Prosthetic Instructions
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a Dentaurum Group company 4

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Medical and technical illustrations: ZTM Dirk Bachmann / ZTM Hans-Werner Pauli / Dr. Manfred Sontheimer
Text: ZTM Dirk Bachmann / Dr. Friedhelm Heinemann / Dr. Manfred Sontheimer
TIOLOX IMPLANTS, a Dentaurum Group company, has been actively involved on the international market as a full-service supplier in the field of oral regeneration since 1995. Founded in Germany in 1886 as a family business, Dentaurum is a highly experienced manufacturer of dental and laboratory products. The Dentaurum Group is market leader in orthodontics and dental titanium technology and the only supplier in the world that can provide treatment systems from "root to crown" using titanium and porcelain.

Apart from Tiolox® implants, the product concept of TIOLOX IMPLANTS includes other specially coordinated product ranges.

- **TIOMESH**  Bone regeneration system
- **TIOTOM**  Osteotomes
- **TIOSET®**  Surgical instruments
- **TIODRAPE**  Sterile drapes

Experienced implantologists and hospitals have collaborated in the design and development of these product ranges. Their aim was to design compatible, user-friendly product ranges with a wide spectrum of applications.

It is not only the quality and design of a system that determines the standard of work produced, but also a profound knowledge of implantology and practical experience in using the relevant type of treatment. The manufacturer offers a training programme tailored to the needs of specific user groups to provide operators with the knowledge and skill required to use the system.
Since its introduction 16 years ago, the Tiolox® implant system has been continually developed without diverging from its ingenious basic concept. The Tiolox® system still has the same impressive advantages:

- low system costs
- easy handling / comprehensive, well-structured professional system
- unique implant design
- sole manufacturer with a concept based on the use of titanium
- precise, technician-friendly prosthetic components
- universal prosthetic components made of different materials

In the courses it offers, TIOLOX IMPLANTS maintains its philosophy of a simple, yet comprehensive overall concept and goes against the trend of providing numerous courses with only minor differences.

The TIOLOX IMPLANTS training programme provides high-quality specialised courses that cover the whole spectrum of modern implant treatment. The courses are designed so that the course participant is the focus of the training event. At Tiolox® courses the participant can discuss actual cases from the dental practice with lecturers and obtain practical advice.

All Tiolox® lecturers are experienced implantologists, who continually update their knowledge of implantology. This ensures that Tiolox® courses always provide reliable, up-to-date information.
### 1. Prosthetic restoration options and imaging procedures

#### 1. Implant exposure and gingiva forming

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<thead>
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<th>Code</th>
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<td>370-766-00</td>
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<td>Plastic abutment, conical</td>
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<td>370-759-00</td>
<td>HFA-plastic abutment</td>
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<tr>
<td>370-786-00</td>
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<tr>
<td>370-785-00</td>
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<td>Premium abutment, titanium, angled</td>
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<td>330-782-00</td>
<td>Premium abutment, porcelain-titanium</td>
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#### 2. Impression taking

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<td>Impression pin, titanium, ø 4.5 mm, L 10 mm</td>
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<tr>
<td>370-620-00</td>
<td>Impression pin, titanium, ø 4.5 mm, L 14 mm</td>
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<tr>
<td>330-650-00</td>
<td>ExactoFix set, ø 3.5 mm</td>
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<tr>
<td>330-651-00</td>
<td>ExactoFix impression aid, ø 3.5 mm (VE 5)</td>
</tr>
<tr>
<td>330-652-00</td>
<td>ExactoFix bite registration aid, ø 3.5 mm (VE 5)</td>
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<tr>
<td>370-650-00</td>
<td>ExactoFix set, ø 4.5 mm</td>
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<tr>
<td>370-651-00</td>
<td>ExactoFix impression aid, ø 4.5 mm (VE 5)</td>
</tr>
<tr>
<td>370-652-00</td>
<td>ExactoFix bite registration aid, ø 4.5 mm (VE 5)</td>
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#### 3. Fabricating the model

<table>
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<tr>
<th>Code</th>
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<tr>
<td>330-611-00</td>
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<td>330-621-00</td>
<td>Sure-grip screw, L 22 mm</td>
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<tr>
<td>330-630-00</td>
<td>Laboratory analogue, ø 3.5 mm</td>
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<tr>
<td>370-630-00</td>
<td>Laboratory analogue, ø 4.5 mm</td>
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#### 4. Technical options

##### 4.1 Fixed restorations

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<td>330-700-00</td>
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<td>Premium abutment, titanium, straight, ø 3 mm, ø 4.5 mm, L 5 mm</td>
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<td>330-783-00</td>
<td>Premium abutment, titanium, straight, ø 3 mm, ø 4.5 mm, L 5 mm</td>
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<td>330-784-00</td>
<td>Premium abutment, titanium, straight, ø 4.0 mm, ø 4.5 mm, L 5 mm</td>
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<td>330-785-00</td>
<td>Premium abutment, titanium, angled 20°, ø 1.5 mm, ø 3 mm, ø 4.5 mm, L 5 mm</td>
</tr>
<tr>
<td>330-786-00</td>
<td>Premium abutment, titanium, angled 20°, ø 3.0 mm, ø 3 mm, ø 4.5 mm, L 5 mm</td>
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<td>330-755-00</td>
<td>Titanium-plastic abutment, L 12 mm, ø 3.5 mm, ø 4.5 mm, L 5 mm</td>
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<tr>
<td>330-758-00</td>
<td>HFA-plastic abutment, L 12 mm, ø 3.5 mm, ø 4.5 mm, L 5 mm</td>
</tr>
<tr>
<td>330-765-00</td>
<td>Plastic abutment, conical, L 12 mm, ø 3.5 mm, ø 4.5 mm, L 5 mm</td>
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<tr>
<td>330-766-00</td>
<td>Plastic abutment, cylindrical, L 12 mm, ø 3.5 mm, ø 4.5 mm, L 5 mm</td>
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##### 4.2 Operator-removable restorations

<table>
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<td>330-758-00</td>
<td>HFA-plastic abutment, L 12 mm, ø 3.5 mm, ø 4.5 mm, L 5 mm</td>
</tr>
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<td>330-765-00</td>
<td>Plastic abutment, conical, L 12 mm, ø 3.5 mm, ø 4.5 mm, L 5 mm</td>
</tr>
<tr>
<td>330-766-00</td>
<td>Plastic abutment, cylindrical, L 12 mm, ø 3.5 mm, ø 4.5 mm, L 5 mm</td>
</tr>
</tbody>
</table>

