COCHLEAR IMPLANTATION
THE HANNOVER GUIDELINE

Thomas LENARZ
This book is based on the elaborated surgical procedure for cochlear implantation at the Department of Otorhinolaryngology, Medical University of Hannover, Germany.

It has been adapted to several new developments including the current design of the receiver stimulator and the electrode. Modifications for different types of implants are possible. The surgical approach has been used in over 2000 cases and proven to be very safe with low rate of complications and can be used in all ages of patients.

A few specific instruments have been developed to allow a minimal invasive surgery.
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Introduction

The surgical technique described herein can be practiced on temporal bones and is based on standard otological techniques. It can be used in all patients including very small children, but also for revision surgery. The overall principle is to avoid introduction of any foreign material besides the implant, but rather to use the bone and the covering soft tissue to secure the implant and avoid any movement of the electrode.

A few special instruments are required and were designed particularly for this type of approach. For more details on instrumentation and prosthesis (see pp. 18).

The cochlear implant system consists of two parts, the external speech processor and the internal receiver stimulator with the stimulating electrode.

The receiver stimulator is fixed in the bone posterior to the mastoid. For proper creation of the bone bed the following considerations are important. The external speech processor must be placed behind the auricle and the transmitter coil must be placed over the antenna part of the implant. This requires that a wide enough area is dissected free of soft tissue to allow a secure fixation of the implant.
General preparation

Incision

The patient is in a supine position with the head rotated towards the contralateral shoulder and slightly bent downwards. Usually shaving is not necessary, only minimal retroauricular hair cutting is needed. After disinfection, local anesthesia combined with epinephrine is injected. The proposed line of incision is marked on the skin (Fig. 1a) as well as the position of the behind the ear speech processor and the receiver stimulator (Fig. 1b). There should be enough distance between the posterior edge of the speech processor and the later position of the transmitter coil. Implants with ceramic cases must be positioned completely posterior to the speech processor and require a larger incision with a superior posterior extension (S-shaped incision). The patient is draped with the pinna folded forward to expose the incision line. The incision begins approximately 1 cm behind the retroauricular fold and is carried through the skin and subcutaneous tissue while maintaining integrity of the periosteum and the temporalis fascia. Then, the pinna is elevated from these underlying tissues anterior to the skin of the outer ear canal. This should not be incised to avoid any contamination of the implant side.

Creating the Periosteal Flap

An anteriorly based periosteal flap with a width of approximately 2 cm is created and elevated from the bone. The posterior part of the periosteum is elevated as well as the inferior edge of the temporalis muscle.
**Periosteal Pouch**

A periosteal pouch is created with the straight raspatory approximately 2/3 of the length of the raspatory (Fig. 2). It should be large enough so that the receiver stimulator can be inserted completely.

**Exposure of the Mastoid Plane**

After creation of the pouch wound retractors are placed. Then the following landmarks are identified:

1. Spina suprameatum (Spine of Henle)
2. Temporal line
3. Tip of the mastoid bone
4. Posterior wall of the outer ear canal leaving skin intact
5. Point of insertion of the zygomatic bone (Fig 3.)

**Mastoidectomy**

The mastoid is drilled out exposing the bony wall of the outer ear canal, the antrum with incus, the lateral semicircular canal, the sinodural angle and the course of the sigmoid sinus. The estimated position of the facial nerve should be determined by drilling along the posterior wall of the outer ear canal leaving the cortical bone intact and proceeding medially. Landmarks for identifying the facial nerve include the tip of the short process of the incus and the digastric ridge. A line between these two points marks the course of the facial nerve, which is always medial to it (Fig. 5).
The cortical bone covering the mastoid cavity is partially preserved inferiorly, posteriorly and superiorly to create an overhang, that can be used effectively to stabilize the electrode in the mastoid cavity (Fig. 4). Cutting burrs and diamond drills are used.

In young children, the mastoid bone is not yet pneumatized. It is filled inferiorly with the soft bone, however, which bleeds easily. This bone has to be removed to create enough space for the placement of the electrode. The mastoid should be drilled out in any way completely to prevent any mastoiditis following one of the frequent episodes of acute otitis media.

**Bone Bed**

To securely fix the implant, a bone bed is created. This has proven to be the most effective way to stabilize the receiver stimulator and avoid any movement caused by gravity or by external impact. The bone bed should lie in a posterosuperior position of the mastoid cavity and the electrode outlet should project towards the sinodural angle. The minimum distance for receiver stimulators with a titanium case should be 6–8 mm, for ceramic cases the implant must be placed more posteriorly, which requires a larger skin incision and elevation of peristemeum and temporalis muscle. The main objective of the bone bed is to provide a precise fit for the implant case so that the rigid part of the implant can be recessed completely. The floor of the bone bed should be flat to avoid any rocking of the implant. The creation of the bone bed should be done with cutting burrs and, while approaching the dura, with diamond burrs. In young children, where the bone is very thin, it is necessary to expose the dura circumferentially at the border of the bone bed, leaving a bone island in the middle that then can be pressed down by the implant (Fig. 5). Special drills can be used to create a sharp edge at the rim of the implant bed. To facilitate this part of the procedure, a special hook with integrated suction tube has been developed that allows the surgeon to work with two hands. While one hand is retracting the skin, the other hand is using the drill. Figure 5 shows the configuration for a left-handed person, while a right-handed person would use the drill with the right hand.
Creating the Tunnel or Channel
The bone bed and the mastoid are connected by a tunnel or a channel. Our data demonstrate that this type of technique secures the implant in the bone bed and avoids any movement towards the mastoid and the pinna, which could compromise the use of the receiver stimulator afterwards. It also protects the electrode outlet of the implant very effectively. The placement of the tunnel is oriented precisely towards the sinodural angle where the bone is thick enough, even in very young children, to avoid any damage to the dura or the sigmoid sinus. Using a diamond drill (1.8 mm) one can start at the side of the bone bed and then proceed towards the mastoid. The tunnel can then be enlarged to approximately 2.3 mm. In very few cases one also has to expose the part of the dura underlying the tunnel or the sigmoid sinus on its upper edge (Fig. 6). If the operating surgeon is not familiar with the tunnel technique or if the electrode design requires creating a channel for the electrode (e.g., with a rigid metallic tube for insertion of the electrode), the tunnel is split more eccentrically so that there is still enough bone to cover the electrode lead. This split should be large enough for the electrode lead to be placed in. The precise fit can be checked using the dummy device. Then all bone dust is removed.

Posterior Tympanotomy
In order to reach the middle ear and promontory, the bone between the facial nerve in its mastoid segment, the chorda tympani and the bridge, or so-called buttress, has to be removed. We start with a 2.3 mm diameter diamond drill that allows removal of the mastoid cells which cover the facial nerve and the posterior wall of the outer ear canal. We also remove the cells that lie over the posterior semicircular canal. This allows the facial nerve to be identified in its bone canal. In the next step, the 1.8 mm drill is used to proceed towards the middle ear. The bone is then partially removed until the chorda tympani becomes visible in the bone. It is also preserved. In several cases, the so-called facial recess, which is the distance between the facial nerve and the chorda tympani, is too small for cochlear implantation to proceed. In such cases, it is necessary to remove all of the bone covering the chorda tympani by using a small diamond drill down to 1.0 mm in diameter and a House curette. The chorda tympani can then be re-routed anteriorly and laterally. The facial recess becomes smaller inferiorly and it should be drilled out as far as necessary. Normally, the posterior tympanotomy is completed with the 1.5 mm and 1.0 mm diamond drill. The buttress should be preserved, and the facial nerve should remain covered by a thin shell of bone. This will avoid any damage by the rotating shaft of the drill while working towards the cochleostomy or any pressure generated by the electrode, which will be placed at the posterior tympanotomy (Fig. 7). The posterior tympanotomy is wide enough once the promontory with the complete round window niche, the stapes with the incudostapedial joint, and the stapedius tendon are visible. Injury to the stapedius muscle or tendon should be avoided so that the electrically evoked stapedius reflex can be recorded intraoperatively.
Preparation of the Round Window Niche for the Cochleostomy

The round window niche is normally not completely visible. The view is obstructed by a bone overhang superiorly and posteriorly, leaving only the inferior part of the membrane in direct view. In addition, scar tissue or a duplicated mucosa often cover the true membrane. In order to identify the appropriate landmark for the cochleostomy, the round window membrane has to be completely exposed. First, the soft tissue is removed using small hooks and a sickle knife. Second, the bone overhang is removed using a 1.5 mm and a 1.0 mm diamond drill. A specially designed thin-shaft drill should be used to work safely through the posterior tympanotomy. Owing to its thin shaft, the drill does not obstruct the surgeon’s view and avoids contact with the canal of the facial nerve (Figs. 8a–c). Once the bone has been removed, the entire round window membrane is visible. It can be further identified by touching the stapes. Then the membrane should bulge towards the surgeon. Rigorous hemostasis should be applied to avoid any bleeding at the time of cochleostomy.

