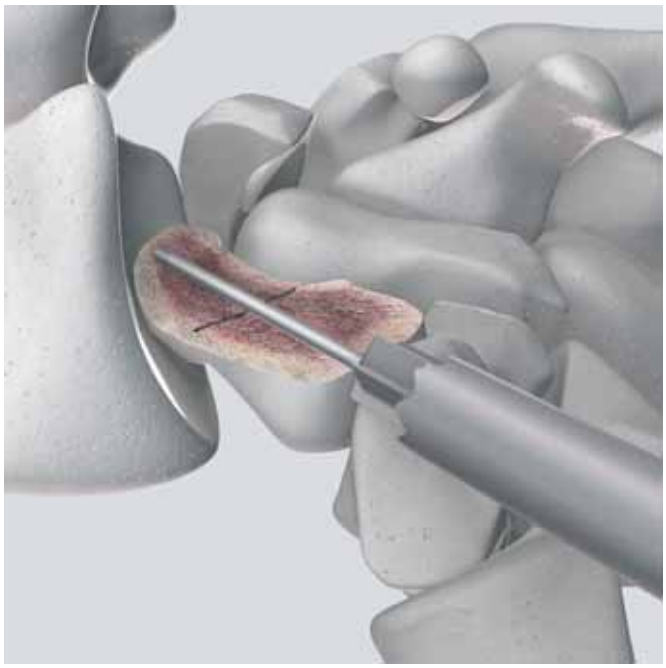
Instruments	
03.226.003	Trapezium Burr
03.226.005	Protection Sleeve for Trapezium Burr
311.430	Handle with Quick Coupling

To facilitate screw insertion, the flank of the trapezium can be removed with the trapezium burr.

Slide the trapezium burr with the protection sleeve over the guide wire and carefully ream the trapezium.

Ensure that the trapezium burr does not damage the scaphoid.

Note: Do not forcefully insert the trapezium burr since this may damage the guide wire.



3

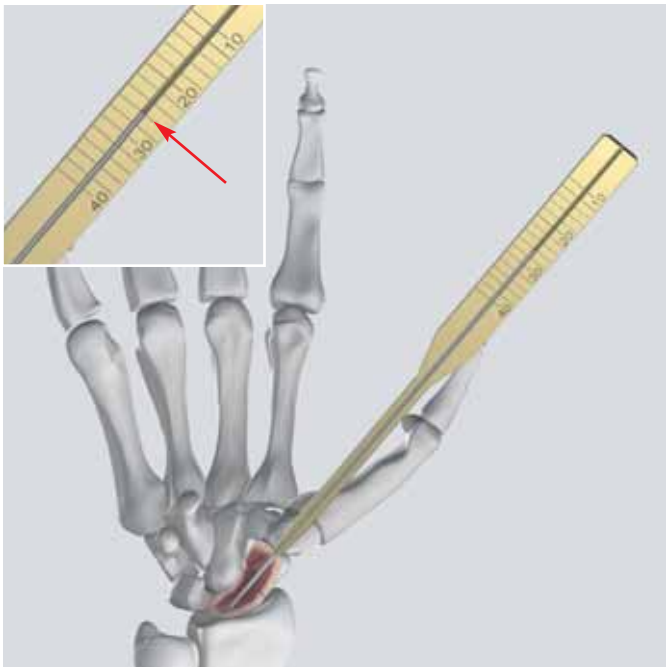
Determine screw and thread length

Instrument	
03.226.002	Direct Measuring Device

Slide the narrow end of the measuring device over the guide wire to the bone.

The measurement on the measuring device shows the depth of the guide wire in the bone in millimetres.

Subtract 2 mm if the screw is to be countersunk below the bone surface. If the fracture gap will close further during compression, subtract more.



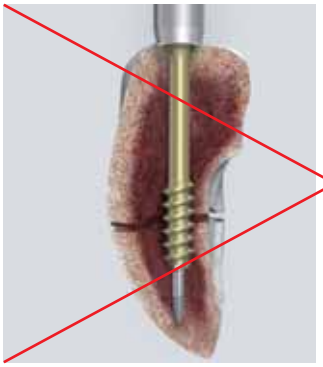
The position of the fracture line determines the thread length

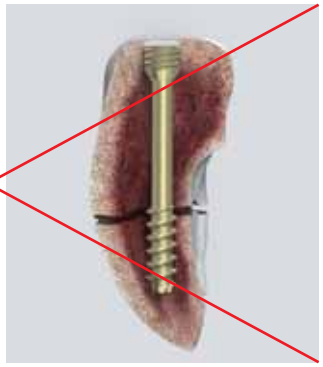
Correctly selected thread length

The shaft thread lies completely within the proximal fragment during compression. Fragments can hence be compressed.