#### Technical options

- Single crowns
- Bridges

**Torque for tightening screws:** 20 Ncm
4.3 Removable restorations

**Bar restorations**

- **330-738-00**: Adjustment sleeve, titanium, ø 3.5 mm, L 2.8 mm
- **330-740-00**: Adjustment sleeve, titanium, ø 3.5 mm, L 3.5 mm
- **330-742-00**: Adjustment sleeve, titanium, ø 3.5 mm, L 4.5 mm
- **330-746-00**: Adjustment sleeve, titanium, ø 3.5 mm, L 5.5 mm
- **370-738-00**: Adjustment sleeve, titanium, ø 4.5 mm, L 2.8 mm
- **370-740-00**: Adjustment sleeve, titanium, ø 4.5 mm, L 3.5 mm
- **370-742-00**: Adjustment sleeve, titanium, ø 4.5 mm, L 4.5 mm
- **370-746-00**: Adjustment sleeve, titanium, ø 4.5 mm, L 5.5 mm

**Casting**

- **330-768-00**: Plastic abutment, L 10 mm
- **330-769-00**: Plastic abutment, L 5 mm

**Technical options**

- Milled bars
- Bars

**Torque for tightening screws: 20 Ncm**

**Telescope restorations**

- **330-758-00**: HFA-plastic abutment, cylindrical, L 12 mm, ø 3.5 mm, screw
- **370-759-00**: HFA-plastic abutment, L 12 mm, ø 4.5 mm, screw
- **370-758-00**: HFA-plastic abutment, cylindrical, L 12 mm, ø 4.5 mm, screw

**Technical options**

- Telescope restorations
- Torque for tightening screws: 20 Ncm

**Laser welding**

- **330-749-00**: Titanium abutment, L 5 mm
- **330-770-00**: rematitan® macro resilient bar, macro bar sleeve, retention, L 40 mm
- **330-771-00**: rematitan® macro bar attachment, macro bar sleeve, retention, L 40 mm
- **330-772-00**: rematitan® macro bar sleeve, retention
- **330-775-00**: rematitan® micro resilient bar, micro bar sleeve, retention, L 40 mm
- **330-776-00**: rematitan® micro bar attachment, micro bar sleeve, retention, L 40 mm
- **330-777-00**: rematitan® micro bar sleeve, retention

**Technical options**

- Titanium bars
- Torque for tightening screws: 20 Ncm

**Ball anchors**

- **330-801-00**: Ball anchor and SS 2.5 mm, titanium, ø 3.5 mm
- **330-802-00**: Ball anchor and SS 3.5 mm, titanium, ø 3.5 mm
- **330-803-00**: Ball anchor and SS 4.5 mm, titanium, ø 3.5 mm
- **370-801-00**: Ball anchor and SS 2.5 mm, titanium, ø 4.5 mm
- **370-802-00**: Ball anchor and SS 3.5 mm, titanium, ø 4.5 mm
- **370-803-00**: Ball anchor and SS 4.5 mm, titanium, ø 4.5 mm
- **330-815-00**: Titanium matrix and plastic assembly ring
- **330-816-00**: Ring spring, standard
- **330-817-00**: Ring spring, weak

**Technical options**

- Ball anchor attachments
- Torque for tightening screws: 28 Ncm

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GH – gingival height
HFA – high-fusing alloy
SS – spacer sleeve
1.1 Prosthetic components - Technical data

**Provisio post**

**Impression components (closed)**

**Gingiva former / adjustment sleeve**

**Porcelain abutment components**

**Impression components (open)**

**Titanium abutment components**
Titanium abutment components

Plastic abutment components

Titanium-plastic abutment components

Plastic abutment components

HFA-plastic abutment components

Ball anchor
2. Implant exposure and gingiva forming

The long-term success of implants depends to a large extent on the restoration. Close cooperation between the dentist and dental technician, careful preprosthetic planning and involvement of the patient are important prerequisites for a successful implant restoration. The healing period is generally 3 months for the mandible and 6 months for the maxilla. The healing time also varies depending on the bone quality, healing process and anatomy. Prosthetic treatment\(^1\) can begin after the healing period and gingiva forming are complete.

2.1 Implant exposure

The implant is exposed after the healing stage. The patient is prepared in the same way as for other types of surgery and given a local anaesthetic. Different techniques and instruments, e.g. scalpel or laser, can be used for exposing the implant. Use of a scalpel or laser preserves the condition of the peri-implant tissue (attached gingiva) and attains aesthetically optimum results (management of the gingiva). A laser can be used in the same way as a scalpel for making the incision; the advantage of using a laser rather than a scalpel is that there is virtually no bleeding during surgery. This ensures the operator has a clear view of the operating site. The impression can be taken directly after exposure of the implant.

The healing caps are removed prior to gingiva forming.

\(^1\) It is essential that the operator has carefully read all the relevant Tiolox\(^\circ\) directions for use and special instructions before using the implants. It is recommended that operators complete an appropriate training course on the Tiolox\(^\circ\) implant system beforehand, as the instructions for use can only cover some of the numerous options available.
2.2 Gingiva forming

The operator has the choice of two different designs of gingiva former:

- Cylindrical gingiva formers (adjustment sleeves)
- Conical gingiva formers

The screws of the gingiva formers are tightened using a maximum torque of 15 Ncm or manually (see Torque Ratchet Page 50).

Cylindrical gingiva formers
(Prosthetic adjustment sleeves)

The cylindrical gingiva formers fulfil two important functions:

- Clinical: Gingiva forming
- Prosthetic: Compensating for abutment divergences (not for single crowns)

Gingiva formers are available in different lengths depending on the gingival height. The flared conical section of the gingiva former should be flush with the upper edge of the gingiva.

3.5 mm diameter:
- 330-738-00 Gingiva former, titanium, L 2.8 mm
- 330-740-00 Gingiva former, titanium, L 3.5 mm
- 330-742-00 Gingiva former, titanium, L 4.5 mm
- 330-746-00 Gingiva former, titanium, L 5.5 mm

4.5 mm diameter:
- 370-738-00 Gingiva former, titanium, L 2.8 mm
- 370-740-00 Gingiva former, titanium, L 3.5 mm
- 370-742-00 Gingiva former, titanium, L 4.5 mm
- 370-746-00 Gingiva former, titanium, L 5.5 mm

The gingiva formers are secured in position with the following cover screws:

- 330-744-00 Screw, titanium, L 5.5 mm
  (for gingiva formers, L 2.8 mm and L 3.5 mm)
- 330-747-00 Screw, titanium, L 7.5 mm
  (for gingiva formers, L 4.5 mm and L 5.5 mm)
Conical gingiva formers
The conical gingiva formers have been designed for widening the peri-implant tissue. They are available in different lengths depending on the gingival height.

