

ENGLISH – UNITED STATES

 **Caution: Federal law restricts this device to sale only by or on the order of a licensed dentist or physician.**

Device Description

The PiezoImplant System consists of endosseous dental implants, surgical instruments and restorative components in a variety of dimensions to accommodate differing patient anatomy. The REX TL endosseous implants are blade-form having a wedge shape and an apical surface treated with resorbable blast media (grit-blasted and acid passivated). These are offered in buccolingual thicknesses of 1.8mm and 2.9mm having lengths which range from 9 mm to 15 mm. Cover screws provide protection to the threads of the abutment connection during the tissue healing process. Retention screws fasten the implant and abutment. A variety of PiezoImplant abutments are offered including Straight, Angled, Healing, Provisional Cylinders, and Multi-Unit. Restorations can be screw and/or cement-retained to the abutments. Laboratory analogs, impression transfers, and pins facilitate creation of the prosthetic restoration. Associated surgical instrumentation includes Piezosurgery® Handpiece inserts for site preparation. A torque of 15 Ncm is recommended for cover screws, coping screws, and healing abutments. A torque of 25 Ncm is recommended for retention screws and all other abutments.

The PiezoImplant REX TL implants are provided preassembled to an impression transfer that may also function as a straight abutment via a retention screw to facilitate implantation. Cover screws are prepackaged with each preassembled implant. Both the assembled implant and the cover screws are provided sterile. The PiezoImplant System surgical instruments and restorative components are provided in a non-sterile condition and must be sterilized prior to use.

The PiezoImplant System implants, abutments, fit gauge, laboratory analogs, impression pins, copings, coping screws, cover screws, and retention screws are manufactured from titanium alloy (Ti-6Al-4V ELI) per ASTM F136. Castable copings are manufactured from polymethylmethacrylate (PMMA).

The REX TL 1.8 implant series has a standard 4.1 mm diameter (4.1 mmD) external hex implant platform with a hex height of 0.7 mm. The REX TL 2.9 implant series has a standard 3.5mm diameter (3.5 mmD) implant platform with a 45° internal hexagon connection and 1.5 mm hex depth.

Indications for Use

The PiezoImplant System is intended for use in dental implant applications for oral rehabilitation of edentulous and partially dentate adult patients over the age of 21 in the maxilla and mandible. Implant retained restorations may consist of single crowns or bridges as well as complete or partial dentures. The prosthetic components are connected to the implants by the corresponding abutments. The PiezoImplant System is intended for delayed loading.

Contraindications

Do not use the Rex PiezoImplant System in presence of following:

- Patients who suffer from any medical conditions that make surgery inadvisable or may be otherwise deemed to be a contraindication by the treating dental practitioner. Such conditions may include and not be limited to: heart disease, diabetes, cirrhosis, HIV positivity, puberty, pregnancy or breastfeeding, radiotherapy, chemotherapy, immunosuppressant therapy, parafunctional therapy, and psychiatric disorder;
- Bone metabolism disturbances,
- Uncontrolled bleeding disorders,
- Inadequate wound healing capacity,
- Uncompleted growth of the maxilla or mandible,
- Drug or alcohol abuse,
- Xerostomia,
- Weakened immune system,
- Uncontrollable endocrine disorders,
- Steroid use,
- Titanium allergy,

- An insufficient quantity of bone volume (height and width) at the implant site,
- Untreated periodontal diseases (loosening of the teeth),
- Untreated severe grinding or clenching of the teeth,
- Unmanaged occlusal parafunction,
- Infections at the operative site or in the neighboring teeth (pockets, cysts, granulomas), including major sinusitis, or
- Poor hygiene of the mouth and teeth and low compliance (uncooperative or unmotivated).