Incorrect thread length

The shaft thread lies over the fracture gap. Fragments cannot be compressed.





4
Predrilling

Instruments	
310.221	2.0 mm Drill Bit
312.151	Double Drill Guide

Predrilling makes it substantially easier to insert the screw in dense bone.

Slide the double drill guide with the drill bit over the guide wire and pre-drill to the desired depth.

- Verify the effective drilling depth with the image intensifier.

Note: Do not drill beyond the tip of the guide wire. Slowly pull the drill bit straight out while running the power tool in "forward mode" to ensure that the guide wire stays in place.

5
Pick up screw

Instrument	
03.226.000	Compression Sleeve

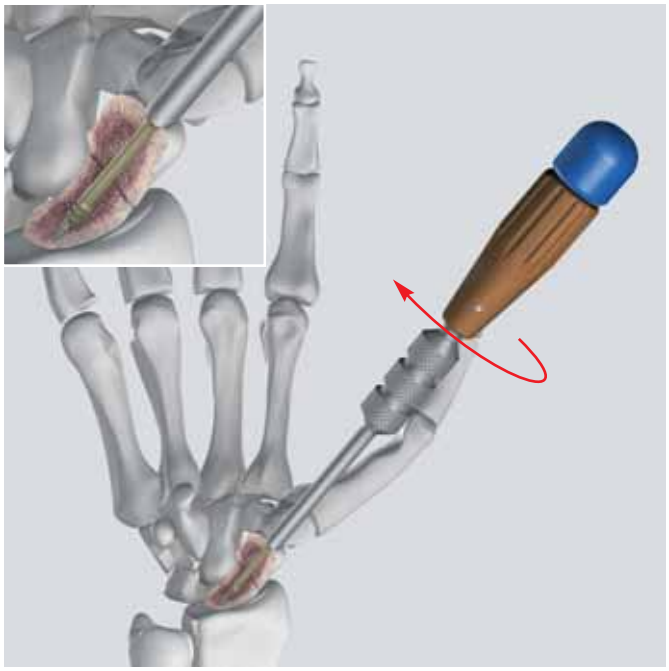
Twist the compression sleeve over the head thread of the screw to remove the screw from the screw rack.

6

Insert screw and compress fragments

Instruments	
03.226.000	Compression Sleeve
03.226.006	Handle for Compression Sleeve

Slide the handle into the compression sleeve. Insert the screw into the bone until the fracture gap is closed and compressed.



Notes

Verify the correct position of the shaft thread in the proximal fragment using the image intensifier. If the thread lies over the fracture gap, the gap cannot be compressed.

Carefully tighten the screw with the compression sleeve. Forceful tightening could cause stripping of the shaft thread.

If the thread strips, some or all of the compression will be lost. If the screw is then countersunk correctly, the thread will regain purchase, thereby reducing the danger of post-operative screw loosening.

If loss of compression makes screw extraction necessary, follow the instructions on screw extraction on page 24.

7
Countersink screw

Instruments	
03.226.000	Compression Sleeve
03.226.004	Screwdriver Shaft, cannulated, Stardrive T8
314.430	Handle with Quick Coupling

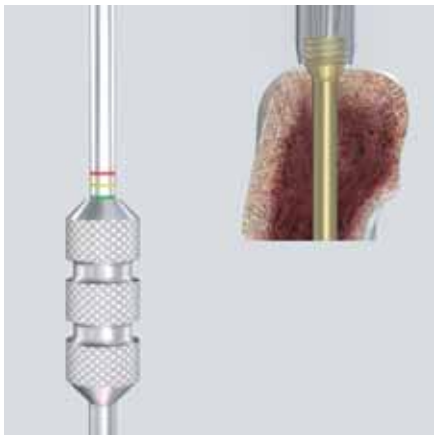
Remove the compression sleeve handle (with the blue cap) and slide the cannulated screwdriver through the compression sleeve.

Countersink the screw by turning the screwdriver shaft while simultaneously holding the compression sleeve stationary.