3.5 mm diameter:
- 330-470-00 Gingiva former, titanium, L 2.8 mm (incl. screw, L 5.5 mm)
- 330-472-00 Gingiva former, titanium, L 3.5 mm (incl. screw, L 5.5 mm)
- 330-474-00 Gingiva former, titanium, L 4.5 mm (incl. screw, L 7.5 mm)
- 330-476-00 Gingiva former, titanium, L 5.5 mm (incl. screw, L 7.5 mm)

4.5 mm diameter:
- 370-470-00 Gingiva former, titanium, L 2.8 mm (incl. screw, L 5.5 mm)
- 370-472-00 Gingiva former, titanium, L 3.5 mm (incl. screw, L 5.5 mm)
- 370-474-00 Gingiva former, titanium, L 4.5 mm (incl. screw, L 7.5 mm)
- 370-476-00 Gingiva former, titanium, L 5.5 mm (incl. screw, L 7.5 mm)

If a temporary restoration is fitted during gingiva forming, it should be adequately relieved. The impression should only be taken if there are no signs of inflammation.
3. Impression taking

3.1 Open impression technique

After the alginate impression has been taken, a custom tray is fabricated, reinforced and perforated in the area of the implants.

The gingiva formers should be removed before taking the impression.

The impression pins are placed on the implants in the mouth and secured in position with sure-grip screws (torque 15 Ncm or manually, see Torque Ratchet Page 50).

Two different lengths of impression pins are available for the two implant diameters depending on the amount of occlusal space available.

- 330-610-00 Impression pin, titanium, ø 3.5 mm, L 10 mm
- 330-620-00 Impression pin, titanium, ø 3.5 mm, L 14 mm
- 370-610-00 Impression pin, titanium, ø 4.5 mm, L 10 mm
- 370-620-00 Impression pin, titanium, ø 4.5 mm, L 14 mm
- 330-611-00 Sure-grip screw, titanium, L 18 mm (for impression pin, L 10 mm)
- 330-621-00 Sure-grip screw, titanium, L 22 mm (for impression pin, L 14 mm)
When fitting the custom tray, it is important that the impression pins or sure-grip screws do not come into contact with the tray at the perforation.

The impression is then taken with the custom tray. The impression pins are retained in the impression. Care should be taken to obtain an accurate impression of the peri-implant gingiva.

After removing the sure-grip screws, the impression with the posts retained in position and the sure-grip screws are passed on to the dental technician. It is essential that the dental technician is informed of the correct implant diameter.
3.2 Closed impression technique

The ExactoFix impression system is available for the closed impression technique. It produces a quick, accurate impression using a closed stock impression tray.

ExactoFix impression components are available for each implant diameter:

- 330-650-00 ExactoFix set, ø 3.5 mm (Base, impression aid, bite registration aid and screw)
- 370-650-00 ExactoFix set, ø 4.5 mm (Base, impression aid, bite registration aid and screw)

The impression and bite registration aids can be ordered separately.

- 330-651-00 ExactoFix impression aid, ø 3.5 mm (VE 5)
- 370-651-00 ExactoFix impression aid, ø 4.5 mm (VE 5)
- 330-652-00 ExactoFix bite registration aid, ø 3.5 mm (VE 5)
- 370-652-00 ExactoFix bite registration aid, ø 4.5 mm (VE 5)

The gingiva formers are first removed and the corresponding titanium abutments secured in position on the implant (torque 15 Ncm or manually, see Torque Ratchet Page 50). The impression aids are then fitted, ensuring the vertical retention grooves are properly aligned, until the snap mechanism is clearly felt and heard. The impression is taken in the same way as with the direct impression technique. After the impression material has set, the tray is removed. The titanium abutments are sent separate from the impression to the laboratory. It is essential that the laboratory is informed of the correct implant diameter.

Special bite registration aids are available for registering the bite before or after impression taking.

• Impression caps and bite registration aids are intended for single use. Repeated use produces inaccuracies in reproduction when taking the impression.
4. Fabricating the model

4.1 Fabricating the stone model with gingival mask (open impression)

The impression material is removed from the occlusal edge right up to the upper edge of the impression pins to check that they have been positioned exactly. The laboratory analogues are inserted into the impression pins with the external hex and secured flush using the sure-grip screws.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>330-630-00</td>
<td>Laboratory analogue, ø 3.5 mm</td>
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<tr>
<td>370-630-00</td>
<td>Laboratory analogue, ø 4.5 mm</td>
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<tr>
<td>330-611-00</td>
<td>Sure-grip screw, titanium, L 18 mm (for impression pin, L 10 mm)</td>
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<tr>
<td>330-621-00</td>
<td>Sure-grip screw, titanium, L 22 mm (for impression pin, L 14 mm)</td>
</tr>
</tbody>
</table>

Fabricating the gingival mask

A flexible gingival mask is recommended for all implant work. It ensures optimal contouring of the crowns and, when removed, allows an unhindered view of the neck of the implant. The implant abutments can then be checked to ensure that they are seated properly.

The flexible gingival mask is poured directly into the implant area of the impression.

Caution:
As the silicones used can create an inseparable bond, it is essential to apply a separator before pouring the gingival mask.
Fabricating the stone model

After the gingival mask has set, the impression is poured in stone.

The sure-grip screws should be removed before taking off the impression.

Finished stone model.

Stone model with the gingival mask removed and laboratory analogues.
4.2 Fabricating the stone model with gingival mask (closed impression)

The laboratory analogue is screwed together with the titanium abutment. The titanium abutment is then inserted in the impression aid, ensuring the vertical retention grooves are properly aligned, until the snap mechanism is clearly felt and heard. The laboratory analogue with the titanium abutment and impression aid should be rigidly retained in the impression material.

The gingival mask and model are fabricated as described in 4.1. The impression tray can be removed directly from the model.

330-650-00 ExactoFix set, ø 3.5 mm (Base, impression aid, bite registration aid and screw)
370-650-00 ExactoFix set, ø 4.5 mm (Base, impression aid, bite registration aid and screw)

The impression and bite registration aids can be ordered separately.

330-651-00 ExactoFix impression aid, ø 3.5 mm (VE 5)
370-651-00 ExactoFix impression aid, ø 4.5 mm (VE 5)
330-652-00 ExactoFix bite registration aid, ø 3.5 mm (VE 5)
370-652-00 ExactoFix bite registration aid, ø 4.5 mm (VE 5)
These instructions deal only with the application of the main prosthetic components using selected standard examples. Relevant prosthetic courses and the Tiolox® hotline can provide you with further information on the Tiolox® implant system.

