ENDOSCOPIC TRANSNASAL SURGERY OF THE SKULL BASE
The BETTAG/SCHÄFER Technique

Martin BETTAG
Peter SCHÄFER
ENDOSCOPIC TRANSNASAL SURGERY OF THE SKULL BASE

THE BETTAG/SCHÄFER TECHNIQUE

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Endoscopic transnasal transsphenoidal pituitary surgery is an advancement of traditional microsurgical techniques. Its advantages include better illumination of the operative field and more accurate control of the tumor resection. Basically any functioning or nonfunctioning micro- and macroadenoma is accessible by endoscopic surgery through the transnasal transsphenoidal route. The surgical treatment of pituitary adenomas with significant para-, supra- or retrostellar extension as well as craniopharyngiomas, clivus chordomas, and other tumors of the anterior skull base requires extended skull base approaches under purely endoscopic control.

Advantages of the Operating Technique

Endoscopic transnasal skull base surgery offers the following advantages over standard microscopic techniques:

- Excellent illumination of the operative field by delivering light close to the anatomical structures of interest
- High maneuverability of surgical instruments, unhampered by a nasal speculum
- Little trauma to the mucosa
- More accurate differentiation of normal and neoplastic tissues
- High image resolution with a wide-angle view
- Use of scopes with viewing angles of 30° to 45°, expanding the range of areas that can be inspected
Details of the Operation

Operating Room Setup
The surgeon, assistant, and scrub nurse are standing at each side of the operating table and watch the monitor screen, which is set up behind the patient’s head. It is most convenient for a right-handed surgeon to stand on the left side of the table (patient’s right side).

Operative Technique
Pituitary surgery should employ a 3-hand technique in which the surgeon generally holds the pituitary endoscope with a THUMFART handle in the left hand and a working instrument (drill, curette, etc.) in the right hand while an assistant manipulates the suction.

The surgeon should definitely use a bimanual operating technique for complex tumors and extended skull base approaches. In this case the assistant introduces the Bettag/Schäfer scope, which is 30 cm long, along the upper border of the nasal cavity and instills irrigating fluid as needed.
After the removal of the intrasphenoidal septa, the key anatomical landmarks of the anterior skull base can be identified: optico-carotid recess (OCR), planum sphenoidale (PS), sellar floor (SF), clivus (C), and carotid protuberance (CP).

**Ostium in the Anterior Wall of the Right Sphenoid Sinus**

The ostium of the sphenoid sinus (SO) is identified between the nasal septum (NS) and the superior turbinate (ST).
Opening the Sellar Floor
The floor of the sella is opened with a coarse diamond drill.

Incision of the Dura
The dura is incised using a sickle knife with a retractable blade.

Adenoma Curettage
The tumor capsule is opened, and various ring curettes are used to mobilize the tumor tissue and deliver it to the tip of the suction tube.
Endoscopic Appearance after Tumor Resection

Endoscopic inspection after successful adenoma removal. The medial wall bordering the cavernous sinus (CS) is visible on the left side, and the sellar diaphragm (DI) is visible above.

Parasellar Anatomy

Soft tumors in the cavernous sinus (CS) can be removed until neurovascular structures are exposed: internal carotid artery (ICA), oculomotor nerve (OmN), trochlear nerve (TN), and abducent nerve (AN).

Extended Endoscopic Approach to the Skull Base (Transtubercular Transplanum Approach)

Preoperative sagittal MR image (after gadolinium administration) demonstrates a suprasellar tumor extending into the third ventricle.
Following endoscopic tumor resection through a trans-tubercular transplanum approach, inspection reveals the flattened anterior communicating artery complex (ACoA) and the entrance to the third ventricle.

A mucosal flap is elevated from the nasal septum and transposed on its vascular pedicle to cover the dural defect.

Postoperative MRI demonstrates the pituitary gland in the sella. The tumor has been completely resected. The transposed flap appears as a soft-tissue mass in contact with the planum sphenoidale, sella, and clivus.
Anatomical Guide

Contents

Nasal Cavity
Sphenoid Sinus
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Nasal Septal Flap
Infrachiasmatic Region
Suprachiasmatic Region
Cavernous Sinus
Retroclival Region
Intraventricular Region
Nasal Cavity

<table>
<thead>
<tr>
<th>Anatomical landmarks</th>
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<tbody>
<tr>
<td>Co</td>
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<tr>
<td>ET</td>
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<td>IT</td>
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<td>MT</td>
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<td>NS</td>
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<td>SER</td>
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Sphenoid Sinus

<table>
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<tbody>
<tr>
<td>C</td>
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<tr>
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<td>IOCR</td>
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<td>mOCR</td>
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<td>PS</td>
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<td>RS</td>
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<td>SF</td>
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<tr>
<td>SO</td>
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</table>

17a 17b 17c
Endoscopic Transnasal Surgery of the Skull Base – The BETTAG/SCHÄFER Technique

![Image 17d](image17d.png)

![Image 17e](image17e.png)

![Image 17f](image17f.png)
## Sella

<table>
<thead>
<tr>
<th>Anatomical landmarks</th>
<th>Description</th>
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<tbody>
<tr>
<td>Di</td>
<td>Sellar diaphragm</td>
</tr>
<tr>
<td>DM</td>
<td>Dura mater</td>
</tr>
<tr>
<td>mCS</td>
<td>Medial wall of cavernous sinus</td>
</tr>
<tr>
<td>SF</td>
<td>Sellar floor</td>
</tr>
<tr>
<td>TS</td>
<td>Tuberculum sellae</td>
</tr>
</tbody>
</table>

18a

18b

18c

![Image a](image1.png)

![Image b](image2.png)

![Image c](image3.png)
Nasal Septal Flap

<table>
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<tbody>
<tr>
<td>Co</td>
</tr>
<tr>
<td>NS</td>
</tr>
<tr>
<td>SO</td>
</tr>
<tr>
<td>Choana</td>
</tr>
<tr>
<td>Nasal septum</td>
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<td>Sphenoid ostium</td>
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Infrachiasmatic Region

<table>
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<th>Anatomical landmarks</th>
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</thead>
<tbody>
<tr>
<td>A1</td>
</tr>
<tr>
<td>BA</td>
</tr>
<tr>
<td>Ch</td>
</tr>
<tr>
<td>DS</td>
</tr>
<tr>
<td>ICA</td>
</tr>
<tr>
<td>ON</td>
</tr>
<tr>
<td>OphA</td>
</tr>
</tbody>
</table>

Anatomical landmarks:
- A1: A1 segment of anterior cerebral artery
- BA: Basilar artery
- Ch: Chiasm
- DS: Dorsum sellae
- ICA: Internal carotid artery
- ON: Optic nerve
- OphA: Ophthalmic artery
### Anatomical landmarks

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>OmN</td>
<td>Oculomotor nerve</td>
</tr>
<tr>
<td>OT</td>
<td>Optic tract</td>
</tr>
<tr>
<td>P1</td>
<td>P1 segment of posterior cerebral artery</td>
</tr>
<tr>
<td>P2</td>
<td>P2 segment of posterior cerebral artery</td>
</tr>
<tr>
<td>PCoA</td>
<td>Posterior communicating artery</td>
</tr>
<tr>
<td>Pg</td>
<td>Pituitary gland</td>
</tr>
<tr>
<td>Ps</td>
<td>Pituitary stalk</td>
</tr>
</tbody>
</table>