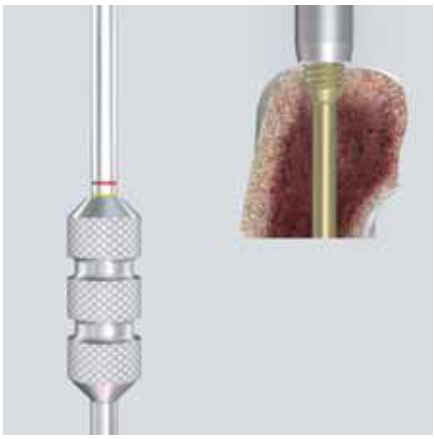
- Verify the screw position with the image intensifier. Ensure that the screw tip does not penetrate the proximal cortex. Remove and dispose of the guide wire.

Color markings

The color markings on the screwdriver shaft show the position of the screwdriver tip and head thread of the screw.

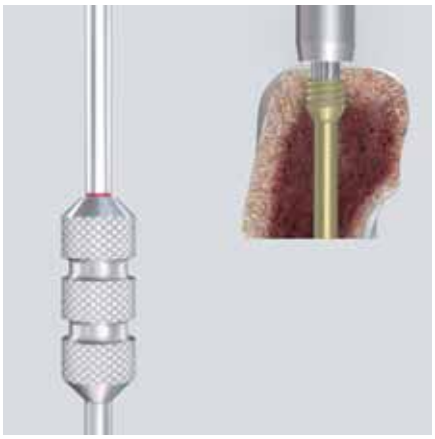


Green mark at the top end of the compression sleeve
The screwdriver tip is seated correctly in the Stardrive recess of the screw.



Yellow mark at the top end of the compression sleeve
The top end of the head thread is even with the bone surface.

Note: If the screw is inserted at an angle, it must be countersunk further than the yellow mark so that it does not project from the surface.



Red mark at the top end of the compression sleeve
The top end of the head thread is approximately 2 mm below the bone surface.

Chevron Osteotomy for Hallux Valgus

The following simplified surgical technique for a chevron osteotomy for hallux valgus serves as an example for the use of the 3.0 HCS in the foot.

1

Remove bunion and perform V-shaped osteotomy

Remove the bunion on the medial side of the first metatarsal with a saw blade.

Perform a V-shaped osteotomy (inner angle approx. 55°), with the peak approximately 2 mm distal from the center of the head of the first metatarsal.

2

Move the distal fragment laterally

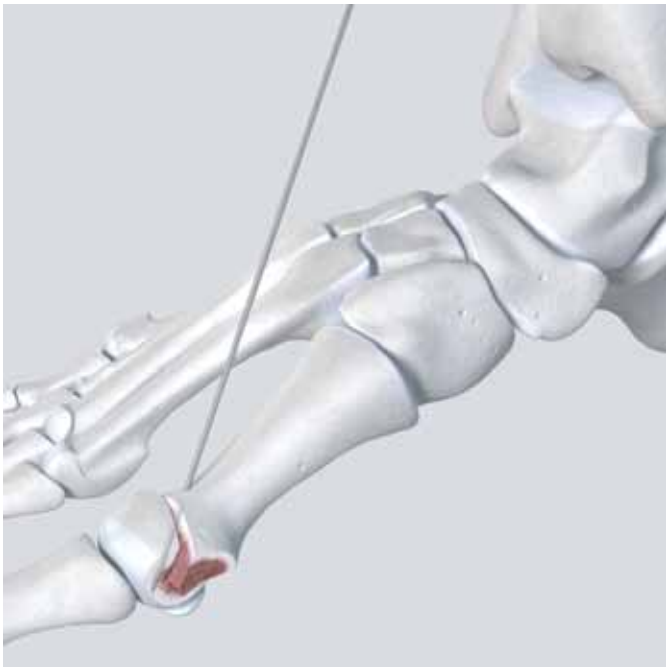
Move the distal fragment in a lateral direction to correct the alignment.

3
Insert the guide wire

Instruments	
292.622/ 292.623	Guide Wire
312.151	Double Drill Guide

While monitoring with the image intensifier, advance the guide wire through the double drill guide from proximal dorsal to distal plantar through the osteotomy into the bone until the thread tip is anchored in the far cortex.

Note: Do not forcefully insert the guide wire. This may cause it to bend.



