ENDO REMOVAL SYSTEM

by K. Gonczowski

The ERS system is a universal set of instruments dedicated to the removal of broken parts of endodontic instruments from root canals under visual control by surgical microscope.

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Dr. Krzysztof Gończowski graduated from the Jagiellonian University in Kraków in 2000. Between 2001 and 2008, he worked and lectured as an assistant at the Institute of Dentistry, Jagiellonian University (Division of Preventive Dentistry and Endodontology). Since 2001, he has also maintained his private practice in Krakow. Dr. Gończowski holds a Polish (ID No.: 2658170) and a Norwegian (ID No.: 10037928) dental license. He practices in Poland and in Norway. In 2005, he received his PhD from Jagiellonian University, and in 2007, he completed his specialization in Endodontics and Conservative Dentistry. He is a two-time participant of research fellowship programs in Germany, at the University of Cologne and the University of Munich. Since 2005, he has lectured and run practical courses for dentists in Poland and around the world in over 35 countries in Europe, North America, Asia, and Africa in the scope of endodontics, efficient and comfortable local anesthesia, sedation in dentistry, and dental tourism. Dr. Gończowski is a member of various Polish and international scientific societies: ESE (European Society of Endodontontology), ERC (European Resuscitation Council), SAAD (Society for the Advancement of Anaesthesia in Dentistry). He has over 45 research publications in Polish and international dentistry journals and has received many prestigious awards for his research. Amongst others, he is a four time recipient of CED Travel Stipend (IADR) as well as the Expertise Talent Award Europe for Young Scientists. In 2010, he designed a system of micro-instruments for removing the broken endodontic instruments from the root canals - Endo Removal System® (Cerkamed).
Removal of broken endodontic instrument with ERS – Endo Removal System®
designed by Dr. K. Gończowski

Removing a broken piece of an endodontic instrument is one of the most demanding procedures performed by dental surgeons. Ultrasonic method is most commonly used for removing broken pieces of endodontic instruments. It involves dislodging and activation of the broken instrument piece using a vibrating ultrasonic tip without water cooling under visual control of a dental microscope. The key disadvantage of this method is that the broken instrument piece cannot be directly grabbed. This method is also associated with a high risk of further fragmentation of the removed piece. All too often, once the old root filling material in the root canal or the root dentin are broken down, it is not technically feasible to remove the broken piece as it is, for example, stuck firmly or too deeply located inside a narrow and angled root canal. If this is the case, one solution is to use dedicated clamping microinstruments together with an endodontic microprobe and an endodontic microlever to remove the broken piece of an instrument in a quick and reproducible manner, without any risk of complications, such as canal wall perforations or further fragmentation of the damaged instrument by ultrasounds. ERS® was designed and made of top-quality surgical steel for ergonomic and comfortable use under control of a dental microscope. The first version of the system was designed and released in 2010. The system was modified in 2015 by adding a new unique structure consisting of a patent-protected movable wedge and microwindows. The original ERS® was designed to be used mainly for removing broken pieces of manual or machine-operated endodontic instruments with the maximum angle of convergence of 2-4 degrees. In 2019, a brand new version of the system was introduced featuring optimized retaining force of the removed instrument piece, simplicity of operation, sterilization effectiveness, and the ability to remove rotating and reciprocating instruments with higher taper.

