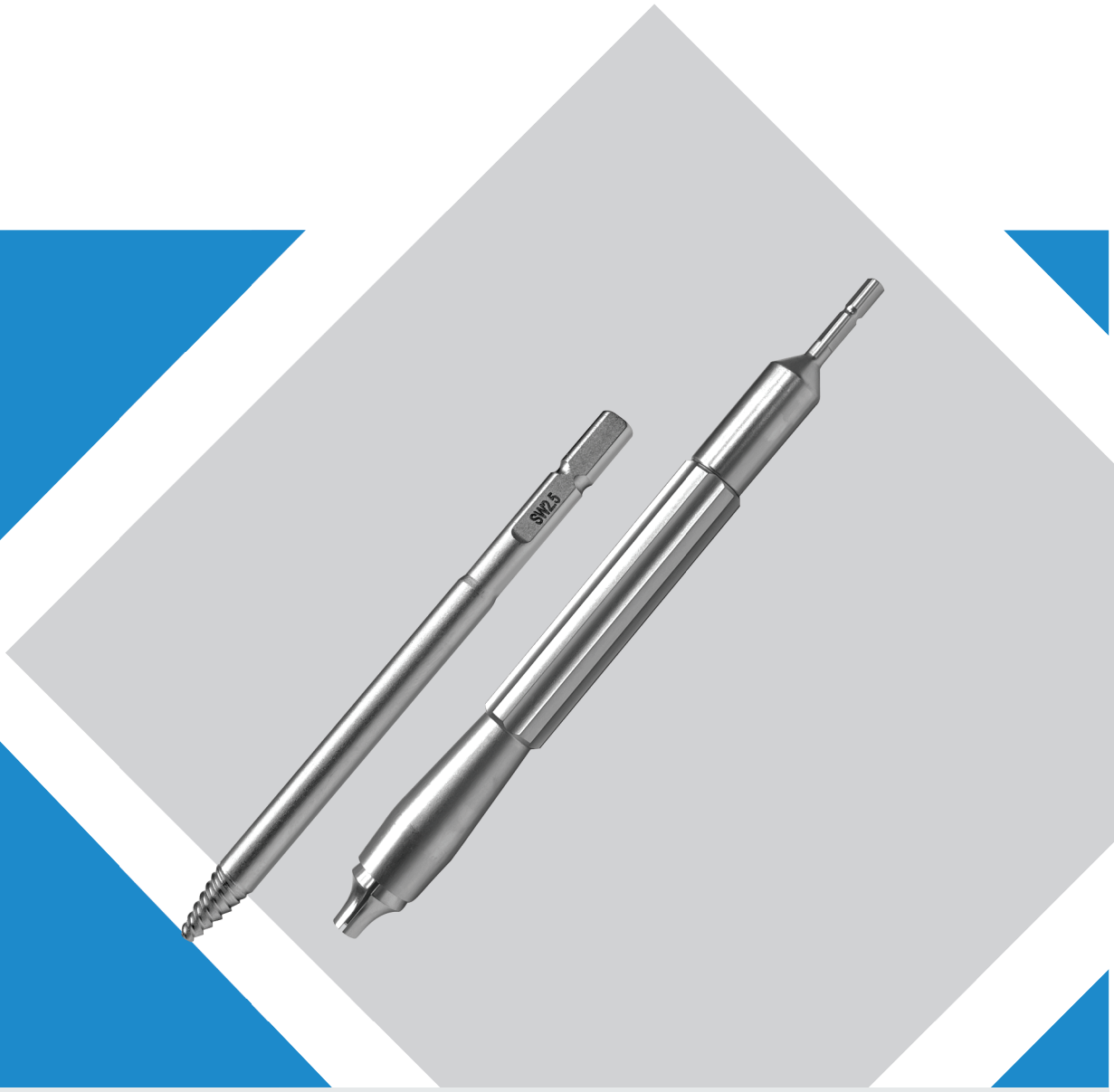
Auxein®



Surgical Technique

Broken Screw Removal

about us

Auxein Medical is an integrated, research based, orthopaedic Implants & instruments manufacturing company, producing a wide range of quality, affordable generic implants, trusted by healthcare professionals and patients across geographies. It is the Company's constant endeavor to provide a wide basket of generic and our innovator products that exceed the highest expectations of customers in term of quality and safety. The company has world-class manufacturing unit established in india and serves customers in over 75 countries worldwide.

Our Achievements

Guidelines

This publication sets forth detailed recommended procedures for using Auxein Medical devices and instruments.

It offers guidance that needs to be heeded. However, with any such technical guide, each surgeon must consider the unique needs of each patient and make appropriate adjustments when and as required.

A workshop training under DAIS Academy by Auxein will provide assistance prior to first surgery. It is vital to know that all non-sterile devices must be cleaned and sterilized before use.

Moreover, multi-component instruments must be disassembled for cleaning. The surgeon must discuss all relevant risks, including the finite lifetime of the device, with the patient, when necessary.

Please NOTE that all the bone screws referenced in this document here are not approved for screw attachment or fixation in the areas not mentioned in this publication.

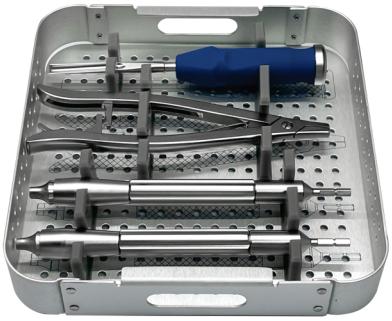
Warning:
This description is not sufficient for immediate application of the instrumentation. Instruction by a surgeon experienced in handling this instrumentation is highly recommended.

DAIS
Division of Auxein Institute for Surgeons

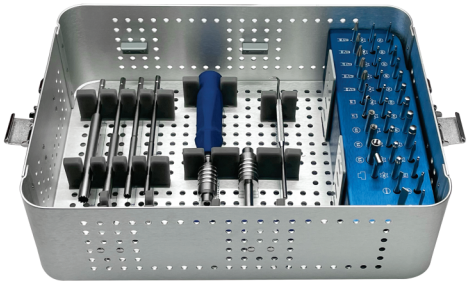
Organised by: Auxein

Screw Removal Set, Instruments for removing

The Screw Removal Set contains instruments required for removing intact screws or damaged screws that are difficult to remove.