Relative Contraindications

Caution should be exercised in the presence of the following:

- Exposure to long-term use of opioids or bisphosphonate drugs,
- Previously irradiated bone,
- Diabetes Mellitus,
- Anticoagulation drugs,
- Hemorrhagic diatheses,
- Unfavorable anatomic bone conditions,
- Temporomandibular joint disorders,
- Tobacco use, including moderate to heavy smoking, or
- An unbalanced relationship between the upper and lower teeth.

Warnings and Precautions

- Rex PiezoImplants are single-use products, provided in a triple bag, placed in a carton box and sterilized by gamma irradiation.
- A careful biomechanical study must be performed by the surgeon and restorative dentist to determine the optimal oral restoration for each patient.
- The safe and effective use of Rex PiezoImplants, and associated surgical and prosthetic accessories may be achieved only if qualified surgeons trained in the procedure perform the implant treatment. Email info@reximplants.com to request information on training course availability.
- A one hundred percent implant success rate cannot be guaranteed.
- The safe and effective use of Rex PiezoImplants, associated surgical instruments, and restorative components is guaranteed only if devices are used as supplied per the instructions provided by Rex Implants and used by properly trained professionals. Modifications to the implants and surgical instruments may result in serious injury or death. Restorative devices may only be modified as directed.
- The surgical and prosthetic procedures required for the appropriate use of these devices are highly specialized and complex. It is essential that the surgical procedure minimizes trauma due to bone overheating and damage to adjacent tissues during the piezoelectric osteotomy.
- Take the following into account when placing a Rex PiezoImplant: 1) the incorrect use or handling of small parts in the patient's oral cavity may lead to inhaling and/or swallowing of said parts; and 2) forcing the implant deeper than specified may lead to expanding or fracturing the implant site bony walls, which could prevent the implant from being secured effectively.
- Techniques required to place and restore dental implants are high complex, requiring specialized knowledge. Practitioners must be trained in implantology techniques before using the PiezoImplant System. Improper surgical technique including a preoperative study that does not properly evaluate the bone volume and the bone quality of the alveolar crest may lead to bone loss and/or implant failure. The clinician should also possess a working knowledge of piezoelectric bone cutting techniques as well as the insertion techniques of press-fit implants.
- Poor surgical planning including failure to reconcile the actual dimensions of surgical instruments to the sizes in radiographic measurements may result in drilling beyond the intended depth. This may result in permanent tissue damage that could result in hemorrhage and/or permanent facial numbness.
- Do not use PiezoImplants in patients if the adequate implant position, sizes, or numbers needed to support functional and eventually parafunctional loading cannot be achieved.
- Initial implant stability is achieved by lightly the implant without damaging the bone walls at the surgical site. Initial stability is essential to ensure adequate secondary stability, which is necessary for the long-term success of the implant treatment.
- In the event of implant mobility upon insertion or incorrect implant placement, the implant should be removed immediately. Implant treatment should be repeated only after bone has healed following implant removal. Do not reuse implant.
- Rex PiezoImplants may be restored only upon completion of the healing process. Loading must be delayed at least 6 months from implantation.

- Implants placed in the maxilla should not perforate the sinus floor membrane. If the membrane is perforated, graft inside of implant site preparation with a sponge of platelet-rich fibrin or collagen and prescribe amoxicillin for 3 to 4 days postop.
- During the post-operative healing period, it is critical to protect the implant from trauma and promote osseointegration by ensuring adequate clearance between the implant restoration and antagonist teeth, fixed prosthetic bridge elements or removable prosthetic elements.
- Providing instructions to the patient is essential to ensure success of the implant treatment. The patient must be made aware of the limitations of the implant, importance of oral hygiene and avoidance of contraindications, and potential risk of adverse effects resulting from implant surgery. During the healing period a soft diet must also be prescribed. Patients must be informed to consult a physician if any changes in the performance of the PiezoImplant occurs including bone resorption, loosening, and/or fracture.
- The occlusal load on any Rex PiezoImplant should be similar to that of conventional implants, therefore traumatic and/or parafunctional contacts in the centric relation, right and left laterality, and protrusion must be avoided.
- The REX TL 1.8 PiezoImplants and angled abutments cannot be used in the posterior region. However, this implant can support a single crown in the presence of normal masticatory function if placed elsewhere.
- The REX TL 2.9 PiezoImplant can support a single crown once the osseointegration is completed. If the REX TL 2.9 PiezoImplant is placed in the molar region, a single crown may only be supported in the presence of normal masticatory function.
- Do not use multi-unit abutments and related copings for any angular or divergence correction of the implant body.
- If placing more than one REX TL 1.8 or REX TL 2.9 implant in an edentulous area, Rex Implants, LLC recommends creating a splint that secures the posts to each other.
- After implant placement, if more than 40% of a REX TL PiezoImplant surface is exposed (i.e. not surrounded by bone), the implant should be removed from the patient.