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- Surgery hotline: +49 72 31/803-322
- Surgery hotline: +49 72 31/803-108
- Prosthetics hotline: +49 72 31/803-410
- Ordering by telephone: +49 72 31/803-322
- Ordering by telephone: +49 72 31/803-108
- Fax: +49 72 31/803-375

**Internet**

- www.tiolox.com
5. Technical options

5.1 Fixed restorations

Every implant-borne restoration requires precise prosthetic planning. At this stage the anatomical aspects, prosthetic components and type of restoration, i.e. cemented or screw-retained, are determined. Abutments made from porcelain (example 1), HFA (example 2), titanium (example 3) and plastic are available for fabricating customised, fixed implant-borne restorations. There is a detailed overview of system components on Page 6 – 7.

5.1.1 Single crowns

**Example 1: All-porcelain anterior crown, cemented, implant ø 4.5 mm, porcelain abutment**

**Premium porcelain abutments**

- 330-700-00 Premium abutment, porcelain-titanium, GH 3 mm, ø 3.5 mm
- 370-700-00 Premium abutment, porcelain-titanium, GH 3 mm, ø 4.5 mm

The porcelain-titanium Premium abutment ø 4.5 mm (REF 370-700-00) was used in this example.

The model with the laboratory analogue and gingival mask is articulated and the occlusal space available checked. The titanium base is placed on the laboratory analogue, secured in position with the AnoTite screw supplied and the porcelain abutment is placed on the base.

The abutment height is marked on the porcelain abutment. It should be at least 2 mm below the planned incisal edge of the cemented crown. The gingival margin and contour of the abutment shoulder are then marked. Ensure that the cervical contour is slightly below the gingival level labially/buccally and that it is on or above the gingival level lingually/palatally.
To facilitate customising the porcelain abutment, the following precision instruments are available to the dental technician:

- 330-828-00 Porcelain abutment holder, ø 3.5 mm
- 370-828-00 Porcelain abutment holder, ø 4.5 mm
- 330-831-00 AnatomicHold
  (Precision instrument used in this example for retaining the porcelain abutment holder)

The porcelain abutment holder (REF 370-828-00) is inserted in the AnatomicHold for preparation and rotationally secured using a setscrew (SW 0.9 mm). The retention screw of the holder is then loosened slightly and the porcelain abutment mounted. Ensure the rotational security of the abutment and holder are aligned exactly. The porcelain abutment is fixed in position by tightening the retention screw (manually, max. 15 Ncm). The porcelain abutment is then prepared according to the markings.

The porcelain abutment is prepared with suitable diamond rotary instruments (e.g. Edenta) as follows:

- minimum pressure and sufficient water cooling to avoid local overheating
- the wall thickness of the porcelain abutment should be at least 0.5 mm
- preparation of a deep chamfer with inclined inner edge and minimum shoulder of 0.5 mm
- the overall height of the porcelain abutment (without titanium base) should be at least 7 mm
The porcelain abutment is removed and cleaned after preparation. The porcelain abutment can be customised using a porcelain with a suitable CTE and/or with a stain firing before bonding it to the titanium base with adhesive.

To ensure accurate bonding with adhesive, the titanium base is secured on the polishing aid with the AnoTite screw:
- 330-827-00 Polishing aid, ø 3.5 mm
- 370-827-00 Polishing aid, ø 4.5 mm
- 330-831-00 AnatomicHold
  (Precision instrument used in this example for holding the polishing aid)

The polishing aid secured in the AnatomicHold ensures easy handling when bonding the titanium base and porcelain abutment with adhesive.

The head of the AnoTite screw, used to secure the titanium base in position, should be covered with wax before bonding with adhesive. The adhesive surfaces of the customised porcelain abutment and titanium base are sandblasted with aluminium oxide (50 µm / 2 bar). Silanisation of the adhesive surface of the titanium base is also recommended. Ensure that the adhesive surfaces are free of grease and dry before bonding with adhesive. The manufacturer recommends the following adhesive:
- Panavia F (Kuraray Medical Inc., Kuraray Europe GmbH, Düsseldorf, Germany, Tel. +49 / 211 / 53888-0)

Remove excess after bonding with adhesive. Adhere to the manufacturer’s instructions when fabricating the all-porcelain crown.
Example 2: Metal-porcelain anterior crown, cemented, implant ø 4.5 mm, HFA-plastic abutment

**HFA-plastic abutment**

330-758-00 HFA-plastic abutment, cylindrical, ø 3.5 mm, L 12 mm
370-758-00 HFA-plastic abutment, cylindrical, ø 4.5 mm, L 12 mm
370-759-00 HFA-plastic abutment, ø 4.5 mm, L 12 mm

The HFA-plastic abutment comprises three components:

- HFA abutment, L 2.5 – 3.6 mm (shoulder, L 1.0 – 2.1 mm)
- Plastic extension, L 9.9 – 11.0 mm
- AnoTite screw, L 7 mm

The HFA abutment is made of a cast-on precious metal alloy.
Composition in % by mass:
60 Au, 19 Pt, 20 Pd, 1 Ir
Hardness HV: 205
CTE (500 °C / 932 °F) μm/mK: 12.5
CTE (600 °C / 1112 °F) μm/mK: 12.6
Melting range °C / °F: 1490 – 1400 / 2714 – 2552

The HFA-plastic abutment ø 4.5 mm (REF 370-759-00) was used in this example.

The model with the laboratory analogue and gingival mask is articulated and the occlusal space available checked as in example 1 (porcelain abutment, see Page 20 – 22).

The HFA-plastic abutment is placed on the laboratory analogue, ensuring rotational security and secured in position with the AnoTite screw supplied.
The plastic extension is shortened and trimmed according to the occlusal and anatomical space available. If the titanium screw is to be inserted further, the final position of the screw can be adjusted using the countersink (REF 330-829-00).

The HFA-plastic abutment is removed for waxing up the mesostructure. A precious metal alloy (e.g. DentAurum Bio or DentAurum LFC, Dentaurum) should be used for casting onto the HFA abutment. If the area at HFA abutment is to be faced with porcelain, the cast alloy should have a minimum thickness of 0.3 mm to prevent porcelain cracks. The following precision instruments can be used for customised preparation after casting:

- 330-827-00 Polishing aid, ø 3.5 mm
- 370-827-00 Polishing aid, ø 4.5 mm
- 330-831-00 AnatomicHold
  (Precision instrument used in this example for holding the polishing aid)

The mesostructure is fixed in position on the model and the crown waxed up and cast according to the criteria for the porcelain bonding technique.