[Image of anatomical landmarks]

Ch
Ps

[Image of anatomical landmarks with labels]

ON
OT
A1
ICA
PCoA
P2
P1
OmN
BA
Suprachiasmatic Region

<table>
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<tbody>
<tr>
<td><strong>A2</strong></td>
</tr>
<tr>
<td><strong>Ch</strong></td>
</tr>
<tr>
<td><strong>GR</strong></td>
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<tr>
<td><strong>OIN</strong></td>
</tr>
<tr>
<td><strong>ON</strong></td>
</tr>
<tr>
<td><strong>Pg</strong></td>
</tr>
<tr>
<td><strong>Ps</strong></td>
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<tr>
<td><strong>★</strong></td>
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</table>
## Cavernous Sinus

### Anatomical landmarks

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>AN</td>
<td>Abducent nerve</td>
</tr>
<tr>
<td>Ch</td>
<td>Chiasm</td>
</tr>
<tr>
<td>CS</td>
<td>Cavernous sinus</td>
</tr>
<tr>
<td>ICA</td>
<td>Internal carotid artery</td>
</tr>
<tr>
<td>OmN</td>
<td>Oculomotor nerve</td>
</tr>
<tr>
<td>ON</td>
<td>Optic nerve</td>
</tr>
<tr>
<td>Pg</td>
<td>Pituitary gland</td>
</tr>
<tr>
<td>ThV</td>
<td>Third ventricle</td>
</tr>
<tr>
<td>TN</td>
<td>Trochlear nerve</td>
</tr>
<tr>
<td>V1</td>
<td>First branch of trigeminal nerve</td>
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</table>

![Image of anatomical landmarks](image)

![Image of surgical procedure](image)
Retroclival Region

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>AcN</td>
</tr>
<tr>
<td>AN</td>
</tr>
<tr>
<td>AICA</td>
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<tr>
<td>ASA</td>
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<td>Ch</td>
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<td>FN</td>
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<td>fThV</td>
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<td>GN</td>
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<tr>
<td>HN</td>
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<tr>
<td>MB</td>
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<tr>
<td>MO</td>
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<td>OmN</td>
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<td>ON</td>
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<tr>
<td>P1</td>
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<tr>
<td>PICA</td>
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<td>Ps</td>
</tr>
<tr>
<td>SCA</td>
</tr>
<tr>
<td>TrN</td>
</tr>
<tr>
<td>VA</td>
</tr>
<tr>
<td>VcN</td>
</tr>
<tr>
<td>VN</td>
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</table>

23a: Anatomical landmarks

23b: Anatomical landmarks

23c: Anatomical landmarks
Endoscopic Transnasal Surgery of the Skull Base – The BETTAG/SCHÄFER Technique
Intraventricular Region

<table>
<thead>
<tr>
<th>Anatomical landmarks</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>A1</td>
<td>A1 segment of anterior cerebral artery</td>
</tr>
<tr>
<td>A2</td>
<td>A2 segment of anterior cerebral artery</td>
</tr>
<tr>
<td>ACoA</td>
<td>Anterior communicating artery</td>
</tr>
<tr>
<td>Ch</td>
<td>Chiasm</td>
</tr>
<tr>
<td>CP</td>
<td>Choroid plexus</td>
</tr>
<tr>
<td><strong>Anatomical landmarks</strong></td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>CoF</strong></td>
<td>Columnae fornicis</td>
</tr>
<tr>
<td><strong>FM</strong></td>
<td>Foramen of Monro</td>
</tr>
<tr>
<td><strong>LT</strong></td>
<td>Lamina terminalis</td>
</tr>
<tr>
<td><strong>MI</strong></td>
<td>Massa intermedia</td>
</tr>
<tr>
<td><strong>MB</strong></td>
<td>Mammillary bodies</td>
</tr>
<tr>
<td><strong>PiR</strong></td>
<td>Pineal recess</td>
</tr>
<tr>
<td><strong>PC</strong></td>
<td>Posterior commissure</td>
</tr>
<tr>
<td><strong>T</strong></td>
<td>Thalamus</td>
</tr>
</tbody>
</table>

![Anatomical landmarks](image1)