Cochleostomy

Once the round window membrane has been prepared, the cochlea is opened. Remember, that the basilar membrane is located anteriorly superiorly so that the cochleostomy should be placed anteriorly inferiorly. The most important landmark is the round window membrane. Using the 1.0 mm thin-shaft diamond drill, the cochleostomy, that was created at the round window membrane, is enlarged in the anteroinferior direction. The bone located more superiorly and posteriorly is gradually removed until the appropriate size of the cochleostomy is reached, depending on the diameter of the electrode used. Normally, this should be in the range of approximately 1.4 mm to 1.5 mm. The precise diameter can be easily checked using the 1.5 mm diameter drill as a sizer.
The basilar membrane must not be touched or injured (Fig. 9a, b). Bone dust is removed using Ringer’s solution for irrigation, and is also used carefully inside the scala tympani for only the first 2 mm. Then, the cochlea is filled with a lubricant (normally hyaluronic acid) that not only facilitates insertion of the electrode but also closes the cochlea because of its higher viscosity and can prevent the influx of blood. The scala tympani is then prepared for electrode insertion. Only in cases where the scala tympani is obstructed and the obstructing material can not be removed by using small hooks or a drill, the scala vestibuli is approached. This means that the drill is directed upward towards the basilar membrane. The basilar membrane is then perforated, and the scala vestibuli is checked for patency. If that is open, then the electrode can be placed there. Otherwise, more specific procedures for obliterated cochlea have to be used (e.g., double array with second cochleostomy at the second turn or compressed electrode designs).

Placement of the Receiver Stimulator
Once all the preparations have been completed, the receiver stimulator is unpacked and its physical integrity is checked under the microscope. Then it is placed into the periosteum pouch and inserted posterior to the bone bed to allow proper placement of the electrode lead either through the tunnel or the channel towards the mastoid. The electrode should still be protected by the silastic tube. Both the stimulating electrode and the reference electrode (this is necessary in some devices) are guided through the tunnel or the channel.

Fixation of the Implant
After both electrodes have been guided through the tunnel, the receiver stimulator case is moved forward and snaps into the bone bed. This allows secure fixation of the implant which cannot move anteriorly or to any direction. Also, rotational movement is no longer possible. The reference electrode at the case of the implant is covered by the periosteum; in some cases, subcutaneous sutures have to be applied to cover it (Fig. 10).
Insertion of the Electrode

Once the implant is secured, the stimulating electrode is grasped by a special insertion tool. If there is no specific insertion tool, a specially designed angled implant forceps can be used. It is available as left- or right-angled. Its inner diameter allows the electrode to be grasped and held firmly to control both the direction of the tip and the rotation, but it will not compress the electrode and avoids damage. The electrode is then uncovered by removing the silastic tube. Then the tip is guided into the scala tympani and the electrode can then be pushed forward step by step until the determined point of insertion is reached. In electrodes using a stylet for straightening, the electrode is partially inserted up to the marker spot on the electrode. Then, the stylet is grasped with the forceps and the electrode is advanced off the stylet until the silicone bumps are placed into the cochleostomy. Then the stylet is completely removed. Because the electrodes are preformed, they will curl inside the cochlea (Figs. 11a, b).
The electrode lead is positioned in an S-shaped fashion inside the mastoid. The cortical bone overhang at the mastoid rim allows easy fixation of the electrode, which cannot spring out and is protected against any external impact, e.g., the pressing finger of a child. The S-shaped loop allows for compensation of head growth with the extension of this S-shaped loop. The distance between the receiver stimulator bone bed and the cochleostomy can increase by 2.5 cm as a result of head growth, depending on the age of the child (Fig. 12). The figure also shows the placement of the electrode inside the cochlear. An easy rule to remember is: in the left ear, the fingers of your left hand show how the electrode curls, on the right side the fingers of your right hand show how the electrode curls.

**Closure and Sealing of the Cochleostomy**

The cochleostomy is normally larger than the electrode diameter. A good seal is mandatory to avoid any propagation of infection from the middle ear into the inner ear. It is also necessary to stop any oozer or gusher, that can occur in some patients. Easily accessible material are pieces of temporalis muscle. They are cut and tailored for placement around the electrode.

Sometimes it is necessary to make several attempts to stop CSF leakage. It is most important to use one piece, that will stop it immediately. No fibrin glue is needed. Elevation of the head might help to stop CSF leakage (Fig. 13).
Placement of the Reference Electrode

In case of a separate reference electrode, this should be securely placed under the temporalis muscle. The muscle is elevated by a raspatory, and the electrode is grasped with the right hand and placed under the raspatory. The raspatory is then slowly removed lifting up the muscle (Fig. 14).

The functional integrity of the implant and the stimulation of the auditory system are then checked by intraoperative electrophysiology. For that purpose, the transmitter coil of the stimulating device is positioned over the case of the implant and transcutaneous stimulation is used. The functional integrity of the implant is checked by telemetry. Then the impedances of all electrodes are measured. Objective measures of auditory nerve functions include the electrically evoked stapedius reflexes, nerve response telemetry (electrically evoked compound action potentials of the auditory nerve) and the electrically evoked brainstem responses. All of these responses can be recorded. The stapedius reflex can be detected easily by vision through a microscope. The stimulus intensity is increased until the muscle contracts. This threshold is important for the postoperative fitting because there is a strong correlation to the most comfortable loudness level.

Once the implant function and responses of the auditory nerve have been checked, the wound is closed in layers. The anteriorly based periosteal flap at the outer ear canal is sutured backward, covering the opened mastoid very nicely as well as the anterior portion of the implant. Subcutaneous sutures are placed. In children, the skin is closed by Dermabond® (skin glue), and a pressure dressing is supplied.

The following instruments are specially designed for cochlear implant surgery:
1. Wound retractor with integrated suction tube
2. Thin-shaft diamond drills with diameters of 1.4 mm, 1.0 mm and 0.6 mm
3. Specially designed angled forceps to hold and introduce the electrode (left- and right-angled versions)
References


Cochlear Implantation – The Hannover Guideline

LENARZ Additional Instruments for Cochlear Implantation
Units and Accessoires
LENARZ Additional Instruments for Cochlear Implantation
LENARZ Additional Instruments for Cochlear Implantation