**Tip:**
The notch, which is not faced with porcelain, can be prepared in the palatal/cervical area of the metal framework to facilitate removal of the crown (attachment for crown removal instrument, e.g. curved tip).

The crown is faced with porcelain according to the manufacturer’s instructions (when using conventional alloys e.g. with CARMEN® or CCS, Dentaurum).
Example 3: Metal-porcelain anterior crown, cemented, implant ø 4.5 mm, titanium abutment

Tiolox® Premium titanium abutments are available in straight and angled (20°) versions. They fit exactly at the interface of the implant and abutment and can be easily customised due to their anatomical shape. They have a precisely defined crown margin and integrated rotational security. The angled titanium abutments also have a different gingival height (labial/palatal). The double inner hex allows the position of the abutment to be optimally customised.

**Premium abutments ø 3.5 mm**

- 330-782-00 Premium abutment, titanium, straight, GH 1.5 mm
- 330-783-00 Premium abutment, titanium, straight, GH 3.0 mm
- 330-784-00 Premium abutment, titanium, straight, GH 4.0 mm
- 330-785-00 Premium abutment, titanium, angled 20°, GH 1.5 mm
- 330-786-00 Premium abutment, titanium, angled 20°, GH 3.0 mm

**Premium abutments ø 4.5 mm**

- 370-782-00 Premium abutment, titanium, straight, GH 1.5 mm
- 370-783-00 Premium abutment, titanium, straight, GH 3.0 mm
- 370-784-00 Premium abutment, titanium, straight, GH 4.0 mm
- 370-785-00 Premium abutment, titanium, angled 20°, GH 1.5 mm
- 370-786-00 Premium abutment, titanium, angled 20°, GH 3.0 mm
The angled titanium abutment, GH 1.5 mm, ø 4.5 mm (REF 370-785-00) was used in this example due to the gingival relationship and implant position.

The available occlusal space and axial alignment should always be checked when inserting the abutments. Both can be adjusted as required after marking. The axial position can be optimally aligned to the relevant situation using the double inner hex. There are 12 different positions available. The titanium abutment is fixed in position using the AnoTite screw, L 5 mm.

A titanium preparation set (REF 135-500-00, Dentaurum) is available for optimum preparation of titanium abutments. The Tiolox® precision instruments described on Page 46 are ideal for use during preparation.

The mesostructure is waxed up, cast and prepared.

**Tip:**
A notch, which is not faced with porcelain, can be prepared in the palatal/cervical area of the metal framework to facilitate removal of the crown (attachment for crown removal instrument, e.g. curved tip).

The crown is faced with porcelain according to the manufacturer’s instructions (when using conventional alloys e.g. with CARMEN® or CCS, Dentaurum). If the framework has been completely fabricated in titanium, a suitable titanium facing porcelain should be used, e.g. Triceram®, Dentaurum.
5.1.2 Bridges

Three straight titanium abutments, GH 1.5 mm, ø 3.5 mm (REF 330-782-00) were used in this example.

The titanium abutments are selected according to the gingival conditions. Three different heights (1.5 / 3.0 / 4.0 mm) are available for each implant diameter. Abutments can be customised according to the gingival contour. The height of the coronal section of the abutments is 6 mm, which can be shortened to suit the occlusal space available. The Tiolox® precision instruments described on Page 46 are ideal for preparation. The titanium abutment is fixed in position with the AnoTite screw supplied, L 7 mm.

To ensure that the cast bridge framework fits accurately, the crown copings are modelled using a non-residual burnout resin and connected using the same material after the resin is cured.

The framework is then waxed up to a reduced anatomical form according to the usual technical criteria. Non-residual burnout waxes from Dentaurum (StarWax range) are ideal for waxing up.
Casting and finishing are completed according to the alloy manufacturer’s instructions.

**Important:**
Frameworks should have an absolutely passive fit on the abutments.

**Tip:**
The abutments and their positions on the model should be marked to prevent any mistakes when fitting them in the mouth.

The approximal spaces are contoured so that the necks of the implants can be cleaned with an interdental brush.

**Tip:**
A notch, which is not faced with porcelain, is prepared in the palatal cervical area of the metal framework to facilitate removal of the crown (attachment for crown removal instrument, e.g. curved tip).

**Result:**
A fixed restoration that is aesthetically and functionally perfect.
5.2 Operator-removable restorations

Every implant-borne restoration requires precise prosthetic planning. At this stage the anatomical aspects, prosthetic components and type of restoration, i.e. cemented or screw-retained are determined. Abutments made from HFA (example 1), titanium-plastic (example 2) or plastic are available for fabricating customised, operator-removable, implant-borne restorations.

5.2.1 Single crowns

Example 1: Premolar, occlusally screw-retained, implant ø 3.5 mm, HFA-plastic abutment

The HFA-plastic cylindrical abutment, ø 3.5 mm, L 12 mm was selected for restoration of the ø 3.5 mm implant in this example.

This abutment comprises three components:

- HFA abutment, L 3.6 mm (shoulder, L 2.1 mm)
- Plastic extension, L 9.9 mm
- AnoTite screw, L 7 mm

The HFA abutment is made of a cast-on precious metal alloy.

Composition in % by mass:
60 Au, 19 Pt, 20 Pd, 1 Ir

Hardness HV: 205

CTE (500 °C / 932 °F) µm/mK: 12.5
CTE (600 °C / 1112 °F) µm/mK: 12.6
Melting range °C / °F: 1490 – 1400 / 2714 – 2552

The plastic extension on the HFA abutment is shortened according to the available occlusal space.

The Tiolox® precision instruments described on Page 46 are ideal for retaining the abutment securely during preparation.

Waxing up is carried out according to the usual criteria for bonded porcelain work and begins at the upper margin of the gingiva. The gingival contour can be marked on the abutment with an indelible pencil.
Finishing and ...

... facing are completed according to the porcelain manufacturer's instructions.

The procedure described ensures a customised marginal contour.

- Flat gingival level
- Deep gingival level
Example 2: Molar, occlusally screw-retained, implant ø 4.5 mm, titanium-plastic abutment

The following components are available for the titanium casting technique:

330-755-00 Titanium-plastic abutment, ø 3.5 mm, L 12 mm
370-755-00 Titanium-plastic abutment, ø 4.5 mm, L 12 mm

The titanium-plastic abutment comprises three components:

- titanium abutment, L 2.5 – 3.6 mm
  (shoulder, L 1.0 – 2.1 mm)
- plastic extension, L 9.9 – 11.0 mm
- AnoTite screw, L 7 mm

The titanium-plastic abutment ø 4.5 mm (REF 370-755-00) was used for an occlusally screw-retained restoration in this example.