![Anatomical landmarks](image2)
Minimally Invasive Endoscopic Pituitary Surgery

BETTAG/SCHÄFER Recommended Set
Minimally Invasive Endoscopic Pituitary Surgery

BETTAG/SCHÄFER Recommended Set

1. 28164 AA HOPKINS® Straight Forward Telescope 0°, enlarged view, diameter 4 mm, length 30 cm, autoclavable, fiber optic light transmission incorporated, color code: green
2. 28160 TAL Suction and Irrigation Sheath 0°, for endoscopic diagnosis and surgery of the paranasal sinuses and anterior skull base, oval, with separate channel for suction and irrigation, for use with Irrigation and Suction Handles 28161 TD/TT/JD/JT, Cleaning Accessories 28160 TK + TLL and telescope 28164 AA
3. 28164 BA HOPKINS® Forward-Oblique Telescope 30°, enlarged view, diameter 4 mm, length 30 cm, autoclavable, fiber optic light transmission incorporated, color code: red
4. 28160 TBL Suction and Irrigation Sheath 30°, for endoscopic diagnosis and surgery of the paranasal sinuses and anterior skull base, oval, with separate channel for suction and irrigation, for use with Irrigation and Suction Handles 28161 TD/TT/JD/JT, Cleaning Accessories 28160 TK – TLL and telescope 28164 BA
5. 28132 AA HOPKINS® Straight Forward Telescope 0°, enlarged view, diameter 4 mm, length 18 cm, autoclavable, fiber optic light transmission incorporated, color code: green
6. 28160 TA Suction and Irrigation Sheath 0°, for endoscopic diagnosis and surgery of the paranasal sinuses and anterior skull base, vertical oval, 4.8 mm x 6 mm, with separate channel for suction and irrigation, for use with Irrigation and Suction Handles 28161 TD/TT/JD/JT, Cleaning Accessories 28160 TK – TL and Telescope 28132 AA
7. 28132 BA HOPKINS® Forward-Oblique Telescope 30°, enlarged view, diameter 4 mm, length 18 cm, autoclavable, fiber optic light transmission incorporated, color code: red
8. 28160 TB Suction and Irrigation Sheath 30°, for endoscopic diagnosis and surgery of the paranasal sinuses and anterior skull base, vertical oval, 4.8 mm x 6 mm, with separate channel for suction and irrigation, for use with Irrigation and Suction Handles 28161 TD/TT/JD/JT, Cleaning Accessories 28160 TK – TL and Telescope 28132 BA
9. 28132 FA HOPKINS® Forward-Oblique Telescope 45°, enlarged view, diameter 4 mm, length 18 cm, autoclavable, fiber optic light transmission incorporated, color code: black
10. 28160 TF Suction and Irrigation Sheath 45°, for endoscopic diagnosis and surgery of the paranasal sinuses and anterior skull base, vertical oval, 4.8 mm x 6 mm, with separate channel for suction and irrigation, for use with Irrigation and Suction Handles 28161 TD/TT/JD/JT, Cleaning Accessories 28160 TK – TL and Telescope 28132 FA
11. 28160 TLL Cleaning tube, long for sheaths 28160 TAL and 28160 TBL (not illustrated)
12. 28160 TK Cleaning Adaptor, for irrigation channel of Suction and Irrigation Sheaths 723527 A – F, 28160 TA – TF and 28160 TAL – TBL, LUER-Lock, length 3.5 cm (not illustrated)
13. 28160 TL Cleaning Tube, for suction/telescope channel of Suction and Irrigation Sheaths 28160 TA – TF, LUER-Lock, length 23 cm (not illustrated)
14. 495 EW Light Adaptor, angled 90°, diameter 4.8 mm, free rotatable to connect with standard telescopes
15. 533 TVA Adaptor, autoclavable, permits telescope changing under sterile conditions
16. 28161 TT THUMFART Irrigation and Suction Handle, with push button valve, including:
   - THUMFART Handle, with ergonomic ring handle and finger grip plate, for use with Irrigation and Suction Sheaths 723527 A – F, 28160 TA – TF and 28160 TAL - TBL
   - Push Button Valve (irrigation only active when pressure valve is depressed)
17. 628001 Sickle Knife, pointed, length 19 cm
18. 426620 GRÜNWALD Nasal Dressing Forceps, bayonet-shaped, length 20 cm
19. 792013 MAYO Dissecting Scissors, curved, with tungsten carbide inserts, length 15 cm
20. 403375 KILLIAN-STRUYCKEN Nasal Speculum, with set screw, blade length 75 mm, length 15 cm
21. 488074 FREER Elevator, double-ended, sharp and blunt, special matt finish, length 20 cm
22. 449002 HEYmann Nasal Scissors, medium, (standard model), working length 9.5 cm
23. 456501 BLAKESLEY-WILDE Nasal Forceps, 45° upturned, size 1, working length 11 cm
24. 456000 BLAKESLEY Nasal Forceps, straight, size 0, working length 11 cm
25. 456001 Same, size 1
26. 456101 GRÜNWALD-HENKE Nasal Forceps, straight, through-cutting, tissue-sparing, BLAKESLEY shape, width 3.5 mm, working length 11 cm
27. 456121 Same, 45° upturned
28. 459010 STAMMBERGER RHINOFORCE® II Antrum Punch, upside backward cutting, working length 10 cm
29. 459051 STAMMBERGER Antrum Punch, right side downward and forward cutting, working length 10 cm
30. 459052 Same, left side downward and forward cutting
31. 459151 STAMMBERGER SilCut® Antrum Punch, extremely powerful resection, patented uniform force transmission for gently controlled cutting, new ergonomic handle design, right side downward and forward cutting, working length 10 cm
32. 459152 Same, left side downward and forward cutting
33. 28164 MKA Punch, upbiting 60° forward, size 1 mm, working length 17 cm
34. 28164 MBK Same, size 2 mm

It is recommended to check the suitability of the product for the intended procedure prior to use.
Minimally Invasive Endoscopic Pituitary Surgery
BETTAG/SCHÄFER Recommended Set

- **648500** HAJEK-KOFLER **Sphenoid Punch**, not through-cutting, reversible, size 3.2 x 4 mm, working length 17 cm
- **203720** **Suction Tube**, cylindrical, Luer, outer diameter 2 mm, working length 9 cm
- **203730** **Same**, outer diameter 3 mm, working length 11 cm
- **203740** **Same**, outer diameter 4 mm, working length 11 cm
- **662882** FRANK-PASQUINI **Suction Tube**, angular, tip curved upwards, ball end, with grip plate and cut-off hole, Luer, diameter 2.4 mm, working length 13 cm
- **662885** **Same**, diameter 3 mm
- **662882** FRANK-PASQUINI **Suction Tube**, angular, tip straight, with grip plate and cut-off hole, diameter 2.5 mm, working length 12 cm
- **662830** **Same**, diameter 3 mm
- **649180 B** **Suction Tube**, malleable, with elongated cut-off hole and stylet, Luer, 6 Fr., working length 15 cm
- **28164 BDD** **TAKE-APART® Bipolar Forceps**, width 2 mm, distally angled 45°, horizontal closing, outer diameter 3.4 mm, working length 20 cm, including:
  - **Bipolar Ring Handle**
  - **Outer Sheath**
  - **Inner Sheath**
  - **Forceps Insert**
- **28164 BDK** **TAKE-APART® Bipolar Forceps**, width 4 mm, distally angled 45°, horizontal closing, size 3.4 mm, working length 20 cm, including:
  - **Handle**
  - **Outer Tube**
  - **Inner Tube**
  - **Bipolar Insert**
- **28164 BDM** **TAKE-APART® Bipolar Forceps**, with fine jaws, width 1 mm, distally angled 45°, horizontal closing, outer diameter 3.4 mm, working length 20 cm, including:
  - **Bipolar Ring Handle**
  - **Outer Sheath**
  - **Inner Sheath**
  - **Forceps Insert**
- **844523** **Bipolar Coagulating Forceps**, insulated, bayonet-shaped, tip 0.7 mm, length 23 cm, for use with Bipolar High Frequency Cords 847000 E or 847000 A/F/M/N/S/T/V
- **28164 KK** de DIVITIIS-CAPPABIANCA **Scalpel**, with retractable blade, including:
  - **Handle**
  - **Outer Sheath**
  - **Micro Knife**, sickle-shaped
- **663239** **Forceps**, straight, not through-cutting, with oval, fenestrated cupped jaws, width 2.5 mm, working length 18 cm
- **663231** **Forceps**, straight, with round cupped jaws, diameter 2.5 mm, working length 18 cm
- **663237** **Same**, 45° upturned
- **663301** **Scissors**, straight, delicate, working length 18 cm
- **663304** **Same**, curved to right, extra delicate
- **663305** **Same**, curved to left, extra delicate
- **663307** **Same**, 45° curved upwards, extra delicate
- **28164 GS** **Miniature Forceps**, through-cutting, with fine flat jaws, bite 1 mm, straight, working length 18 cm
- **28164 GU** **Same**, curved up
- **28164 KA** **Curette**, round spoon, tip slightly angled, size 1 mm, with round handle, length 25 cm
- **28164 KF** **Same**, tip highly angled, size 2 mm
- **28164 ER** **Micro Raspatory**, single curved to right, width 2 mm, length 27 cm
- **28164 EL** **Same**, single curved to left
- **28164 DS** **Elevator**, sharp, tip angled 15°, slightly curved spatula, with round handle, size 2 mm, length 25 cm
Minimally Invasive Endoscopic Pituitary Surgery