4

Determine screw and thread length

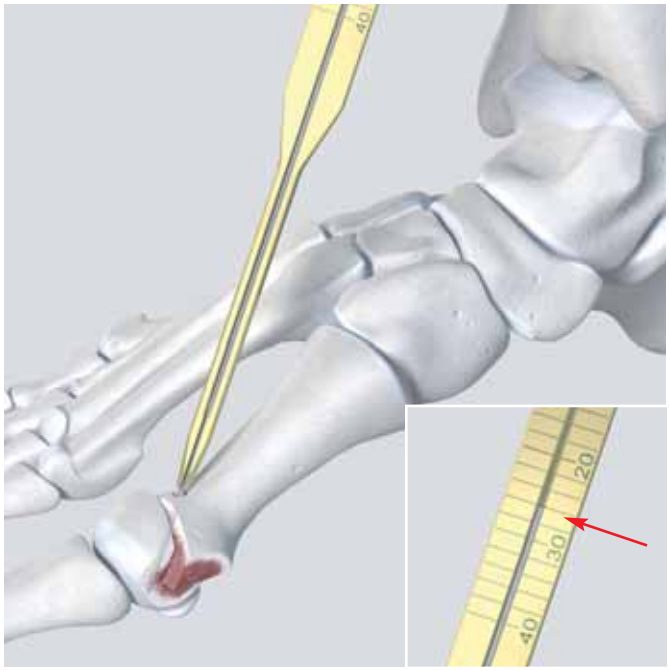
Instrument	
03.226.002	Direct Measuring Device

Slide the narrow end of the measuring device over the guide wire to the bone.

The measurement on the measuring device shows the depth of the guide wire in the bone in millimetres.

Subtract 2 mm if the screw is to be countersunk below the bone surface. If the osteotomy gap will close further during compression, subtract more.

Note: The position of the osteotomy line determines the thread length (see page 7).



5
Predrilling

Instruments	
310.221	2.0 mm Drill Bit
312.151	Double Drill Guide

Predrilling makes it substantially easier to insert the screw in dense bone.

Slide the double drill guide with the drill bit over the guide wire and predrill to the desired depth.

Verify the effective drilling depth with the image intensifier.

Note: Do not drill beyond the tip of the guide wire. Slowly pull the drill bit straight out while running the power tool in "forward mode" to ensure that the guide wire stays in place.

6
Pick up screw

Instrument	
03.226.000	Compression Sleeve

Twist the compression sleeve over the head thread of the screw to remove the screw from the screw rack.

7

Insert screw and compress osteotomy

Instruments	
03.226.000	Compression Sleeve
03.226.006	Handle for Compression Sleeve

Slide the handle into the compression sleeve. Insert the screw into the bone until the osteotomy is closed and compressed.

Notes

Verify the correct position of the shaft thread in the distal fragment using the image intensifier. If the thread lies over the osteotomy, the gap cannot be compressed.

Carefully tighten the screw with the compression sleeve. Forceful tightening could cause stripping of the shaft thread.

If the thread strips, some or all of the compression will be lost. If the screw is then countersunk correctly, the thread will regain purchase, thereby reducing the danger of postoperative screw loosening.

If loss of compression makes screw extraction necessary, follow the instructions on screw extraction on page 24.