The unique features of the new ERS®:
• Extremely firm and stable grasp of a broken piece of an endodontic instrument (as little as 0.8 mm of accessible length of the broken piece!!) if broken endodontic instruments with a long, thin active surface passing through a microwindow are removed (e.g. Lentulo spiral or C-File, D-File, S-File or K-File types of files), the retention force of the instrument is only one of its kind on the market and allows for smooth, quick and safe removal of the broken instrument, even if it is stuck in the bone of alveolar process extending beyond a root canal! In this clinical case the ultrasonic dislodging of the instrument would be associated with a risk of its further fragmentation.
• No additional costs of worn single-use parts (all ERS® components can be re-used and re-sterilized)
• No complicated procedure of instrument preparation – you only need to insert the selected microtip onto a universal handle; it is not necessary to assemble the ligature each time the system is used like with "lasso" techniques!
• Very high resistance to mechanical damage. Extremely stable and simple structure resistant to misuse.
• Precisely operating system of automatic wedge return to the starting position – Blow-back System. If you fail to grasp the broken piece, release the trigger switch on ERS® handle and the wedge will return to the starting position. You do not have to remove the locking element by hand!
• Effective sterilization – detachable universal handle and all microtips are fitted with a PERMANENTLY attached universal Luer-lock connector. No adaptors are necessary to effectively disinfect and clean the INSIDE of the tip with a water jet.
• The angle of convergence of the movable wedge is designed to effectively lock inside the tube both tiniest instruments having a low angle of convergence as well as state-of-art rotating and reciprocal files having a high taper (up to 8 degree).
ENDO REMOVAL SYSTEM

Stages of procedure using ERS – Endo Removal System® designed by Dr. K. Gończowski

1. Preliminary identification of location and type of broken instrument with RVG and/or CBCT:
   a. Identification of the appropriate root canal where the instrument fragment is located, as well as the depth and position of the broken piece
   b. Determination of the presumed type and size of the damaged instrument – the type of the selected microtip depends on the type and size of the removed piece

2. Getting wide access to the broken instrument with the aid of a dental microscope while maintaining maximum tissue protection:
   a. Any suitable rotating or reciprocal endodontic instruments, including Gates-Glidden, Largo-Peeos or Beutelrock drills, can be used to widen access to the lumen of the root canal. Munce Discovery drills are highly recommended, or even indispensable. Various types of ultrasonic tips can also be used (without water cooling) either with a diamond abrasive or silicon carbide brushes (slower wear and tear, better cutting performance).
   b. Trepan-like sleeve burs can be used during the final stage of the root canal extension over the broken instruments to reduce operating time, but also involve high loss of the tooth tissues. Therefore it is recommended to use an angular (typically 120°) ultrasonic tip with force reduction as well as smooth, rounded and sharp pointed files made of metal alloys that can be PERMANENTLY bent to the shape of the root canal. The procedure is performed under visual control of a dental microscope, without water cooling, in a pulse mode (avoid overheating – take breaks every 10-15 s while working with ultrasounds). Counter-clockwise circular movements are performed around the broken piece. The exception are broken reciprocating instruments with a left sided thread, such as Reciproc VDW or WaveOne Dentsply Maillefer, in which case clockwise rotation is recommended.
   c. No less than 0.8 mm of the removed piece should be exposed to obtain an effective gripping force of the broken instrument piece. The larger the piece of a broken instrument inserted inside the microtip, the higher its gripping force. The maximum holding force can be obtained by inserting the broken piece into the microtip and byevaluating it to the side through one of 2 microwindows located ca. 0.6 mm from the entrance.
   d. Heavy rinsing of the root canal is recommended while operating inside the root canal above the broken instrument piece, either with sodium hypochlorite (NaOCl) and disodium edetate (EDTA), in both cases with an addition of surfactants. The detergents reduce the surface tension of NaOCl and EDTA, which more readily permeate to narrow spaces between the wall of a root canal and the broken instrument piece. The sonic activation of NaOCl is a necessary element of the root canal rinsing procedure.

The most recommended sonic activation method is to use an air scalper with a single-use NON-CUTTING plastic tip as it produces no iatrogenic complications (no risk of perforation or notch excision e.g. EDDY – VDW®), offers high effectiveness of root system decontamination, and it is easily accessible and inexpensive.

e. It is recommended to use special-purpose solvents to remove old filling material in the root canal over the broken instrument. Methylene chloride is also recommended because of very high effectiveness in dissolving Gutta-percha pins and Endomethasone pastes as well as ultralow surface tension. Alternatively, chloroform, orange oil and eucalyptol can be used.