BETTAG/SCHÄFER Recommended Set

- 28164 RN CAPPABIANCA-de DIVITIIS Ring Curette, with round wire, inner diameter 3 mm, tip angled 45°, with round handle, length 25 cm
- 28164 RO Same, inner diameter 5 mm
- 28164 RP Same, inner diameter 7 mm
- 28164 RI CAPPABIANCA-de DIVITIIS Ring Curette, with round wire, inner diameter 3 mm, tip angled 90°, with round handle, length 25 cm
- 28164 RG Same, inner diameter 5 mm
- 28164 RB CAPPABIANCA-de DIVITIIS Ring Curette, with round wire, inner diameter 3 mm, laterally curved sheath end, with round handle, length 25 cm
- 28164 RA Same, inner diameter 5 mm
- 28164 RC Same, inner diameter 7 mm
- 28164 DA Dissector, sharp, tip angled 45°, round spatula, with round handle, size 2 mm, length 25 cm
- 28164 DB Same, size 3 mm

Optional Entrance Instruments (not illustrated)

- 7229 AA HOPKINS® Straight Forward Telescope 0°, diameter 2.7 mm, length 18 cm, autoclavable
- 723527 A Irrigation and Suction Sheath 0°, vertical oval, 3.5 x 4.7 mm, separate irrigation and suction channels
- 7229 BA HOPKINS® Forward-Oblique Telescope 30°, diameter 2.7 mm, length 18 cm, autoclavable
- 723527 B Irrigation and Suction Sheath 30°, vertical oval, 3.5 x 4.7 mm, separate irrigation and suction channels
- 7229 FA HOPKINS® Forward-Oblique Telescope 45°, diameter 2.7 mm, length 18 cm, autoclavable
- 723527 F Irrigation and Suction Sheath 45°, vertical oval, 3.5 x 4.7 mm, separate irrigation and suction channels

Recommended Containers for Sterilization

Telescopes: 39301 A (3x)
Telescopes long: 39301 B
Instruments: 39360 AK
HOPKINS® Telescopes
for Minimally Invasive Endoscopic Pituitary Surgery

diameter 4 mm, length 30 cm

- **28164 AA**
  - HOPKINS® Straight Forward Telescope 0°,
  - enlarged view, diameter 4 mm, length 30 cm, *autoclavable*,
  - fiber optic light transmission incorporated,
  - color code: green

- **28164 BA**
  - HOPKINS® Forward-Oblique Telescope 30°,
  - enlarged view, diameter 4 mm, length 30 cm, *autoclavable*,
  - fiber optic light transmission incorporated,
  - color code: red

**diameter 4 mm, length 18 cm**

- **28132 AA**
  - HOPKINS® Straight Forward Telescope 0°,
  - enlarged view, diameter 4 mm, length 18 cm, *autoclavable*,
  - fiber optic light transmission incorporated,
  - color code: green

- **28132 BA**
  - HOPKINS® Forward-Oblique Telescope 30°,
  - enlarged view, diameter 4 mm, length 18 cm, *autoclavable*,
  - fiber optic light transmission incorporated,
  - color code: red

- **28132 FA**
  - HOPKINS® Forward-Oblique Telescope 45°,
  - enlarged view, diameter 4 mm, length 18 cm, *autoclavable*,
  - fiber optic light transmission incorporated,
  - color code: black

**495 EW** Light Adaptor, angled 90°, diameter 4.8 mm,
- free rotatable to connect with standard telescopes

**533 TVA** Adaptor, autoclavable, permits telescope changing
under sterile conditions
Suction and Irrigation Sheaths
for Minimally Invasive Endoscopic Pituitary Surgery

28160 TAL  **Suction and Irrigation Sheath 0°**, for endoscopic diagnosis and surgery of the paranasal sinuses and anterior skull base, oval, with separate channel for suction and irrigation, for use with Irrigation and Suction Handles 28161 TD/TT/JD/JT, Cleaning Accessories 28160 TK + TLL and telescope 28164 AA

28160 TBL  **Suction and Irrigation Sheath 30°**, for endoscopic diagnosis and surgery of the paranasal sinuses and anterior skull base, oval, with separate channel for suction and irrigation, for use with Irrigation and Suction Handles 28161 TD/TT/JD/JT, Cleaning Accessories 28160 TK + TLL and telescope 28164 BA
Suction and Irrigation Sheaths
for Minimally Invasive Endoscopic Pituitary Surgery

28160 TA Suction and Irrigation Sheath 0°, for endoscopic diagnosis and surgery of the paranasal sinuses and anterior skull base, vertical oval, 4.8 mm x 6 mm, with separate channel for suction and irrigation, for use with Irrigation and Suction Handles 28161 TD/TT/JD/JT, 723630, Cleaning Accessories 28160 TK – TL and Telescope 28132 AA

28160 TB Suction and Irrigation Sheath 30°, for endoscopic diagnosis and surgery of the paranasal sinuses and anterior skull base, vertical oval, 4.8 mm x 6 mm, with separate channel for suction and irrigation, for use with Irrigation and Suction Handles 28161 TD/TT/JD/JT, 723630, Cleaning Accessories 28160 TK – TL and Telescope 28132 BA

28160 TF Suction and Irrigation Sheath 45°, for endoscopic diagnosis and surgery of the paranasal sinuses and anterior skull base, vertical oval, 4.8 mm x 6 mm, with separate channel for suction and irrigation, for use with Irrigation and Suction Handles 28161 TD/TT/JD/JT, 723630, Cleaning Accessories 28160 TK – TL and Telescope 28132 FA

28160 TLL Cleaning tube, long for sheaths 28160 TAL and 28160 TBL
28160 TK Cleaning Adaptor, for irrigation channel of Suction and Irrigation Sheaths 723527 A – F and 28160 TA – TF, LURER-Lock, length 3.5 cm
28160 TL Cleaning Tube, for suction/telescope channel of Suction and Irrigation Sheaths 28160 TA – TF, LURER-Lock, length 23 cm
THUMFART **Irrigation and Suction Handle**

28161 TT  THUMFART **Irrigation and Suction Handle**, with push button valve, including:
THUMFART **Handle**, with ergonomic ring handle and finger grip plate, for use with Irrigation and Suction Sheaths 723527 A – F, 28160 TA – TF and 28160 TAL - TBL

**Push Button Valve**
(irrigation only active when pressure valve is depressed)
### Instruments

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<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>628001</td>
<td><strong>Sickle Knife</strong>, pointed, length 19 cm</td>
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<tr>
<td>426620</td>
<td><strong>GRÜNWALD Nasal Dressing Forceps</strong>, bayonet-shaped, length 20 cm</td>
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<tr>
<td>792013</td>
<td><strong>MAYO Dissecting Scissors</strong>, curved, with tungsten carbide inserts, length 15 cm</td>
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<td>403375</td>
<td><strong>KILLIAN-STRUYCKEN Nasal Speculum</strong>, with set screw, blade length 75 mm, length 15 cm</td>
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<td>488074</td>
<td><strong>FREER Elevator</strong>, double-ended, sharp and blunt, special matt finish, length 20 cm</td>
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<tr>
<td>449002</td>
<td><strong>HEYMANN Nasal Scissors</strong>, medium, (standard model), working length 9.5 cm</td>
</tr>
</tbody>
</table>

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*Endoscopic Transnasal Surgery of the Skull Base – The BETTASCHÄFER Technique*
Instruments