The model with the laboratory analogue and gingival mask is articulated and the occlusal space checked. The gingival level should also be determined to ensure optimum contouring of the crown.

The plastic extension is placed on the titanium abutment, ensuring rotational security and fixed in position on the laboratory analogue with the AnoTite screw supplied.
The plastic extension is shortened and trimmed according to the occlusal and anatomical space available. If the titanium screw is to be inserted further, the final position of the screw can be adjusted using the countersink (REF 330-829-00). Ensure that there is sufficient space between the head of the screw and opposing bite to allow the screw channel to be sealed with composite after the crown is fitted.

The plastic extension can be removed from the titanium abutment for modelling, as the rotational security ensures that it can be repositioned accurately.

The plastic extension is then waxed up according to the criteria for metal-porcelain restorations.

There are special requirements for titanium preparation in the laboratory. Non-residual burnout waxes (e.g. StarWax, Dentaurum) should always be used.

Dentaurum has a comprehensive range for the preparation of titanium. Call +49 72 31/803-210 to request the relevant literature.

The cast titanium coping is then fitted to the titanium abutment, ensuring rotational security. The two components are laser welded (equipment and accessories range can be obtained from Dentaurum). For an optimum weld seam the following points should be noted:

- set the parameters on the laser welder to suit the materials used (parameters can vary depending on the manufacturer)
- a flush junction between the two components
- adequate shrouding with argon (quality of argon minimum 4.6, flow 8 l/min)
- there should be no discoloration of the titanium after welding

A titanium preparation set (REF 135-500-00) is available from Dentaurum that facilitates optimum preparation.

The Tiolox® precision instruments described on Page 46 are ideal for retaining the abutments securely during preparation.

Information about titanium preparation and laser welding can be obtained from the Dentaurum Group hotline +49 72 31/803-410.

The crown is faced with titanium porcelain (e.g. Triceram®, Dentaurum) according to the manufacturer’s instructions. The screw channel can be sealed with a porcelain inlay fabricated in the laboratory or with a composite filling placed by the dentist.
5.3 Removable restorations

Numerous prosthetic options are available for fabricating removable restorations, e.g. telescopes (5.3.1), milled bars (5.3.2), ball anchors (5.3.3) and magnets.

5.3.1 Telescope restorations

HFA-plastic abutments are used for fabricating individual telescope crowns. They guarantee an accurate fit on the implant due to the prefabricated HFA abutment. The plastic extension ensures optimum customisation of the individual telescope crowns.

330-758-00 HFA-plastic abutment, cylindrical, ø 3.5 mm, L 12 mm
370-758-00 HFA-plastic abutment, cylindrical, ø 4.5 mm, L 12 mm
370-759-00 HFA-plastic abutment, ø 4.5 mm, L 12 mm

The HFA abutment is made of a cast-on precious metal alloy.
Composition in % by mass:
60 Au, 19 Pt, 20 Pd, 1 Ir
Hardness HV: 205
CTE (500 °C / 932 °F) µm/mK: 12.5
CTE (600 °C / 1112 °F) µm/mK: 12.6
Melting range °C: 1490 – 1400 / 2714 – 2552

The cylindrical HFA-plastic abutment, ø 3.5 mm (REF 330-758-00) was used for treating an edentulous lower jaw in this example.

The HFA-plastic abutment comprises three components:
› HFA abutment, L 2.5 mm (shoulder L 1 mm)
› Plastic extension, L 12 mm
› AnoTite screw, L 7 mm

The HFA-plastic abutments are placed on the laboratory analogues, the space available checked using the labial and lingual overcasts and the plastic extensions adjusted.
The primary telescope crowns are then waxed up taking into account the labial and lingual overcasts. This technique guarantees that there is adequate space for subsequent working stages, such as fabricating secondary telescope crowns and a metal strengthener and the extension of the denture.

This technique ensures that the result corresponds with the preprosthetic planning.

The waxed-up primary crowns are milled in wax (e.g. with the Paramil milling unit REF 094-220-00, Dentaurum). They are placed on the model again for a final check and sprued. The subgingival area is conically contoured with wax before investing the wax patterns. A precious metal alloy (e.g. DentAurum Classic, Dentaurum) should be used for casting on to the HFA abutment.

**Tip:**
Mark the sprues according to their position on the model.

After casting, the primary telescope crowns are fitted on the model for checking, ...
... prepared and polished.

Finished primary telescope crowns (illustration: electro-formed copings on the model).

A metal strengthener is fabricated to ensure the long-term stability of the restoration into which individual electroformed secondary telescope crowns are cemented.

To avoid mixing up the individual primary telescope crowns during fitting, they are also marked to indicate their position on the implant.
5.3.2 Bar restorations

When the implants are divergent, various adjustment sleeves can be used to fabricate a bar restoration. The following adjustment sleeves are available depending on the gingival height and implant diameter. The upper edge of the adjustment sleeve should fit flush with upper margin of the gingiva. The adjustment sleeves cannot be used for single crowns.

**Diameter 3.5 mm:**
- 330-738-00 Adjustment sleeve, titanium, L 2.8 mm
- 330-740-00 Adjustment sleeve, titanium, L 3.5 mm
- 330-742-00 Adjustment sleeve, titanium, L 4.5 mm
- 330-746-00 Adjustment sleeve, titanium, L 5.5 mm

**Diameter 4.5 mm:**
- 370-738-00 Adjustment sleeve, titanium, L 2.8 mm
- 370-740-00 Adjustment sleeve, titanium, L 3.5 mm
- 370-742-00 Adjustment sleeve, titanium, L 4.5 mm
- 370-746-00 Adjustment sleeve, titanium, L 5.5 mm

Two techniques are available for the adjustment sleeves:
Example 1: Prefabricated bar (laser/casting technique)
Example 2: Milled bar

**Example 1: Prefabricated bar (laser/casting technique)**

General guidelines for positioning a bar (resilient bar):

**Horizontal positioning of the bar**
The bar should be positioned horizontally to the ideal occlusal plane to ensure that the masticatory forces are distributed correctly. Positioning it at an angle results in incorrect loading of the implants and pressure on the soft tissue.

**Vertical positioning of the bar**
The resilient bar acts as a rotational axis for fixed-free dentures. The bar should be positioned vertical to the median line to enable uniform loading of the alveolar ridge.
Laser welding
Prefabricated conical titanium abutments are screwed onto the adjustment sleeves. They fit the ø 3.5 mm and ø 4.5 mm adjustment sleeves, as both diameters have the same funnel-shaped occlusal taper.