3. Dislodging and activation of the piece of broken instrument using an ultrasonic system:
   a. It is recommended to use an angular (typically 120°) ultrasonic tip with force reduction as well as smooth, rounded and sharp pointed files made of metal alloys that can be PERMANENTLY bent to the shape of the root canal. The procedure is performed under visual control of a dental microscope, without water cooling, in a pulse mode (avoid overheating – take breaks every 10-15 s while working with ultrasounds). Counter-clockwise circular movements are performed around the broken piece. The exception are broken reciprocating instruments with a left sided thread, such as Reciproc VDW or WaveOne Dentsply Maillefer, in which case clockwise rotation is recommended.
   b. If the broken instrument piece is made of a Ni-Ti alloy and it is located in a curved root canal (partially behind the curvature), it is recommended to cut the root dentin with the use of an ultrasonic tip ON THE INNER SIDE OF THE CURVATURE. This is determined by the properties of the alloy that the broken piece is made of. This type of alloy has a tendency to return to its original straight alignment. Therefore if the incision is performed on the outer wall of the curvature, the broken piece will remain in a bent position in the place where its end rests on the canal wall and will lodge more firmly within the root canal.
   c. As soon as the first signs of the fragment loosening are observed under the microscope, the cavitation phenomenon can be taken advantage of, caused by the vibrations of the thin ultrasonic tip within a space bound by hard walls of the root canal. The phenomenon of acoustic microflow of fluid in the vicinity of the broken element facilitates the transfer of kinetic energy from the vibrating ultrasonic tip to the fragment being removed – the liquid being denser than air more effectively transfers these vibrations. For more efficient transfer of kinetic energy from the ultrasound tip to the broken endodontic instrument, high density fluid as a medium e.g. natural olive oil or liquid silicone lubricant can be used.
d. If the broken fragments are long and are firmly wedged inside the root canal, or they are partially beyond the canal inside the bone of alveolar process, the force generated by the ERS® instrument may be sufficient to dislodge it while avoiding the risk accompanying ultrasonic dislodging of the instrument. In this case ultrasonic dislodging of the instrument involves a risk of further fragmentation of the proximal section of the broken instrument at an even deeper level of the canal, typically at the boundaries of the removed filler material or at the most distal extent of the root dentin preparation. This type of complication is typical for broken long fragments of Lentulo spirals, manual negotiating files, or silver points.

4. Gripping and removal of a broken instrument piece using ERS®:
   a. The type of ERS® microtip is selected depending on the location, size, and angle of convergence of the broken fragment being removed:
      • 1.0 mm in diameter – removal of rotating and reciprocating instruments with a high taper (> 6 degrees)
      • 0.8 mm and 0.7 mm in diameter – removal of rotating and reciprocating instruments with a low taper (< 6 degrees), manual instruments and Lentulo spirals
      • 0.55 mm in diameter – removal of very thin pieces of tips of rotating and reciprocating instruments with a low taper (< 6°), and small fragments of manual instruments and Lentulo spirals – NOTE!!! A microtip WITHOUT microwindows behind initial serration!

<table>
<thead>
<tr>
<th>External diameter [mm]</th>
<th>1.0</th>
<th>0.8</th>
<th>0.7</th>
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<tbody>
<tr>
<td>Internal diameter [mm]</td>
<td>0.8</td>
<td>0.6</td>
<td>0.43</td>
<td>0.32</td>
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<tr>
<td>Internal diameter including initial serration [mm]</td>
<td>0.55</td>
<td>0.4</td>
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b. The entry path of ERS® microtips with a movable wedge does not have to an extension of the long axis of a broken piece (180 degrees). This is very important from a clinical point of view as typically it is not technically feasible to gain rectilinear access, otherwise the tooth structure would have to be significantly affected. All diameters of microtips with a movable wedge, except for the smallest one (0.55) are designed to grasp the instrument at a 45 degree angle. Two microwindows placed opposite each other, the size of 0.4/1 mm at a distance of around 0.6 mm from entrance to the tube are designed for visual control of the entry path under a dental microscope whenever there is a sharp access angle to the broken piece; the microwindows also create an additional point of reference during removal of the instrument.