456501 BLAKESLEY-WILDE Nasal Forceps, 45° upturned, size 1, working length 11 cm

456000 BLAKESLEY Nasal Forceps, straight, size 0, working length 11 cm

456001 Same, size 1
Instruments

456101  GRÜNWALD-HENKE Nasal Forceps, straight, through-cutting, tissue-sparing, BLAKESLEY shape, width 3.5 mm, working length 11 cm

456121  Same, 45° upturned

459010  STAMMBERGER RHINOFORCE® II Antrum Punch, upside backward cutting, with cleaning connector, working length 10 cm
Instruments

459051 STAMMBERGER Antrum Punch, right side downward and forward cutting, working length 10 cm

459052 Same, left side downward and forward cutting

459152 STAMMBERGER SilCut® Antrum Punch, extremely powerful resection, patented uniform force transmission for gently controlled cutting, new ergonomic handle design, right side downward and forward cutting, with cleaning connector, working length 10 cm

459152 Same, left side downward and forward cutting
Instruments

28164 MKA **Punch**, upbiting 60° forward, size 1 mm, working length 17 cm

28164 MKB **Same**, size 2 mm

648500 **HAJEK-KOFLER Sphenoid Punch**, not through-cutting, reversible, size 3.2 x 4 mm, working length 17 cm
Instruments

- **Suction Tube**, cylindrical, LUER, outer diameter 2 mm, working length 9 cm
- **Same**, outer diameter 3 mm, working length 11 cm
- **Same**, outer diameter 4 mm, working length 11 cm

- **FRANK-PASQUINI Suction Tube**, angular, tip curved upwards, ball end, with grip plate and cut-off hole, LUER, diameter 2.4 mm, working length 13 cm
- **Same**, diameter 3 mm
- **FRANK-PASQUINI Suction Tube**, angular, tip straight, with grip plate and cut-off hole, diameter 2.5 mm, working length 12 cm
- **Same**, diameter 3 mm

- **Suction Tube**, malleable, with elongated cut-off hole and stylet, LUER, 6 Fr., working length 15 cm

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- 203720
- 203730
- 203740
- 662882
- 662885
- 662825
- 662830
- 649180 B
**TAKE-APART® Bipolar Forceps**

For use with Bipolar High Frequency Cords 26176 LE/LM/L/LA/LV

- **28164 BDD**
  - **TAKE-APART® Bipolar Forceps**, width 2 mm, distally angled 45°, horizontal closing, outer diameter 3.4 mm, working length 20 cm, including:
    - Bipolar Ring Handle
    - Outer Sheath
    - Inner Sheath
    - Forceps Insert

- **28164 BDK**
  - **TAKE-APART® Bipolar Forceps**, width 4 mm, distally angled 45°, horizontal closing, size 3.4 mm, working length 20 cm, including:
    - Handle
    - Outer Tube
    - Inner Tube
    - Bipolar Insert

- **28164 BDM**
  - **TAKE-APART® Bipolar Forceps**, with fine jaws, width 1 mm, distally angled 45°, horizontal closing, outer diameter 3.4 mm, working length 20 cm, including:
    - Bipolar Ring Handle
    - Outer Sheath
    - Inner Sheath
    - Forceps Insert
Instruments

844523  **Bipolar Coagulating Forceps**, insulated, bayonet-shaped, tip 0.7 mm, length 23 cm, for use with Bipolar High Frequency Cords 847000 E or 847000 A/F/M/N/S/T/V

28164 KK  **de DIVITIIS-CAPPABIANCA Scalpel**, with retractable blade, including:
- **Handle**
- **Outer Sheath**
- **Micro Knife**, sickle-shaped

663239  **Forceps**, straight, not through-cutting, with oval, fenestrated cupped jaws, width 2.5 mm, working length 18 cm
Instruments

663231 Forceps, straight, with round cupped jaws, diameter 2.5 mm, working length 18 cm

663237 Same, 45° upturned

28164 GS Miniature Forceps, through-cutting, with fine flat jaws, bite 1 mm, straight, working length 18 cm

28164 GU Same, curved up

663301 Scissors, straight, delicate, working length 18 cm

663304 Same, curved to right, extra delicate

663305 Same, curved to left, extra delicate

663307 Same 45° curved upwards, extra delicate
Instruments

28164 KA
Curette, round spoon, tip slightly angled, size 1 mm, with round handle, length 25 cm

28164 KF
Same, tip highly angled, size 2 mm

28164 EL
Micro Raspatory, single curved to left, width 2 mm, length 27 cm

28164 ER
Same, single curved to right
Instruments

28164 DS 
**Elevator**, sharp, tip angled 15°, slightly curved spatula, with round handle, size 2 mm, length 25 cm

28164 DA 
**Dissector**, sharp, tip angled 45°, round spatula, with round handle, size 2 mm, length 25 cm

28164 DB 
**Same**, size 3 mm

28164 RP 
**Ring Curette**, CAPPABIANCA-de DIVITIIS
with round wire, inner diameter 3 mm, tip angled 45°, with round handle, length 25 cm

28164 RO 
**Same**, inner diameter 5 mm

28164 RP 
**Same**, inner diameter 7 mm

28164 RI 
CAPPABIANCA-de DIVITIIS **Ring Curette**, with round wire, inner diameter 3 mm, tip angled 90°, with round handle, length 25 cm

28164 RG 
**Same**, inner diameter 5 mm

28164 RB 
CAPPABIANCA-de DIVITIIS **Ring Curette**, with round wire, inner diameter 3 mm, laterally curved sheath end, with round handle, length 25 cm

28164 RA 
**Same**, inner diameter 5 mm

28164 RC 
**Same**, inner diameter 7 mm
HOPKINS® Telescopes

HOPKINS® Straight Forward Telescope 0°, diameter 2.7 mm, length 18 cm, autoclavable, fiber optic light transmission incorporated, color code: green

HOPKINS® Forward-Oblique Telescope 30°, diameter 2.7 mm, length 18 cm, autoclavable, fiber optic light transmission incorporated, color code: red

HOPKINS® Forward-Oblique Telescope 45°, diameter 2.7 mm, length 18 cm, autoclavable, fiber optic light transmission incorporated, color code: black

Irrigation and Suction Sheath 0°, vertical oval, 3.5 x 4.7 mm, separate irrigation and suction channels, for use with Irrigation and Suction Handles 28161 TD/TT/JD/JT, 723620 – 723630, Cleaning Accessories 28160 TK, 723527 L, 723540 K and Telescope 7219 AA

Irrigation and Suction Sheath 30°, vertical oval, 3.5 x 4.7 mm, separate irrigation and suction channels, for use with Irrigation and Suction Handles 28161 TD/TT/JD/JT, 723620 – 723630, Cleaning Accessories 28160 TK, 723527 L, 723540 K and Telescope 7219 BA

Irrigation and Suction Sheath 45°, vertical oval, 3.5 x 4.7 mm, separate irrigation and suction channels, for use with Irrigation and Suction Handles 28161 TD/TT/JD/JT, 723620 – 723630, Cleaning Accessories 28160 TK, 723527 L, 723540 K and Telescope 7219 FA
Plastic Container for Sterilizing and Storage of Telescopes