330-749-00 Titanium abutment, L 5 mm

The prefabricated titanium bar is shortened to the correct length and positioned to the correct horizontal axis for laser welding.

Parallelogram for laser welding (REF 090-520-00 Paralas, Dentaurum).
Bar components and sleeves are laser welded together. Only pure titanium wire (available from Dentaurum) should be used as filler material. Further information about laser and titanium techniques can be obtained by contacting the Dentaurum Group technical hotline +49 72 31/803-410.

Passively fitting laser-welded bar.
After laser welding, the bar is finished and polished (e.g. with the titanium preparation REF 135-500-00, Dentaurum).

The titanium bar sleeve is laser welded to the titanium retention and ...

... polymerised into the denture.

The prefabricated titanium abutment components enable a precise, cost-effective restoration to be fabricated using the same material.
Casting

The plastic abutments for the adjustment sleeves fit both implant diameters.

They are fixed in position on the adjustment sleeves. If limited space is available, the plastic abutments can be easily trimmed. The final position of the screw can be adjusted with the countersink (REF 330-829-00).

330-769-00 Plastic abutment, L 5 mm
330-829-00 Tungsten carbide countersink (screw fit)

The long cylindrical plastic abutment can be used as an alternative to the conical plastic abutment.

330-768-00 Plastic abutment, L 10 mm

A custom-fabricated plastic bar is fixed in position with wax on the plastic abutments.

Casting, finishing and polishing should be completed according to the alloy manufacturer’s instructions.
Example 2: Milled bar

When fabricating a milled bar, the same plastic abutments are used on the adjustment sleeves as for a bar (Casting, Page 39).

The plastic abutments are fixed in position on the adjustment sleeves and shortened or trimmed according the space available. The final position of the screw can be adjusted if required using the countersink (REF 330-829-00).

The abutments are connected with modelling resin.
The customised bar is waxed up and then paralleled using the milling unit.

To improve retention, attachments are integrated horizontally and vertically (e.g. DentAttach H REF 240-112-00 or V REF 240-110-00, Denta**urum**)

Casting, finishing and polishing are completed in the usual manner.
The DentAttach matrices are fitted.

The superstructure was completed with an electroformed mesostructure in this example. This is fitted with a strengthener made from a CrCo alloy (e.g. remanium® GM 800+, Dentaurum) to increase the stability.
5.3.3 Ball anchors

Ball anchors are used to retain purely tissue-borne dentures.

The following lengths and diameters are available depending on the gingival height:

**Ball anchor ø 3.5 mm**
- 330-801-00 Ball anchor and spacer sleeve, L 2.5 mm, titanium
- 330-802-00 Ball anchor and spacer sleeve, L 3.5 mm, titanium
- 330-803-00 Ball anchor and spacer sleeve, L 4.5 mm, titanium

**Ball anchor ø 4.5 mm**
- 370-801-00 Ball anchor and spacer sleeve, L 2.5 mm, titanium
- 370-802-00 Ball anchor and spacer sleeve, L 3.5 mm, titanium
- 370-803-00 Ball anchor and spacer sleeve, L 4.5 mm, titanium

**Accessories for ball anchors ø 3.5 mm / ø 4.5 mm**
- 330-541-00 Hexagon key for ball anchor
- 330-820-00 Screwdriver for titanium matrix
- 330-816-00 Ring spring, standard
- 330-817-00 Ring spring, weak

The withdrawal force of the titanium matrix is determined by a ring spring. If there is a reduction in the withdrawal force of the ring spring, the matrix can be easily removed with the screwdriver (REF 330-820-00) and the spring replaced.
Example 1
Modifying an existing full denture. The ball anchors with the correct spacer sleeves are fixed in position in the laboratory analogues.

Before polymerising the matrix into the denture, the original threaded titanium ring is replaced with a plastic assembly ring. The larger diameter of the plastic assembly ring facilitates the insertion of the original threaded titanium ring later. The ring spring should also be positioned in the plastic assembly ring.

The matrices are fitted onto the ball anchors and aligned vertically with a parallel path of insertion.

Undercuts are blocked out to prevent acrylic flowing into the ball anchors and ensure that the paths of insertion of the matrices remain parallel.
The denture should be ground out above the ball anchors so that the matrices have adequate free space. An opening should be cut lingually or palatally to check that the matrices are properly seated. The matrices are fixed in position through the opening with cold-cure resin. Follow the manufacturer’s instructions when using the cold-cure resin.

When the resin is set, the plastic assembly rings are removed with the screwdriver and the original threaded titanium ring with mounted ring spring screwed in position.

Excess resin is removed. The denture is smoothed and polished. Check on the model that the ball anchors function properly.

**Example 2**
The procedure is virtually the same when fabricating a new denture, except that the matrices are polymerised directly into the acrylic base.

**Recall**
Dentures and their retentive units should be checked at six monthly intervals. The following points should be noted:

- eliminate any undesirable movement of the denture (reline the denture, activate or replace the matrices)
- check the fit of the ball anchors on the implants (tighten if required)
- poor oral hygiene (remove plaque and tartar and instruct the patient once again on implant hygiene)
6. Precision accessories for the laboratory

AnatomicTwist

Red aluminium handle, stainless steel instrument socket, instrument holder ø 2.35 mm, span of allen key for locking screw 0.9 mm, maintenance-free rotary bearing

91 x ø max. 24 mm - ø min. 11 mm

AnatomicHold

Solid stainless steel, instrument socket ø 2.35 mm, span of allen key for locking screw 0.9 mm

115 x ø max. 20 mm - ø min. 8.1 mm

AnatomicTray

Aluminium embossed edges, aluminium laminated panels, rigid polythene foam lining

Overall dimensions 330 x 240 x 40 mm
For secure retention and controlled rotation of rotary instruments with a Ø 2.35 mm standard shank, for Tiolox® instrument inserts (all rotationally secure): countersink (inner hexagon), countersink (screw fit), diamond-coated milling cutter D 30 (course), diamond-coated milling cutter D 25 (medium), diamond-coated milling cutter D 20 (fine), reamer (screw channel) - milling, drilling, cutting.

For secure retention of instruments with a Ø 2.35 mm standard shank, for Tiolox® instrument inserts (all rotationally secure): polishing aid Ø 3.5 mm, polishing aid Ø 4.5 mm, holder for porcelain abutments Ø 3.5 mm, holder for porcelain abutments Ø 4.5 mm - secure retention of prosthetic components during preparing and polishing.