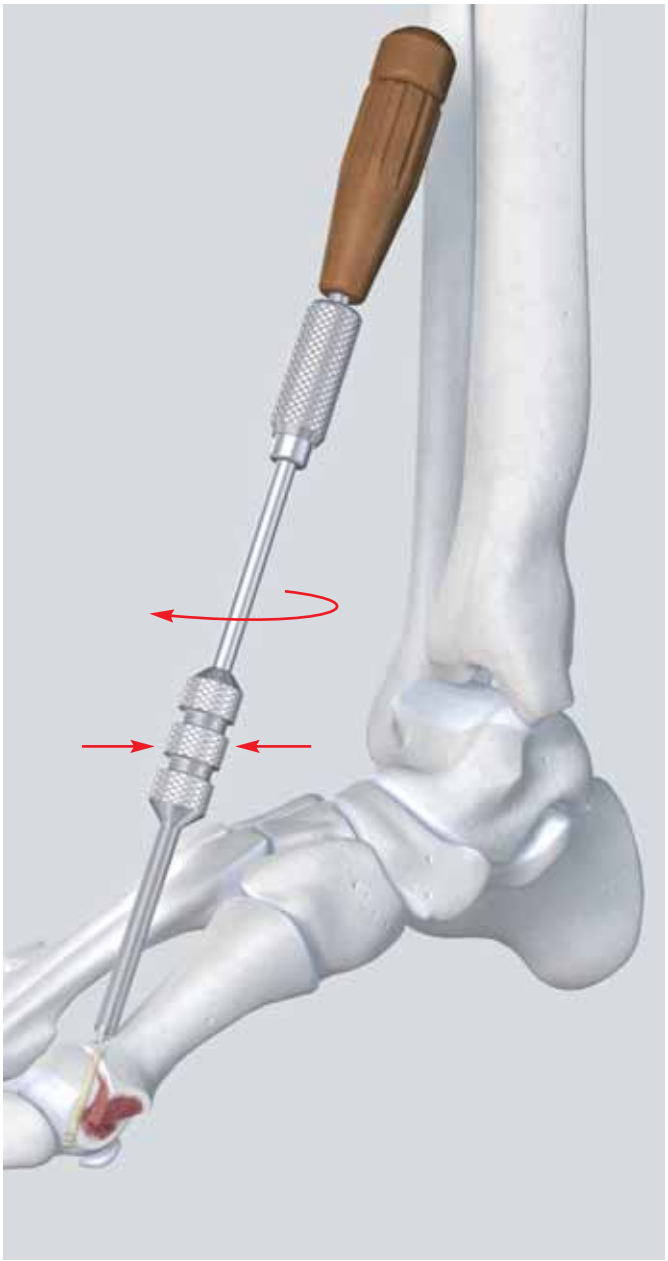
8
Countersink screw

Instruments	
03.226.000	Compression Sleeve
03.226.004	Screwdriver Shaft, cannulated, Stardrive T8
314.430	Handle with Quick Coupling

Remove the compression sleeve handle (with the blue cap) and slide the cannulated screwdriver through the compression sleeve.

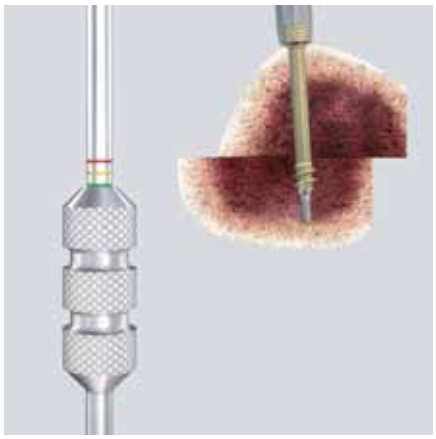
Countersink the screw by turning the screwdriver shaft while simultaneously holding the compression sleeve stationary.

Verify the screw position with the image intensifier. Ensure that the screw tip does not penetrate the distal cortex. Remove and dispose of the guide wire.

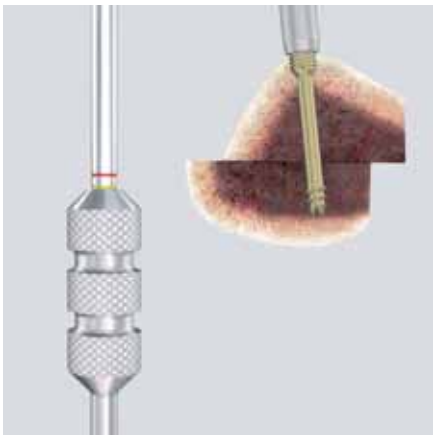


Color markings

The color markings on the screwdriver shaft show the position of the screwdriver tip and head thread of the screw.

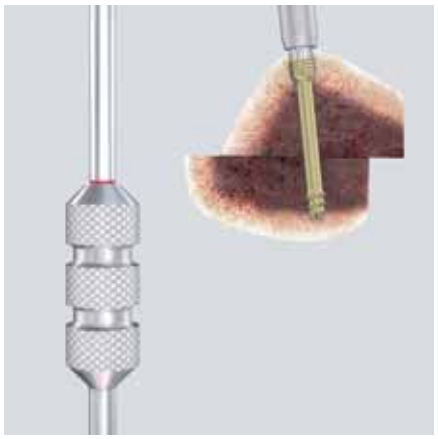


Green mark at the top end of the compression sleeve
The screwdriver tip is seated correctly in the Stardrive recess of the screw.



Yellow mark at the top end of the compression sleeve
The top end of the head thread is even with the bone surface.