Modular design
The modular design ensures that the assembly is ideally suited to requirements and the set is always complete. The clear layout makes the instruments easy to locate, thereby reducing the danger of selecting the wrong instrument.



Comprehensive system

All existing Auxein screws can be removed with the instruments supplied in the Screw Removal Set. This prevents delays caused by missing or incorrect instruments.

The screw removal set contains screwdriver shafts for all screw sizes and drives, as well as extraction instruments for removing broken and damaged screws.

The set contains instruments to remove all screws with the following drive recesses:

- Hex: 1.5 mm,2.0 mm, 2.5 mm,3.0 mm, 3.5 mm,4.0 mm,4.5 mm, 5.0 mm, and 5.5 mm.
- StarDrive Recess: T6, T6.2, T7, T8, T9, T10, T15, T18, T20, T25, & T30,
- Crosshead screwdriver
- Square screwdriver hex 1.2mm, 1.5mm
- Triangle screwdriver 1.7mm

The set contains instruments for removing the following screws:

- Cortex screws
- Cancellous bone screws
- Shaft screws
- Cannulated screws
- Locking screws
- Locking bolts

Broken Screw Removal

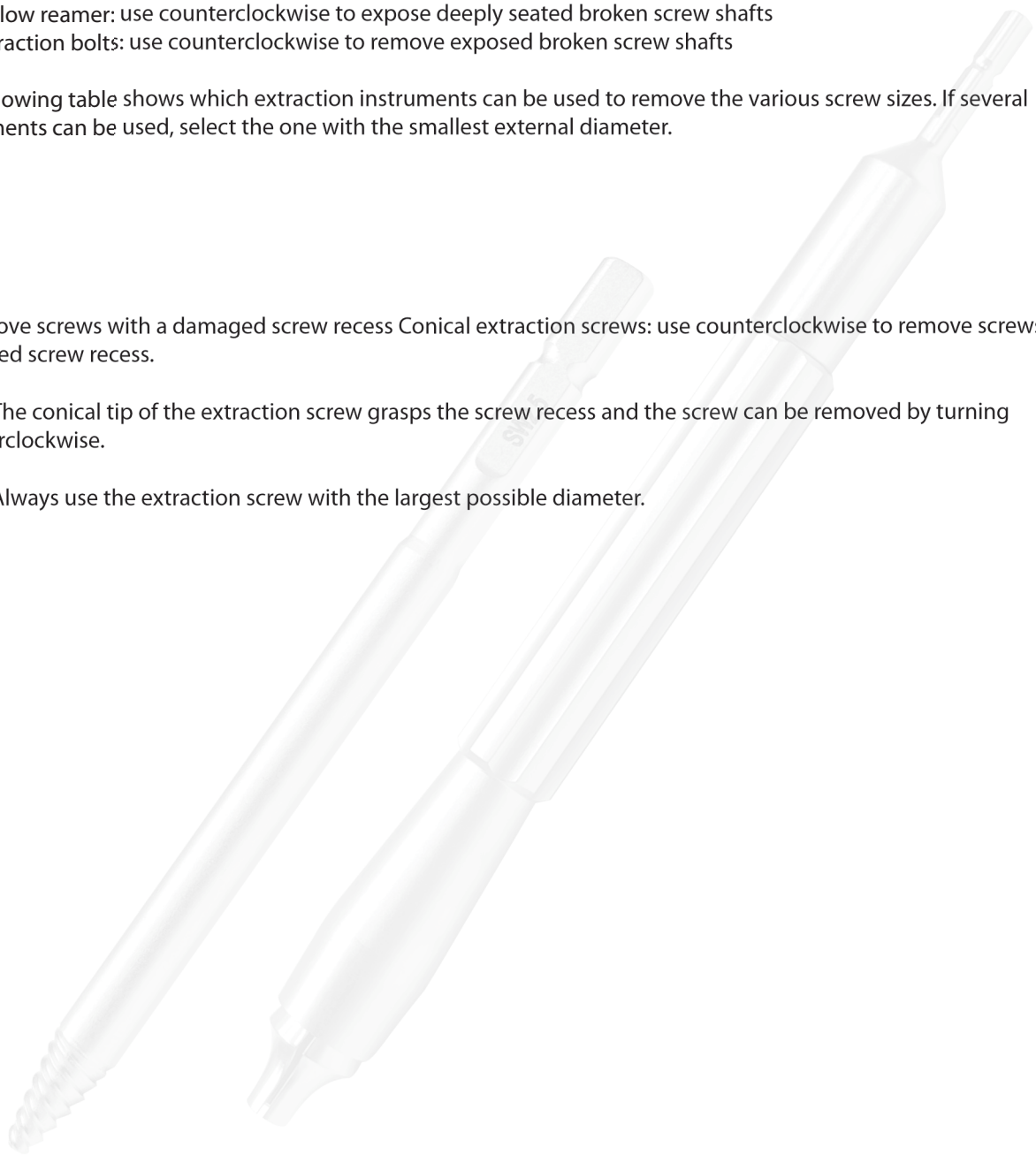
To remove intact screws

- Hex screwdriver shafts
- StarDrive Screwdriver shafts
- Cruciform screwdriver shafts

To remove broken screws

- Hollow reamer: use counterclockwise to expose deeply seated broken screw shafts
- Extraction bolts: use counterclockwise to remove exposed broken screw shafts

The following table shows which extraction instruments can be used to remove the various screw sizes. If several instruments can be used, select the one with the smallest external diameter.



To remove screws with a damaged screw recess Conical extraction screws: use counterclockwise to remove screws with a damaged screw recess.

Note: The conical tip of the extraction screw grasps the screw recess and the screw can be removed by turning counterclockwise.

Note: Always use the extraction screw with the largest possible diameter.

Preoperative Planning and Preparation

Preoperative planning
Gather information: Before the implant removal, the surgeon should gather the following information:

- Implant type: Identify the specific type of implant that was used.
- Time of implantation: Note the duration since the implant was initially placed.
- Material: Determine the material of the implant (e.g., steel, titanium).
- Recess geometry and dimensions: Identify the shape (hex, cruciform, StarDrive) and dimensions of the screw recess.
- Screw diameter: Note the diameter of the screws to select appropriate removal instruments.
- Any visible damage: Assess if there are any visible damages to the implant, such as a broken screw shaft.