c. Operating a microtip with a movable wedge

**NOTE!!! Bending of the microtips may cause irreparable tool breakage!!!**

- Introduce the instrument into the lumen of the properly widened root canal all the way down to the level of the broken instrument piece.
- Insert the sleeve on the exposed piece of a broken instrument to the minimum depth of 0.8 mm – the longer instrument piece is placed inside the tube, the higher the retention force.
- The maximum retention force can be produced when the broken instrument passes through a lateral microwindow.
- Smoothly press the trigger switch on ERS® handle as far as it will go.
- Remove the broken instrument piece from the root canal by pulling the microtip out without releasing the grasping.
- If the broken instrument slips out of the microtip, release the trigger switch and the blow-back system will automatically withdraw the movable wedge to the inside of the tube. This mechanism allows to immediately repeat the attempt to grip the broken tool WITHOUT having to remove ERS® from the root canal to prepare it for another grasping attempt.
- After several unsuccessful attempts to grasp and remove the broken instrument you should expose a longer section of the instrument to increase retention force inside the tube and/or improve mobility of the instrument piece by more effectively dislodging it using an ultrasonic tip NOTE!!! The longer the exposed piece of the broken instrument, the higher the risk it will be fragmented during an attempt to dislodge it with ultrasonic!!!

- Endodontic microlever + endodontic microprobe – two-handed technique with direct visual control under a microscope and in light reflected from a mirror held by an assistant. These are very simple auxiliary instruments to facilitate careful dislodging and grasping of a broken instrument piece. They can be used separately, but their usefulness in removing broken instruments is very limited owing to their low retention force.
• Introduce the microlever into the lumen of the properly widened root canal all the way down to the level of the broken instrument piece.
• Place the semi-open sleeve over no less than 1-1.5 mm of the exposed instrument piece (0.8 mm is enough with automatic microtips with the blow-back system and movable wedge). The broken piece should pass through the cone in the proximal part of the sleeve. A 5 mm window is placed behind the cone, and it is not mandatory to maintain a linear alignment of access to the broken instrument. The long axis of the microlever does not have to be an extension of the long axis of the removed instrument piece. This instrument also operates at an angle of 45 degrees.
• Place the microprobe end in the microlever window and press it to the inside of the groove and move down as far as it will go while using the wedge to block the broken instrument inside the cone in the proximal part of the sleeve.
• Remove the broken instrument from the root canal by pulling the microlever and the microprobe out without releasing the grasp – NOTE!!! This requires considerable manual dexterity and the help of a properly trained assistant (both physician’s hands are busy – microtips with a movable wedge can be operated with one hand only!)

ERS - Endo Removal System® by
Krzysztof Gończowski
DDS, PhD, MSc
Specialist in Conservative Dentistry and Endodontics

Description of the system
The ERS system is a universal set of instruments dedicated to the removal of broken parts of endodontic instruments from root canals under visual control (surgical microscope). The system is easy to use and cheap in maintenance – IT IS NOT NECESSARY TO BUY ANY CONSUMABLE ELEMENTS!!! All the parts of the ERS system are intended for multiple disinfection and sterilization.
**Handle**

- One universal screwable handle matching **ALL** the types of working tips – lower cost and simple as well as effective disinfection, cleaning and sterilization.

- The surface of the handle is equipped with spiral grooves facilitating a secure hand grip with the use of all types of gloves (latex, nitrile, vinyl), also when saliva is present.

- Light (empty inside), ergonomically designed handle that fits the hand perfectly.

