Please read this manual carefully before using the system for the first time and always observe the clinical indications, directions and notes in the instructions for use of the system components and instruments. Furthermore, we recommend that all users attend a training course specific to the system prior to first using a new implant system.

Some products may not be available in all countries. Please contact your DENTSPLY Implants representative to obtain up-to-date information on the product range and on availability.

To improve readability for our customers, DENTSPLY Implants does not use “®” or “™” in body copy. However, DENTSPLY Implants does not waive any right to the trademark and nothing herein shall be interpreted to the contrary.

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Warnings and precautions

These instructions for use must be read prior to using ANKYLOS components. The ANKYLOS components may only be used for their intended purpose according to the general rules for dental/surgical treatment, occupational safety and accident prevention. ANKYLOS components must only be used for medical/dental procedures, with the ANKYLOS implant system. If the indication and use are unclear, treatment should be suspended until these points have been clarified. The following instructions are not adequate to allow inexperienced clinicians to administer professional implant dentistry. We recommend that an experienced user provides proper use instructions. ANKYLOS components must only be used by dentists and surgeons with training and experience in oral surgery, prosthetics as well as diagnosis and preoperative planning. DENTSPLY Implants Manufacturing GmbH is not liable for damages resulting from use outside the intended use of the product.

The following complications have arisen occasionally when using these instruments:
- Components used in the patient’s mouth have been aspirated or swallowed.
- Osseointegration has failed due to the implant being manipulated or implant loss.
- Necessity of explantation of the implant after breakage of instruments and associated damage to anatomical structures.
- Slipping of instruments which may damage the surrounding structures.
- Instruments becoming jammed.
- Breakage of instruments.

There are general residual risks in spite of correct use of the RepairSet:
- Restoration of the implant may not be possible and the implant has to be explanted.
- The connection taper of the implant is damaged, and it cannot be properly secured, the implant must be removed.
- If the internal straining screw has broken off at the same level as the abutment, the operational conditions are made considerably more difficult.
- The preparation of the thread may not be possible and therefore the prosthetic restoration cannot be preserved.
- Removal of remaining fracture fragments requires experience, time and patience.
- Always use water cooling and drill with a surgical unit
- Use 1800 rpm for drilling and a pressure that creates visible burs.
- Always drill in the direction of the screw / screw channel
- Prepare a flap to provide visibility to the implant shoulder, carefully expose the implant.
- Never get drills and taps wedged. These instruments are made from hardened steels and thus difficult to remove in case of fracture.
- A fracture of drills might result in the necessity to remove the implant.

The following precautions are to be met prior to or during treatment:
- Prior to each procedure it must be ensured that all necessary components, instruments and materials are available in the required quantities and are fully operational.
- No product intended for single use may be reused. Noncompliance generally leads to the risk of complications due to a lack of accuracy and precision of the instruments through to fractures of the instruments!
- Always wear protective clothing for your own safety.
- Position the patient such that the danger of aspiration or swallowing.
- Schedule sufficient time for careful use of the repair instruments.
- Adequate space should be ensured around the implant to be repaired.
- Replace dull drills immediately.
- Where the repair is not successful (e.g. breakage of an instrument), a trephine drill adjusted to the diameter of the implant should be kept ready for explantation of the implant.
- Replacement of a fracture fragment requires experience, time and patience.
- Always use water cooling and drill with a surgical unit
- Use 1800 rpm for drilling and a pressure that creates visible burs.
- Always drill in the direction of the screw / screw channel
- Prepare a flap to provide visibility to the implant shoulder, carefully expose the implant.
- Never get drills and taps wedged. These instruments are made from hardened steels and thus difficult to remove in case of fracture.
- A fracture of drills might result in the necessity to remove the implant.

Construction principles of abutments

Abutments with straining screw

Many of the prosthetic abutments (e.g. Regular abutments) have an integrated straining screw. This straining screw is mobile but not removable. These Abutments with straining screw consist of
- abutment body (grey)
- shaft of straining screw (red)
- thread ring (yellow)

The thread ring is laser-welded onto the bottom of the straining screw. Excessive torque might result in the failure of this attachment.