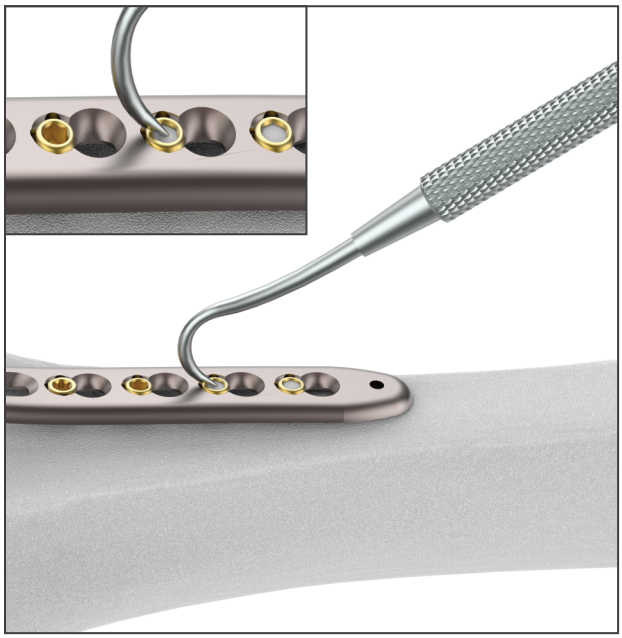
Clean screw recess

Instrument

7-043-47 Sharp Hook for Screw Removal

- Before removing the screws, it is important to clean the screw recess.

- Free the screw recess: Use the sharp hook to carefully remove any ingrown scars or bone tissue from the screw recess. This ensures that the screwdriver can be fully inserted into the recess.



Remove screw

Connect the appropriate screwdriver shaft to a handle with quick coupling.

.

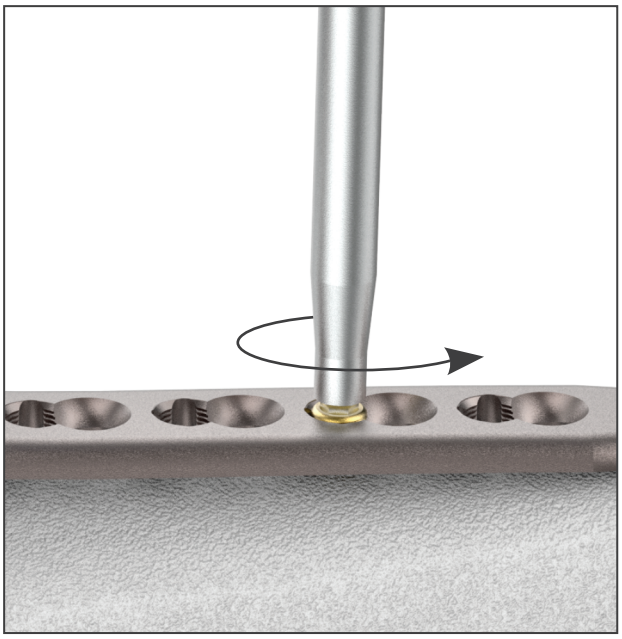
Remove screw continued

Insert the screwdriver fully into the screw recess.

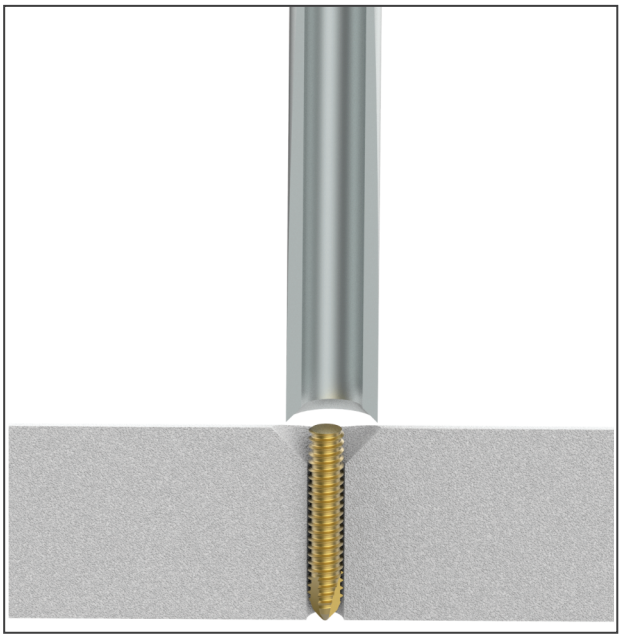
Note: Ensure that the screwdriver shafts are not damaged and are inserted on the same axis as the screw to be removed. The screw recess can be damaged if the screwdriver is not inserted straight or if it is blunt.

Note: To ensure that the loosened screw is not lost in the soft tissues, nor strips its thread in the bone, the screw can be held in position by extraction pliers for screws. Guide the extraction pliers along the screwdriver to the screw head and grasp the screw directly behind the head.

When all screws have been removed, the plate/ internal fixator can be removed.



Option 1: Screw shaft is exposed



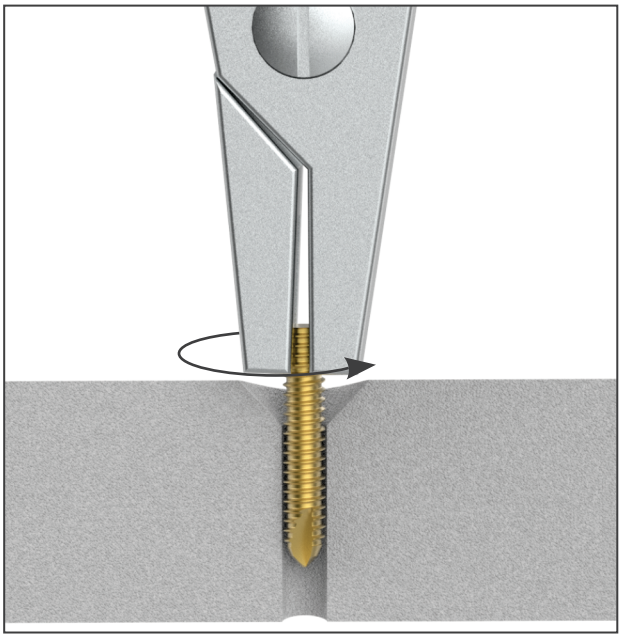
1. Expose the screw shaft

Instrument

7-043-50	Hollow Gouge
7-043-48	Plier for Screw Removal

If the screw head is broken and the shaft is visible on the surface or slightly below the surface, use the hollow gouge to remove the bone surrounding the screw shaft to approximately in the middle of the bone.