1. 208000 Surgical Handle, Fig. 3, length 12.5 cm, for Blades 208010 – 15, 208210 – 15
2. 220211 PLESTER Retractor, 2x 2 prongs, length 11 cm
3. 219511 WULLSTEIN Retractor, 3x 3 prongs, length 11 cm
4. 214920 ANDERSON-ADSON Retractor, 4x 4 prongs, sharp, curved, length 20 cm
5. 662477 OLIVECRONA Brain Spatula, angled on both sides, concave, elastic, width 11 and 13 mm, length 18 cm
6. 662476 Same, width 7 and 9 mm
7. 204405 PLESTER Suction Tube, with grip plate, cut-off hole and stylet, LUER, 5 Fr., length 20 cm
8. 204407 Same, 7 Fr.
9. 204409 Same, 9 Fr.
10. 2x 204005 Suction Tube, angular, LUER-Lock, outer diameter 0.5 mm, working length 6 cm
11. 2x 204007 Same, outer diameter 0.7 mm
12. 204004 WULLSTEIN Suction Handle, with cut-off hole, LUER cone, length 10 cm, for Suction Tubes 204005 – 204025, 204305 – 204330
13. 233110 Octagonal Handle, with LUER cone, straight, length 17 cm
14. 262550 Diamond Burr, barrel-shaped, diameter 5 mm, length 10 mm, for creating a flat bone edge during cochlear implantation surgery, blunt tip for protection of the dura, with smooth shaft diameter 2.35 mm, length 44 mm
15. 262506 Diamond Burr, shaft diameter 2.35 mm, diameter 0.6 mm, length 70 mm
16. 262510 Same, diameter 1 mm
17. 262511 Same, diameter 1.4 mm
18. 223891 Seeker, extra delicate, angled 25°, with ball end diameter 1 mm, length 16 cm
19. 223892 Same, with ball end diameter 1.5 mm
20. 233212 Forceps, for insertion of cochlear electrodes, nucleus 24 contour, curved to left, working length 6 cm
21. 233211 Same, curved to right
22. 233105 Micro Guiding Instrument, for electrodes array, claw-shaped, tip angled downwards, length 16 cm
23. 233106 Same, tip angled upwards
24. 224802 Footplate Hook, 0.2 mm, length 16 cm
25. 224806 PLESTER Footplate Hook, 0.6 mm, length 16 cm
26. 801814 LENARZ Retractor, 43 x 11 mm, slim and flat blade with integrated suction tube, length 21.5 cm
27. 786500 SCHÖNBORN Thymus Retractor, width 5 mm, length 20.5 cm
28. 799990 RANEY Applying and Removing Forceps, for scalp haemostasis clips, length 16 cm
29. 799995 RANEY Scalp Haemostasis Clips, package of 12 (not illustrated)
30. 516015 Needle Holder, tungsten carbide inserts, length 15 cm
31. 536909 Dissecting and Ligature Forceps, straight, smooth jaws, length 9.5 cm
32. 474000 FREER Elevator, double-ended, semisharp and blunt, length 20 cm
33. 213008 PLESTER Elevator, width 8 mm, length 18 cm
34. 662721 ALLIS Forceps, with fine teeth, length 20 cm
35. 214000 WULLSTEIN Forceps, serrated, length 15 cm
36. 792403 Dressing Forceps, narrow, length 14.5 cm
37. 533212 ADSON-BROWN Tissue Forceps,atraumatic, fine side grasping teeth, length 12 cm
38. 844319 Bipolar Coagulation Forceps, insulated, bayonet-shaped, slender, tip 0.5 mm, length 19 cm, for use with Bipolar High Frequency Cords 847000 or 847000 A/E/M/V
39. 231008 Preparation Plate, glass, 13 x 8 cm
40. 847000 E Bipolar High Frequency Cord, length 300 cm, for AUTOCON® II 400 SCB systems (111, 113, 115, 122, 125), AUTOCON® II 200, AUTOCON® II 80, KARL STORZ Coagulator 26021 B/C/D, 860021 B/C/D, 27810 B/C/D, 28810 B/C/D, AUTOCON® systems (50, 200, 350), Erbe-Coagulator, T and ICC series and KARL STORZ bipolar coagulation forceps (not illustrated)

It is recommended to check the suitability of the product for the intended procedure prior to use.
1. 208000  **Surgical Handle**, Fig. 3, length 12.5 cm, for Blades 208010 – 15, 208210 – 15

2. 220211  **PLESTER Retractor**, 2x 2 prongs, length 11 cm

3. 219511  **WULLSTEIN Retractor**, 3x 3 prongs, length 11 cm

4. 214920  **ANDERSON-ADSON Retractor**, 4x 4 prongs, sharp, curved, length 20 cm

5. 662476  **OLIVECRONA Brain Spatula**, angled on both sides, concave, elastic, width 11 and 13 mm, length 18 cm

6. 662477  Same, width 7 and 9 mm
1. 204405  
PLESTER Suction Tube, with grip plate, cut-off hole and stylet, LUER, 5 Fr., length 20 cm

2. 204407  Same, 7 Fr.

3. 204409  Same, 9 Fr.

4. 204005  Suction Tube, angular, LUER-Lock, outer diameter 0.5 mm, working length 6 cm

5. 204007  Same, outer diameter 0.7 mm

6. 204004  WULLSTEIN Suction Handle, with cut-off hole, LUER cone, length 10 cm, for Suction Tubes 204005 – 204025, 204305 – 204330

7. 233110  Octagonal Handle, with LUER cone, straight, length 17 cm

8. 262550  Diamond Burr, barrel-shaped, diameter 5 mm, length 10 mm, for creating a flat bone edge during cochlear implantation surgery, blunt tip for protection of the dura, with smooth shaft diameter 2.35 mm, length 44 mm

9. 262506  Diamond Burr, shaft diameter 2.35 mm, diameter 0.6 mm, length 70 mm

10. 262510  Same, diameter 1 mm

11. 262514  Same, diameter 1.4 mm

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<td>214000</td>
<td><strong>WULLSTEIN Forceps</strong>, serrated, length 15 cm</td>
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<td><strong>Dressing Forceps</strong>, narrow, length 14.5 cm</td>
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<td>231008</td>
<td><strong>Preparation Plate</strong>, glass, 13 x 8 cm</td>
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UNIDRIVE® S III ENT SCB/UNIDRIVE® S III ECO
The multifunctional unit for ENT

Special Features:

Touch Screen: Straightforward function selection via touch screen
Set values of the last session are stored
Optimized user control due to touch screen
Choice of user languages
Operating elements are single and clear to read due to color display

One unit – multifunctional:
- Shaver system for surgery of the paranasal sinuses and anterior skull base
- INTRA Drill Handpieces (40,000 rpm and 80,000 rpm)
- Sinus Shaver
- Micro Saw
- Dermatome
- High-Speed Handpieces (60,000 rpm and 100,000 rpm)

Two motor outputs: Two motor outputs enable simultaneous connection of two motors:
For example, a shaver and micro motor
Soft start function
Textual error messages

Integrated irrigation and coolant pump:
- Absolutely homogeneous, micro-processor controlled irrigation rate throughout the entire irrigation range
- Quick and easy connection of the tubing set

Easy program selection via automated motor recognition
Continuously adjustable revolution range
Maximum number of revolutions and motor torque: Microprocessor-controlled motor rotation speed. Therefore the preselected parameters are maintained throughout the drilling procedure
Maximum number of revolutions can be preset
SCB model with connections to the KARL STORZ Communication Bus (KARL STORZ-SCB)
Irrigator rod included
## Motor Systems

### Specifications

#### System specifications

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**Power supply:**

100–240 VAC, 50/60 Hz

**Dimensions:**

300 x 165 x 265 mm

(w x h x d)

**Two outputs for parallel connection of two motors**

**Integrated irrigation pump:**

Flow: adjustable in 9 steps

* Approx. 4,000 rpm is recommended as this is the most efficient suction/performance ratio.

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<tr>
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<th><strong>UNIDRIVE® S III ENT SCB</strong></th>
<th><strong>UNIDRIVE® S III ECO</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Touch Screen:</td>
<td>6.4&quot; / 300 cd/m²</td>
<td></td>
</tr>
<tr>
<td>Weight:</td>
<td>5.2 kg</td>
<td>4.7 kg</td>
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<tr>
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<td>IEC 60601-1</td>
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<td>English, French, German, Spanish, Italian, Portuguese, Greek, Turkish, Polish, Russian</td>
<td>numerical codes</td>
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Motor Systems
Special features of high-performance EC micro motor II
and of the high-speed micro motor

Special features of high-performance EC micro motor II:
- Self-cooling, brushless high-performance EC micro motor
- Smallest possible dimensions
- Autoclavable
- Reprocessable in a cleaning machine
- Detachable connecting cable
- INTRA coupling enables a wide variety of applications
- Maximum torque 4 Ncm
- Number of revolutions can be continuously adjusted up to 40,000 rpm
- Provided a suitable handle is used, the number of revolutions can be continuously adjusted up to 80,000 rpm

Special Features of the high-speed micro motor:
- Brushless high-speed micro motor
- Smallest possible dimensions
- Autoclavable
- Reprocessable in a cleaning machine
- Maximum torque 6 Ncm
- Maximum torque 6 Ncm
- Number of revolutions can be continuously adjusted up to 60,000 rpm
- Provided a suitable handle is used, the number of revolutions can be continuously adjusted up to 100,000 rpm
UNIDRIVE® S III ENT SCB