One-piece abutments

One-piece abutments (e.g. straight standard abutments) are made in one piece from the abutment head into the taper connection and threads. These abutments do not have a screw channel.
Repair instruments and accessories

**Pre-requisites**
- Repair instruments and accessories

**ANKYLOS**
- Taper Protection
- Holder for Taper Protection
- Handle for Taper Protection

**Order no.**
- 3103 4620
- 3103 4630
- 3103 4610

**ANKYLOS Crown Cutter**
- Rotation Counterclockwise

**Order no.**
- 3103 4640
- 3103 4648
- 3103 4630

**ANKYLOS End-cutting Drill**
- for Individual Screw Retention

**Order no.**
- 3103 4690
- 3103 4691
- 3103 4692

**ANKYLOS Twist Drill 1.4 mm**

**Order no.**
- 3103 4693
- 3103 4694
- 3103 3070
- 3103 3080
- 3103 3090
- 3103 4650
- 3103 4610

**ANKYLOS Handle**
- for Technical Taps
- Handle for Screwdriver standard Ø 12 mm
- Unscrew Instrument, Repair Kit
- Tap M 1.8
- Tap M 1.2

**Order no.**
- 3103 3425
- 3103 3426
- 3103 4640
- 3103 4670
- 3103 4680

**ANKYLOS Ratchet Insert**
- for extraction bolt
- for Manual Instruments for conical reamers and taps

**Order no.**
- 3103 4693
- 3103 4694
- 3103 3070
- 3103 3080
- 3103 3090
- 3103 4650
- 3103 4610

**ANKYLOS Ratchet Insert**
- for extraction bolt
- Screw fragment removal instrument

**Order no.**
- 3103 4693
- 3103 4694
- 3103 3070
- 3103 3080
- 3103 3090

**ANKYLOS Thread core drill M 1.6**

**ANKYLOS Screw tap M 1.6**

**ANKYLOS Extraction bolt**

**Order no.**
- 3103 4690
- 3103 4691
- 3103 4692

**Order no.**
- 3103 3425
- 3103 3426
- 3103 4640
- 3103 4670
- 3103 4680

**Order no.**
- 3103 4690
- 3103 4691
- 3103 4692

**Order no.**
- 3103 7500
- 3103 7502

- Check shipment of repair instruments for being complete
- Have surgical kit for ratchet and ratchet inserts at hand
- Depending on the individual case the following instruments and accessories can be helpful:
  - Diamond coated fine apex tongs
  - Magnifying glasses or surgical microscope
  - Crown remover
  - Extension for rotating instruments
  - Bone wax to protect surrounding tissues from drilling burs
  - Petroleum jelly for lubricating the tap
  - Diamond coated round drill in case of removal of broken taps
Step-by-step: Fractured straining screw and removal of remaining thread ring

Identify the situation

The abutment screw can be rotated clockwise without stopping. The abutment can be removed with the shaft of the straining screw inside the abutment. There is no thread attached to the shaft.

Option 1
Laser weld between screw shaft and thread is broken

Check for a small offset approx. 1 mm to the end of the shaft of the straining screw. When this is the case, the thread ring remains without tension in the implant and shows a hole in the center.

Continue reading on the opposite page.

Option 2
Screw shaft is broken above the thread ring

In case there is no offset at the end of the shaft the shaft is fractured above the thread and the complete thread without hole remains in the implant.

• removal with an ultra sonic scaler
• remove thread by drilling out and cut new a thread (page 22)

Removal of thread ring with unscrew instrument

Again, check the abutment for being intact and the offset small offset approx. 1 mm to the end of the shaft of the straining screw is present. Retrieve thread ring only when abutment and shaft are completely removed

Instruments:

• Handle for Screwdriver standard, Ø 12 mm to rotate the unscrew instrument
• Unscrew Instrument, Repair Kit to retrieve thread ring

Insert unscrew instrument repair kit into Handle for Screwdriver standard, Ø 12 mm.

Insert unscrew instrument into the implant’s lumen and probe the hole of the thread ring.

Turn counter-clockwise until the unscrew instrument engages in the thread ring, continue counter-clockwise rotation and remove the thread ring.
Step-by-step: Fracture of abutment with straining screw, fracture at upper end of conical connection

Possible situations:

1. The straining screw remains intact, the coronal part of the abutment is “connected” by the screw. Continue reading in the next column.

2. Abutment and screw shaft fractured on implant level. Continue reading on the opposing page.

3. Abutment fractured on implant level and screw shaft was torn out of the abutment. Continue reading on page 14.

Identify the situation

screw intact

Fracture at upper end of conical connection, the straining screw remains intact. When the screw is intact, the coronal part of the abutment is “connected” to the implant by the screw. Open the screw completely and try to remove the abutment with a crown removal instrument. In case it is not possible to remove the abutment by pulling, try by turning counter-clockwise to push out the fragment by the screw. In case this is not successful, turn the screw clockwise to the very bottom and try to fracture the laser welding by applying excessive torque. Then remove all loose parts (i.e. the abutment and screw shaft).