Practical system organiser for safe storage and transport of instruments and components.
## Precision instruments – Overview

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>330-061-00</td>
<td>AnatomicTray (laboratory tray)</td>
<td>System organiser for safe storage and transport of instruments and components.</td>
</tr>
<tr>
<td>330-831-00</td>
<td>AnatomicHold instrument holder</td>
<td>For secure retention of polishing aids.</td>
</tr>
<tr>
<td>330-827-00</td>
<td>Polishing aid Ø 3.5 mm</td>
<td>For secure retention of prosthetic components during preparation and polishing; made of titanium to ensure long service life when preparing with rotary instruments (any abrasion of the polishing aid onto the abutment is biologically harmless); same material as titanium abutments ensures no damage to the abutment hex.</td>
</tr>
<tr>
<td>370-827-00</td>
<td>Polishing aid Ø 4.5 mm</td>
<td></td>
</tr>
<tr>
<td>330-828-00</td>
<td>Holder for porcelain abutments Ø 3.5 mm</td>
<td></td>
</tr>
<tr>
<td>370-828-00</td>
<td>Holder for porcelain abutments Ø 4.5 mm</td>
<td></td>
</tr>
<tr>
<td>330-832-00</td>
<td>AnatomicTwist instrument holder</td>
<td>For secure retention and controlled rotation of instrument inserts.</td>
</tr>
<tr>
<td>330-825-00</td>
<td>Countersink (inner hex)</td>
<td>Made of tungsten carbide; for 90% removal of the inner hexagon to compensate for divergent abutments of connected superstructures.</td>
</tr>
<tr>
<td>330-829-00</td>
<td>Countersink (screw fit)</td>
<td>Made of tungsten carbide; for accurately placing the screw head deeper, e.g. with limited space.</td>
</tr>
<tr>
<td>330-836-00</td>
<td>Conical countersink</td>
<td>Made of tungsten carbide; for preparing cast bar components.</td>
</tr>
<tr>
<td>330-833-00</td>
<td>Milling cutter, fine diamond-coated, D 20</td>
<td>These are designed for adjusting the basal surface (interface to implant) of the abutment if casting inaccuracies (blows, roughness etc.) prevent an accurate fit! The diamond coating and central guide pin allow accurate cervical surface adjustments. This ensures a flush fit to the implant. The milling cutters are used in decreasing stages of grit number (D 30 ➞ D 25 ➞ D 20). The D 30 grit is used first after casting to remove any rough casting inaccuracies. The D 25 is then used for smoothing and the D 20 for final surface preparation. This procedure guarantees that the dental technician produces a flat, uniform seating surface.</td>
</tr>
<tr>
<td>330-834-00</td>
<td>Milling cutter, medium diamond-coated, D 25</td>
<td></td>
</tr>
<tr>
<td>330-835-00</td>
<td>Milling cutter, coarse diamond coated, D 30</td>
<td></td>
</tr>
<tr>
<td>330-821-00</td>
<td>Reamer</td>
<td>For flush, smooth preparation of the screw channel in the abutment. Ideal for removing casting inaccuracies.</td>
</tr>
<tr>
<td>330-062-00</td>
<td>Prosthetic kit “EQ Line”</td>
<td>AnatomicTray equipped with prosthetic components.</td>
</tr>
</tbody>
</table>

Standard instruments do not have rotational security (flat side), so spontaneous turning of standard inserts in the holder cannot be ruled out.
7. Torque ratchet

**Brief description**

The Tiolox® torque ratchet (REF 330-519-00) comprises a ratchet head, ratchet handle and an adjustment screw. The ratchet head can be locked to cancel the torque limiter. The torque is set using the adjustment screw when the ratchet head is not locked.

The torque can be gradually adjusted from 10 Ncm to 30 Ncm. The Tiolox® torque ratchet is used with different inserts to operate the manual instruments for preparing the implant site as well as for tightening closure screws, gingiva formers, impression components and titanium abutment screws.

**Application**

The Tiolox® torque ratchet is used with different inserts either with or without torque limiter depending on the application. The Tiolox® torque ratchet and inserts should be disassembled, cleaned, dried and sterilised after reassembly before initial use and after each use on the patient.

**Note:**

- After each use the adjustment screw should be turned to the lowest setting to release the stress on the spring.
- The torque ratchet should be recalibrated every two years.

**Surgery: Application without torque limiter**

1. Set the adjustment screw to 10 Ncm with a few turns (Fig. 1).
2. Remove the ratchet head from the ratchet handle, turn it 90° and engage it on the ratchet handle. The ratchet head can no longer be bent (Fig. 2 – 3).
3. After attaching the appropriate insert (for manual surgical instruments, accessory components), the torque ratchet can be used as a ratchet without torque limiter (Fig. 4).
Prosthetics: Application with torque limiter

1. Set the ratchet head so that it bends when pressure is applied to the side. If the ratchet head is in the locked position, the adjustment screw should be set to 10 Ncm with a few turns. The ratchet head is then removed from the ratchet handle, turned 90° and engaged on the ratchet head (Fig. 5 – 6).

2. Turn the adjustment screw until the correct torque is shown in the display and the mark is level with the ratchet handle (Fig. 7 – 8).

3. Place the correct insert (hex key, insertion key) into the ratchet head (Fig. 9).

4. Insert the closure screw, screw for the gingiva former and titanium abutment screws in the abutment until the ratchet head bends. This indicates that the set torque has been reached. There should be no further tightening when the ratchet head is bent (Fig. 10).

Torque chart

<table>
<thead>
<tr>
<th>Application</th>
<th>Torque</th>
<th>Illustration</th>
<th>Inserts</th>
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<tbody>
<tr>
<td>Closure screws</td>
<td>manually driven</td>
<td>330-532-01</td>
<td>Hex key L 20 mm</td>
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<tr>
<td>Implants (max. 15 Ncm)</td>
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<tr>
<td>Closure screws</td>
<td>manually driven</td>
<td>330-533-01</td>
<td>Hex key L 25 mm</td>
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<tr>
<td>Gingiva formers (max. 15 Ncm)</td>
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<tr>
<td>Impression components</td>
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<tr>
<td>Titanium abutment screws</td>
<td>20 Ncm</td>
<td>330-541-00</td>
<td>Insertion key ball anchor L 22 mm</td>
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<tr>
<td>Ball anchor</td>
<td>28 Ncm</td>
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If you require further information on the Tiolox® implant system, contact the Dentaurum Group hotline. The Dentaurum Group also offers special courses on the Tiolox® implant system. Further information can be obtained from:

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