2. Remove screw



Instrument

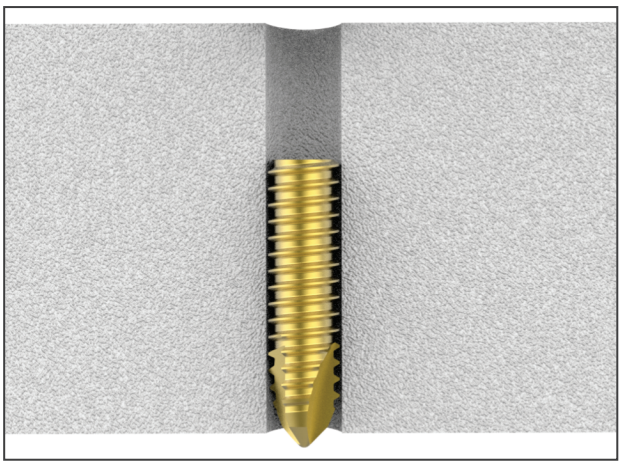
7-043-48 Plier for Screw Removal

- Use the plier for screw removal (instrument **(7-043-48)** to grasp the screw shaft.
- Rotate the pliers counterclockwise to remove the screw. Do not pull or bend the screw.

Notes:

- Ensure that you rotate the screw counterclockwise to remove it. Do not apply excessive force or bend the screw, as this can cause further damage.
- If the forceps for screw removal are not suitable for the specific case, you can use the narrow screw removal pliers instead. These pliers require less space to grasp the screw shaft.

Option 2: Screw shaft is not exposed



1. Expose the screw shaft

Instrument

7-043-01	T-Shaped Handle Quick Coupling
7-043-02	Straight Handle Quick Coupling
7-043-03	Trephine Reamer Ø4mm
7-043-04	Trephine Reamer Ø5mm
7-043-05	Trephine Reamer Ø6.5mm
7-043-06	Trephine Reamer Ø8mm

If the screw shaft is not exposed, you can follow these steps:

1. Expose the screw shaft:

Use the appropriate instrument to create an opening:

- T-Shaped Handle Quick Coupling (instrument **(7-043-01)** or Straight Handle Quick Coupling (instrument **(7-043-02)**
- Select the appropriate size of trephine reamer (instrument **(7-043-03)** for Ø4mm, **(7-043-04)** for Ø5mm, **(7-043-05)** for Ø6.5mm, or **(7-043-06)** for Ø8mm).
- Use the trephine reamer to create an opening or enlarge the existing opening to gain access to the screw shaft.

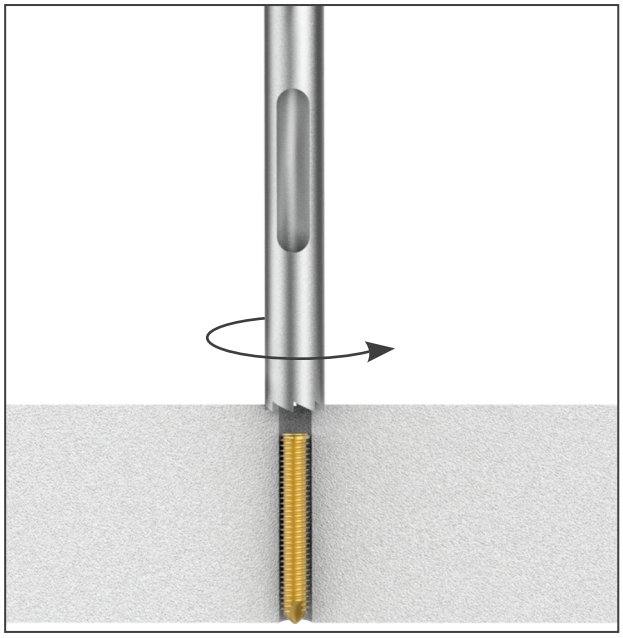
Note: Ensure that you create the opening carefully and precisely to avoid damaging surrounding tissues and structures.

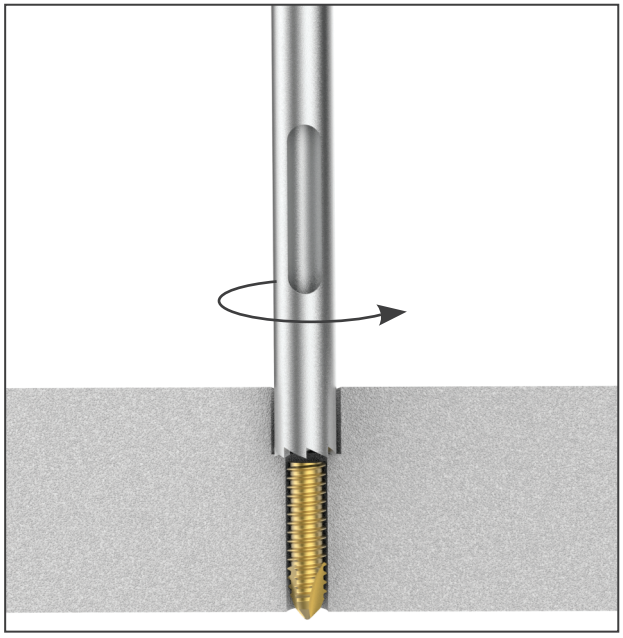
Extraction Bolt.	
Extraction Bolt Ø4.0mm	3.5 mm Locking Screw
Extraction Bolt Ø5.0mm	5.0 mm Locking Screw
Extraction Bolt Ø6.5mm	6.5 mm Locking Screw

Option 2: Screw shaft is not exposed

If the screw shaft has broken off less than approximately 5 mm below the bone surface.