Note: If the screw is inserted at an angle, it must be countersunk further than the yellow mark so that it does not project from the surface.



Red mark at the top end of the compression sleeve
The top end of the head thread is approximately 2 mm below the bone surface.

9

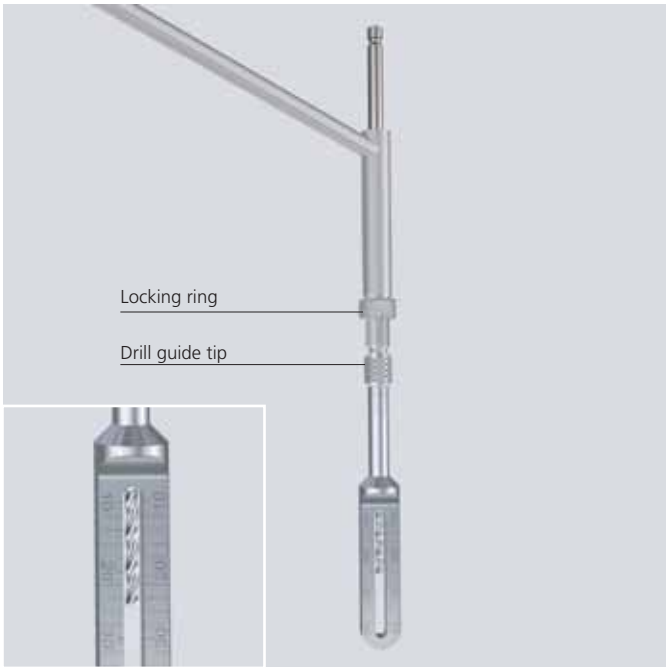
Remove protruding bone

Remove the protruding bone of the proximal fragment

Using the Drill Guide with Stop

The drill guide with stop allows control of the drilling depth and can be used for drilling instead of the double drill guide (312.151).

Instruments	
310.221	2.0 mm Drill Bit
03.226.007	Drill Guide with Stop
03.226.008	Direct Measuring Device for Drill Guide with Stop



To set the drilling depth, insert the drill bit in the drill guide with stop, and slide the measuring device over the drill bit until the retaining device is engaged.

Release the locking ring, and set the drilling depth by rotating the tip of the drill guide. The measurement on the measuring device indicates the set drilling depth in millimetres.

Tighten the locking ring to fix the drilling depth.

Screw Extraction

Instruments

314.467 or 03.226.004	Screwdriver Shaft, Stardrive T8 Screwdriver Shaft, cannulated, Stardrive T8
03.226.000	Compression Sleeve
314.430	Handle with Quick Coupling

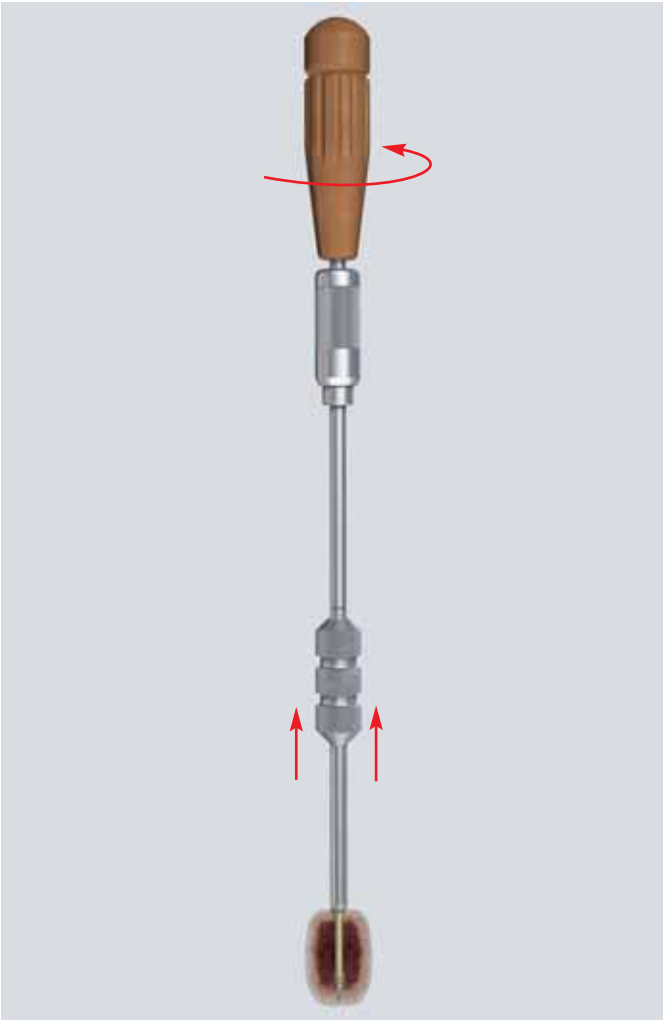
For extraction of the HCS use one of the two Stardrive T8 screwdrivers.