- Specially designed durable trigger lever of ergonomic shape that perfectly fits the thumb fingertip of both right and left hand. The contact surface with the operator's finger was widened and covered with a special texture increasing friction and facilitating precise work with the trigger, even when the finger is covered with patient's saliva.
ENDO REMOVAL SYSTEM

• Long travel of the trigger! An extremely important feature that enables to properly dose the strength of grip of the broken instrument by precisely choosing the degree of pulling out of the blocking wedge.

• The system is universal for both the right-handed and the left-handed dentists and is adapted to work in EVERY position of operator’s hand grip: forehand, backhand, proximal, distal. Threaded bush of each working tip is rotatably mounted on the shank of the tip that enables a precise, smooth and very easy regulation of setting of any working angle of the tip in relation to the long axis of the trigger lever.

• All the working tips are equipped with a PERMANENTLY joined Luer-lock thread. After finished work, it is not necessary to use any special adapters to perform effective disinfection and cleaning of the INSIDE of the tip with a stream of liquid under pressure. The thread also fits to the classical Luer type syringes, but it is recommended to use Luer-lock type syringes for washing and disinfection of the inside of the tips. They allow to generate higher fluid pressure without the risk of a sudden disconnection of the connection between the syringe and the working tip.
• Working tips have permanently engraved markings that are not subject to degradation during the sterilization process
**Working tip with the movable wedge**

- Simple design resistant to user errors and mechanical damage. In comparison to the previous version ERS, fragile movable parts that could be quickly worn or damaged have been eliminated.

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- Manufactured in 4 sizes (outer diameter of the tube) 1.0 mm, 0.8 mm, 0.7 mm and 0.55 mm. The wall thickness of the tube is 0.1 mm, and the depth of the embossment is 0.2 mm. This means that with the use of a 1.00mm tip it is possible to grip broken instruments with a maximum diameter of approx. 0.3 mm (2x0.1 mm of the wall + 2 x 0.2 mm of the circular embossment + a minimum of 0.1 mm of free space for the blocking wedge), whereas with the 0.8mm tip – instruments with a maximum diameter of 0.1 mm.

- Just behind the circular embossment there are two opposite microwindows with a diameter of 1 mm / 0.4 mm. They allow to insert the tube onto the broken instrument at an acute angle (and not only 180°), while still observing it under the microscope. It is a unique feature of the ERS system!
• The microwindows also serve as the additional mechanical retention in the event when a part of the broken instrument passes outside the tube. This is an absolutely unique feature of the ERS system providing extremely high grip strength of the broken instrument!
In the case of removing long and thin instruments (convergence angle of 2° and less), e.g., Lentulo needle, which are wedged and stuck partly outside the root canal in the alveolar bone or in the maxillary sinus, the use of ERS system is particularly recommended due to the risk of further breaking of the removed fragment when trying to use ultrasound systems.

• The angle of convergence of the movable wedge is chosen in a way to effectively block inside the tube both the thinnest instruments with a low angle of convergence, and modern rotary or reciprocal files with a high angle of convergence (even up to 8°).
• Inside the tip there is a strong spring, which guarantees smooth and extremely simple operation of the system thanks to the function of automatic reversing of the movable blocking wedge in the case of releasing the pressure on the trigger ("blow back system"). Long travel of the trigger combined with a strong spring tension ensures the doctor a high comfort of work, because it is possible to choose the strength of the grip of the broken instrument very precisely by the degree of pulling out the blocking wedge. The system of automatic return of the wedge to the starting position (hidden inside the tube outside the microwindows) after releasing the pressure on the trigger - "blow back system" - allows quick and effective work in the root canal in case of not gripping the broken instrument. There is no need to perform ANY additional steps to repeat the attempt to grip the broken instrument in the root canal – just release the pressure on the trigger!
Endodontic micro chisels

Endodontic micro probe - bent and straight (code: 015-195)
Total length: 195 mm (bent), 205 mm (straight)
Length of working part: 30 mm
Diameter of working part: 0.5 mm

Operational parameters:
- Stainless steel with plastic properties so that the micro probe can be bent to fit the shape of a root canal.
- The long and sharply pointed working part allows the micro probe to be introduced deep inside the root canal without obscuring the field of vision while using the microscope.
- A light and ergonomic non-slip handle with a large diameter and profiled cuts for stable grip of the instrument.