UNIDRIVE® S III ECO

Recommended System Configuration

UNIDRIVE® S III ENT SCB

40 7016 20-1

UNIDRIVE® S III ENT SCB, motor control unit with color display, touch screen, two motor outputs, integrated irrigation pump and SCB module, power supply 100–240 VAC, 50/60 Hz including:

Mains Cord
Irrigator Rod
Two-Pedal Footswitch, two-stage, with proportional function
Clip Set, for use with silicone tubing set
SCB Connecting Cable, length 100 cm
Single Use Tubing Set*, sterile, package of 3

UNIDRIVE® S III ECO

40 7014 20

UNIDRIVE® S III ECO, motor control unit with two motor outputs and integrated irrigation pump, power supply 100–240 VAC, 50/60 Hz including:

Mains Cord
Two-Pedal Footswitch, two-stage, with proportional function
Clip Set, for use with silicone tubing set
Single Use Tubing Set*, sterile, package of 3

Specifications:

<table>
<thead>
<tr>
<th>Feature</th>
<th>UNIDRIVE® S III ENT SCB</th>
<th>UNIDRIVE® S III ECO</th>
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<tr>
<td>Touch Screen</td>
<td>6,4*/300 cd/m²</td>
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<td>Flow</td>
<td>9 steps</td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td>100–240 VAC, 50/60 Hz</td>
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</tr>
<tr>
<td>Dimensions w x h x d</td>
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</tr>
<tr>
<td>Weight</td>
<td>5.2 kg</td>
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<tr>
<td>Certified to</td>
<td>EC 601-1, CE acc. to MDD</td>
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Optional Accessories
for UNIDRIVE® S III ENT SCB and UNIDRIVE® S III ECO

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<th>Code</th>
<th>Description</th>
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<tr>
<td>280053</td>
<td><strong>Universal Spray</strong>, 6x 500 ml bottles – HAZARDOUS GOODS – UN 1950 including: <strong>Spray Nozzle</strong></td>
</tr>
<tr>
<td>280053 C</td>
<td><strong>Spray Nozzle</strong>, for the reprocessing of INTRA burr handpieces, for use with Universal Spray 280053 B</td>
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<tr>
<td>031131-10*</td>
<td><strong>Tubing Set</strong>, for irrigation, for single use, sterile, package of 10</td>
</tr>
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</table>
INTRA Drill Handpieces
for Ear Micro Surgery

Special Features:
- Tool-free closing and opening of the drill
- Right/left rotation
- Max. rotating speed up to 40,000 rpm / 80,000 U/min
- Detachable irrigation channels
- Lightweight construction
- Operates with little vibrations
- Low maintenance
- Reprocessable in a cleaning machine
- Safe grip

**INTRA Drill Handpiece**, angled, length 12.5 cm, transmission 1:1 (40,000 rpm), for use with KARL STORZ high-performance EC micro motor II and straight shaft burrs

**INTRA Drill Handpiece**, angled, length 12.5 cm, transmission 1:2 (80,000 rpm), for use with KARL STORZ high-performance EC micro motor II and straight shaft burrs

**INTRA Drill Handpiece**, straight, length 11 cm, transmission 1:1 (40,000 rpm), for use with KARL STORZ high-performance EC micro motor II and straight shaft burrs
Burrs

Straight Shaft Burrs, length 7 cm, for use with INTRA Drill Handpieces 252590, 252570, 252573

<table>
<thead>
<tr>
<th>Size</th>
<th>Dia. mm</th>
<th>Standard</th>
<th>Tungsten Carbide</th>
<th>Transverse Tungsten Carbide</th>
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<th>Diamond, coarse</th>
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<td>261070</td>
<td>–</td>
<td>262070</td>
<td>262270</td>
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</table>

260000 Standard Straight Shaft Burr, stainless, sizes 006–070, length 7 cm, set of 15
261000 Tungsten Carbide Straight Shaft Burr, stainless, sizes 006–070, length 7 cm, set of 15
261100 Tungsten Carbide Straight Shaft Burr, with cross cut, stainless, sizes 014–060, length 7 cm, set of 6
262000 Diamond Straight Shaft Burr, stainless, sizes 006–070, length 7 cm, set of 15
262200 Rapid Diamond Straight Shaft Burr, stainless, with coarse diamond coating for precise drilling and abrasion without hand pressure and generating minimal heat, sizes 023–070, length 7 cm, set of 9, color code: gold
**Burrs**

Straight Shaft Burrs, length 5.7 cm, for use with INTRA Drill Handpieces 252590, 252570, 252573

<table>
<thead>
<tr>
<th>Detail</th>
<th>Size</th>
<th>Dia. mm</th>
<th>Standard</th>
<th>Tungsten Carbide</th>
<th>Transverse Tungsten Carbide</th>
<th>Diamond</th>
<th>Diamond, coarse</th>
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<tbody>
<tr>
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<td>649614 Q</td>
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<td></td>
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<td>1.8</td>
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<td>649618 HK</td>
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<td></td>
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<td>4</td>
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<td>649670 HK</td>
<td>–</td>
<td>649770 K</td>
<td>649770 GK</td>
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649600 K  **Standard Straight Shaft Burr**, stainless, sizes 014–070, length 5.7 cm, set of 11

649600 HK **Tungsten Carbide Straight Shaft Burr**, stainless, sizes 014–070, length 5.7 cm, set of 11

649700 K  **Diamond Straight Shaft Burr**, stainless, sizes 014–070, length 5.7 cm, set of 11

649700 GK **Rapid Diamond Straight Shaft Burr**, stainless, with coarse diamond coating for precise drilling and abrasion without hand pressure and generating minimal heat, sizes 023–070, length 5.7 cm, set of 9, color code: gold

Straight Shaft Burrs, cylindrical, barrel-shaped, and bud-shaped

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<thead>
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<th>bud-shaped</th>
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<td></td>
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<td>length 7 cm</td>
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<td>–</td>
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<td>070</td>
<td>7</td>
<td>265070</td>
<td>–</td>
<td>263070</td>
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</tbody>
</table>
Burrs and Accessories

**LINDEMANN Burrs, conical, stainless, length 7 cm**

<table>
<thead>
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<th>Size</th>
<th>Diameter mm</th>
<th>Conical</th>
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<tbody>
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</tr>
<tr>
<td>023</td>
<td>2.3</td>
<td>263523</td>
</tr>
</tbody>
</table>

Burrs Accessories

- **Size Template**, for drills, stainless steel, sterilizable
- **Brush**, for cleaning atraumatic jaws, sterilizable, package of 5
- **Temporal Bone Holder**, bowl-shaped, with 3 fixation screws for tensioning the petrosal bone and with evacuation tube for irrigation liquid
Accessories for Burrs

280030  **Rack**, for 36 straight shaft burrs with a length of 7 cm, foldable, sterilizable, size 22 x 11.5 x 2 cm

280030 K  **Metal Bar**, for fixation at Rack 280030, to hold 18 burrs with a length of 7 cm and 16 burrs with a length of 5.7 cm, size 16 x 2.5 x 1 cm

280033  **Rack**, for 36 straight shaft burrs with a length of 9.5 cm, foldable, sterilizable, size 22 x 14 x 2 cm

280034  **Rack**, for 36 straight shaft burrs with a length of 12.5 cm, foldable, sterilizable, size 22 x 17 x 2 cm

NEW  280035  **Rack**, for 54 straight shaft burrs with a length of 5 cm (36 pieces) and 7 cm (18 pieces), foldable, sterilizable, size 22 x 12.5 x 3 cm

NEW  280040  **Rack**, flat model, to hold 21 straight shaft burrs with a length of up to 6 cm (6 pcs) and 7 cm (15 pcs), folding model, sterilizable, size 17.5 x 9.5 x 1.2 cm

NEW  280043  **Rack**, flat model, to hold 21 straight shaft burrs with a length of 7 cm (6 pcs) and 9.5 cm (15 pcs), folding model, sterilizable, size 17.5 x 11.5 x 1.2 cm

Please note: The burrs displayed are not included in the rack.
### Accessories for Burrs

39552 A  **Wire Tray**, provides safe storage of accessories for KARL STORZ drilling/grinding systems during cleaning and sterilization, includes tray for small parts, for use with Rack 280030, rack **not included**