Potential adverse events

Potential adverse events must be communicated to the patient prior to surgery. Potential adverse events related to the use of dental implants may include: integration failure; integration reduction; wound dehiscence requiring bone graft; jaw bone fracture; the perforation of the following: maxillary sinus, inferior border of the mandible, labial and lingual bone walls, alveolar canal, and gingiva; abscesses, fistulas, suppuration, inflammation, radiotransparency, persistent pain, sensitivity reduction, paresthesia, hyperplasia, excessive bone reduction requiring surgery, implant fracture, systemic infections, nerve lesions or other nerve damage, and vascular lesions or hemorrhaging, which at times may be serious especially in patients undergoing treatment with anticoagulants and/or antiaggregants.

Failure to comply with the instructions contained in this document, including reuse of products marked as single-use, may cause harm to the patient, including risk of serious injury or death.

How supplied

The REX TL PiezoImplants are provided preassembled to a straight abutment via a retention screw to facilitate implantation. Cover screws are pre-packaged with each preassembled implant.

The implant assembly and included cover screw are provided sterile and should be handled in a safe manner. All sterile products are labeled "STERILE." Do not use the sterile products if the package is damaged or already opened. Do not use the sterile products if the expiration date on the label has passed. Do not clean, re-sterilize or reuse any sterile product. Due to the complex surface characteristics of the PiezoImplants, only gamma radiation has been demonstrated to effectively sterilize these devices. The REX TL PiezoImplants should be stored in a clean, dry, dust-free, dark place at room temperature.

The PiezoImplant System restorative components, surgical tray, and surgical instruments are provided non-sterile and must be sterilized prior to use. All dental abutments and restorative accessories are indicated as single use.

Cleaning/Reprocessing

The devices in the PiezoImplant System provided non-sterile must be thoroughly cleaned before use. Reusable devices must be cleaned between uses. While it is recommended that the following validated steps are included in a reprocessing protocol, the end-user bears the ultimate responsibility for the cleanliness of the device. These instructions are not intended for implants or devices not manufactured by Rex Implants.

Manual Cleaning/Disinfecting Reprocessing Method

1. Rinse device in cold, potable tap water (< 43°C; <109°F) to remove debris and prevent coagulation of blood.
2. Prepare a solution of enzyme detergent* and potable tap water at pH 7, according to the manufacturer's instructions.
3. Place the device in a container. Add a sufficient amount of solution of enzyme detergent in the container to cover them completely.
4. Leave the device immersed for 10 minutes at 40°C (104°F). This will reduce the organic residues. When immersed in the solution of enzyme detergent, gently brush any threaded parts and small grooves on the device.

5. Place the device in an ultrasonic bath containing enzymatic detergent solution at 40°C (104°F) for at least 10 minutes. This will reduce the organic compounds on the devices. After soaking in the ultrasonic bath, gently brush any threaded parts or grooves on the device
6. Under running, warm, potable tap water and using a toothbrush with soft bristles made of nylon, clean the device thoroughly without damaging the surface. Do this until all visible traces of soil are removed. Carry out the final rinse with distilled water.
7. Finish cleaning and inspect the devices under an appropriate light source, paying attention to details that might house soil (e.g., threads, holes, slots) and if necessary repeat the cleaning cycle.
8. Inspect all devices for any signs of wear and tear. Do not use any device whose integrity is visibly compromised.
9. Dry the device in preparation for sterilization.