39301 A  Plastic Container for Sterilizing and Storage of Telescopes, perforated, with transparent lid, with silicone telescope holder, external dimensions (w x d x h): 321 x 90 x 45 mm, for 4 mm Arthrosopy Telescopes and similar, including:
Bottom Part
Lid
Silicone Telescope Holder

39301 B  Plastic Container for Sterilizing and Storage of Telescopes, perforated, with transparent lid, with silicone telescope holder, external dimensions (w x d x h): 446 x 90 x 45 mm, for 4 mm Cystoscopy Telescopes or 10 mm Laparoscopy Telescopes and similar, including:
Bottom Part
Lid
Silicone Telescope Holder
Silicone Telescope Holder

Plastic Container for Sterilizing and Storage

39360 AK  Plastic Container for Sterilizing and Storage of Variable Instrument Sets, perforated, with transparent lid, with silicone mat, two-level storage, (1 additional insert), external dimensions (w x d x h): 525 x 240 x 100 mm. The plastic containers may be used for sterilization with steam, gas and plasma, including:
2x Snap-in Clip, package of 12
2x Silicone Tie-Downs, package of 12
Tool
Endoscopic Transnasal Surgery of the Skull Base – The BETTAG/SCHÄFER Technique

The ENDOCA MELEON® is the newest member of the HOPKINS® family of rod-lens telescopes – and the most versatile.

With a simple turn of the adjusting knob, ENDOCAMELEON® enables the user to select the direction of view between 15° and 90°. Consequently, the surgeon can quickly and easily select the desired direction of view for optimal orientation and control.

The ENDCAMELEON® from KARL STORZ brings a new quality to endoscopy in the OR as it often enhances orientation during an operation without the time-consuming changeover of telescopes, thereby ensuring safe and smooth surgery.

The ENDCAMELEON® combines the user comfort of the proven HOPKINS® endoscopes with unprecedented versatility – in the proven KARL STORZ high quality.

Special Features:

- Variable direction of view (15° to 90°)
- Easy-to-use adjusting knob selects the desired direction of view
- Lightweight construction and modern design
- HOPKINS® telescope with unique rod-lens system
- Diameter 4 mm, length 18 cm
- Standard eyepiece fits all camera heads

The familiar ergonomics and handling of conventional telescopes is enhanced with the additional convenience of a variable direction of view.

The direction of view is adjusted by a mere turn of the adjusting knob at the proximal end of the ENDCAMELEON®.
**Telescope**

28132 AE  **ENDOCAMELEON® HOPKINS® Telescope**,
diameter 4 mm, length 18 cm, **autoclavable**, variable direction of view from 15° to 90°, adjustment knob for selecting the desired direction of view, fiber optic light transmission incorporated, color code: gold

**Accessories**

7230 AES  **Irrigation and Suction Sheath**, outer diameter 4.8 x 6 mm, working length 14 cm, for use with ENDOCA MELEON® ENT HOPKINS® Telescope 7230 AE and KARL STORZ lens irrigation system CLEARVISION® II

39501 A1  **Wire Tray for Cleaning, Sterilization and Storage**
of one rigid endoscope, including holder for light post adaptors, silicone telescope holders and lid, external dimensions (w x d x h): 290 x 60 x 52 mm, for rigid endoscopes up to diameter 5 mm and working length 20 cm
UNIDRIVE® S III NEURO SCB

Special Features:

Straightforward function selection and optimized user control via touch screen

Choice of user languages

Operating elements are single and clear to read due to color display

One unit – six functions:
- Neurosurgery:
  - Craniotomes
  - Perforators
  - High-Speed Handpieces 100,000 rpm
  - High-Speed Handpieces 60,000 rpm
- ENT:
  - Shaver system for surgery of the paranasal sinuses and anterior skull base
  - INTRA Drills
  - Sinus Shavers
  - Micro Saws
  - Dermatomes

Two motor outputs:
Two motor outputs enable two motors to be connected simultaneously: for example, a high-speed handpiece and a shaver handpiece may be connected in parallel

Safe work due to rapid blade when the pedal is released

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 variable revolution range

Maximum number of revolutions and motor torque:
Microprocessor-controlled revolutions per minute. Therefore the preselected parameters are maintained all the time during drilling

Maximum number of evolutions can be preset

With connection possibilities to the KARL STORZ Communication Bus (KARL STORZ-SCB)

Irrigator rod included
UNIDRIVE® S III NEURO SCB
Recommended Standard Set Configurations

407017 01-1 UNIDRIVE® S III NEURO SCB, motor control unit with color display, touch screen, two motor outputs, integrated irrigation pump and integrated 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 tubing set
   SCB Connecting Cable, length 100 cm
   Single Use Tubing Set*, sterile, package of 3

Specifications:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
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<tbody>
<tr>
<td>Touch Screen</td>
<td>6.4”/300 cd/m²</td>
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<tr>
<td>Available languages</td>
<td>English, French, German, Spanish, Italian, Portuguese, Greek, Turkish, Polish, Russian</td>
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<tr>
<td>Power supply</td>
<td>100–240 VAC, 50/60 Hz</td>
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<tr>
<td>Dimensions w x h x d</td>
<td>300 x 165 x 265 mm</td>
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<tr>
<td>Weight</td>
<td>5.2 kg</td>
</tr>
<tr>
<td>Certified to</td>
<td>IEC 601-1, CE acc. to MDD</td>
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</table>
UNIDRIVE® S III NEURO SCB
High-Speed Micro Motor

Special Features:
- Self-cooling and brushless high-speed micro motor
- Smallest possible dimensions
- Autoclavable
- Can be processed in a cleaning machine
- Maximum torque 6 Ncm
- Number of revolutions can be continuously adjusted from 1000 – 60,000 rpm
- Possible to adjust the number of revolutions to 100,000 rpm with the appropriate handle

20712033

20712033  High-Speed Micro-Motor, max. speed 60,000 rpm, including connecting cable, for use with UNIDRIVE® S III ENT/NEURO

Accessories:

280053  Universal Spray, 6x 500 ml bottles – HAZARDOUS GOODS – UN 1950
including:
Spray Nozzle

031131-10*  Tubing Set, for irrigation, for single use, sterile, package of 10
UNIDRIVE® S III NEURO SCB
System Components

Two-Pedal Footswitch

Single Use Tubing Set

High-Speed Micro Motor

High Performance EC Micro Motor II

DRILLCUT-X® II Shaver Handpiece

Perforator

INTRA Drill Handpiece, 80,000 rpm

Craniotome

INTRA Drill Handpiece, 40,000 rpm

High-Speed Handpieces, 100,000 rpm

Micro Saw

Dermatomes

High-Speed Handpieces, 60,000 rpm
UNIDRIVE® S III NEURO SCB
High-Speed Handpieces, angled, 100,000 rpm

For use with drills with shaft diameter 3.17 mm

252680  High-Speed Handpiece, short, angled, 100,000 rpm, for use with High-Speed Micro-Motor 20 7120 33

252681  High-Speed Handpiece, medium, angled, 100,000 rpm, for use with High-Speed Micro-Motor 20 7120 33

252682  High-Speed Handpiece, long, angled, 100,000 rpm, for use with High-Speed Micro-Motor 20 7120 33
UNIDRIVE® S III NEURO SCB
High-Speed Handpieces, angled, 60,000 rpm