Use the hollow reamer and hollow gouge to create appropriate opening for the corresponding instruments to grasp the screw shaft and extract the screw.

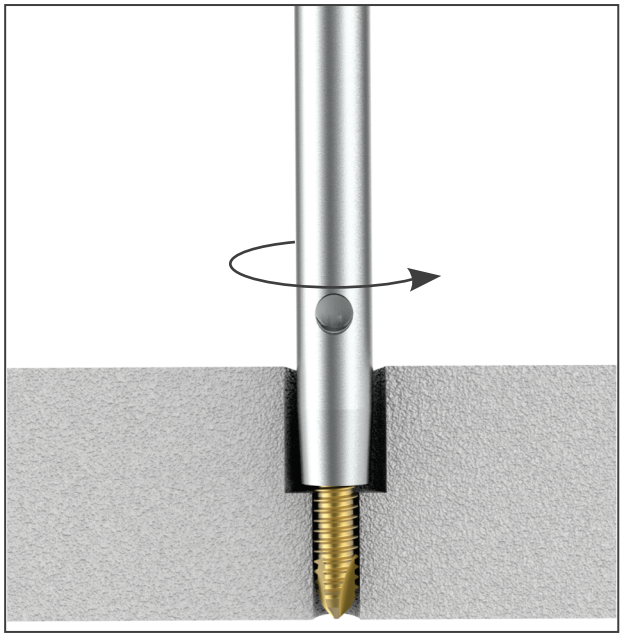




2. Remove screw

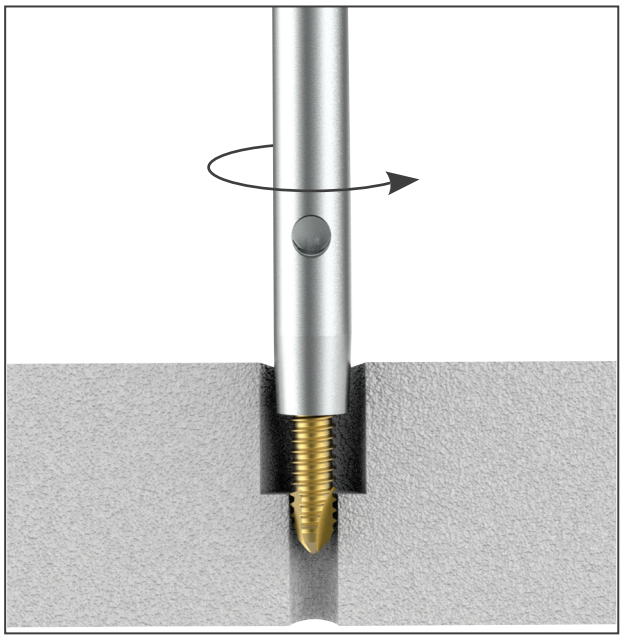
instrument

7-043-12	Extraction Screw Hexagonal 4.0mm Conical
7-043-13	Extraction Screw Hexagonal 3.5mm Conical
7-043-14	Extraction Screw Hexagonal 2.5mm Conical
7-043-15	Extraction Screw Hexagonal 2.7mm Conical
7-043-16	Extraction Screw Hexagonal 2.0mm Conical
7-043-43	Universal Screw Extractor
7-043-01	T-Shaped Handle Quick Coupling
7-043-02	Straight Handle Quick Coupling



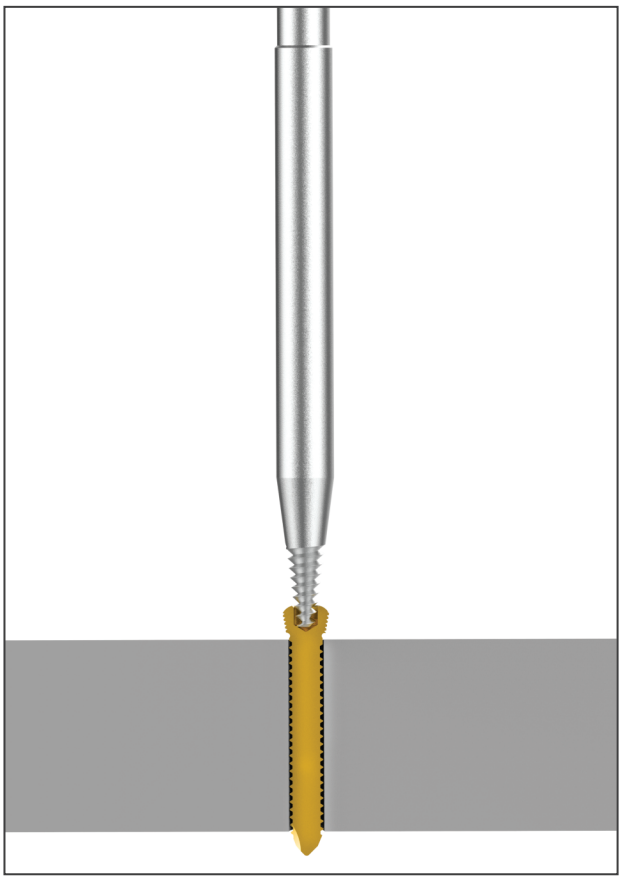
1. Remove the screw:

- Connect the conical extraction screw to the handle with quick coupling.
- Insert the tip of the conical extraction screw into the screw recess.
- Hold the extraction screw as vertically as possible.
- Turn the extraction screw counterclockwise while exerting pressure.
- Continue turning counterclockwise until the extraction screw grasps into the screw recess.
- Keep turning counterclockwise to remove the screw.



Note: During the insertion of the extraction screw, make sure to apply sufficient axial pressure and maintain alignment with the axis of the screw.
Only use sharp-edged extraction screws for this procedure.

3. Removal of Screws with Damaged Recesses



Option 1: Screwdriver turns freely in the recess

1. Remove screw

Instrument

7-043-12	Extraction Screw Hexagonal 4.0mm Conical
7-043-13	Extraction Screw Hexagonal 3.5mm Conical
7-043-14	Extraction Screw Hexagonal 2.5mm Conical
7-043-15	Extraction Screw Hexagonal 2.7mm Conical
7-043-16	Extraction Screw Hexagonal 2.0mm Conical
7-043-01	T-Shaped Handle Quick Coupling
7-043-02	Straight Handle Quick Coupling

- Connect the conical extraction screw to the handle with quick coupling.
- Insert the tip of the conical extraction screw into the screw recess.
- Hold the extraction screw as vertically as possible.
- Turn the extraction screw counterclockwise while exerting pressure.
- Continue turning counterclockwise until the extraction screw grasps into the screw recess.
- Keep turning counterclockwise to remove the screw.