If the screw strips, use the following procedure:

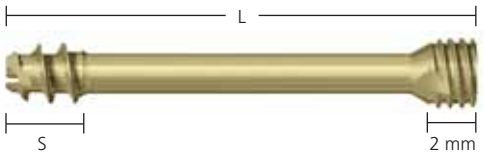
Twist the compression sleeve over the head thread and insert the screwdriver through the compression sleeve into the Stardrive recess of the screw.

Remove the screw by simultaneously pulling on the compression sleeve and turning both the screwdriver and the compression sleeve in counterclockwise direction.

Note: If necessary, expose the recess and part of the head thread with a hollow reamer (e.g. 309.035) or preferred method.



3.0 mm HCS, short thread



Art. No.	Screw length (mm) L	Shaft thread length (mm) S
0X.226.010	10	4
0X.226.011	11	4
0X.226.012	12	4
0X.226.013	13	4
0X.226.014	14	4
0X.226.015	15	4
0X.226.016	16	4
0X.226.017	17	4
0X.226.018	18	4
0X.226.019	19	4
0X.226.020	20	4
0X.226.021	21	4
0X.226.022	22	4
0X.226.023	23	4
0X.226.024	24	5
0X.226.025	25	5
0X.226.026	26	5
0X.226.027	27	6
0X.226.028	28	6
0X.226.029	29	6
0X.226.030	30	7
0X.226.032	32	7
0X.226.034	34	8
0X.226.036	36	9
0X.226.038	38	9
0X.226.040	40	10

Shaft thread length is approximately 20% of the screw length.

X=2: Steel
X=4: Titanium

All screws are also available sterile packed.

3.0 mm HCS, long thread

Art. No.	Screw length (mm) L	Shaft thread length (mm) S
0X.226.116	16	5
0X.226.117	17	6
0X.226.118	18	6
0X.226.119	19	7
0X.226.120	20	7
0X.226.121	21	8
0X.226.122	22	8
0X.226.123	23	8
0X.226.124	24	8
0X.226.125	25	8
0X.226.126	26	10
0X.226.127	27	10
0X.226.128	28	10
0X.226.129	29	10
0X.226.130	30	12
0X.226.132	32	12
0X.226.134	34	14
0X.226.136	36	14
0X.226.138	38	16
0X.226.140	40	16

Shaft thread length is approximately 40% of the screw length.

X=2: Steel
X=4: Titanium

All screws are also available sterile packed.

Instruments

Standard instruments

292.622	Guide Wire ∅ 1.1 mm with threaded tip with trocar, Length 150 mm	
292.623	Guide Wire ∅ 1.1 mm with trocar tip Length 150 mm	
312.151	Double Drill Guide 2.0/1.1 mm For protecting soft tissue during insertion of guide wires and predrilling	
03.226.002	Direct Measuring Device For determining the appropriate screw length	
310.221	Drill Bit ∅ 2.0 mm, cannulated For predrilling	
03.226.000	Compression Sleeve For closing the fracture gap and compressing the bone fragments	

03.226.006	Handle for Compression Sleeve	
311.430	Handle with Quick Coupling For Stardrive T8 Screwdriver Shafts (03.226.004 and 314.467) and Trapezium Burr (03.226.003)	
03.226.004	Screwdriver Shaft, cannulated, Stardrive T8 For countersinking the screw; with color markings to control countersink depth	
314.467	Screwdriver Shaft, Stardrive T8 For screw extraction; with self-retaining tip	
319.970	Screw Forceps	
319.292	Cleaning Stylet ∅ 1.1 mm For cleaning cannulated instruments during surgery	
319.291	Cleaning Brush ∅ 1.25 mm For postoperative cleaning of cannulated instruments	