The situation should be as such:

The cone fragment is wedged in the implant’s connection cone, the drill channel of the straining screw is empty, the thread ring remains in the implant.

To Do: Remove cone fragment with the extraction bolt. Remove the thread ring with the Uncrew Instrument Repair Kit.

Continue reading on page 14.

Identify the situation

screw fractured

Abutment and screw shaft fractured on implant level. The straining screw is fractured with the abutment. The cone fragment is wedged in the implant’s connection cone, the screw channel of the straining screw is blocked with the remaining shaft of the straining screw.

To Do: Drill shaft of the straining screw out from the cone fragment, a short portion of the shaft remains on the thread ring. Remove cone fragment with extraction instruments. Turn out threads at the remaining portion of the shaft.

Drill down screw shaft

Prepare a flap to provide visibility to the implant shoulder. Before starting the procedure possibly drill plane the fracture surface. Apply a centering dimple with a round drill or diamond cutter.

Use the counter-clockwise operating crown cutter 1.0 mm to drill free the screw channel of the abutment fragment. Drill until the cutting geometry disappears in the implant. Use 1800 rpm for drilling, full cooling and a pressure that creates visible burs.

The upper end of the cutting edges are the reference point for the drilling depth.

Caution: The handpiece must run counter-clockwise. Sufficient cooling must be ensured when drilling since high temperatures compromise the drill’s ability to cut and the implant could be lost if it overheats.

Please note:
In order to prepare for the use of the repair instruments, it is necessary to smooth the fracture surface where required. Then a hole can be accurately centered using a suitable round drill.
Identify the situation

Abutment fractured on implant level and screw shaft was torn out of the abutment or previously drilled out.
The cone fragment is wedged in the implant’s connection cone, the screw channel of the straining screw is open, only the thread ring remains at below the taper fragment.

Continue reading in the next column.

Thread core drill M 1.6

The 1.1 mm drill hole of the taper fragment is to be enlarged to 1.3 mm with the thread core drill M 1.6 at a speed of 1 800 rpm, making sure to apply sufficient pressure. The necessary drill depth of 3 mm has been reached once the ring marking on the drill is level with the implant shoulder.

Caution: Ensure sufficient cooling. When drilling, ensure that the drill is not tilted or flexed. This would result in breaking the instrument and may render continuation impossible.

Screw tap M 1.6

Smear a little petroleum jelly on the screw tap prior to use. The thread is tapped clockwise using the ratchet insert for manual instruments in combination with the screw handle. No fewer than three full turns must be made. Then, rinse the thread with sufficient water to remove shavings and other operational residues.

Caution: Proceed with extreme care when using the screw tap. The screw tap is brittle and may break with improper strain (tilting / flexion). The process should be paused at intervals or where there is increased cutting resistance and the tap drill should be rotated a little to the left. This releases the screw tap and the cutting residues are broken up. Resume the drilling process after this. This strategy will reduce the risk of breaking the screw tap.

Extraction bolt

Screw the extraction bolt into the prepared thread hole using the smaller thread. The hexagon screwdriver 1.0 mm can be used for this. When screwing in the extraction bolt, check whether the required three full turns have been made. The extraction bolt should allow not less than three complete rotations while being screwed in. If this is not the case, check whether the thread hole will allow further tapping.

Ratchet insert for extraction bolt

Wind the ratchet insert onto the extraction bolt until the edge of the instrument is seated in the implant shoulder. The taper fragment is extracted from the implant by screwing further with the aid of the ratchet and the open-end wrench.

Remove thread ring from the implant

Scenario 1:
The straining screw broke at the laser weld between screw shaft and thread ring. This left the thread ring in place while the screw shaft can be removed. Now the thread ring shows a centric hole. Use unscrew instrument repair kit to remove the thread ring (page 11).

Scenario 2:
The shaft of the straining screw was fractured on implant shoulder level, the thread ring now carries a residual portion of the screw shaft.

• Remove with an ultra sonic scaler
• Remove with screw fragment removal instrument (page 16)

Check for the uncompromised condition of the implant which now can be restored with a new abutment.