*Procedure validated with All-in-One 4 enzyme detergent.

Automated Cleaning/Disinfecting Reprocessing Method

1. Perform a pre-cleaning by following steps 1 - 6 of the Manual Cleaning/Disinfecting Reprocessing Method
2. Lay the device in a metallic tray and place it in thermodisinfector.

NOTE: Place the devices in the washing machine so that dead zones do not arise and the water can properly drain. Also, make sure that the devices are properly held in place in the washing basket and cannot move during the washing process, as shocks could damage them.

WARNING: Avoid overloading. Overloading compromises cleaning effectiveness.

3. Set the following sequence and parameters applicable to the cycle:
 - 3 min, Pre-wash with cold, potable tap water;
 - 5 min, Wash with enzymatic cleaner at 45°C ± 2°C (113°F);
 - 2 min, Rinse with cold, potable tap water;
 - 5 min, Thermodisinflect at 93°C (200°F) with demineralized water following the national requirements about A0 values (thermal disinfection at a temperature of 90°C [200°F] for 5min results in an A0 value of 3000)
 - 2 min rinse with cold, de-mineralized water
4. Finish cleaning and inspect the devices under an appropriate light source, paying attention to details that might house soil (e.g., threads, holes, slots) and if necessary repeat the cleaning cycle.
5. Inspect all devices for any signs of wear and tear. Do not use any device whose integrity is visibly compromised.
6. Dry the device in preparation for sterilization.

Drying

Before starting the sterilization cycle, make sure that the device is thoroughly dry, both externally and internally. For this purpose, blow compressed air both externally and into/through any holes; this will prevent the onset of stains, haloes, or rust on the device.

Sterilization

The PiezoImplant System abutments, surgical tray, surgical instruments, and restorative accessories are provided non-sterile and must be sterilized prior to use. These instructions are not intended for implants or devices not manufactured by Rex Implants such as Piezosurgery® Inserts. The surgical tray is not to be used as a sterilization tray. Prior to sterilization, wrap the abutments, surgical tray, surgical instruments, and restorative accessories individually using FDA cleared sterilization pouches. Drying is to be performed inside the steam sterilizer in the prevacuum cycle at 132°C (270°F).

Sterilization validation in an otherwise empty chamber has shown the following recommendations for sterilization to be effective to an SAL of 10⁻⁶.

Method: Steam
Cycle: Prevacuum for three cycles
Temperature: 132°C (270°F)
Exposure Time: 4 minutes
Minimum Drying Time: 20 minutes

MRI Safety Information

Non-clinical testing has demonstrated the Rex PiezoImplant is MR Conditional. A patient with this device can be safely

scanned in an MR system meeting the following conditions:

- Static magnetic field of 1.5 T and 3 T
- Maximum spatial field gradient of 1700 gauss/cm
- Maximum MR system reported, whole body averaged specific absorption rate (SAR) of 2 W/kg (Normal Operating Mode).

Under the scan conditions defined above, the Rex PiezoImplant is expected to produce a maximum temperature rise of less than 2.2°C after 15 minutes of continuous scanning.

In non-clinical testing, the image artifact caused by the device extends approximately 16.2 mm from the Rex PiezoImplant when imaged with a gradient echo pulse sequence and a 3.0 T MRI system.