Note: During the insertion of the extraction screw, make sure to apply sufficient axial pressure and maintain alignment with the axis of the screw. Only use sharp-edged extraction screws for this procedure.

Extraction Screw Hexagonal Conical	
Extraction Screw Hexagonal 2.0mm Conical	2.4 mm Wise Lock/ 2.7 mm Cortical Screw
Extraction Screw Hexagonal 2.5mm Conical	3.5 mm Wise Lock/3.5 mm Cortical/4.0 mm Cancellous
Extraction Screw Hexagonal 2.7mm Conical	3.5 mm Wise Lock/3.5 mm Cortical/4.0 mm Cancellous
Extraction Screw Hexagonal 3.5mm Conical	4.5 mm Cortical/ 5.0 mm WL/ 6.5 mm Cancellous
Extraction Screw Hexagonal 4.0mm Conical	7.3 mm Cancellous/ 6.5mm Locking Bolt

4. Remove broken instrument and screw

- Insert the hexagonal conical extraction screw into the predrilled hole.
- Turn the extraction screw counterclockwise while exerting pressure.
- Continue turning counterclockwise until the extraction screw grasps into the screw recess.
- Keep turning counterclockwise to remove the screw.

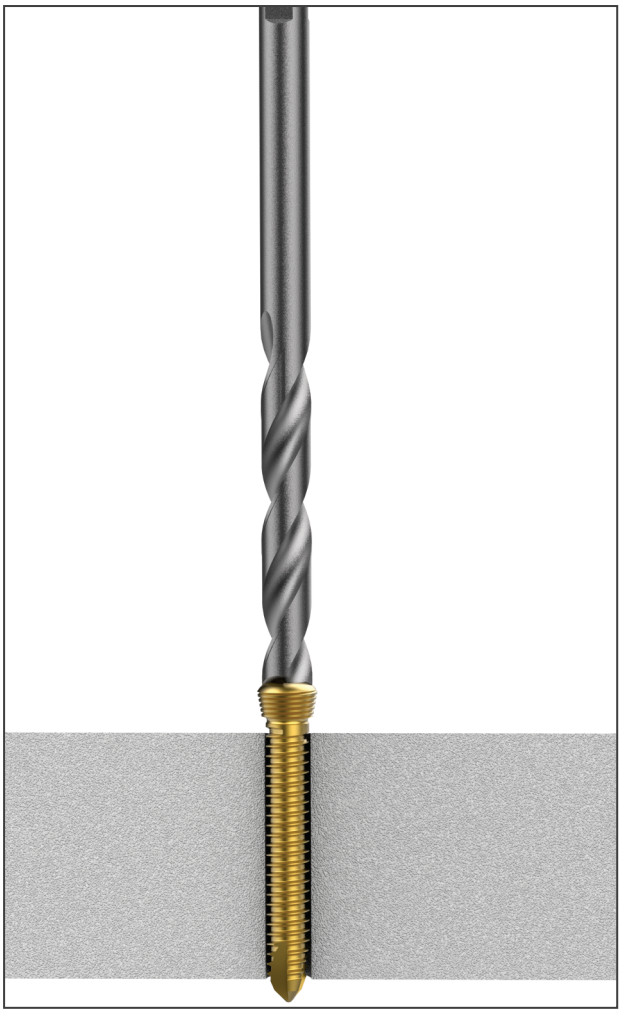
Removal of Jammed Screws

1. preparation for drill

Select the appropriate drill bit and attach it to the universal chuck of the power tool and tighten. If the screw is deep, the carbide drill bit extensions can be used.

Before drilling, attach the appropriate drill sleeve to the drill suction device. Then connect the drill suction device to the irrigation system and the vacuum pump. To release the drill sleeve, press the side flange.

Note: The use of the drill suction device allows efficient aspiration of the drill chips, while simultaneously cooling the drill bit.



2. Drill off screwhead

Switch on the rinsing equipment and the vacuum pump. Position the drill suction device on the relevant screw.

Insert the drill bit into the drill sleeve, start the drill then begin drilling. Carefully drill off the screwhead.

Align the axis of the drill with axis of the screw and maintain this alignment throughout the drilling process. Drill until the screwhead is detached or removed from the screw shaft.

Note: Do not interrupt the water supply. Ensure that the supply and waste hoses are not bent.

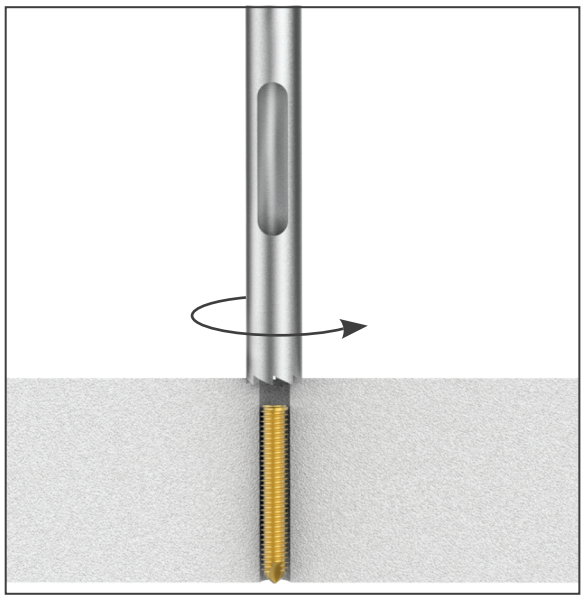
Drill Size	
Drill 4.0 mm Screw	3.5 mm Locking Screw, ,4.0mm Cancellous, 4.5mm Cortical, & 5.0mm Locking.
Drill 5.0 mm Screw	5.0 mm Locking Screw, 6.5mm Cancellous, 7.0mm Cortical, 7.3mm Cancellous.
Drill 6.0 mm Screw	5.0 mm Locking Screw, 6.5mm Cancellous, 7.0mm Cortical, 7.3mm Cancellous.