Please note:
The instruments described on this double page for removal of a taper fragment cannot used in case of:
• Breakage of a CERCON or ATLANTIS Zirconia abutment
• Breakage of a single-piece abutment (e.g. Balance Base Abutment)
Step-by-step: Removal of a screw fragment from the implant with screw removal instrument

Removal of the screw fragment

If the weld seam of the straining screw is fractured, following extraction of the taper fragment the remaining thread ring in the implant’s inner thread must be removed with the unscrew instrument, repair kit.

If the shaft of the straining screw is broken at implant shoulder level, following extraction of the abutment fragment a screw fragment remains in the implant. This screw fragment can be removed with the screw fragment removal instrument. Use the appropriate picking sleeve for the abutment straining screws:
- CERCON Ø 0.9 mm (1 ring),
- placement head Ø 1.0 mm (2 rings),
- other abutments Ø 1.1 mm (without ring).

Screw the picking sleeve in a counterclockwise direction into the clamping sleeve so far that the slit is still completely free. Place the screw fragment removal instrument with the picking sleeve over the remaining screw shaft.

The screw fragment is removed in a counterclockwise direction using the ratchet insert for manual instruments in combination with the handle or the ratchet.

The screw fragment removal instrument firstly moves around in the implant until it engages with the screw fragment. The screw fragment is removed by continuing to turn in a counterclockwise direction, in doing so the screw fragment removal instrument is twisted out of the implant. The up-and-down motion is visible via the ring marking on the screw fragment removal instrument.

If removal is not possible, turn back the screw fragment removal instrument in a clockwise direction no more than 6 times and then remove the screw fragment removal instrument from the screw fragment. If the screw fragment cannot be successfully removed, it must be drilled out of the implant using the ANKYLOS repair instruments.

After removal of the screw fragment, the implant is inspected for damage and can be treated as usual.
Possible scenarios:

1. Fracture at upper end of conical connection. Straining screw fractures on same level. See page 13 for drilling down the screw shaft, then continue on page 19.

2. Fracture at upper end of conical connection. Straining screw is pulled out from implant upon the fracture. Continue on page 19.

3. Fracture at upper end of conical connection. Straining screw fractures on same level. See page 13 for drilling down the screw shaft, then continue on page 19.

Initial situation

The cone fragment is wedged in the implant’s connection cone, the channel of the straining screw is empty, the thread ring remains in implant.

Thin out the ceramic abutment cone

Use a flame shaped diamond cutter to cut into the abutment’s connection cone in opposing direction until the titanium of the implant’s connection cone shines through the ceramic.

Attention: avoid cutting into the implant’s connection cone.

When the ceramic is thin enough break out the fragments with fork lift or similar instrument. When the abutment’s connection cone is removed turn out the thread ring with the unscrew instrument (see page 11).
Possible scenarios:

1. The abutment fractured at the upper end of conical connection (level of implant shoulder). The residual connection cone is connected to the implant by the thread. There is no central access hole due to the one-piece abutment. Continue reading next column.

2. A fracture occurred between thread and connection cone. This possibly happened after previous abutment loosening. See page 22 for removal of the thread.

Abutment fracture on implant level

A standardized protocol to remove remains of a one-piece abutment is in preparation.

Step-by-step:
Fracture of a one-piece abutment
Step-by-step: Drill-out abutment thread fragments from the implant

Instruments and procedure:

Only when previous attempts fail the thread will be drilled out completely and a new thread is cut. The connection cone of the implant will be protected from surface damage with the taper protection.

According to the drill diameter there are two versions of the taper protection. In a first step the fractured thread receives a centric drill hole using a drill cutting in counter-rotational direction.

Options
- The counter-clockwise rotation of the drill turns out the thread. The implant should be able to receive a new abutment at this point.
- Once the first drilling is performed the thread is a ring. Use the unscrew instrument to remove the thread ring.

In case the previous fails the hole will be widened to the core hole of the implant thread. There will be cut new implant thread.

Taper protection
Insert the 1.0 mm taper protection into ball joint of the handle. Insert taper protection into connection cone of the implant. Fasten the ball joint in the desired position by distorting the handle.

The taper protection must be placed secure and without play in the connection cone to provide a centric guidance and depth stop for the drilling.

The taper protection has a depth stop to prevent the implant from being perforated.

Crown cutter (counter-clockwise cutting)

The handpiece must run counter-clockwise! Use the crown cutter to spot drill the thread section of the jammed abutment and drill it open.