Opening the Sterile Packaging

Open the cardboard box and extract its contents using non-sterile gloves. Manually open the Mylar bag in the direction of the Chevron peel opening side and drop the sterile Tyvek pouch into a sterile tray. Do not allow the Tyvek pouch to contact any non-sterile objects. Use sterile gloves to open the Tyvek pouch in the direction of the Chevron peel opening side and pull out the polybag pouch. Hold the packaged implant and open the larger portion of the pouch using surgical scissors without dropping the contents. For implants packaged without a Transfer / Straight Abutment, hand tighten Removal Carrier TL 1.8 to the restorative connection. For pre-assembled implants, connect the Thumb Knob (TK) to the square head of the transfer. Extract the implant from the polypouch. Do not allow the implant to contact any other surface before placement. After the implant has been placed, hold the packaged cover screw and open the smaller portion of the pouch using surgical scissors without dropping the contents. Remove the cover screw from the pouch.

Surgical Technique Synopsis

The proper implant placement procedure consists of several surgical steps, which are briefly described below.

Step 1 - Preoperative Planning: A PiezoImplant radiographic template for the pre-surgical study of each implant site is provided. The implant radiographic template should be used in combination with cross section radiographic images or Cone Beam CT Scans in order to evaluate the thickness and quality of the residual crestal bone, to evaluate the proper position of the implant site, and to determine the most suitable PiezoImplant size to be used. Rex PiezoImplants are recommended for the treatment of thin residual crestal bone at least 3.5 mm wide (buccolingually) for the REX TL 1.8 implant series and 5 mm wide (buccolingually) for the REX TL 2.9 implant series. Ridge measurement should be performed at the apex of the crest. The cervico-occlusal distance (height) of the ridge must be greater than the desired implant length.

A distance of 3 mm is required between the REX TL PiezoImplants and other implants, and a distance of 1.5 to 2 mm is required between the REX TL PiezoImplants and proximal teeth. Do not place implants in the presence of local root remains.

Step 2: Take proper measurements with a standard dental probe: 8 mm from the axis of the last singlerooted tooth in the case of partial edentulism; 6-8 mm mesio-distally from proximal teeth in the case of mono-edentulism.

Step 3: Create a pilot osteotomy at the center of the desired implant position with the W1 Piezosurgery® insert making sure to reach the larger, upper laser marking.

A Piezosurgery® device by Mectron must be used for osteotomy creation. The Piezosurgery® device is prepared for use by following the instructions provided with the device.

Step 4: Use the alignment pin to verify the proper position and angulation of the osteotomy and check the distance with the proximal teeth.

Step 5: Perform a reference pilot osteotomy on each side (mesial and distal) of the initial implant osteotomy at a distance of 1 mm from the latter using the W1 insert. The osteotomy is considered complete upon reaching the lower, smaller laser marking. The total distance between the reference osteotomies must be at least 5.5 mm.

WARNING: Failure to provide proper mesiodistal space in the osteotomy increases the risk of iatrogenic bone fracture.

Step 6: Connect the pilot osteotomies using the W2 insert; the depth of the osteotomy (9, 11, 13, 15 mm) depends on the implants length, reflected in the laser markings on the insert. The depth of the osteotomy should not exceed the length of the PiezoImplant to be used.

Step 7: Refine the osteotomy with the W3 insert, stopping at the laser markings corresponding to the length (9, 11, 13, 15 mm) of the REX PiezoImplant to be used.

Step 8: Verify the dimensions and alignment of the osteotomy with the Fit Gauge, which must be inserted to the laser mark corresponding to the length of the Rex PiezoImplant to be used. If the Fit Gauge does not fit within the osteotomy, repeat steps 6 and 7.

Step 9: Enlarge the osteotomy in the crestal bone with the W4 insert. If placing a REX TL

1.8 series implant, the depth should not exceed the laser mark at the base of the wedge (3 mm) for most cases. If the bone is sclerotic, the depth of the osteotomy can be increased to the depth of the other laser marks. If placing a REX TL 2.9 series implant, enlarge the osteotomy with the W4 insert to the desired osteotomy depth as indicated by the laser markings corresponding to the length (9, 11, 13, 15mm) of the PiezoImplant to be used.