Optional instruments

03.226.003	Trapezium Burr, cannulated For freeing the palmar approach to the distal pole of the scaphoid	
03.226.005	Protection Sleeve for Trapezium Burr For protecting soft tissue during use of the trapezium burr	
03.226.007	Drill Guide with Stop For controlled drilling	
03.226.008	Direct Measuring Device for Drill Guide with Stop For determining the drilling depth	
398.408	Periosteal Elevator For manipulating small bones and bone fragments	
398.409	Sharp Reduction Hook For levering up carpal bones	

Set List

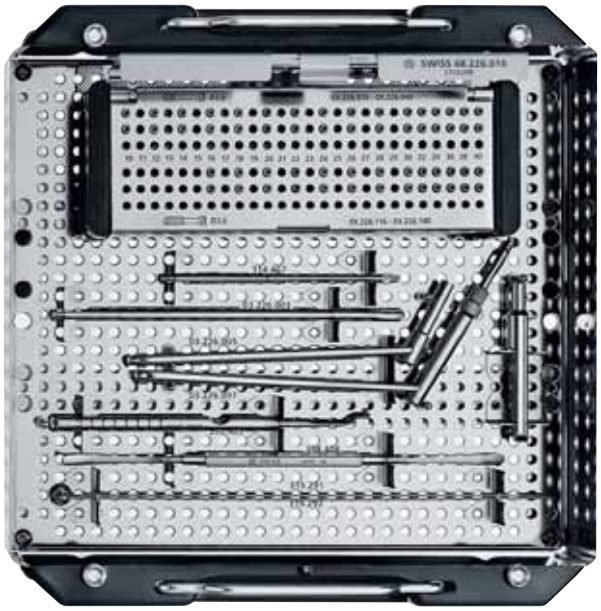
Instrument Set for HCS – Headless Compression Screw ∅ 3.0 mm in Vario Case

01.226.002	Implants in stainless steel
01.226.004	Implants in titanium

Case

68.226.000	Vario Case for Instrument Set for HCS – Headless Compression Screw ∅ 3.0 mm, without Lid, without Contents

The Vario Case offers space for standard and optional instruments



Instruments

		Pieces
03.226.000	Compression Sleeve for HCS – Headless Compression Screw ∅ 3.0 mm	1
03.226.002	Direct Measuring Device for HCS – Headless Compression Screw ∅ 3.0 mm	1
03.226.004	Screwdriver Shaft, cannulated, Stardrive T8, with coloured marking, for HCS – Headless Compression Screw ∅ 3.0 mm	1
03.226.006	Handle for Compression Sleeve, for HCS – Headless Compression Screw ∅ 3.0 mm	1
292.622	Guide Wire ∅ 1.1 mm with threaded tip with trocar, length 150 mm, Stainless Steel	10
292.623	Guide Wire ∅ 1.1 mm with trocar tip, length 150 mm, Stainless Steel	10
310.221	Drill Bit ∅ 2.0/1.15 mm, cannulated, length 150/48 mm, 3-flute, for Quick Coupling	2
311.430	Handle with Quick Coupling, length 110 mm	1
312.151	Double Drill Guide 2.0/1.1	1
314.467	Screwdriver Shaft, Stardrive T8, self-holding	1
319.291	Cleaning Brush ∅ 1.25 mm, for Cannulated Instruments	1
319.292	Cleaning Stylet ∅ 1.1 mm, for Cannulated Instruments	1
319.970	Screw Forceps, self-holding, length 85 mm	1

Implants

3.0 mm HCS, short thread

0X.226.010	2 pcs
0X.226.012	2 pcs
0X.226.014	2 pcs
0X.226.016	2 pcs
0X.226.018	2 pcs
0X.226.020	2 pcs
0X.226.022	2 pcs
0X.226.024	2 pcs
0X.226.026	2 pcs
0X.226.028	2 pcs
0X.226.030	2 pcs
0X.226.032	2 pcs
0X.226.034	2 pcs
0X.226.036	2 pcs
0X.226.038	2 pcs
0X.226.040	2 pcs

3.0 mm HCS, long thread

0X.226.116	2 pcs
0X.226.118	2 pcs
0X.226.120	2 pcs
0X.226.122	2 pcs
0X.226.124	2 pcs
0X.226.126	2 pcs
0X.226.128	2 pcs
0X.226.130	2 pcs
0X.226.132	2 pcs
0X.226.134	2 pcs
0X.226.136	2 pcs
0X.226.138	2 pcs
0X.226.140	2 pcs

X=2: Steel
X=4: Titanium

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