Application:
Identification of access into root canals, and establishing the position and blocking force of broken endodontic instruments and silver pins in root canals.

Technique:
To ensure free access to the operational field under the microscope the probe must be appropriately bent to the shape of the root canal, e.g. using a special bending tool for canulas with liquid gutta-percha or an endodontic line from Dentsply-Maillefer, fitted with two pins for bending endodontic instruments.
**Endodontic micro lever (code: 017-008)**

Total length: 205 mm  
Length of working part: 7.5 mm  
Diameter of working part (rounded cutting edge): 0.6 mm  
Exit diameter of cone blocking the broken instrument: 0.8 mm

**Operational parameters:**

- Stainless steel with plastic properties enabling the micro lever to be bent to fit the shape of a root canal.
- The long and thin working part allows the micro lever to be introduced deep inside a root canal without covering the field of vision under the microscope.
- The working part has the shape of a semi-open tube with a sharp cutting edge at the top. After the first 1 mm the rounded cutting edge turns into a cone that widens towards the handle, which is responsible for blocking the released fragment of a broken endodontic instrument. Above the cone there is a small window through which one can view through the microscope the depth to which the micro lever is introduced to the broken instrument.
- The semi-open tube makes it possible to clean the working part with mandril to remove retention material (depending on the expected bonding power: sticky wax or glassionomer cement), block the broken instrument with an endodontic micro probe or introduce a loop-shaped piece of thin endodontic wire when using the „lasso“ method.
- A light and ergonomic non-slip handle with a large diameter and profiled cuts for a stable grip of the instrument.
Application:
Removing fragments of broken endodontic instruments from root canals after they have been unblocked using ultrasound systems.

Technique:
Retention material is applied to the working part of the micro lever on the cutting edge side (the top of the instrument). Depending on the expected bonding power sticky wax or glassionomer cement can be used. Once the working part is prepared it is applied to the broken, previously unblocked fragment of an endodontic instrument. After waiting for the time required for glassionomer cement to bond, or immediately when using sticky wax, the micro lever should be taken out of the root canal together with the seized broken instrument. After the operation is finished (before sterilization) the working part must be carefully cleaned to remove the remains of the retention material (e.g. ultrasound washer and mandryl). Alternatively, it is possible to use the technique of wedging the broken fragment of an endodontic instrument by simultaneously using the micro lever and the micro probe. It is also possible to use the „lasso” technique which consists of seizing the broken instrument by tightening a loop made from a piece of thin orthodontic wire.

ENDO REMOVAL SYSTEM

by K. Gonczowski

The ERS system is a universal set of instruments dedicated to the removal of broken parts of endodontic instruments from root canals under visual control by surgical microscope.

BEFORE USE PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY
PRODUCT FOR DENTAL USE ONLY
NON - STERILE PRODUCT STERILIZE DIRECTLY BEFORE USE

CHARACTERISTICS
Product made manually of high quality grade specialist stainless steel.
Special processes have been undertaken during the manufacture of the instruments to ensure corrosion-resistance. In spite of this, the durability of the instruments depends on their proper use and correct maintenance.

STORAGE CONDITIONS
This product should be stored in a place, where temperature and humidity are not subject to sudden variations. Places with high temperatures and humidity should be avoided.

FIRST USE
This product has been delivered as a non-sterile device. Before its first use the device must be inspected and sterilised, according to principles described in section: Inspection and maintenance.

INSPECTION AND MAINTENANCE
1. Checking operability and functionality
Before each use the device must be inspected to confirm proper working order. During visual inspection attention must be paid to defects, cracks or surface contaminations.
End of device’s life does not depend on the number of processing cycles (that is, cleaning, disinfection and sterilisation). It is defined by normal wear and tear and damages arisen through its usage.