WARNING: Failure to provide proper buccolingual space in the osteotomy increases the risk of iatrogenic bone fracture.

Step 10 (REX TL 2.9 series only): If a REX TL 2.9 series PiezoImplant is to be placed in the osteotomy and additional mesiodistal space is needed as determined by pre-surgical planning, continue to enlarge the osteotomy to the desired size using the W5 insert. The depth should not exceed the laser markings at the base of the wedge. Repeat this step with the W6 insert tip if necessary. The W5 insert tip has a coronal width of 2.3 mm and the W6 insert tip has a coronal width of 2.6 mm.

Depending on the amount of bone mineralization at the implant site, this step may not be necessary. However, failure to provide proper degree of underpreparation and mesiodistal space in the osteotomy increases the risk of iatrogenic bone fracture.














Step 11: The preassembled Rex PiezoImplant is manually inserted in the surgical site. The Thumb Knob (TK) is used to extract the PiezoImplant assembly from the packaging and place the PiezoImplant assembly in the osteotomy.

Step 12: Rex PiezoImplant insertion to the osteotomy site is performed using a surgical mallet. Gently tap the head of the Transfer / Straight Abutment. Repeat as necessary until the implant is fully seated with the shoulder of the implant slightly beneath the bone level.

Step 13: Connect one of the two drivers, long (L) or short (S) to the Thumb Knob. Remove the Transfer / Straight abutment from the implant by disengaging the retention screw from the implant.

Step 14: Open the cover screw compartment of the perforated poly pouch. Remove the cover screw and hand-tighten to the implant. Connect a 0.050" hex driver to a calibrated torque wrench and tighten cover screw to 15 Ncm of torque. Suture the soft tissue around the cover screw. In the presence of thick soft tissue, a healing abutment may be used instead of a cover screw.

IFU-US-01 Rev 1, issued January 25, 2022. Additional information is available at <http://www.reximplants.com>.

Reference number and symbol	Title of symbol	Description of symbol per Standard ¹
5.1.1 	Manufacturer	Indicates the medical device manufacturer, as defined in EU Directives 90/385/EEC, 93/42/EEC and 98/79/EC
5.1.3 	Date of manufacture	Indicates the date when the medical device was manufactured
5.1.4 	Use-by date	Indicates the date after which the medical device is not to be used
5.1.5 	Batch code	Indicates the manufacturer's batch code so that the batch or lot can be identified
5.1.6 	Catalogue number	Indicates the manufacturer's catalogue number so that the medical device can be identified
5.2.4 	Sterilized using irradiation	Indicates a medical device that has been sterilized using irradiation
5.2.8 	Do not use if package is damaged	Indicates a medical device that should not be used if the package has been damaged or opened
5.2.12 	Double sterile barrier system	Indicates two sterile barrier systems
5.4.2 	Do not re-use	Indicates a medical device that is intended for one use, or for use on a single patient during a single procedure
5.4.3 	Consult instructions for use	Indicates the need for the user to consult the instructions for use
5.4.4 	Caution	Indicates the need for the user to consult the instructions for use for important cautionary information such as warnings and precautions that cannot, for a variety of reasons, be presented on the medical device itself
5.7.7 	Medical device	Indicates the item is a medical device
 ASMF F2503-20 ²	MR Conditional	The item poses no known hazards in a specified magnetic resonance imaging (MRI) environment with specified conditions of use
RxOnly 21CFR801.109(b)(1)	Prescription use only	Caution: Federal law restricts this device to sale only by or on the order of a licensed dentist or physician

¹ Unless otherwise noted, reference numbers (e.g., 5.1.1) and descriptions from ISO 15223-1:2021, Medical Devices – Symbols to be used with information to be supplied by the manufacturer– Part 1: General requirements, FDA recognized standard # 5-134; ²FDA recognized standard #8-528