For use with drills with shaft diameter 2.35 mm

252660  **High-Speed Handpiece**, extra short, angled, 60,000 rpm, for use with High-Speed Micro-Motor 20 712033

252661  **High-Speed Handpiece**, short, angled, 60,000 rpm, for use with High-Speed Micro-Motor 20 712033

252662  **High-Speed Handpiece**, medium, angled, 60,000 rpm, for use with High-Speed Micro-Motor 20 712033

252663  **High-Speed Handpiece**, long, angled, 60,000 rpm, for use with High-Speed Micro-Motor 20 712033
UNIDRIVE® S III NEURO SCB
High-Speed Handpieces, straight, 60,000 rpm

For use with drills with shaft diameter 2.35 mm

**252690** High-Speed Handpiece, extra short, straight, 60,000 rpm, for use with High-Speed Micro-Motor 20 7120 33

**252691** High-Speed Handpiece, short, straight, 60,000 rpm, for use with High-Speed Micro-Motor 20 7120 33

**252692** High-Speed Handpiece, medium, straight, 60,000 rpm, for use with High-Speed Micro-Motor 20 7120 33
**UNIDRIVE® S III NEURO SCB**

High-Speed Handpieces, malleable, slim, angled, 60,000 rpm

For use with drills with shaft diameter 1 mm

![Image of UNIDRIVE® S III NEURO SCB](image)

The handpieces have malleable shafts that can be bent up to 20° according to user requirements.

252671 **High-Speed Handpiece**, extra long, malleable, slim, angled, 60,000 rpm, for use with High-Speed Micro-Motor 20712033

252672 **High-Speed Handpiece**, super long, malleable, slim, angled, 60,000 rpm, for use with High-Speed Micro-Motor 20712033
UNIDRIVE® S III NEURO SCB
For use with High-Speed Handpieces, 100,000 rpm

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

100,000 rpm
diameter 7.5 mm

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<td>350120 S</td>
<td>350120 M</td>
<td>350120 L</td>
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<td>350130 L</td>
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<td>4</td>
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<td>350140 L</td>
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<td>350150 L</td>
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High-Speed Diamond Burrs, 100,000 rpm, for single use, sterile, package of 5

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<tr>
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<td>7</td>
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**UNIDRIVE® S III NEURO SCB**
High-Speed Coarse Diamond Burrs, High-Speed Acorns, High-Speed Barrel Burrs, High-Speed Neuro Fluted Burrs

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

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<td>9.1</td>
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<table>
<thead>
<tr>
<th>Diameter in mm</th>
<th>short</th>
<th>medium</th>
<th>long</th>
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<tr>
<td>1.8</td>
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<td>350718 M</td>
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<tr>
<td>3</td>
<td>350730 S</td>
<td>350730 M</td>
<td>350730 L</td>
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</table>
**UNIDRIVE® S III NEURO SCB**

High-Speed Standard Burrs, High-Speed Diamond 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>
<th>medium</th>
<th>long</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>330110 ES</td>
<td>330110 S</td>
<td>330110 M</td>
<td>–</td>
</tr>
<tr>
<td>2</td>
<td>330120 ES</td>
<td>330120 S</td>
<td>330120 M</td>
<td>330120 L</td>
</tr>
<tr>
<td>3</td>
<td>330130 ES</td>
<td>330130 S</td>
<td>330130 M</td>
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<td>330140 L</td>
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<td>330150 M</td>
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</tr>
<tr>
<td>6</td>
<td>330160 ES</td>
<td>330160 S</td>
<td>330160 M</td>
<td>330160 L</td>
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<tr>
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</table>

<table>
<thead>
<tr>
<th>Diameter in mm</th>
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<th>short</th>
<th>medium</th>
<th>long</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.6</td>
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<td>330206 S</td>
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<td>–</td>
</tr>
<tr>
<td>1</td>
<td>330210 ES</td>
<td>330210 S</td>
<td>330210 M</td>
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</tr>
<tr>
<td>1.5</td>
<td>330215 ES</td>
<td>330215 S</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
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<td>330220 ES</td>
<td>330220 S</td>
<td>330220 M</td>
<td>330220 L</td>
</tr>
<tr>
<td>3</td>
<td>330230 ES</td>
<td>330230 S</td>
<td>330230 M</td>
<td>330230 L</td>
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<td>4</td>
<td>330240 ES</td>
<td>330240 S</td>
<td>330240 M</td>
<td>330240 L</td>
</tr>
<tr>
<td>5</td>
<td>330250 ES</td>
<td>330250 S</td>
<td>330250 M</td>
<td>330250 L</td>
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<td>330260 ES</td>
<td>330260 S</td>
<td>330260 M</td>
<td>330260 L</td>
</tr>
<tr>
<td>7</td>
<td>330270 ES</td>
<td>330270 S</td>
<td>330270 M</td>
<td>330270 L</td>
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</table>
### UNIDRIVE® S III NEURO SCB

**High-Speed Diamond Burrs, High-Speed Barrel Burrs, LINDEMANN High-Speed Fluted Burrs**

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

![Image of burrs]

60,000 rpm

<table>
<thead>
<tr>
<th>Diameter in mm</th>
<th>extra short</th>
<th>short</th>
<th>medium</th>
<th>long</th>
</tr>
</thead>
<tbody>
<tr>
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<td>330330 ES</td>
<td>330330 S</td>
<td>330330 M</td>
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<td>330340 M</td>
<td>330340 L</td>
</tr>
<tr>
<td>5</td>
<td>330350 ES</td>
<td>330350 S</td>
<td>330350 M</td>
<td>330350 L</td>
</tr>
<tr>
<td>6</td>
<td>330360 ES</td>
<td>330360 S</td>
<td>330360 M</td>
<td>330360 L</td>
</tr>
<tr>
<td>7</td>
<td>330370 ES</td>
<td>330370 S</td>
<td>330370 M</td>
<td>330370 L</td>
</tr>
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</table>

60,000 rpm
diameter 5.5 mm

### LINDEMANN High-Speed Fluted Burrs

<table>
<thead>
<tr>
<th>Diameter 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>
UNIDRIVE® S III NEURO SCB
High-Speed Diamond Burrs

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

High-Speed Diamond Burrs, 60,000 rpm, for single use, sterile, package of 5

<table>
<thead>
<tr>
<th>Diameter in mm</th>
<th>extra long</th>
<th>super long</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>320220 EL</td>
<td>320220 SL</td>
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<tr>
<td>3</td>
<td>320230 EL</td>
<td>320230 SL</td>
</tr>
<tr>
<td>4</td>
<td>320240 EL</td>
<td>320240 SL</td>
</tr>
</tbody>
</table>

High-Speed Coarse Diamond Burrs, 60,000 rpm, for single use, sterile, package of 5