2. Initial washing and disinfection
Before washing process, any possible contaminations should be removed (tissue remnants, soiling, dust etc.) by means of disposable cloths, paper towels or brushes with bristles made of plastic (e.g. nylon).
Hand washing:
It is recommended to use washing-disinfecting agents indicated for that purpose. Instructions and reservations given by the manufacturer of the product must be followed. If possible, ultrasonic washing is recommended.
Rinse washed devices thoroughly under running water. For final rinsing use demineralised water. Visually inspect degree of surface cleanliness and control any damages to the device.

Washing in washer-disinfector:
Subject the device to washing in washer-disinfector with the use of appropriate agents. Washing must be performed according to recommendations of a given washing-disinfecting device and its instructions for use.
Disinfection should be carried out in the temperature of 90°C by bathing in demineralised water without detergents for about 15 minutes. Then the device should be dried.

WARNINGS:
3. Preparation for sterilisation
   - Before sterilisation, instruments must be greased with oil. Industrial oils must not be used.

4. Sterilisation
The instrument, after its prior washing, disinfection and drying, should be subject to sterilisation process, by means of devices and in conditions compliant with effective standards. Recommended method of sterilisation is by means of water vapour under overpressure (high-temperature method).

Parameters:
Temperature: 134°C (do not exceed the temperature of 200°C), pressure: 2 atm. above atmospheric pressure (overpressure), minimum time of exposure to sterilising agent: 5 minutes.

GUARANTEE
CERKAMED guarantees that this product is free of any faults either in material or workmanship. The company gives 1-year guarantee for manufactured instruments. The condition for using the guarantee is the application of products as per its intended use, as well as proper preparation, handling and sterilisation according to information included in these instructions for use. In the case of fault being found during guarantee period, we kindly request sending decontaminated instrument together with the information on the type of defect found directly to the company to the address present herein in manufacturer section.

Guarantee shall not cover:
1. Wear resulting from normal course of usage (e.g. blunting of blades, surface wear of working part, wear of connection elements and thus excessive play in connections) and similar cases mentioned in general conditions of guarantee;
2. Misuse, application not as per intended use;
3. Mechanical damage or excessive load;
4. Corrosion damages (e.g. corrosion pits, surface discolouration) resulting from contact with aggressive chemical substances (e.g. salt solutions);
5. Mishandling in the process of cleaning and maintenance during their preparation for reuse or storage, by:
   - inadequate disinfecting and cleaning agents,
   - misuse of disinfecting agents,
   - incorrect methods of washing and cleaning,
   - missing maintenance (greasing) of connecting elements or using inadequate maintenance agents;
6. Incorrect sterilisation, for instance through inadequate quality of sterilising vapour or incorrect parameters of sterilisation process, etc;
7. CERKAMED shall bear no liability for damages arisen as a result of using instruments manufactured by the company, not fit for respective use, or the ones subject to modifications and enhancements made by user alone without the knowledge of the manufacturer. Questions concerning repairs and maintenance should be directed to CERKAMED.

WARNING
Pay as much attention as possible to patient’s safety and apply this product as per its intended use and information included in the attached instructions for use. Avoid exposure of product to action of chemical agents. It may be a cause of damage in the case of corrosion.
The instruments should not be subject to:
   - Reprocessing
   - Surface marking, both mechanical (through impact or vibration methods) and electrochemical or laser;
   - Deformation, as it causes significant shortening of product’s life as well as the loss of guarantee.

When cleaning, use a detergent intended for medial application. You must not use detergents intended for household application. For more information on this, go to section Inspection and Maintenance of these instructions for use. The use of damaged instruments is prohibited. Never repair the instrument by yourself. Service and repairs should always be entrusted exclusively to trained and qualified employees of our authorised service.

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