**for storage of:**
- Up to 6 drill handpieces
- Connecting cable
- EC micro motor
- Small parts

39552 B  **Wire Tray**, provides safe storage of accessories for KARL STORZ drilling/grinding systems during cleaning and sterilization, includes tray for small parts, for use with Rack 280030, rack **included**

**for storage of:**
- Up to 6 drill handpieces
- Connecting cable
- EC micro motor
- Up to 36 drill bits and burrs
- Small parts

---

**Please note:** The instruments displayed are not included in the sterilizing and storage trays.
UNIDRIVE® S III ENT SCB
High-Speed Handpieces, angled, 100,000 rpm

For use with High-Speed Drills, shaft diameter 3.17 mm
and with High-Speed Micro Motor 20712033

20712033

252680

252681

100,000 rpm
diameter 7.5 mm

252680  High-Speed Handpiece, short, angled, 100,000 rpm,
for use with High-Speed Micro-Motor 20712033

252681  High-Speed Handpiece, medium, angled, 100,000 rpm,
for use with High-Speed Micro-Motor 20712033
UNIDRIVE® S III ENT SCB
High-Speed Handpieces, angled and straight, 60,000 rpm

For use with High-Speed Drills, shaft diameter 2.35 mm and with High-Speed Micro Motor 20712033

- **20712033**: High-Speed Handpiece, extra short, angled, 60,000 rpm, for use with High-Speed Micro-Motor 20712033
- **252660**: High-Speed Handpiece, short, angled, 60,000 rpm, for use with High-Speed Micro-Motor 20712033
- **252690**: High-Speed Handpiece, extra short, straight, 60,000 rpm, for use with High-Speed Micro-Motor 20712033
- **252691**: High-Speed Handpiece, short, straight, 60,000 rpm, for use with High-Speed Micro-Motor 20712033
UNIDRIVE® S III ENT SCB
High-Speed Standard Burrs, High-Speed Diamond Burrs

For use with High-Speed Handpieces, 100,000 rpm

High-Speed Standard Burrs, 100,000 rpm, for single use, sterile, package of 5

<table>
<thead>
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<th>Diameter in mm</th>
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<th>medium</th>
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<td>350130 M</td>
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<td>350140 M</td>
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<td>350150 M</td>
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<td>350160 M</td>
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<td>7</td>
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High-Speed Diamond Burrs, 100,000 rpm, for single use, sterile, package of 5

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<th>medium</th>
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<td>350220 M</td>
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<td>350260 M</td>
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UNIDRIVE® S III ENT SCB
High-Speed Diamond Burrs, High-Speed Acorns, High-Speed Barrel Burrs, High-Speed Neuro Fluted Burr

For use with High-Speed Handpieces, 100,000 rpm

<table>
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<td>350340 M</td>
</tr>
<tr>
<td>5</td>
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<tr>
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High-Speed Coarse Diamond Burrs, 100,000 rpm, for single use, sterile, package of 5

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<td>9</td>
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High-Speed Acorns, 100,000 rpm, for single use, sterile, package of 5

<table>
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<td>9.1</td>
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High-Speed Barrel Burrs, 100,000 rpm, for single use, sterile, package of 5

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<tr>
<td>3</td>
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<td>350730 M</td>
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High-Speed Neuro Fluted Burr, 100,000 rpm, for single use, sterile, package of 5

<table>
<thead>
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<th>Diameter in mm</th>
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<td>350718 M</td>
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<tr>
<td>9</td>
<td>350730 S</td>
<td>350730 M</td>
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UNIDRIVE® S III ENT SCB
High-Speed Standard Burrs, High-Speed Diamond Burrs

For use with High-Speed Handpieces, 60,000 rpm

<table>
<thead>
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<th>Diameter in mm</th>
<th>extra short</th>
<th>short</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>330110 ES</td>
<td>330110 S</td>
</tr>
<tr>
<td>2</td>
<td>330120 ES</td>
<td>330120 S</td>
</tr>
<tr>
<td>3</td>
<td>330130 ES</td>
<td>330130 S</td>
</tr>
<tr>
<td>4</td>
<td>330140 ES</td>
<td>330140 S</td>
</tr>
<tr>
<td>5</td>
<td>330150 ES</td>
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</tr>
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<td>6</td>
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<td>330160 S</td>
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<td>7</td>
<td>330170 ES</td>
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</tr>
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<td>1.5</td>
<td>330215 ES</td>
<td>330215 S</td>
</tr>
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<td>2</td>
<td>330220 ES</td>
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<td>330260 ES</td>
<td>330260 S</td>
</tr>
<tr>
<td>7</td>
<td>330270 ES</td>
<td>330270 S</td>
</tr>
</tbody>
</table>
**UNIDRIVE® S III ENT SCB**

High-Speed Diamond Burrs, High-Speed Cylinder Burrs, LINDEMANN High-Speed Fluted Burrs

For use with High-Speed Handpieces, 60,000 rpm

<table>
<thead>
<tr>
<th>Diameter in mm</th>
<th>extra short</th>
<th>short</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>330330 ES</td>
<td>330330 S</td>
</tr>
<tr>
<td>4</td>
<td>330340 ES</td>
<td>330340 S</td>
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<tr>
<td>5</td>
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<td>6</td>
<td>330360 ES</td>
<td>330360 S</td>
</tr>
<tr>
<td>7</td>
<td>330370 ES</td>
<td>330370 S</td>
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</table>

<table>
<thead>
<tr>
<th>Diameter in mm</th>
<th>extra short</th>
<th>short</th>
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</thead>
<tbody>
<tr>
<td>4</td>
<td>330440 ES</td>
<td>330440 S</td>
</tr>
<tr>
<td>6</td>
<td>330460 ES</td>
<td>330460 S</td>
</tr>
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</table>

**LINDEMANN High-Speed Fluted Burrs, 60,000 rpm, for single use, sterile, package of 5**

<table>
<thead>
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<th>Size in mm (diameter x length)</th>
<th>extra short</th>
<th>short</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter 2.1/11</td>
<td>330511 ES</td>
<td>330511 S</td>
</tr>
<tr>
<td>Diameter 2.3/26</td>
<td>330526 ES</td>
<td>330526 S</td>
</tr>
</tbody>
</table>
Oscillating Micro Saws

254000 Oscillating Micro Saw, inbuilt irrigation tube, max. recommended number of revolutions 15,000 rpm corresponds to 15,000 oscillations/min., without saw blades, with fork wrench

Saw blades, short shaft, for use with 254000

254024 Saw Blade, short shaft, blade thickness 0.3 mm, width of blade 6 mm, working length 11 mm, package of 1, for use with 254000

254025 Same, width of blade 10 mm

254026 Same, width of blade 15 mm

254030 Same, blade thickness 0.15 mm, width of blade 6 mm

Saw blades, long shaft, for use with 254000

254027 Saw Blade, long shaft, blade thickness 0.3 mm, width of blade 6 mm, working length 26 mm, package of 1, for use with 254000

254028 Same, width of blade 10 mm

254029 Same, width of blade 15 mm

254031 Same, blade thickness 0.15 mm, width of blade 6 mm
micro Compass Saws, Osseo Scalpel

254100 Micro Sagittal Saw, without saw blades, integrated irrigation tube, with fork wrench, recommended maximum speed: 20,000 rpm

Saw blades, for use with 254100

254170 Saw Blade, blade thickness 0.35 mm, width of blade 4 mm, working length 10 mm, package of 12, for use with Micro Sagittal Saw 254100

254171 Same, width of blade 6 mm, working length 10 mm

254172 Same, width of blade 6 mm, working length 15 mm

254173 Same, width of blade 10 mm, working length 15 mm

254174 Same, width of blade 12 mm, working length 27 mm

254175 Same, width of blade 6 mm, working length 10 mm

254200 Osseo Scalpel, Micro Saw, with axial/sagittal channel, pendulum stroke, especially appropriate for 3-dimensional incision guiding, without saw blades, inbuilt irrigation tube, max. recommended number of revolution 20,000 rpm, with fork wrench

Saw blades, for use with 254200

254235 Saw Blade, blade thickness 0.35 mm, working length 12 mm, package of 12, for use with Osseo Scalpel, Micro Saw 254200

254236 Same, working length 18 mm

254237 Same, working length 24 mm
**Micro Compass Saws**

![Micro Compass Saw](image)

254300  **Micro Compass Saw**, without saw blades, detachable irrigation tube, with fork wrench, recommended maximum speed: 15,000 rpm