<table>
<thead>
<tr>
<th>Diameter in mm</th>
<th>extra long</th>
<th>super long</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>320320 EL</td>
<td>320320 SL</td>
</tr>
<tr>
<td>3</td>
<td>320330 EL</td>
<td>320330 SL</td>
</tr>
<tr>
<td>4</td>
<td>320340 EL</td>
<td>320340 SL</td>
</tr>
</tbody>
</table>
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 tray.
**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
- Sustainable investment
- Compatible with all light sources

**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
- 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

**Dashboard**

**Live menu**

**Intelligent icons**

**Side-by-side view: Parallel display of standard image and Visualization mode**
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

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.
**IMAGE1 S Camera System**

**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:**

<table>
<thead>
<tr>
<th>HD video outputs</th>
<th>- 2x DVI-D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Format signal outputs</td>
<td>1920 x 1080p, 50/60 Hz</td>
</tr>
<tr>
<td>LINK video inputs</td>
<td>3x</td>
</tr>
<tr>
<td>USB interface</td>
<td>4x USB, (2x front, 2x rear)</td>
</tr>
<tr>
<td></td>
<td>2x 6-pin mini-DIN</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>2.1 kg</td>
</tr>
</tbody>
</table>

**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.**
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>
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<tbody>
<tr>
<td>Product no.</td>
<td>TH 100</td>
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<tr>
<td>Image sensor</td>
<td>3x 1/3&quot; CCD chip</td>
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<tr>
<td>Dimensions w x h x d</td>
<td>39 x 49 x 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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<tbody>
<tr>
<td>Product no.</td>
<td>TH 104</td>
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<tr>
<td>Image sensor</td>
<td>3x 1/3&quot; CCD chip</td>
</tr>
<tr>
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<td>39 x 49 x 100 mm</td>
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<tr>
<td>Weight</td>
<td>299 g</td>
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<tr>
<td>Optical interface</td>
<td>integrated Parfocal Zoom Lens, f = 15–31 mm (2x)</td>
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<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>
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
Endoscopic Transnasal Surgery of the Skull Base – The BETTAG/SCHÄFER Technique

Monitors

<table>
<thead>
<tr>
<th>KARL STORZ HD and FULL HD Monitors</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>KARL STORZ HD and FULL HD Monitors</th>
<th>19&quot;</th>
<th>26&quot;</th>
</tr>
</thead>
<tbody>
<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>
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<tr>
<td>Reaction time</td>
<td>5 ms</td>
<td>8 ms</td>
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<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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<td>Rated power</td>
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<td>Operating conditions</td>
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<td>5–35°C</td>
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<td>Storage</td>
<td>-20–60°C</td>
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</tr>
<tr>
<td>Rel. humidity</td>
<td>max. 85%</td>
<td>max. 85%</td>
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<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>
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<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>

Optional accessories:
- 9826 SF **Pedestal**, for monitor 9826 NB
- 9626 SF **Pedestal**, for monitor 9619 NB
42" HD Flat Screen Monitor (see page 7, Fig. 4)

W 29642 NBO 42" HD Flat Screen Monitor,
- aspect ratio 16:9 wall-mounted, VESA 300 x 100
- color system PAL/NTSC, resolution max. 1920 x 108
- SD-SDI, HD-SDI (1080i), composite video, S-Video, RGB, DVI-I and optical DVI-D (1080p)
- input with electric redrive and VGA input brightness: 500 cd/m², contrast: 1300:1, power supply: 100-240 VAC, 50/60 Hz
- Dimensions in mm WxHxD: 1030 x 633 x 119
- Weight in kg: 30

including:
42" HD TFT Flat Screen
Mains Cord
Video cable set (DVI-D, BNC, S-Video, VGA)

Note: Fibreoptic cable, the signal converter/transmitter W 26074 (DVI-D to optical signal) and the corresponding power supply W 26110 are not part of the delivery and have to be ordered separately.

W 30567 Mobile Cart for Large Screens,
- with VESA plate 100 x 100/200 x 200
- for mounting large screens 42" or more
- Dimensions:
  - Platform (w x d) in mm: 820 x 665
  - Height without monitor: 1700 mm
  - Weight: 20 kg,
  - including:
    - Steel platform, rides on 4 casters, caster diameter 100 mm
    - Column mount with cross bars, height 1500 mm
    - VESA plate, 100 x 100/200 x 200

W 26091 Fibre optic cable,
- for transmission of a DVI-D signal, with fixed transmitter- and receiver-modules. For transmission of the HD-signal of the IMAGE1 HD HUB™ camera-control unit to an HDTV monitor, connectors DVI-D male length 10 m
Cold Light Fountains and Accessories

495 NL  
Fiber Optic Light Cable,  
with straight connector, diameter 3.5 mm,  
length 180 cm

495 NA  
Same, length 230 cm

Cold Light Fountain XENON 300 SCB

2013301-1  
Cold Light Fountain XENON 300 SCB  
with built-in antifog air-pump, and integrated  
KARL STORZ Communication Bus System SCB  
power supply: 100–125 VAC/220–240 VAC, 50/60 Hz  
including:  
Mains Cord  
Silicone Tubing Set, autoclavable, length 250 cm  
SCB Connecting Cable, length 100 cm

20133027  
Spare Lamp Module XENON  
with heat sink, 300 watt, 15 volt

20133028  
XENON Spare Lamp, only,  
300 watt, 15 volt

Cold Light Fountain XENON NOVA® 300

20134001  
Cold Light Fountain XENON NOVA® 300,  
power supply: 100–125 VAC/220–240 VAC, 50/60 Hz  
including:  
Mains Cord

20132028  
XENON Spare Lamp, only,  
300 watt, 15 volt
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, high, rides on 4 antistatic dual wheels equipped with locking brakes
- 3 shelves
- Mains switch on top cover
- Central beam with integrated electrical subdistributors with 12 sockets, holder for power supplies
- Potential earth connectors and cable winding on the outside

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

**Including:**
- Base module equipment cart, wide
- Cover equipment, equipment cart wide
- Beam package equipment, equipment cart high
- 3x Shelf, wide
- Drawer unit with lock, wide
- 2x Equipment rail, long
- Camera holder

Monitor Swivel Arm,
- Height and side adjustable
- Can be turned to the left or the right side
- Swivel range 180°, overhang 780 mm
- Overhang from centre 1170 mm
- Load capacity max. 15 kg
- With monitor fixation VESA 5/100
- For usage with equipment carts UG xxx
Recommended Accessories for Equipment Cart

**UG 310**
*Isolation Transformer,*
200 V–240 V; 2000 VA with 3 special mains socket, expulsion fuses, 3 grounding plugs, dimensions: 330 x 90 x 495 mm (w x h x d), for usage with equipment carts UG xxx

**UG 410**
*Earth Leakage Monitor,*
200 V–240 V, for mounting at equipment cart, control panel dimensions: 44 x 80 x 29 mm (w x h x d), for usage with isolation transformer UG 310

**UG 510**
*Monitor Holding Arm,*
height adjustable, inclinable, mountable on left or right, turning radius approx. 320°, overhang 530 mm, load capacity max. 15 kg, monitor fixation VESA 75/100, for usage with equipment carts UG xxx

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Please note that the described products in this medium may not be available yet in all countries due to different regulatory requirements.