Insert the crown cutter into taper protection 1.0 mm to the depth stop and mark the shank at this position for orientation.

Remove the crown cutter. Insert taper protection into the implant and start drilling. The 1.0 mm taper protection guides and centers the drill. The crown cutter drills out the residual threads of the former abutment with counter-clockwise rotation. Use 1600 - 1800 rpm and pressure that creates visible burs. Either the thread fragment becomes loose with the counter-clockwise drilling procedure or it will be removed with the unscrew instrument (next column).

Unscrew instrument

If the fragment cannot be removed with counter-clockwise rotating drill, use the handle with the unscrew instrument in counter-clockwise direction (page 11).

Twist drill

If the fragment cannot be removed, the 1.4 mm taper protection should be inserted into the implant with the handle. The 1.4 mm twist drill is used to drill out the thread fragment (1600 - 1800 rpm) and create the core for tapping the thread. The taper protection has a depth stop to prevent the implant from being perforated.

Caution: When drilling the remains of an abutment thread out of an implant, ensure that the drill or tap does not break. The drills are made of tungsten carbide or hardened steel and drill fragments can be difficult or even impossible to remove. Should this occur, the implant must be removed.

M 1.8 thread tap set

After the thread fragment is drilled out from the implant, a new thread inside the implant (parving to fasten the abutment) is tapped clockwise in three stages using the handle for technical taps and taps. This handle has an internal hollow square to receive the shank of the thread taps and is used only with the related thread taps. The shavings are removed from the implant’s tapered section. Then a new abutment can be seated.

Caution: Tapping should be interrupted at regular intervals or if the tap binds. The tap should be rotated slightly counter-clockwise. This loosens the tap and breaks the shavings to allow the thread to be tapped further. This minimizes the risk of the tap breaking.

The set of thread taps M 1.8 contains a pre-cutter (one ring on the shank), thread main cutter (two rings) and finisher (three rings). The taps are used in this sequence.
Possible scenarios:
The straining screw remains intact, the placement head is “connected” by the screw. See page 12 for possible removal of the abutment.

The shaft of the straining screw is pulled out upon the fracture. The placement head can be removed completely. See page 11 for possible removal of the thread ring.

The shaft of the straining screw is pulled out upon the fracture. Only the upper part of placement head can be removed. The index portion of the placement head and the thread ring remain in the implant. Continue reading in the next column.

Then remove the thread ring as described on page 11.

1.0 mm end-cutting drill
Use a handpiece driven end-cutting drill clockwise to drill the fractured thread section out of the abutment.

Caution: When drilling the remains of a thread section out of the abutment, ensure that the drill or tap does not break. The drills are made of tungsten carbide or hardened steel and drill fragments can be difficult or even impossible to remove. Should this occur, the abutment must be replaced.

M 1.2 thread tap
Smear a little petroleum jelly on the screw tap prior to use. The lateral thread is tapped clockwise in three stages using the handle and tap. The pre-cutter (one ring on the shank), thread main cutter (two rings on the shank) and finisher (three rings on the shank) are used in successively increasing order. The shavings are removed from the thread and a new M 1.2 screw wound in.

Caution: Tapping should be interrupted at regular intervals or if the tap binds. The tap should be rotated slightly counter-clockwise. This loosens the tap and breaks the shavings to allow the thread to be tapped further. This minimizes the risk of the tap breaking.

Replacement Screw M 1.2
When the new thread is cut the shavings are removed from the thread and a new M 1.2 screw is wound in.

Step-by-step:
Rupture of the placement head’s index

Step-by-step:
Drill out a fractured lateral screw M 1 x 0.2
About DENTSPLY Implants
DENTSPLY Implants offers comprehensive solutions for all phases of implant therapy, including ANKYLOS®, Astra TECH Implant System™ and XiVE® implant lines, digital technologies, such as ATLANTIS™ patient-specific CAD/CAM solutions and SIMPLANT® guided surgery, regenerative solutions, and professional development programs. DENTSPLY Implants creates value for dental professionals and allows for predictable and lasting implant treatment outcomes, resulting in enhanced quality of life for patients.

About DENTSPLY International
DENTSPLY International Inc. is a leading manufacturer and distributor of dental and other healthcare products. For over 110 years, DENTSPLY’s commitment to innovation and professional collaboration has enhanced its portfolio of branded consumables and small equipment. Headquartered in the United States, the Company has global operations with sales in more than 120 countries.

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