**Saw blades, for use with 254300**

254312  **Saw Blade**, blade thickness 0.25 mm, working length 11 mm, package of 12, for use with 254300

254313  **Same**, working length 14 mm

254314  **Same**, working length 18 mm

254315  **Same**, working length 22 mm

254316  **Same**, working length 26 mm
Micro Saws – Accessories

39553 A Sterilizing and Storage Basket, provides safe storage of accessories for the KARL STORZ micro saw system during cleaning and sterilization, includes basket for small parts

for storage of:
– Up to 6 saw handpieces
– Connecting cable
– EC micro motor
– Saw blades
Dermatomes

Special features:
- For removing skin and mucosa
- Dermaplaning for obtaining small pieces of skin from behind the ear
- Can be easily adapted to motor
- Optimal setting of the incision depth
- Lightweight construction

253000 Dermatome, with INTRA coupling, width of incision 12 mm, max. number of rev. 8000 rpm
253001 Replacement Blade, for Dermatome 253000, width of incision 12 mm, sterile, package of 10

253100 Dermatome, with INTRA coupling, width of incision 25 mm, max. number of rev. 8000 rpm
253101 Replacement Blade, for Dermatome 253100, width of incision 25 mm, sterile, package of 10

253200 Dermatome, with INTRA coupling, width of incision 50 mm, max. number of rev. 8000 rpm
253201 Replacement Blade, for Dermatome 253200, width of incision 50 mm, sterile, package of 10

253300 Dermatome, with INTRA coupling, width of incision 75 mm, max. number of rev. 8000 rpm
253301 Replacement Blade, for Dermatome 253300, width of incision 75 mm, sterile, package of 10
Dermatome – Accessories

39554 A  **Sterilizing and Storage Basket**, provides safe storage of accessories for the **KARL STORZ** dermatome system during cleaning and sterilization

for storage of:
- Up to 2 dermatomes
- Connecting cable
- EC micro motor with INTRA coupling
**IMAGE1 S™ Camera System**

**Economical and future-proof**
- Modular concept for flexible, rigid and 3D endoscopy as well as new technologies
- Forward and backward compatibility with video endoscopes and FULL HD camera heads

**Innovative Design**
- Dashboard: Complete overview with intuitive menu guidance
- Live menu: User-friendly and customizable
- Intelligent icons: Graphic representation changes when settings of connected devices or the entire system are adjusted

**Sustainable investment**
- Compatible with all light sources

**Automatic light source control**
- Side-by-side view: Parallel display of standard image and the Visualization mode
- Multiple source control: IMAGE1 S™ allows the simultaneous display, processing and documentation of image information from two connected image sources, e.g., for hybrid operations
**IMAGE1 S™ Camera System**

**Brilliant Imaging**
- Clear and razor-sharp endoscopic images in FULL HD
- Natural color rendition

**Reflection is minimized**
- Multiple IMAGE1 S™ technologies for homogeneous illumination, contrast enhancement and color shifting

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**FULL HD image**

**CLARA**

**FULL HD image**

**CHROMA**

**FULL HD image**

**SPECTRA A**

**FULL HD image**

**SPECTRA B**

---

* SPECTRA A: Not for sale in the U.S.
** SPECTRA B: Not for sale in the U.S.
TC 200EN*

TC 200EN* IMAGE1 S CONNECT®, connect module, for use with up to 3 link modules, resolution 1920 x 1080 pixels, with integrated KARL STORZ-SCB and digital Image Processing Module, power supply 100–120 VAC/200–240 VAC, 50/60 Hz including:

- **Mains Cord**, length 300 cm
- **DVI-D Connecting Cable**, length 300 cm
- **SCB Connecting Cable**, length 100 cm
- **USB Flash Drive**, 32 GB, USB silicone keyboard, with touchpad, US

*Available in the following languages: DE, ES, FR, IT, PT, RU

**Specifications:**

- **HD video outputs**: - 2x DVI-D
  - 1x 3G-SDI
- **Format signal outputs**: 1920 x 1080p, 50/60 Hz
- **LINK video inputs**: 3x
- **USB interface**: 4x USB, (2x front, 2x rear)
- **SCB interface**: 2x 6-pin mini-DIN

**Power supply**: 100–120 VAC/200–240 VAC

**Power frequency**: 50/60 Hz

**Protection class**: I, CF-Defib

**Dimensions w x h x d**: 305 x 54 x 320 mm

**Weight**: 2.1 kg

For use with IMAGE1 S™ IMAGE1 S CONNECT® Module TC 200EN

TC 300

TC 300 IMAGE1 S H3-LINK, link module, for use with IMAGE1 FULL HD three-chip camera heads, power supply 100–120 VAC/200–240 VAC, 50/60 Hz, for use with IMAGE1 S CONNECT® TC 200EN including:

- **Mains Cord**, length 300 cm
- **Link Cable**, length 20 cm

**Specifications:**

<table>
<thead>
<tr>
<th>Camera System</th>
<th>TC 300 (H3-Link)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supported camera heads/video endoscopes</td>
<td>TH 100, TH 101, TH 102, TH 103, TH 104, TH 106 (fully compatible with IMAGE1 S®) 22220055-3, 22220056-3, 22220053-3, 22220060-3, 22220061-3, 22220054-3, 22220085-3 (compatible without IMAGE1 S® technologies CLARA, CHROMA, SPECTRA*)</td>
</tr>
<tr>
<td>LINK video outputs</td>
<td>1x</td>
</tr>
<tr>
<td>Power supply</td>
<td>100–120 VAC/200–240 VAC</td>
</tr>
<tr>
<td>Power frequency</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Protection class</td>
<td>I, CF-Defib</td>
</tr>
<tr>
<td>Dimensions w x h x d</td>
<td>305 x 54 x 320 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>1.86 kg</td>
</tr>
</tbody>
</table>

* SPECTRA A: Not for sale in the U.S.
** SPECTRA B: Not for sale in the U.S.
Direct Attachment to the VARIO operating microscope from Carl Zeiss Meditec

With the operating microscope the surgeon always has a perfect view of the operating field. Assistents, OR nurses and students, however, often experience poor video presentation, especially if FULL HD visualization is not available.

KARL STORZ offers a one-stop-shop solution to upgrade any surgical microscope with state-of-the-art FULL HD imaging technology. To achieve optimal results, all components in the video chain – from the camera system to the monitor – must be of the highest quality.

The most straightforward and professional connection between camera and microscope is the so-called direct adaption.

Here the H3-M COVIEW microscope camera and the corresponding QUINTUS® TV adaptor are directly connected to the microscope via the C-MOUNT connection.
**IMAGE1 S™ Camera Heads**

For use with IMAGE1 S™ Camera System
IMAGE1 S CONNECT™ Module TC 200EN, IMAGE1 H3-LINK™ Module TC 300
and with all IMAGE 1 HUB™ HD Camera Control Units

---

**TH 106**  
**IMAGE1 S H3-M COVIEW™ Three-Chip FULL HD Camera Head**, 50/60 Hz, IMAGE1 S™-compatible, progressive scan, with C-MOUNT thread for coupling to microscopes, 2 freely programmable camera head buttons, with detachable camera head cable, length 900 cm, for use with IMAGE1 S™ and IMAGE1 HUB™ HD/HD

---

**20200131**  
**Keypad**, for H3-M camera head, for convenient control of the most important H3-M camera functions, with PS/2 connector, cable length 1 m, alternative to a standard keyboard, for use with H3-M or H3-M COVIEW camera heads, only compatible with IMAGE1 HUB™ HD, not compatible with IMAGE1 S™

---

**Specifications:**

<table>
<thead>
<tr>
<th>IMAGE1 S™ FULL HD Camera Heads</th>
<th>IMAGE1 S H3-M COVIEW™</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product code</td>
<td>TH 106</td>
</tr>
<tr>
<td>Image sensor</td>
<td>3x 1/3&quot; CCD chip</td>
</tr>
<tr>
<td>Dimensions w x h x d</td>
<td>45 x 50 x 60 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>240 g</td>
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<tr>
<td>Optical interface</td>
<td>C-MOUNT connection</td>
</tr>
<tr>
<td>Min. sensitivity</td>
<td>F 1.9/1.4 Lux</td>
</tr>
<tr>
<td>Grip mechanism</td>
<td>C-MOUNT connection</td>
</tr>
<tr>
<td>Cable</td>
<td>detachable</td>
</tr>
<tr>
<td>Cable length</td>
<td>900 cm</td>
</tr>
</tbody>
</table>
The new QUINTUS® TV adaptor is the perfect interface between the operating microscope and the H3-M COVIEW FULL HD microscope camera head from KARL STORZ. The innovative features of QUINTUS® are easy to use, making it one of the most flexible TV adaptors on the market.