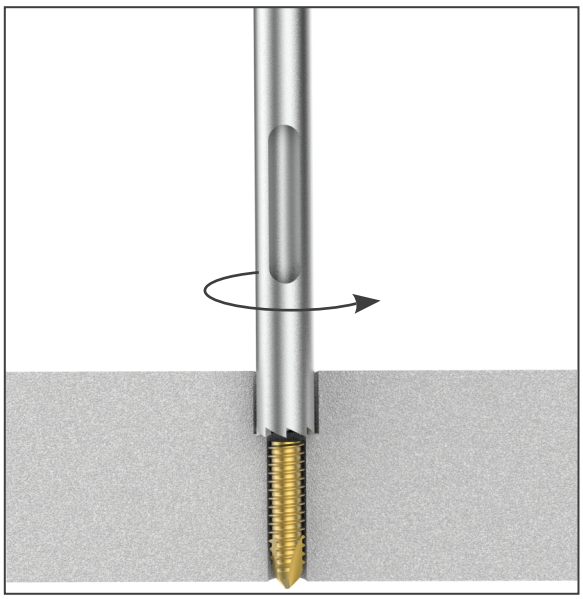
3. Remove remaining screw shaft

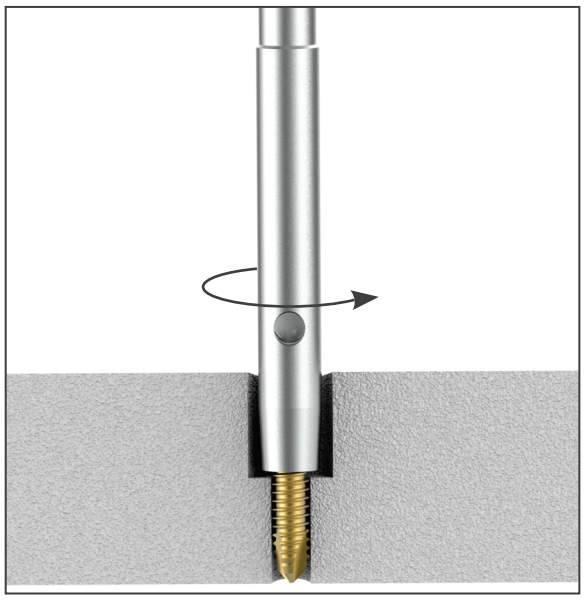
Proceed as for a broken screw.

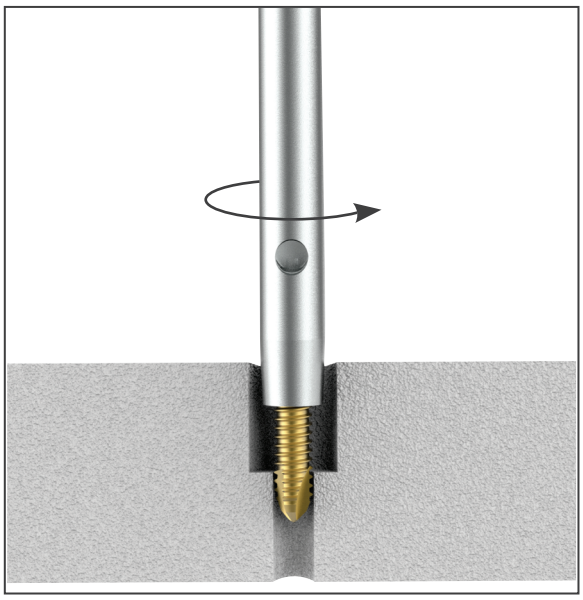
Use the hollow reamer and hollow gouge to create appropriate opening for the corresponding instruments to grasp the screw shaft and extract the screw.

- Connect the conical extraction screw to the handle with quick coupling.
- Insert the tip of the conical extraction screw into the screw recess.
- Hold the extraction screw as vertically as possible.
- Turn the extraction screw counterclockwise while exerting pressure.
- Continue turning counterclockwise until the extraction screw grasps into the screw recess.
- Keep turning counterclockwise to remove the screw.









Instruments

7-043-01 T-Shaped Handle Quick Coupling

7-043-02 Straight Handle Quick Coupling

7-043-03 Trephine Reamer Ø4mm

7-043-04 Trephine Reamer Ø5mm

7-043-05 Trephine Reamer Ø6.5mm

7-043-06 Trephine Reamer Ø8mm

Instruments

7-043-07	Extraction Bolt Ø6.5mm	
7-043-08	Extraction Bolt Ø5.0mm	
7-043-09	Extraction Bolt Ø4.0mm	
7-043-10	Trephine Reamer Ø2.7mm	
7-043-11	Trephine Reamer Ø2.0mm	
7-043-12	Extraction Screw Hexagonal 4.0mm Conical	

Instruments

7-043-13	Extraction Screw Hexagonal 3.5mm Conical	
7-043-14	Extraction Screw Hexagonal 2.5mm Conical	
7-043-15	Extraction Screw Hexagonal 2.7mm Conical	
7-043-16	Extraction Screw Hexagonal 2.0mm Conical	
7-043-17	Slotted Screwdriver Small	
7-043-18	Slotted Screwdriver Large	

Instruments

7-043-19	Crosshead Screwdriver	
7-043-20	Square Screwdriver, Hex 1.2mm	
7-043-21	Square Screwdriver, Hex 1.5mm	
7-043-22	Star Screwdriver Shaft, T30	
7-043-23	Star Screwdriver Shaft, T25	
7-043-24	Star Screwdriver Shaft, T20	

Instruments

7-043-25	Star Screwdriver Shaft, T18	
7-043-26	Star Screwdriver Shaft, T15	
7-043-27	Star Screwdriver Shaft, T10	
7-043-28	Star Screwdriver Shaft, T9	
7-043-29	Star Screwdriver Shaft, T8	
7-043-30	Star Screwdriver Shaft, T7	