QUINTUS® – High-Performance TV Adaptor for Operating Microscopes

Unleash the full performance of your operating microscope from CARL ZEISS MEDITEC – with FULL HD imaging solutions from KARL STORZ.

Product Features:
- A rotating C-MOUNT connection at the QUINTUS® TV adaptor allows immediate adaption of the camera orientation during mounting.
- The focus control makes it possible to easily achieve parfocality (perfectly sharp camera and microscope images).
- The iris control provides convenient and optimal adjustment of the depth of field.
- Pan (X) function enables adjustment of the horizontal position of the camera image.
- Tilt (Y) function enables adjustment of the vertical position of the camera image. The pan and tilt functions help the surgeon to adjust the position of the camera image according to his individual needs.
- The QUINTUS® ZOOM model also features a variable focal length f = 43–86 mm. This allows the surgeon greater flexibility in choosing the exact zone required for documentation.

Focal length of the QUINTUS® TV adaptor:
The QUINTUS® TV adaptor is available in the fixed focal lengths f = 45 and f = 55 mm or as a zoom model with variable focal length 43–86 mm. This provides an optimal FULL HD image in 16:9 in conjunction with the H3-M COVIEW HD microscope camera head from KARL STORZ.

Focal lengths: H3-M COVIEW camera image detail using a QUINTUS® TV adaptor with the fixed focal lengths of 45 and 55 mm.

Variable focal length: Adjustable H3-M COVIEW camera image detail using a QUINTUS® zoom adaptor with variable focal length of 43–86 mm.
HD Imaging with Operating Microscope

System Components

**QUINTUS® TV Adaptor** for operating microscopes from CARL ZEISS MEDITEC with fixed focal length

- **209230 45**  **QUINTUS® Z 45 TV Adaptor**, for CARL ZEISS MEDITEC operating microscopes, \( f = 45 \text{ mm} \), recommended for IMAGE1 HD H3-M/H3-M COVIEW camera heads

- **209230 55**  **QUINTUS® Z 55 TV Adaptor**, for CARL ZEISS MEDITEC operating microscopes, \( f = 55 \text{ mm} \), recommended for IMAGE1 HD H3-M/H3-M COVIEW, H3, H3-Z as well as IMAGE1 S1 and S3 camera heads

**QUINTUS® Zoom TV Adaptor** for operating microscopes from CARL ZEISS MEDITEC with variable focal length

- **209230 00 Z**  **QUINTUS® Zoom TV Adaptor**, for CARL ZEISS MEDITEC operating microscopes, with variable focal length \( f = 43–86 \text{ mm} \), for use with all KARL STORZ cameras (SD and HD)

**Further accessories for operating microscopes from CARL ZEISS MEDITEC**

- **209250 00**  **Iris**, for ZEISS Pentero®, iris as a necessary extension between the QUINTUS® TV adaptor and the operating microscope ZEISS Pentero®

- **301513**  **Optical Beamsplitter 50/50**, for use with ZEISS operating microscope or colposcope

**Note:** Optical beamsplitters for other operating microscopes (i.e. LEICA or Möller-Wedel) are available directly from the manufacturers.
HD Imaging with Operating Microscope
System Components

**QUINTUS® TV Adaptor for operating microscopes from LEICA Microsystems with fixed focal length**

![Image](image1.png)

- **209330 45**  **QUINTUS® L 45 TV Adaptor**, for LEICA Microsystems operating microscopes, \( f = 45 \) mm, recommended for H3-M microscope camera head
- **209330 55**  **QUINTUS® L 55 TV Adaptor**, for LEICA Microsystems operating microscopes, \( f = 55 \) mm, recommended for IMAGE1 HD H3-M/H3-M COVIEW, H3, H3-Z as well as S1 and S3 camera heads

**QUINTUS® TV Adaptor for operating microscopes from LEICA Microsystems with variable focal length**

![Image](image2.png)

- **209330 00 Z**  **QUINTUS® Zoom TV Adaptor**, for LEICA Microsystems operating microscopes, with variable focal length \( f = 43–86 \) mm, for use with all KARL STORZ cameras (SD and HD)

**QUINTUS® TV Adaptor for operating microscopes from Möller-Wedel with fixed focal length**

![Image](image3.png)

- **209530 45**  **QUINTUS® M 45 TV Adaptor**, for Möller-Wedel operating microscopes, \( f = 45 \) mm, recommended for IMAGE1 HD H3-M/H3-M COVIEW camera heads
- **209530 55**  **QUINTUS® M 55 TV Adaptor**, for Möller-Wedel operating microscopes, \( f = 55 \) mm, recommended for IMAGE1 HD H3-M/H3-M COVIEW, H3, H3-Z and S1, S3 camera heads

**Note:** Optical beamsplitters for other operating microscopes (i.e. LEICA or Möller-Wedel) are available directly from the manufacturers.
**IMAGE1 S™ Camera Heads**

For use with IMAGE1 S™ Camera System
IMAGE1 S CONNECT® Module TC 200EN, IMAGE1 S H3-LINK Module TC 300
and with all IMAGE1 HUB™ HD Camera Control Units

**TH 100**

**IMAGE1 S H3-Z Three-Chip FULL HD Camera Head,**
50/60 Hz, IMAGE1 S™-compatible, progressive scan, soakable, gas- and plasma-sterilizable, with integrated Parfocal Zoom Lens, focal length $f = 15–31$ mm (2x), 2 freely programmable camera head buttons, for use with IMAGE1 S™ and IMAGE1 HUB™ HD/HD

**Specifications:**

<table>
<thead>
<tr>
<th>IMAGE1 FULL HD Camera Heads</th>
<th>IMAGE1 S H3-Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product no.</td>
<td>TH 100</td>
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<tr>
<td>Image sensor</td>
<td>$3 \times \frac{1}{3}$ CCD chip</td>
</tr>
<tr>
<td>Dimensions w x h x d</td>
<td>$39 \times 49 \times 114$ mm</td>
</tr>
<tr>
<td>Weight</td>
<td>270 g</td>
</tr>
<tr>
<td>Optical interface</td>
<td>integrated Parfocal Zoom Lens, $f = 15–31$ mm (2x)</td>
</tr>
<tr>
<td>Min. sensitivity</td>
<td>F 1.4/1.17 Lux</td>
</tr>
<tr>
<td>Grip mechanism</td>
<td>standard eyepiece adaptor</td>
</tr>
<tr>
<td>Cable</td>
<td>non-detachable</td>
</tr>
<tr>
<td>Cable length</td>
<td>300 cm</td>
</tr>
</tbody>
</table>

**TH 104**

**IMAGE1 S H3-ZA Three-Chip FULL HD Camera Head,**
50/60 Hz, IMAGE1 S™-compatible, **autoclavable**, progressive scan, soakable, gas- and plasma-sterilizable, with integrated Parfocal Zoom Lens, focal length $f = 15–31$ mm (2x), 2 freely programmable camera head buttons, for use with IMAGE1 S™ and IMAGE1 HUB™ HD/HD

**Specifications:**

<table>
<thead>
<tr>
<th>IMAGE1 FULL HD Camera Heads</th>
<th>IMAGE1 S H3-ZA</th>
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</thead>
<tbody>
<tr>
<td>Product no.</td>
<td>TH 104</td>
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<tr>
<td>Image sensor</td>
<td>$3 \times \frac{1}{3}$ CCD chip</td>
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<td>Dimensions w x h x d</td>
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<td>Min. sensitivity</td>
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<tr>
<td>Grip mechanism</td>
<td>standard eyepiece adaptor</td>
</tr>
<tr>
<td>Cable</td>
<td>non-detachable</td>
</tr>
<tr>
<td>Cable length</td>
<td>300 cm</td>
</tr>
</tbody>
</table>
Monitors