Instruments

7-043-31	Star Screwdriver Shaft, T6.2	
7-043-32	Star Screwdriver Shaft, T6	
7-043-33	Triangle Screwdriver 1.7mm	
7-043-34	Hexagonal Screwdriver, Hex 5.5mm	
7-043-35	Hexagonal Screwdriver, Hex 5.0mm	
7-043-36	Hexagonal Screwdriver, Hex 4.5mm	

Instruments

7-043-37	Hexagonal Screwdriver, Hex 4.0mm	
7-043-38	Hexagonal Screwdriver, Hex 3.5mm	
7-043-39	Hexagonal Screwdriver, Hex 3.0mm	
7-043-40	Hexagonal Screwdriver, Hex 2.5mm	
7-043-41	Hexagonal Screwdriver, Hex 2.0mm	
7-043-42	Hexagonal Screwdriver, Hex 1.5mm	

Instruments

7-043-43 Universal Screw Extractor

7-043-44 High Speed Drill Bit Ø4 x Length 70mm

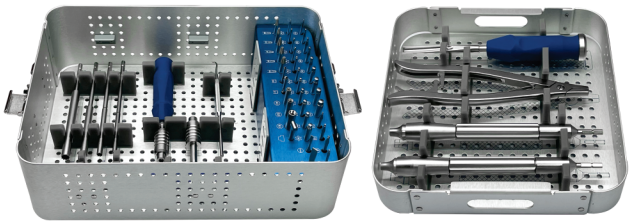
7-043-45 High Speed Drill Bit Ø5 x Length 70mm

7-043-46 High Speed Drill Bit Ø6 x Length 70mm

7-043-47 Sharp Hook for Screw Removal

7-043-48 Plier for Screw Removal

Instruments

7-043-49	Spinal Monoaxial Pedicle Screwdriver	
7-043-50	Hollow Gouge	
7-043-51	Tray for Broken Screw Removal Instruments	
7-043-52	Container for Broken Screw Removal Instruments	

Instruments

7-043 Broken Screw Removal Instrument Set

Instruments

7-043 Broken Screw Removal Instrument Set

Code	Set Consisting of	Qty.
7-043-01	T-Shaped Handle Quick Coupling	1
7-043-02	Straight Handle Quick Coupling	1
7-043-03	Trephine Reamer Ø4mm	1
7-043-04	Trephine Reamer Ø5mm	1
7-043-05	Trephine Reamer Ø6.5mm	1
7-043-06	Trephine Reamer Ø8mm	1
7-043-07	Extraction Bolt Ø6.5mm	1
7-043-08	Extraction Bolt Ø5.0mm	1
7-043-09	Extraction Bolt Ø4.0mm	1
7-043-10	Extraction Bolt Ø2.7mm	1
7-043-11	Extraction Bolt Ø2.0mm	1
7-043-12	Extraction Screw Hexagonal 4.0mm Conical	1
7-043-13	Extraction Screw Hexagonal 3.5mm Conical	1
7-043-14	Extraction Screw Hexagonal 2.5mm Conical	1
7-043-15	Extraction Screw Hexagonal 2.7mm Conical	1
7-043-16	Extraction Screw Hexagonal 2.0mm Conical	1
7-043-17	Slotted Screwdriver Small	1
7-043-18	Slotted Screwdriver Large	1
7-043-19	Crosshead Screwdriver	1
7-043-20	Square Screwdriver, Hex 1.2mm	1
7-043-21	Square Screwdriver, Hex 1.5mm	1
7-043-22	Star Screwdriver Shaft, T30	1
7-043-23	Star Screwdriver Shaft, T25	1
7-043-24	Star Screwdriver Shaft, T20	1
7-043-25	Star Screwdriver Shaft, T18	1
7-043-26	Star Screwdriver Shaft, T15	1
7-043-27	Star Screwdriver Shaft, T10	1
7-043-28	Star Screwdriver Shaft, T9	1
7-043-29	Star Screwdriver Shaft, T8	1
7-043-30	Star Screwdriver Shaft, T7	1
7-043-31	Star Screwdriver Shaft, T6.2	1
7-043-32	Star Screwdriver Shaft, T6	1
7-043-33	Triangle Screwdriver 1.7mm	1
7-043-34	Hexagonal Screwdriver, Hex 5.5mm	1
7-043-35	Hexagonal Screwdriver, Hex 5.0mm	1

Instruments

Code	Set Consisting of	Qty.
7-043-36	Hexagonal Screwdriver, Hex 4.5mm	1
7-043-37	Hexagonal Screwdriver, Hex 4.0mm	1
7-043-38	Hexagonal Screwdriver, Hex 3.5mm	1
7-043-39	Hexagonal Screwdriver, Hex 3.0mm	1
7-043-40	Hexagonal Screwdriver, Hex 2.5mm	1
7-043-41	Hexagonal Screwdriver, Hex 2.0mm	1
7-043-42	Hexagonal Screwdriver, Hex 1.5mm	1
7-043-43	Universal Screw Extractor	2
7-043-44	High Speed Drill Bit Ø4 x Length 70mm	1
7-043-45	High Speed Drill Bit Ø5 x Length 70mm	1
7-043-46	High Speed Drill Bit Ø6 x Length 70mm	1
7-043-47	Sharp Hook for Screw Removal	1
7-043-48	Plier for Screw Removal	1
7-043-49	Spinal Monoaxial Pedicle Screwdriver	1
7-043-50	Hollow Gouge	1
7-043-51	Tray for Broken Screw Removal Instruments	2
7-043-52	Container for Broken Screw Removal Instruments	1

AMPL-ST-142-00, Effective Date: 06/06/2023

USA
Auxein Inc.
1500 Nw 89th Court, Suite 107-108
Doral, Florida 33172
Tel: +1 305 395 6062
E Fax: +1 305 395 6262
Email: USoffice@auxein.com

MEXICO
Auxein México, S.A. de C.V.
Tepic 139 int 801, Colonia Roma Sur,
Alcaldía Cuauhtémoc, CDMX,
México, C.P. 06760
Tel: +521 55 7261 0318
Email: info@auxein.mx

INDIA
Auxein Medical Pvt. Ltd.
Plot No. 168-169-170, Phase-4,
Kundli Industrial Area,
HSIIDC, Sector-57, Sonepat - 131028, Haryana
Tel: +91 99106 43638 | Fax: +91 86077 70197
Email: info@auxein.com

www.auxein.com