9619 NB 19" HD Monitor, color systems PAL/NTSC, max. screen resolution 1280 x 1024, image format 4:3, power supply 100–240 VAC, 50/60 Hz, wall-mounted with VESA 100 adaption, including:
External 24 VDC Power Supply
Mains Cord

9826 NB 26" FULL HD Monitor, wall-mounted with VESA 100 adaption, color systems PAL/NTSC, max. screen resolution 1920 x 1080, image format 16:9, power supply 100–240 VAC, 50/60 Hz including:
External 24 VDC Power Supply
Mains Cord
## Monitors

### KARL STORZ HD and FULL HD Monitors

<table>
<thead>
<tr>
<th></th>
<th>19&quot;</th>
<th>26&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall-mounted with VESA 100 adaption</td>
<td>9619 NB</td>
<td>9826 NB</td>
</tr>
</tbody>
</table>

#### Inputs:
- **DVI-D**
- **Fibre Optic**
- **3G-SDI**
- **RGBS (VGA)**
- **S-Video**
- **Composite/FBAS**

#### Outputs:
- **DVI-D**
- **S-Video**
- **Composite/FBAS**
- **RGBS (VGA)**
- **3G-SDI**

#### Signal Format Display:
- 4:3
- 5:4
- 16:9
- Picture-in-Picture
- PAL/NTSC compatible

### Optional accessories:
- 9826 SF **Pedestal**, for monitor 9826 NB
- 9626 SF **Pedestal**, for monitor 9619 NB

### Specifications:

<table>
<thead>
<tr>
<th></th>
<th>19&quot;</th>
<th>26&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>KARL STORZ HD and FULL HD Monitors</strong></td>
<td>9619 NB</td>
<td>9826 NB</td>
</tr>
<tr>
<td>Desktop with pedestal</td>
<td>optional</td>
<td>optional</td>
</tr>
<tr>
<td>Product no.</td>
<td>9619 NB</td>
<td>9826 NB</td>
</tr>
<tr>
<td>Brightness</td>
<td>200 cd/m² (typ)</td>
<td>500 cd/m² (typ)</td>
</tr>
<tr>
<td>Max. viewing angle</td>
<td>178° vertical</td>
<td>178° vertical</td>
</tr>
<tr>
<td>Pixel distance</td>
<td>0.29 mm</td>
<td>0.3 mm</td>
</tr>
<tr>
<td>Reaction time</td>
<td>5 ms</td>
<td>8 ms</td>
</tr>
<tr>
<td>Contrast ratio</td>
<td>700:1</td>
<td>1400:1</td>
</tr>
<tr>
<td>Mount</td>
<td>100 mm VESA</td>
<td>100 mm VESA</td>
</tr>
<tr>
<td>Weight</td>
<td>7.6 kg</td>
<td>7.7 kg</td>
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<tr>
<td>Rated power</td>
<td>28 W</td>
<td>72 W</td>
</tr>
<tr>
<td>Operating conditions</td>
<td>0–40°C</td>
<td>5–35°C</td>
</tr>
<tr>
<td>Storage</td>
<td>-20–60°C</td>
<td>-20–60°C</td>
</tr>
<tr>
<td>Rel. humidity</td>
<td>max. 85%</td>
<td>max. 85%</td>
</tr>
<tr>
<td>Dimensions w x h x d</td>
<td>469.5 x 416 x 75.5 mm</td>
<td>643 x 396 x 87 mm</td>
</tr>
<tr>
<td>Power supply</td>
<td>100–240 VAC</td>
<td>100–240 VAC</td>
</tr>
<tr>
<td>Certified to</td>
<td>EN 60601-1, protection class IPX0</td>
<td>EN 60601-1, UL 60601-1, MDD93/42/EEC, protection class IPX2</td>
</tr>
</tbody>
</table>
Data Management and Documentation
KARL STORZ AIDA® – Exceptional documentation

The name AIDA stands for the comprehensive implementation of all documentation requirements arising in surgical procedures: A tailored solution that flexibly adapts to the needs of every specialty and thereby allows for the greatest degree of customization.

This customization is achieved in accordance with existing clinical standards to guarantee a reliable and safe solution. Proven functionalities merge with the latest trends and developments in medicine to create a fully new documentation experience – AIDA.

AIDA seamlessly integrates into existing infrastructures and exchanges data with other systems using common standard interfaces.

WD 200-XX*  
AIDA Documentation System,  
for recording still images and videos,  
dual channel up to FULL HD, 2D/3D,  
power supply 100-240 VAC, 50/60 Hz  
including:  
USB Silicone Keyboard, with touchpad  
ACC Connecting Cable  
DVI Connecting Cable, length 200 cm  
HDMI-DVI Cable, length 200 cm  
Mains Cord, length 300 cm

WD 250-XX*  
AIDA Documentation System,  
for recording still images and videos,  
dual channel up to FULL HD, 2D/3D,  
including SMARTSCREEN® (touch screen),  
power supply 100-240 VAC, 50/60 Hz  
including:  
USB Silicone Keyboard, with touchpad  
ACC Connecting Cable  
DVI Connecting Cable, length 200 cm  
HDMI-DVI Cable, length 200 cm  
Mains Cord, length 300 cm

*XX Please indicate the relevant country code  
(DE, EN, ES, FR, IT, PT, RU) when placing your order.
Workflow-oriented use

**Patient**
Entering patient data has never been this easy. AIDA seamlessly integrates into the existing infrastructure such as HIS and PACS. Data can be entered manually or via a DICOM worklist. All important patient information is just a click away.

**Checklist**
Central administration and documentation of time-out. The checklist simplifies the documentation of all critical steps in accordance with clinical standards. All checklists can be adapted to individual needs for sustainably increasing patient safety.

**Record**
High-quality documentation, with still images and videos being recorded in FULL HD and 3D. The Dual Capture function allows for the parallel (synchronous or independent) recording of two sources. All recorded media can be marked for further processing with just one click.

**Edit**
With the Edit module, simple adjustments to recorded still images and videos can be very rapidly completed. Recordings can be quickly optimized and then directly placed in the report. In addition,freeze frames can be cut out of videos and edited and saved. Existing markings from the Record module can be used for quick selection.

**Complete**
Completing a procedure has never been easier. AIDA offers a large selection of storage locations. The data exported to each storage location can be defined. The Intelligent Export Manager (IEM) then carries out the export in the background. To prevent data loss, the system keeps the data until they have been successfully exported.

**Reference**
All important patient information is always available and easy to access. Completed procedures including all information, still images, videos, and the checklist report can be easily retrieved from the Reference module.
**Equipment Cart**

Equipment Cart
wide, tall, rides on 4 antistatic dual wheels equipped with locking brakes, 3 shelves, mains switch on top cover, energy beam package with integrated electrical subdistributors with 12 sockets, grounding plugs

Dimensions (w x h x d):
- Equipment cart: 830 x 1474 x 730 mm
- Shelf: 630 x 25 x 510 mm
- Caster diameter: 150 mm

consisting of:
- **Base module**, equipment cart, wide
- **Cover**, equipment cart, wide
- **Beam package**, equipment cart, tall
- 3x **Shelf**, wide
- **Drawer unit with lock**, wide
- 2x **Equipment rail**, long
- **Camera holder**
- 2x **Mains Cord**, length 100 cm

**Monitor Swivel Arm,**
height- and side-adjustable, can be mounted on the left or right, swivel range 180°, overhang 780 mm, overhang from center 1170 mm, load capacity max. 15 kg, with monitor mount VESA 75 / 100, for use with equipment carts UG xxx
Recommended Accessories for Equipment Cart

**Isolation Transformer**, 200 V–240 V; 2000 VA with 3 special mains sockets, automatic cut-out, 3 grounding plugs, dimensions: 330 x 90 x 495 mm (w x h x d), for use with Equipment Carts UG xxx

**Earth Leakage Monitor**, 200 V–240 V, for mounting to equipment cart, control panel dimensions: 44 x 80 x 29 mm (w x h x d), for use with Isolation Transformer UG 310

**Monitor Holding Arm**, height- and side-adjustable, tilting, mountable to the left or right, swivel range up to 320°, overhang 530 mm, load capacity max. 15 kg, monitor mount VESA 75 / 100, for use with Equipment Carts UG xxx